

tu simple



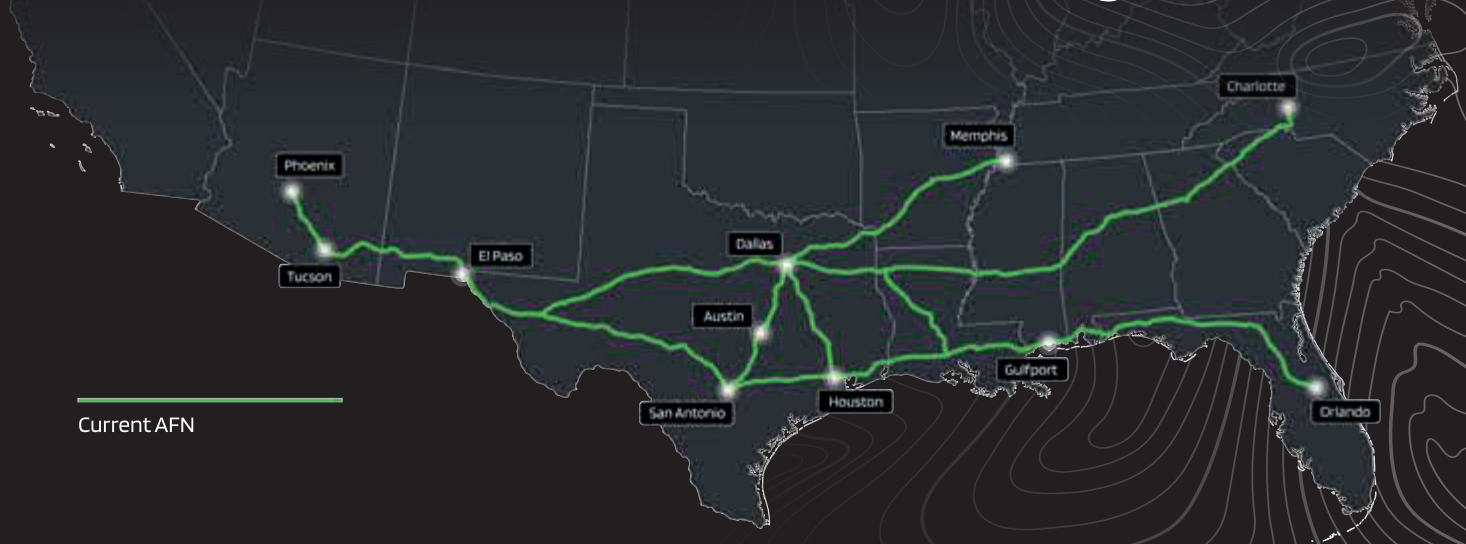
2021 Annual Report



TuSimple Completes First Fully Autonomous Drive with No Driver in a Semi-Truck on Open Public Roads

TuSimple has reached the level of technology maturity required to safely remove the human driver in its heavy-duty trucks and has completed a series of Driver Out runs with no humans in the vehicle, no human remote control and no human intervention. Over 550 miles across seven Driver Out runs were conducted on an 80-mile route in Arizona between a large railyard in Tucson and a high-volume distribution center outside of Phoenix. TuSimple plans to expand runs to all hours of the day with more repetition to demonstrate consistent and repeatable operations.

Scalable Go-to-Market via Autonomous Freight Network



In 2021, we scaled our Autonomous Freight Network (AFN) significantly to both meet rising demand and accelerate our services. We opened two new terminals in Dallas, TX and Alliance Fort Worth, TX and are also in the process of completing significant expansion to our Tucson terminal.

In addition to expanding our terminal footprint, TuSimple expanded the reach of its mapped routes all the way to the East Coast. We expanded our maps to connect the I-10 all the way to Florida, the I-20 to Charlotte and the I-30 to Memphis, and also completed our mapping for the remainder of the Texas Triangle.



~11,200 Miles of Mapped Routes



6,975 Production Semi Trucks Reserved

TuSimple Company History

2015

2016

- TuSimple **founded** to apply AI technology to AV trucking

2017

- Broke 10 world records as **computer vision world champions**

2018

- **NVIDIA** announced a strategic investment in TuSimple

2019

- First company to demonstrate fully AV truck runs on surface street and highways with our **1,000m perception breakthrough**

- Autonomous Freight Operations with **UPS** and **USPS** began

- **UPS** announced investment in TuSimple

- \$165+ million raised in **Series D**

2020

- ~70 miles, zero-disengagement terminal-to-terminal run featured in **CBS 60 Minutes** report

- **Autonomous Freight Network** Launched

- Production Partnership with **Navistar** announced

- Global Partnership with **TRATON** announced

2021

- \$500+ million raised in **Series E**

- **Traditional IPO** raised \$1 billion in net proceeds – world's first publicly listed AV company

- Driven over 160,000 Autonomous Miles for UPS

2022

- **World's First Driver Out Fully Autonomous Semi-truck Run on Public Roads**

- **Autonomous Domain Controller** Partnership with **NVIDIA**

Proprietary AI-Technology Focused Solely on Trucking

1,000m

Perception
Capability

~6.3 mil

Road Miles on
Surface Streets &
Highways up to
75MPH

387

Patents

~1,100

R&D Personnel
Globally

Key Technological Advantages

1

Proprietary AI-based and most feature-complete autonomous driving system in AV trucking

2

Co-development with NVIDIA to design the world's most advanced Autonomous Domain Controller (ADC) specifically engineered for TuSimple's autonomous trucking applications

3

Only AV company to demonstrate fully autonomous, unmanned highway and surface street operations

4

Focused solely on AV trucking since 2015 with same pioneering technology leadership team

World Class Hardware Partnerships

Premier Global OEM Partnerships

Design, Test and Production of the Automotive Grade L4 Semi-Truck

Autonomous Domain Controller (ADC)

AV Edge Computing Platform in Development with NVIDIA

Supply Base Partners

TRATON



NAVISTAR

SCANIA



NVIDIA



GOODYEAR

Mando



KNORR-BREMSE

Top Tier Downstream Partners



TuSimple

Leadership

Dr. Xiaodi Hou



Co-founder and Chief Executive Officer

Dr. Xiaodi Hou co-founded TuSimple in 2015 and serves as the company's Chairman of the Board, President, Chief Executive Officer, and Chief Technology Officer. Dr. Xiaodi Hou is an internationally renowned expert in artificial intelligence, machine learning, and computer vision. Dr. Xiaodi Hou currently holds 23 patents in the field of autonomous vehicles. In the field of computer vision, Mr. Hou has developed leading theories in computational models for visual saliency. He earned a Ph.D. in Computation and Neural Systems from the California Institute of Technology and holds a Bachelor of Engineering degree in Computer Science from Shanghai Jiao Tong University. Dr. Xiaodi Hou has presented at global events such as Web Summit and Nvidia's GTC conference and has been featured in leading publications such as Wired and Forbes.

Pat Dillon



Chief Financial Officer

Pat Dillon is the Chief Financial Officer of TuSimple. Prior to joining TuSimple, Pat spent 10 years as an investment banker at Morgan Stanley, co-leading its coverage of vehicle technology companies. During his tenure at Morgan Stanley working in both the New York and Chicago offices, Pat advised clients on capital raising, mergers & acquisitions, and other strategic transactions. Prior to that, Pat was a member of Deloitte's tax consulting practice. Pat has an MBA from the University of Chicago Booth School of Business and an M.S. and B.B.A. in accountancy from the University of Notre Dame.

Jim Mullen



Chief Administrative and Legal Officer

Jim Mullen is the Chief Administrative and Legal Officer of TuSimple. He has more than 15 years of executive leadership experience in the trucking industry. Jim is also a member of the Board of Directors for the American Trucking Associations, the largest and most comprehensive national trade association for the trucking industry. Prior to joining TuSimple, Jim served as the Acting Administrator and Chief Counsel of the U.S. Department of Transportation's Federal Motor Carrier Safety Administration (FMCSA). Prior to that, Jim was an executive at Werner Enterprises, Inc., a publicly-traded transportation and logistics company, serving as executive vice president and general counsel. Jim holds a J.D. from the University of Nebraska College of Law and a B.A. in economics from the University of Nebraska.

**“There is only one heroism in the world: to see the world as it is, and to love it.”
— Romain Rolland**

To Our Shareholders:

It is with great pride that I pen my first shareholder letter as the proud Co-Founder and CEO of TuSimple. We live in an evolving world, and the commercial vehicle industry is a prime example of an industry ripe for change and adaptation. It is TuSimple’s mission to change the game for the industry with unbridled enthusiasm towards improving safety, providing heightened efficiency, demonstrating real cost of operation, and shepherding environmental change. The \$4 trillion dollar global truck freight market’s potential for advancement is unparalleled - and it is in urgent need of innovation and reinvention. To be a hero, one must see the world as it is, love it, and foster amendments for the betterment of society. At TuSimple, this is our charter.

A Dedicated Team and Financial Stability

Our story began in 2015. Mo Chen and I laid the foundation to pursue a vision of alleviating real-world obstacles with computer vision technology. Autonomous technology paired with technical prowess and a robust strategy set the stage for our journey’s dawning. Six years later, TuSimple became a public company with nearly 1,400 employees globally, yet still laser focused on bringing our SAE L4 autonomous trucking operations to market at scale.

We acknowledge that without our dedicated team, our true heroes, we would not be able to deliver on our promises. And the TuSimple team delivered, and accomplished our 2021 promise of successfully completing the world’s first autonomous truck driver out run on an open highway at speeds up to 65 miles per hour, as well as operation on surface streets without use of remote control.

TuSimple began 2021 with \$350M on our balance sheet, aiming to close our Series E private capital raise transaction. In the first four months of 2021, we finished our Series E process raising over over \$500M in total and raised another \$1B through our IPO, ending the year with over \$1.3B on our balance sheet. We are grateful for the trust our investors have placed in us. We are focused on our mission, knowing we have the team and resources to run, finish, and win the race.

Relentlessly Pursuing Commercialization

Commercialization demands proof of concept. Driver Out operations are a must-have step for any autonomous trucking company to commercialize, and at TuSimple the Driver Out era is here. Being ready to launch that first mission represented a zero to one moment, and provided a tangible and visible step forward. The seminal moment demonstrated enhanced system ruggedization and redundancy, hardware and software optimization and validation and a system that has surpassed our internal rigorous validation demands. We invested heavily in these efforts, not for aplomb, but because these efforts are a prerequisite for safe commercial operation. To be a hero, and bring our charter to fruition we must back our words with action.

The next step is a heightened focus on commercialization: expanding our Operational Design Domain (ODD) to add more commercial scenarios. For example, we are extending our Driver Out operations from a

pilot to an ongoing program that will expand in scope and scale beginning with hauling diverse cargo for Union Pacific. And, we continue to accelerate our tally of autonomous mileage with key partners, exemplified by our over 160,000 miles of autonomous mode operation with UPS. Additionally, we expanded the reach of our Autonomous Freight Network (AFN) operations to the East Coast with routes connecting the I-10 corridor to Florida, the I-20 corridor to Charlotte and the I-30 corridor to Memphis. Our AFN footprint includes two dedicated terminals in the Dallas/Fort-Worth metroplex, and operation in the ever-expanding Texas Triangle with top-tier partners such as Ryder, DHL and Hillwood.

Moreover, we are working in close partnership with Navistar and TRATON, which has resulted in the world's first - and only - publicly announced fully purpose-built L4 semi-truck production plan. Setting TuSimple apart from the competition, our production partnership with one of the global OEM commercial vehicle leaders is a primary step towards commercialization - not a research and development plan - but a specific production plan and schedule that exemplifies our readiness to meet our vehicle reservation commitments. And, our ever-increasing reservation tally highlights that the market is ready. In 2021 alone, we secured 2,400 new reservations from blue chip partners for a year-end total of 6,975 reservations.

Heroes must approach every impasse with vigor, and resolve for the betterment of society. If we are slowed down by the immature supply chain, if we are told that we cannot address safety, performance, and timeline at the same time, we must act. And, we have taken this step with the development of our own autonomous domain controller (ADC) with NVIDIA, the undisputed leader in accelerated computing and AI. The vertical integration of NVIDIA's Drive Orin system-on-a-chip (SoC) with TuSimple's autonomous driving system will result in automotive-grade safety, unparalleled performance, and a market timing that fits into our overall commercialization roadmap.

As we proceed into 2023, we will continue to safely remove support vehicles from our driverless runs, perform day and night operations, add additional routes, haul customer freight on driverless runs, and economize for market penetration. We are relentless in our approach, and our vision is in clear view.

Dedicated and Focused on the Future

2022 is the year to combine TuSimple's efforts with a singular focus to align our company with an "all for one" goal - commercialization. Equipped with a clear vision to synchronize exceptional technology with a driven corporate focus, TuSimple is positioned to achieve our goal. To that end, I am honored to be leading this great company and team as CEO - as we must, and we will bring all facets of the company together with one voice, and with one collective dedication to change the game.

Relentlessly pursuing excellence,

A handwritten signature in black ink, appearing to read 'Xiaodi Hou'.

Xiaodi Hou
Co-founder and Chief Executive Officer
TuSimple Inc.

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**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K**

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2021

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____
Commission file number 001-40326

TuSimple Holdings Inc.
(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation or organization)
9191 Towne Centre Drive, Suite 600
San Diego, CA
(Address of Principal Executive Offices)

86-2341575
(I.R.S. Employer Identification No.)
92122
(Zip Code)

Registrant's telephone number, including area code **(619) 916-3144**
Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Trading Symbol(s)</u>	<u>Name of each exchange on which registered</u>
Class A Common Stock, par value \$0.0001 per share	TSP	The Nasdaq Stock Market LLC (Nasdaq Global Select Market)

Securities registered pursuant to section 12(g) of the Act: **None**

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports); and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input checked="" type="checkbox"/>	Smaller reporting company	<input type="checkbox"/>
		Emerging growth company	<input checked="" type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C.7262(b)) by the registered public accounting firm that prepared or issued its audit report.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of voting stock held by non-affiliates of the Registrant on June 30, 2021, based on the closing price of \$71.24 for shares of the Registrant's Class A common stock as reported by the Nasdaq Global Select Market, was approximately \$9.27 billion. Shares of common stock beneficially owned by each executive officer, director, and holder of more than 10% of our common stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of January 31, 2022, the number of shares of the registrant's Class A common stock outstanding was 198,148,655 and the number of shares of the registrant's Class B common stock outstanding was 24,000,000.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement relating to the 2022 Annual Meeting of Stockholders are incorporated herein by reference in Part III of this Annual Report on Form 10-K to the extent stated herein. Such definitive proxy statement will be filed with the Securities and Exchange Commission within 120 days after the registrant's fiscal year ended December 31, 2021.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains forward-looking statements within the meaning of the federal securities laws, which statements involve substantial risks and uncertainties. All statements other than statements of historical facts contained in this Annual Report on Form 10-K are forward-looking statements. The words “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “design,” “intend,” “expect,” “could,” “plan,” “potential,” “predict,” “seek,” “should,” “would,” or the negative version of these words and similar expressions are intended to identify forward-looking statements. Forward-looking statements contained in this Annual Report on Form 10-K include, but are not limited to, statements about:

- our future performance, including our revenue, cost of revenue, and operating expenses;
- the sufficiency of our cash and cash equivalents to meet our operating requirements;
- our ability to scale our Autonomous Freight Network, which we refer to as our AFN;
- our ability to attract new users to services provided on our AFN;
- our ability to increase reservations for our purpose-built L4 autonomous semi-trucks;
- our ability to convert reservations for our purpose-built L4 autonomous semi-trucks into purchases;
- our ability to fulfill all reservations for our purpose-built L4 autonomous semi-trucks according to each customer’s delivery schedule;
- our ability to effectively manage our growth and future expenses;
- the estimated timing for when additional routes will be available;
- our ability to compete in a market that is rapidly evolving and subject to technological developments;
- our estimated total addressable market, the market for autonomous truck and freight transport solutions, and our market position;
- our ability to successfully collaborate with business partners;
- our ability to obtain, maintain, protect, and enforce our intellectual property;
- our ability to comply with modified or new laws and regulations applicable to our business or industry;
- our ability to attract and retain employees with the technical skills we require and other key personnel;
- our ability to successfully complete additional driver-out tests on open public roads on the timeline we expect;
- our ability to achieve our driver-out milestones on the timeline expected;
- our anticipated investments in research and development and sales and marketing, and the effect of these investments on our results of operations;
- the increased expenses associated with being a public company; and
- the potential impact of the COVID-19 pandemic on our, and our partners’, business and results of operations, and on the global economy generally.

We caution you that the foregoing list may not contain all of the forward-looking statements made in this Annual Report on Form 10-K.

You should not rely upon forward-looking statements as predictions of future events. We have based the forward-looking statements contained in this Annual Report on Form 10-K primarily on our current expectations and projections about future events and trends that we believe may affect our business, financial condition, results of operations, and prospects. These forward-looking statements are subject to a number of risks, uncertainties, and assumptions, including those described in “Risk Factors.” Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties, and assumptions, the forward-looking events and circumstances discussed in this Annual Report on Form 10-K may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

Except as required by applicable law, we do not assume responsibility for the accuracy and completeness of the forward-looking statements. Moreover, the forward-looking statements made in this Annual Report on Form 10-K relate only to events as of the date on which the statements are made. We undertake no obligation to update any forward-looking statements made in this Annual Report on Form 10-K to reflect events or circumstances after the date of this Annual Report on Form 10-K or to reflect new information or the occurrence of unanticipated events, except as required by applicable law. We may not actually achieve the plans, intentions, or expectations disclosed in our forward-looking statements and you should not place undue reliance on our forward-looking statements. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures, or investments we may make.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this Annual Report on Form 10-K, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements.

PART I

ITEM 1. BUSINESS

Overview of Our Company

We are an autonomous technology company that is revolutionizing the estimated \$4 trillion global truck freight market.¹ We have developed autonomous technology specifically designed for semi-trucks, which has enabled us to be the first company to autonomously operate semi-trucks without a driver or human operator on open public roads (“Driver Out” operation). Our technology has allowed us to build the first Autonomous Freight Network (“AFN”) in partnership with shippers, carriers, railroads, freight brokers, fleet asset owners, and truck hardware partners.

Since our founding in 2015, we have developed a fully integrated software and hardware solution enabling Level 4 (“L4”)² driver-out autonomous semi-truck technology.³ Hallmarks of our proprietary semi-truck specific technology include our 1,000 meter perception range, 35 second planning horizon, high definition (“HD”) maps with accuracy within five centimeters, an integrated L4 autonomous semi-truck design comprising of a fully redundant sensor suite, an Autonomous Domain Controller (“ADC”) on-board computing solution, and other components. Long-range perception, advanced planning and decision-making, and highly accurate mapping are critical capabilities for the autonomous operation of semi-trucks, which are heavy, articulated vehicles that need to be able to operate at highway speeds. We believe that our technology and our AFN will make long haul trucking significantly safer as well as more reliable, efficient and environmentally friendly, creating significant benefits for all who rely on the freight ecosystem to deliver essential goods.

We are focused specifically on the truck freight market, which is a large and essential industry that moves approximately 80% of the freight in the United States by revenue.⁴ E-commerce trends such as same day shipping are expected to further accelerate demand for truck freight and strain traditional freight providers’ ability to supply sufficient capacity dynamically and cost effectively.⁵ Currently, trucking is facing substantial challenges in several areas including safety, efficiency, and carbon footprint, which we believe cannot be fully addressed without significant technological innovation.

Driver Out Operations. In December 2021, we commenced Driver Out runs on an 80+ mile freight route in Arizona, covering surface streets, on-ramps, off-ramps and highways. We plan to continue our runs on this route, systematically expanding the operational design domain (“ODD”) in which our Driver Out semi-trucks operate and expanding Driver Out runs to new routes in the southern U.S. including hauling Driver Out customer freight. We believe that commencing Driver Out runs is a significant proof point in our technology development and a necessary step to building a scalable autonomous trucking solution.

Ecosystem of Global Partnerships That Will Help Us Scale. We have created an ecosystem of partners consisting of Original Equipment Manufacturers (“OEMs”), Tier 1 components suppliers, shippers, carriers, railroads, freight brokers, fleet asset owners, and third party service providers that we believe will de-risk commercialization of the AFN, enable rapid adoption of our autonomous freight solution, and allow us to build an attractive, network-based business model.

We have partnered with a leading commercial vehicle OEM, TRATON Group (“TRATON®”) and specifically with its Navistar and Scania semi-truck brands, to build a purpose-built L4 autonomous semi-truck to be operated on our network. We also have partnered with a diverse group of leading global hardware components suppliers and are developing in partnership with NVIDIA® the first vertically integrated ADC computing solution for an L4 semi-truck. We believe that this collaborative approach to create semi-trucks designed and built with integrated auto-grade components and sensors will increase our AFN’s reliability at scale. Vertically integrating through partnerships with OEMs and Tier 1 component suppliers also allows us to maintain strong supply chain and hardware design control while remaining capital light and primarily focusing on developing proprietary autonomous technology.

In parallel, we have developed an ecosystem of shippers, carriers, railroads, freight brokers, fleet asset owners, and third party service providers, including UPS®, McLane®, U.S. Xpress®, Werner®, Schneider®, Ryder®, DHL®, Union Pacific®, and CN®, that provide critical validation and enhance the network effect benefits of our approach. We believe that our partnership network creates a significant and sustainable competitive advantage, especially as we work with shippers, carriers, and railroads to strategically locate our AFN terminals near their distribution centers. The continued growth of our AFN infrastructure and partnerships will continue to improve our user experience and drive more users to our platform which will allow us to further densify our strategic terminal network and reinforce rapid network growth.

¹ Armstrong & Associates, Inc., 2019 Global Third-Party Logistics (3PL) Market Analysis.

² Based on the “Levels of Driving Automation” published by the Society of Automotive Engineers (“SAE”).

³ L4 autonomous solution expected to be capable of driver-out operations on AFN mapped routes.

⁴ American Trucking Associations, U.S. Freight Transportation Forecast 2019 to 2030.

⁵ American Transportation Research Institute (“ATRI”), E-Commerce Impacts on the Trucking Industry, February 2019.

Transformative Benefits for Industry Stakeholders. Our AFN leverages our proprietary L4 autonomous semi-trucks, HD digital route mapping capabilities, and TuSimple Connect cloud-based autonomous operations oversight system to provide substantial benefits to the key truck freight industry stakeholders. The “plug and play” nature of our solution will allow any truck freight market participant to access and benefit from our autonomous freight capacity. Shippers, carriers, and railroads gain access to reliable and safe freight capacity at a substantially lower annual total cost of ownership when direct labor is removed from the per mile cost structure. Additionally, our solution can deliver over 10% better fuel efficiency than traditional trucking through optimized truck control and driving operations which can deliver a measurable reduction in carbon emissions, based on a study conducted with the University of California San Diego and empirical data from our users. Removing the driver from long haul operations allows shippers, carriers, and railroads to reallocate scarce driver resources to customer facing first and last mile routes. In addition, our L4 semi-trucks are not currently limited by industry hours-of-service rules that apply for human drivers, which will allow our trucks to operate for more than 20 hours per day, which is a differentiating capability versus a single driver human-operated truck. Freight brokers will be able to benefit from the reliability of autonomy, which allows them to match demand more efficiently with the lowest cost long haul freight capacity. We believe that the wide ranging benefits of our solution to industry participants will accelerate the adoption of our network.

Our Go-to-Market Strategies

In the United States, we plan two primary business models for our AFN:

Carrier-Owned Capacity. Many of our users prefer to own all or a substantial portion of their semi-truck fleet. Our Carrier-owned Capacity model is expected to allow users to seamlessly integrate autonomous freight operations into their existing supply chain. Users will pay TuSimple a per mile subscription fee to operate their purpose-built L4 autonomous semi-truck and receive the full benefit of our AFN, including autonomy-enabled routes mapped directly to users’ existing facilities and TuSimple Connect platform.

TuSimple Capacity. Access to our full service autonomous freight capacity as a service is available to our users through our TuSimple Capacity model. We utilize a capital light business model, financing our L4 autonomous semi-trucks through third party fleet asset owners and financing sources. This model provides us with control of operational logistics and user experience as we offer a seamless terminal to terminal freight service to our users. Our users pay for access to our L4 autonomous semi-trucks operating across our AFN on a per mile basis.

Additionally, we plan to build purpose-built autonomous trucking solutions specifically for the Europe and China markets with our OEM partner TRATON. We believe that our expansion in both regions will augment and complement our AFN commercialization in the United States.

Our Core Technologies

Proprietary Perception and Sensor System. Our proprietary perception and sensor system is critical to our L4 autonomous semi-trucks’ perception range and accuracy. Our perception system is powered by proprietary artificial intelligence technology and, when coupled with our proprietary camera module, enables the semi-truck’s 1,000 meter perception range, even in low light conditions. This range across lighting environments is designed to provide our semi-trucks with sufficient reaction time to safely operate at highway speeds, ultimately allowing for a planning horizon up to 35 seconds. Our camera-centric system is powered by both primary and backup cameras, providing a fully redundant camera system for increased safety. Augmenting the camera perception is an array of LiDAR, radar systems, GPS, and ultrasonic sensors. Our combined use of cameras and sensors provides our semi-trucks with superior perception range, while also being highly accurate in different road scenarios. With the exception of our specially designed long range high definition camera, we have sourced the balance of our sensor suite from existing third party products in order to reduce the cost of the overall system.

Motion Planning. Our innovative motion planning software complements our proprietary perception and sensor system by predicting the future paths of surrounding vehicles. Due to our long range perception technology that allows us to accurately capture the road environment up to 1,000 meters ahead, we have over 35 seconds of planning horizon. By utilizing prediction models which assess vehicle speeds and driver intent, we can plan better and safer driving trajectories for our semi-trucks. We believe that our systems’ ability to accurately forecast the behavior of compliant and non-compliant drivers is highly differentiated and will significantly increase the safety of our purpose-built L4 autonomous semi-trucks relative to human drivers.

Control. Our control algorithms receive input from the motion planning module to put into action a safe and efficient driving trajectory. These algorithms must be designed specifically for the semi-truck use case, as semi-trucks are significantly less nimble than passenger cars, with characteristics including longer gear shift timeframes and the need for higher actuation accuracy.

Machine Learning Infrastructure. The accuracy of our perception and motion planning capabilities is augmented by our proprietary machine learning algorithms. Over the course of over 6 million road miles, we have accumulated a vast set of semi-truck specific driving data with which to train our perception and motion planning capabilities. We focus our data collection and storage efforts on both quality and quantity. This enables our database to be informative and relatively easily analyzed by our machine learning software which currently has the capacity to process 100,000 instances per day. This data analysis trains our software to more accurately predict how the surrounding environment of a semi-truck will change in real time.

HD Mapping. We believe that integrated mapping software with rapid updating is crucial for the operation of an L4 autonomous semi-truck. Our AFN is comprised of HD digital maps of the major freight corridors over which our semi-trucks operate. Our proprietary mapping technology provides us significant control to map the routes on which we operate, with the level of detail we require and update the maps rapidly. Our proprietary maps are developed by driving camera, LiDAR and GPS equipped commercial vehicles along the target freight route several times. This data collection is followed by fully automated processing which fine tunes and generates full 3D high definition maps at an accuracy of five centimeters or less.

Autonomous Domain Controller. We have partnered with NVIDIA, a leading graphical computing technology company, to develop a proprietary ADC computing solution. The ADC is a central on-board computer that is being designed to execute hundreds of trillions of operations per second for our autonomous driving system, including our perception, planning and control systems. The ADC will incorporate NVIDIA's Orin System-on-Chip hardware and our autonomous driving software and algorithms. We and NVIDIA plan to develop the ADC for use in our production semi-trucks. We believe the ADC will be a powerful, scalable computing solution specifically engineered to the requirements of our autonomous driving system.

Proprietary HD Mapping Capability. Our in-house mapping technology can quickly map new routes and provide users with more location options for shipping on our AFN. Our proprietary mapping technology and process is accurate to within five centimeters. Precise localization accuracy is crucial to safely operate semi-trucks autonomously given the 8.5 foot average tractor width, particularly when travelling on local streets which average just 10 feet wide. We also have the ability to update our maps quickly, allowing new roadway conditions experienced by one of our semi-trucks to be uploaded on our HD maps and shared with the rest of the fleet rapidly. This nimble, flexible approach is expected to provide operational efficiency and enhanced safety, while meeting our users' evolving freight demands and efficiently expanding our network.

Cloud-Based Operational and Monitoring System. Our seamless user experience will be enhanced by our proprietary TuSimple Connect system. This cloud-based autonomous operations oversight system is designed to ensure safe operations, reliability, and efficient capacity for our users. The system will directly connect to our users' Transportation Management Systems, integrating TuSimple Connect into their supply chain and creating a close user relationship. Our users will be able to book and track their freight seamlessly with real-time two way communication that allows our AFN to dynamically match freight supply with demand.

Our TRATON Partnership

We have a global partnership with TRATON, a publicly listed subsidiary of Volkswagen. TRATON is one of the world's largest commercial truck OEMs with truck brands including Scania, Navistar (which produces the "International" brand of trucks), MAN Truck & Bus and Volkswagen Caminhões e Ônibus. We initially established independent partnerships with Navistar and TRATON in 2020. In July 2021, TRATON merged with Navistar and it became a wholly owned subsidiary of TRATON.

We are working with TRATON and its brands to develop a line of purpose-built L4 autonomous semi-trucks. In North America, we are continuing to partner with Navistar under a Joint Development Agreement to collaboratively develop a purpose-built L4 autonomous semi-truck. As part of this partnership, we have also negotiated with Navistar terms for a production license agreement to commercially market and provide services for autonomous trucks thereafter. The product development process will follow a stage gate development model for the production of purpose-built L4 autonomous semi-trucks. We are providing the software, system design, and requirements for the autonomous truck while Navistar serves as the system integrator for the truck hardware and is responsible for validation and testing.

In Europe and China, we work with TRATON's Scania brand on autonomous technology development including a L4 autonomous trucking pilot program on a hub-to-hub truck freight route in Sweden.

We believe our partnership with TRATON allows us to primarily focus on our technology development on our proprietary core autonomous driving system technologies, while gaining the benefits of capital light vertical integration.

Our Operations Today

We currently operate approximately 100 L4 autonomous semi-trucks with approximately 75 operating in the U.S. and 25 in China. We have commenced Driver Out runs in Arizona on a more than 80 mile freight route, covering surface streets, on-ramps, off-ramps and highways. The runs are conducted on an actual freight route between a railyard in Tucson, AZ, and a high-volume distribution center in the Phoenix metro area. Our vehicles interact with traffic, change lanes at highway speeds, navigate intersections and traffic signals, and handle complex road situations such as emergency lane vehicles.

In addition, we operate L4 autonomous semi-trucks with a safety driver and safety engineer in the cabin (“Driver In”), both in testing operations and in commercial operations where we haul paid freight for customers. Operating with a safety driver and safety engineer allows us to continually improve our L4 technology. We aim to scale Driver Out operations to be an increasing percentage of our overall operations.

We also haul paid freight for customers in manual mode with a human driver operating the vehicle. We believe this is beneficial to build our long-term customer relationships for our AFN. We aim to continue increasing the penetration of autonomous operations on our AFN over time.

Government Regulation

We believe that the current regulatory environment exhibits a clear path for L4 autonomous semi-trucks to deploy nationwide and that working collaboratively with regulators and ecosystem partners will create a safer freight industry. The U.S. Department of Transportation has stated that “the United States Government is committed to fostering surface transportation innovations to ensure the United States leads the world in automated vehicle (AV) technology development and integration while prioritizing safety, security and privacy and safeguarding the freedoms enjoyed by Americans.” Today, 44 states allow autonomous semi-truck testing, of which 26 states allow autonomous semi-truck commercial deployment. We believe that the current regulatory environment exhibits a clear path toward autonomous trucking solutions nationwide and that regulators will be our partners in creating a new, drastically safer freight industry.

At the federal level in the United States, the safety of commercial motor vehicles is regulated by the U.S. Department of Transportation through two federal Agencies – the National Highway Traffic Safety Administration (the “NHTSA”) and the Federal Motor Carrier Safety Administration (the “FMCSA”). NHTSA establishes the Federal Motor Vehicle Safety Standards (the “FMVSS”) for motor vehicles and motor vehicle equipment and oversees the actions that manufacturers of motor vehicles and motor vehicle equipment are required to take regarding the reporting of information related to defects or injuries related to their products and the recall and repair of vehicles and equipment that contain safety defects or fail to comply with the FMVSS. FMCSA regulates the safety of commercial motor carriers operating in interstate commerce, the qualifications and safety of commercial motor vehicle drivers, and the safe operation of commercial trucks.

While there are currently no federal U.S. regulations expressly pertaining to the safety of autonomous driving systems for trucks, the U.S. Department of Transportation has established recommended voluntary guidelines, and NHTSA and FMCSA have authority to take enforcement action should an automated driving system pose an unreasonable risk to safety or inhibit the safe operation of a commercial motor vehicle. Certain U.S. states have legal restrictions on autonomous driving vehicles, and many other states are considering them. This patchwork increases the legal complexity for our purpose-built autonomous trucks. In Europe, certain vehicle safety regulations apply to self-driving braking and steering systems, and certain treaties also restrict the legality of certain higher levels of autonomous driving vehicles. Autonomous driving laws and regulations are expected to continue to evolve in numerous jurisdictions in the U.S. and foreign countries and may create restrictions on autonomous driving features that we develop.

As the trucks that carry our technology go into production, we are subject to existing stringent requirements overseen by NHTSA under the National Traffic and Motor Vehicle Safety Act of 1966 (the “Vehicle Safety Act”), including a duty to report, subject to strict timing requirements, safety defects with our products. The Vehicle Safety Act imposes potentially significant civil penalties for violations including the failure to comply with such reporting actions. We are also subject to the existing U.S. Transportation Recall Enhancement, Accountability and Documentation Act (the “TREAD Act”), which requires motor vehicle equipment manufacturers, such as us, to comply with “Early Warning” requirements by reporting certain information to NHTSA, such as information related to defects or reports of injury related to our products. The TREAD Act imposes criminal liability for violating such requirements if a defect subsequently causes death or bodily injury.

In addition, the National Traffic and Motor Vehicle Safety Act authorizes NHTSA to require a manufacturer to recall and repair vehicles that contain safety defects or fail to comply with U.S. federal motor vehicle safety standards. Sales into foreign countries may be subject to similar regulations. As the development of federal and state regulation of autonomous machines and vehicles continues to evolve, we may be subject to additional regulatory schemes.

In addition, our operations are subject to various international, federal, state, and local laws and regulations governing pollution and protection of the environment, the use, generation, storage, management, discharge, transportation, disposal, and release of, and human exposure to, hazardous and toxic materials, and the occupational health and safety of our employees. Our truck drivers and trucking operations are subject to the Federal Motor Carrier Safety Regulations (the “FMCSRs”) established by FMCSA, and we are subject to the requirements of the federal Occupational Safety and Health Act, as amended (“OSHA”), and comparable international, state, and local laws that protect and regulate employee health and safety.

In order for us to operate in international markets outside the U.S., we must comply with relevant legal regulations regarding autonomous vehicles as well as technology export control, data security, cybersecurity and other related regulations that apply to global technology companies. We have developed robust compliance processes and procedures related to these regulatory requirements and believe that we are in compliance with such requirements. We do not believe there are any regulatory restrictions that would materially restrict our ability to operate in our key markets of the U.S., China or Europe. We are in regular dialogue with the relevant regulatory policy bodies globally and will continue to comply with these regulations or any updates thereof.

Research and Development

We have invested a significant amount of time and effort into research and development of proprietary artificial intelligence, algorithms, and software to solidify our technology leadership in the market. Our ability to maintain this leadership position depends in part on our ongoing research and development activities. Our research and development team is responsible for the design, development, and testing of our technology.

Our research and development is largely conducted at our headquarters in San Diego, California. As of December 31, 2021, we had approximately 1,100 full time employees engaged in our research and development activities. We expect research and development expense to increase over future years as we continue to develop our L4 autonomous semi-truck technology.

Intellectual Property

Our ability to be at the forefront of innovation in the autonomous trucking and freight transport market largely depends on our ability to obtain, maintain, and protect our intellectual property and other proprietary rights relating to our key technology, and our ability to successfully enforce these rights against third parties. To accomplish this, we rely on a combination of intellectual property rights, such as patents, trademarks, copyrights, and trade secrets (including know-how), in addition to employee and third-party nondisclosure agreements, intellectual property licenses, and other contractual rights. Our success also depends in part on our ability to operate without infringing, misappropriating, or otherwise violating the intellectual property and proprietary rights of others, and in part, on our ability to prevent others from infringing, misappropriating, or otherwise violating our intellectual property and proprietary rights. A comprehensive discussion on risks relating to intellectual property is provided under the section titled “Risk Factors—Risks Related to Our Intellectual Property, Information Technology, and Data Privacy.”

As of December 31, 2021, we had 387 issued patents and 763 pending patent applications globally, including 130 issued patents in the United States and various counterpart patents in China. Our patents in the United States expire between February 2035 and September 2039, and our patents in China expire between November 2026 and February 2039. Our issued patents and patent applications cover a broad range of system level and component level aspects of autonomous technology, and we intend to continue to file additional patent applications with respect to our technology.

Competition

We view ourselves as a partner to the key stakeholders in the traditional truck freight industry rather than a competitor. We believe that our AFN solution will address the key supply and demand pain points faced by the industry today and that our technology will make truck freight shipper and carrier operations significantly safer and more efficient. We believe that our partnerships with well-established industry participants validates this collaborative approach.

Despite our partnership approach, we face significant competition from traditional freight carriers and shippers. The truck freight industry is fragmented and highly competitive, historically leading to pricing pressure and low operating margins. We will compete with traditional carriers on reliability, price, and safety. We believe that our technology provides us with a significant advantage across each of these key competitive areas.

While we face technological competition from other autonomous vehicle companies, we believe that our exclusive focus on the semi-truck use case differentiates us from other autonomous vehicle companies. L4 autonomous semi-trucks present distinct challenges relative to autonomous passenger vehicles, and we believe that overlap in technological capabilities is limited. We also believe that our lead in solved semi-truck autonomy edge cases, extensive patent portfolio, and well-established industry partnerships further strengthen our leadership position.

Our People and Culture

We pride ourselves on the talent, passion, and dedication of our employees, who are united in our goal to revolutionize the global freight market. As of December 31, 2021, we had approximately 1,400 full-time employees. The majority of our employees are based in San Diego, California, with others located in other states and internationally.

We have built a values-based culture that emphasizes values such as striving for excellence, transparency, and support for each other. Our employees have access to development stipends, a wide range of training, different career paths, and, most importantly, challenging and purposeful work. Our culture is also built on diversity, inclusion, camaraderie, and celebration. We organize regular cultural events, teambuilding activities and public recognition forums to celebrate our diversity and invest in strong relationships.

Apart from culture and career development, we offer a robust benefits package. This package includes vacation days, paid parental leave, 401(k), performance bonuses, and a premier health plan for employees and their dependents. We also regularly survey and host roundtables with our employees to better understand their needs and perspectives, and, as a result of these discussions, we have added benefits including conference funds, fitness stipends, teambuilding budgets, and pet insurance.

Corporate Information

Our principal executive offices are located at 9191 Towne Centre Drive, Suite 600, San Diego, California 92122, and our telephone number is (619) 916-3144. Our website address is www.tusimple.com. Information contained on, or that can be accessed through, our website does not constitute part of this Annual Report on Form 10-K.

ITEM 1A. RISK FACTORS

Certain factors may have a material adverse effect on our business, financial condition, results of operations and prospects. You should carefully consider the risks and uncertainties described below, together with all of the other information in this Annual Report on Form 10-K, including the section titled “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our condensed consolidated financial statements and the accompanying notes, included elsewhere in this Annual Report on Form 10-K. Our business, financial condition, results of operations, or prospects could also be harmed by risks and uncertainties not currently known to us or that we currently do not believe are material. If any of these risks actually occur, it may materially harm our business, financial condition, liquidity, results of operations, prospects, and the market price of our Class A common stock.

Risk Factors Summary

Below is a summary of the principal factors that make an investment in our common stock speculative or subject to risk. This summary does not address all of the risks facing our business. You should consider the risks in this summary together with the detailed discussion of risks that immediately follows this summary in this section titled “Risk Factors,” as well as the other information in this Annual Report on Form 10-K.

- Autonomous driving is an emerging technology and involves significant risks and uncertainties.
- Our business model has yet to be tested, and any failure to commercialize our strategic plans would have an adverse effect on our operating results and business, and harm our reputation and could result in substantial liabilities that exceed our resources.
- We are subject to substantial regulations, including regulations governing autonomous vehicles, and unfavorable changes to, or failure by us to comply with, these regulations could substantially harm our business and operating results.
- We are an early stage company with a history of losses, and expect to incur significant expenses and continuing losses for the foreseeable future.
- We expect to need to raise additional funds, and these funds may not be available to us on attractive terms when we need them, or at all.
- We depend on the experience and expertise of our senior management team, technical engineers, and certain key employees, and losing one or more of such individuals could harm our business, operating results, and financial condition.
- We rely on third-party suppliers, and because some of the raw materials and key components in our products come from limited or sole sources of supply, we are susceptible to supply shortages, long lead times for components, and supply changes.
- We may be subject to product liability or warranty claims that could result in significant direct or indirect costs, including reputational harm, increased insurance premiums, or the need to self-insure, which could adversely affect our business and operating results.
- If our L4 autonomous semi-trucks fail to perform as expected, our ability to develop our AFN and market, sell, or lease our purpose-built L4 autonomous semi-trucks could be harmed. Future product recalls involving our purpose-built L4 autonomous semi-trucks or hardware deployed on our L4 autonomous semi-trucks could materially and adversely affect our business, prospects, operating results, and financial condition.

- Unauthorized control or manipulation of systems in autonomous semi-trucks may cause them to operate improperly or not at all, or compromise their safety and data security, which could result in loss of confidence in us and our products, cancellation of contracts with certain of our OEM or Tier 1 partners, and harm our business.
- We may become subject to litigation brought by third parties claiming infringement, misappropriation, or other violation by us of their intellectual property rights.
- Our business may be adversely affected if we are unable to adequately establish, maintain, protect, and enforce our intellectual property and proprietary rights or prevent third parties from making unauthorized use of our technology and other intellectual property rights.
- We face risks associated with our international operations, including unfavorable regulatory, political, tax, and labor conditions, which could harm our business.
- Changes to trade policy, tariffs, and import/export regulations may have a material adverse effect on our business, financial condition, and results of operations.
- Anti-takeover provisions in our charter documents may discourage our acquisition by a third party, which could limit our stockholders' opportunity to sell their shares at a premium.
- The COVID-19 pandemic may adversely affect our business and operating results, along with those of our suppliers and users.

Risks Related to Our Technology, Business Model, and Industry

Autonomous driving is an emerging technology and involves significant risks and uncertainties.

Our autonomous driving technology is highly dependent on internally-developed software, as well as on partnerships with third parties such as semi-truck original equipment manufacturers ("OEM") and other Tier 1 suppliers. We develop and integrate our autonomous driving technology and work with OEMs and other suppliers to develop autonomous driving technology hardware.

We currently operate on our Autonomous Freight Network ("AFN") Level 4 ("L4") autonomous semi-trucks equipped with our autonomous driving technology. We also have a partnership with an OEM, TRATON Group ("TRATON"), specifically its Navistar and Scania semi-truck brands, that seeks to manufacture purpose-built L4 autonomous semi-trucks capable of incorporating our autonomous driving technology, and may in the future partner with other OEMs. In addition to OEMs, we depend on other third parties, such as ZF Group, Knorr-Bremse, and NVIDIA, to produce components for our L4 autonomous semi-trucks. The timely development and performance of our autonomous driving programs is dependent on the materials, cooperation, and quality delivered by our partners. Further, we do not control technology for serial production, such as brakes, gear shifting, and steering. There can be no assurance that those applications can be developed and validated at the high reliability standard required for L4 autonomous driving in a cost-effective and timely manner. Our dependence on these relationships exposes us to the risk that components manufactured by OEMs or other suppliers could contain defects that would cause our autonomous driving technology to not operate as intended.

Although we believe that our algorithms, data analysis and processing, and artificial intelligence technology are promising, we cannot assure you that our technology will achieve the necessary reliability for L4 autonomy at commercial scale. For example, we are still improving our technology in terms of handling non-compliant driving behavior by other cars on the road and low reflectivity objects and performing in extreme weather conditions, such as snow or heavy fog. There can be no assurance that our data analytics and artificial intelligence can predict every single potential issue that may arise during the operation of our L4 autonomous semi-trucks. Moreover, although the initial results of our 10-week, 80,000 mile telematics study released in September 2021 and involving our L4 autonomous semi-trucks indicate that our L4 trucks reduce certain industry standard harsh driving events, there is no assurance that future results from the same study or from similar studies will yield materially similar results or that our L4 trucks will perform in a similar manner in commercial operations.

We have a limited operating history in a new market and face significant challenges as our industry is rapidly evolving.

We commenced operations in 2015 and launched in July 2020 our AFN, an ecosystem consisting of L4 autonomous semi-trucks, high definition digital mapped routes, strategically placed terminals, and TuSimple Connect, a proprietary cloud-based autonomous operations oversight system. We expect to derive substantially all of our revenue from our AFN, which is still in the early stages of development and commercialization. While in December 2021, we completed our first driver out, fully autonomous semi-truck run with our upfitted class 8 semi-truck traveling 80 miles on surface streets and highways at night in Arizona without a human in the vehicle, we still continue to be in the early stages of commercialization of our L4 autonomous truck. While we continue to perform Drive-Out runs, there is no assurance that they will be successful.

You should consider our business and prospects in light of the risks and challenges we face as a new entrant into a novel industry, including, among other things, with respect to our ability to:

- navigate an evolving and complex regulatory environment;
- design, outfit, and produce safe, reliable, and quality L4 autonomous semi-trucks with our partners on an ongoing basis;
- successfully produce with OEM partners a line of purpose-built L4 autonomous semi-trucks on the timeline we estimate;
- improve and enhance our software and autonomous technology;
- establish and expand our user base;
- successfully market our AFN and our other products and services;
- successfully completing additional driver-out tests on open public roads on the timeline we expect, or at all;
- achieve our driver-out milestones on the timeline expected;
- demonstrate the safety profile of our L4 autonomous semi-trucks in future studies;
- properly price our products and services;
- improve and maintain our operational efficiency;
- maintain a reliable, secure, high-performance, and scalable technology infrastructure;
- attract, retain, and motivate talented employees;
- anticipate and adapt to changing market conditions, including technological developments and changes in competitive landscape; and
- build a well-recognized and respected brand.

If we fail to address any or all of these risks and challenges, our business may be materially and adversely affected. There are also a number of additional challenges to L4 autonomous driving, many of which are not within our control, including market acceptance of autonomous driving, governmental licensing requirements, concerns regarding data security and privacy, actual and threatened litigation (whether or not a judgment is rendered against us), and the general perception that an autonomous vehicle is not safe because there is no human driver. There can be no assurance that the market will accept our technology, in which case our future business, results of operations and financial condition could be adversely affected.

The autonomous trucking and freight transport industry is in its early stages and is rapidly evolving. Our autonomous driving technology has not yet commercialized at scale. We cannot assure you that we will be able to adjust to changing market or regulatory conditions quickly or cost-effectively. If we fail to do so, our business, results of operations and financial condition will be adversely affected.

Our business model has yet to be tested and any failure to commercialize our strategic plans would have an adverse effect on our operating results and business, harm our reputation and could result in substantial liabilities that exceed our resources.

You should be aware of the difficulties normally encountered by a relatively new enterprise that is beginning to scale its business, many of which are beyond our control, including unknown future challenges and opportunities, substantial risks and expenses in the course of entering new markets and undertaking marketing activities. The likelihood of our success must be considered in light of these risks, expenses, complications, delays, and the competitive environment in which we operate. There is, therefore, substantial uncertainty that our business plan will prove successful, and we may not be able to generate significant revenue, raise additional capital, or operate profitably. We will continue to encounter risks and difficulties frequently experienced by early commercial stage companies, including scaling up our infrastructure and headcount, and may encounter unforeseen expenses, difficulties, or delays in connection with our growth. In addition, as a result of the capital-intensive nature of our business, we can be expected to continue to sustain substantial operating expenses without generating sufficient revenue to cover expenditures.

Our future business depends in large part on our ability to continue to develop and successfully commercialize our L4 autonomous driving technology, our AFN, and other freight capacity services we plan to offer. Our ability to develop, deliver, and commercialize at scale our autonomous driving software and systems to support or perform autonomous operation of large semi-trucks is still unproven.

Our continued enhancement of our autonomous driving technology is and will be subject to risks, including with respect to:

- our ability to continue to enhance our data analytics and software technology;
- designing, developing, and securing necessary components on acceptable terms and in a timely manner;

- our ability to successfully complete additional driver-out pilot programs;
- our ability to attract, recruit, hire, and train skilled employees; and
- our ability to enter into strategic relationships with key members in the trucking and freight transport industries, as well as component suppliers.

We have limited experience to date in applying our autonomous driving technology at scale. While we currently operate autonomous semi-trucks equipped with our autonomous driving technology, we have not yet produced and sold to third parties our purpose-built L4 autonomous semi-trucks at scale. Even if we are successful in developing and commercializing our technology, we could face unexpected difficulties, delays, and cost overruns, including as a result of factors beyond our control such as unforeseen issues with our technology, problems with suppliers, and adverse regulatory developments. Any failure to develop our technology within our projected costs and timelines could have a material adverse effect on our business, prospects, operating results, and financial condition.

Since the market for autonomous solutions is relatively new and disruptive, if our L4 autonomous driving technology fails to gain acceptance from users and other stakeholders in the freight transportation industry, our business, prospects, operating results, and financial condition could be materially harmed.

Demand for autonomous driving technology depends to a large extent on general, economic, political, and social conditions in a given market. The market opportunities we are pursuing are at an early stage of development, and it is difficult to predict user demand or adoption rates for our solutions, including the AFN, or the future growth of the markets in which we operate. Despite the fact that the automotive industry has engaged in considerable effort to research and test L2 and L3 autonomous cars, our technology targeting L4 autonomous semi-trucks requires significant investment and may never be commercially successful on a large scale, or at all.

Further, even if we succeed in operating at commercial scale, because of the disruptive nature of our business to the freight transportation industry, key industry participants may not accept our AFN, may develop competing services or may otherwise seek to subvert our efforts. For example, autonomous semi-trucks might displace individual semi-truck drivers and small fleet owners. Labor unions may also raise concerns about autonomous semi-trucks displacing drivers or otherwise negatively affecting employment opportunities for their members, as has been the case in other industries that have been subject to automation. This has in the past resulted, and could in the future result, in negative publicity, lobbying efforts to U.S. local, state, and federal lawmaking authorities, or equivalent authorities in the foreign jurisdictions in which we seek to do business, to implement legislation or regulations that make it more difficult to operate our business or boycotts of us or our users. Any such occurrences could materially harm our future business.

Additionally, regulatory, safety, and reliability issues, or the perception thereof, many of which are outside of our control, could also cause the public or our potential partners and users to lose confidence in autonomous solutions in general. The safety of such technology depends in part on user interaction and users, as well as other drivers, pedestrians, other obstacles on the roadways or other unforeseen events. For example, there have been several crashes involving automobiles of other manufacturers resulting in death or personal injury where autopilot features are engaged. Even though these incidents were unrelated to our AFN and our technology, such cases resulted in significant negative publicity and, in the future, could result in suspension or prohibition of self-driving vehicles. If safety and reliability issues for autonomous driving technology cannot be addressed properly, our business, prospects, operating results, and financial condition could be materially harmed.

We may be subject to product liability or warranty claims that could result in significant direct or indirect costs, including reputational harm, increased insurance premiums, or the need to self insure, which could adversely affect our business and operating results.

Our technology is used for autonomous driving, which presents the risk of significant injury, including fatalities. Product liability claims, even those without merit or those that do not involve our semi-trucks, could harm our business, prospects, financial condition and operating results. The automobile industry in particular experiences significant product liability claims, and we face inherent risk of exposure to claims in the event our semi-trucks do not perform or are claimed to not have performed as expected. To the extent our semi-trucks continue to be tested or otherwise operated on open roads, we expect in the future that our semi-trucks will be involved in crashes resulting in death or personal injury.

We may be subject to claims if one of our semi-trucks or a user's semi-truck is involved in an accident and persons are injured or purport to be injured or if property is damaged. Any product liability claim may subject us to lawsuits and substantial monetary damages, product recalls or redesign efforts, and even a meritless claim may require us to defend it, all of which may generate negative publicity and be expensive and time-consuming. Any insurance that we carry may not be sufficient or it may not apply to all situations. The risk of serious injury, death, and substantial damage to property is much higher with a substantially heavier fast-moving autonomous semi-truck, as compared to a collision with a slower moving autonomous passenger car in an urban environment. In accidents involving semi-trucks, most of the resulting fatalities are victims outside of the semi-truck. If we experience such an event or multiple events, our insurance premiums could increase significantly or insurance may not be available to us at all. Further, if insurance is not available on commercially reasonable terms, or at all, we might need to self-insure. In addition, lawmakers or governmental agencies could pass laws or adopt regulations that limit the use of autonomous trucking technology or increase liability associated with its use. Additionally, product liability claims that affect our competitors or suppliers may also cause adverse publicity for us, our vehicles and our AFN. Any of these events could adversely affect our brand, relationships with users, operating results, or financial condition.

Our autonomous driving technology and related hardware and software could have undetected defects, errors or bugs in hardware or software which could create safety issues, reduce market adoption, damage our reputation with current or prospective users or expose us to product liability and other claims that could materially and adversely affect our business.

Our autonomous driving technology is highly technical and very complex, and has in the past and may in the future experience defects, errors or bugs at various stages of development. We may be unable to timely correct problems to our partners' and users' satisfaction. Additionally, there may be undetected errors or defects especially as we introduce new systems or as new versions are released. These risks are particularly prevalent in the highly competitive freight transport market, as any such errors or defects could delay or prevent the adoption of autonomous driving technology in trucks. Errors or defects in our products may only be discovered after they have been tested, commercialized, and deployed. If that is the case, we may incur significant additional development costs and product recall, repair or replacement costs, or more importantly, liability for personal injury or property damage caused by such errors or defects, as these problems would also likely result in claims against us. Our reputation or brand may be damaged as a result of these problems and users may be reluctant to use our services, which could adversely affect our ability to retain existing users and attract new users, and could materially and adversely affect our financial results.

In addition, we could face material legal claims for breach of contract, product liability, tort or breach of warranty as a result of these problems. Any such lawsuit may cause irreparable damage to our brand and reputation. In addition, defending a lawsuit, regardless of its merit, could be costly and may divert management's attention and adversely affect the market's perception of us and our services. In addition, our business liability insurance coverage could prove inadequate with respect to a claim and future coverage may be unavailable on acceptable terms or at all. These product-related issues could result in claims against us and our business could be materially and adversely affected.

The operation of our L4 autonomous semi-trucks is different from non-autonomous semi-trucks and may be unfamiliar to our users and other road users.

We have specifically engineered our L4 autonomous semi-trucks with our technology to provide a superior ability to sense, predict, and react to real-world driving situations. Our proprietary artificial intelligence ("AI") and machine vision capabilities are specifically engineered to meet the demands of commercial trucks. In certain instances, these protections may cause the vehicle to behave in ways that are unfamiliar to drivers of non-autonomous driving trucks. For example, our L4 autonomous semi-trucks adhere strictly to safety rules, including stopping for three seconds at a stop sign. These safety rules may not be strictly adhered to by human drivers, and thus may be unfamiliar or come as a surprise to other drivers on the road.

Furthermore, there can be no assurance that our users will be able to properly adapt to the different operation processes for our L4 autonomous semi-trucks. For example, they may not be able to adapt their business processes to address activities such as the dispatching of trucks, pre-trip inspections, remote monitoring, and rescuing of trucks. Any accidents resulting from such failure to operate our L4 autonomous semi-trucks properly could harm our brand and reputation, result in adverse publicity, and product liability claims, and have a material adverse effect on our business, prospects, financial condition, and operating results.

Reservations for our purpose-built L4 autonomous semi-trucks are cancellable.

As of December 31, 2021, we have accepted 6,975 reservations for our purpose-built L4 autonomous semi-truck. Until the customer enters into a purchase agreement for our purpose-built L4 autonomous semi-truck, which is within the discretion of the customer, the reservation can be canceled and the customer is entitled to a full refund of its deposit. We have not entered into purchase agreements with any of our customers that have reserved our purpose-built L4 autonomous semi-trucks.

Because all of our reservations are cancellable, it is possible that a significant number of customers who submitted reservations for our purpose-built L4 autonomous semi-trucks may cancel those reservations. Given the anticipated lead times between customer reservation and delivery of our purpose-built L4 autonomous semi-trucks, there is a heightened risk that customers that have made reservations may not ultimately take delivery of our vehicles due to potential changes in customer preferences, competitive developments, and other factors. As a result, no assurance can be made that reservations will not be canceled, or that reservations will ultimately result in the purchase of purpose-built L4 autonomous semi-trucks. Any cancellations could harm our financial condition, business, prospects, and operating results.

We operate in a highly competitive market and some market participants have substantially greater resources than we do. We compete against a large number of both established competitors and new market entrants.

The market for autonomous trucking and freight transport solutions is highly competitive. Many companies are seeking to develop autonomous trucking and delivery solutions. Competition in these markets is based primarily on technology, innovation, quality, safety, reputation, and price. Our future success will depend on our ability to further develop and protect our technology in a timely manner and to stay ahead of existing and new competitors. Our competitors in this market are working towards commercializing autonomous driving technology and may have substantial financial, marketing, research and development, and other resources. Some examples of our competitors include Waymo, Aurora, Embark, and Kodiak.

In addition, we also face competition from traditional freight transport companies, such as non-autonomous trucking companies, railroads, and air carriers. Traditional shipping fleets and other carriers operating with human drivers are still the predominant operators in the market. Because of the long history of such traditional freight transport companies serving the freight market, there may be many constituencies in the market that would resist a shift towards autonomous freight transport, which could include lobbying and marketing campaigns, particularly because our technology will displace semi-truck drivers. In addition, certain market leaders in the automotive industry may start, or have already started, pursuing large scale deployment of autonomous vehicle technology on their own. These companies may have more operational and financial resources than us. We cannot guarantee that we will be able to effectively compete with them. We may also face competition from Tier 1 suppliers and other technology and automotive supply companies if they decide to expand vertically and develop their own autonomous semi-trucks, some of whom have significantly greater resources than we do. We do not know how close these competitors are to commercializing autonomous driving systems.

Furthermore, although we believe that we have the first-mover advantage in the competitive autonomous freight segment, many established and new market participants have entered or have announced plans to enter the autonomous vehicle market. Most of these participants have significantly greater financial, manufacturing, marketing, and other resources than we do and may be able to devote greater resources to the design, development, manufacturing, distribution, promotion, sale, and support of their products. If existing competitors or new entrants are able to commercialize earlier than expected, our competitive advantage could be adversely affected.

Disruptions to the trucking industry, including changes in transportation and shipping infrastructure, could adversely impact our business, operating results, and financial condition.

Our business and financial performance are affected by the health of the overall U.S., and in the future potentially Europe and China, truck freight industry, which is reliant on infrastructure maintained by third parties and is affected by risks that are largely out of the control of industry participants.

We or our users may experience capacity constraints due to increased demand for transportation services and decaying highway infrastructure. Poor infrastructure conditions and roadway congestion could slow service times, reduce operating efficiency and increase maintenance expense for truck operators. Some states have taken infrastructure funding measures into their own hands and have explored or instituted road-usage programs, truck-only tolling, congestion pricing, and fuel tax increases. In addition, risks including harsh weather or natural disasters, such as hurricanes, tornadoes, fires and floods, global pandemics and acts of terrorism could further damage existing infrastructure. Damage or further deterioration of highway infrastructure could negatively impact our partners and ultimately our business and operating results by increasing costs associated with truck freight. Similarly, a failure of continued investment in highway infrastructure or a redirection of government investment into rail or ocean freight infrastructure could negatively impact the truck freight industry and ultimately us.

The trucking industry is subject to economic, business, and regulatory factors that are largely beyond our control, any of which could have a material adverse effect on us and our business.

The trucking industry is highly cyclical, and our business is dependent on a number of factors that may have a negative impact on our results of operations, many of which are beyond our and our control. Any conditions that negatively impact the trucking industry generally could ultimately impact demand for our technology. We believe that some of the most significant of these factors are economic changes that affect supply and demand in transportation markets such as:

- recessionary economic cycles;

- changes in the inventory levels and practices of our users, including shrinking product/package sizes, and in the availability of funding for their working capital;
- excess truck capacity in comparison with shipping demand;
- increases in fuel or equipment prices, which may impact our users' ability to use our services or purchase our trucks;
- industry compliance with ongoing regulatory requirements; and
- downturns in business cycles of our users, including as a result of declines in consumer spending.

Additionally, economic conditions that decrease shipping demand or increase the supply of available trucks can exert downward pressure on rates and equipment utilization. The risks associated with these factors are heightened to the extent the U.S. economy is weakened. Some of the principal risks during such times are as follows:

- the trucking industry may experience low overall freight levels, which may impair demand for our technology;
- certain of our users may face credit issues and cash flow problems that may lead to payment delays, increased credit risk, bankruptcies and other financial hardships that could result in even lower freight demand;
- freight patterns may change as supply chains are redesigned, resulting in an imbalance between the geographies where our technology is optimized to cover and those where there is demand for it; and
- our users may solicit bids for freight from multiple trucking companies or select competitors that do not use our technology in an attempt to lower their costs or due to concerns about our technology.

Our users may be subject to cost increases outside their and our control that could materially reduce demand for our technology. Such cost increases include, but are not limited to, increases in fuel prices, interest rates, taxes, tolls, license and registration fees, insurance and revenue equipment and related maintenance, tires and other components.

Seasonality and the impact of weather can affect our revenues and profitability.

Truck transportation productivity generally decreases during the winter season because inclement weather impedes operations and some shippers reduce their shipments. As fees for TuSimple Path are expected to be determined on a per mile, usage basis, reduced mileage due to seasonality may negatively impact our revenue and profitability during those times.

Harsh weather may create higher accident frequency, increased claims and more equipment repairs, which could reduce demand for the services we may offer. The trucking industry can also suffer short-term impacts from weather-related events such as hurricanes, blizzards, ice-storms, and floods that could harm our results or make our results more volatile. Accordingly, seasonality may impact demand from our users and the costs associated with freight capacity services provided through the TuSimple Capacity service model. As a result, our revenues and profitability could be negatively impacted by seasonality.

Risks Related to Our Dependence on Third Parties

We rely on our business partners and other industry participants for our AFN. Business collaboration with partners is subject to risks, and these relationships may not lead to significant revenue. Any adverse change in our cooperation with them could harm our business.

Strategic business relationships are and will continue to be an important factor in the growth and success of our business. We have alliances and partnerships with other companies in the trucking and automotive industry to help us in our efforts to continue to enhance our technology, commercialize our solutions, and drive market acceptance. We have established a partnership with leading semi-truck manufacturer TRATON, specifically with its Navistar and Scania semi-truck brands, and a leading microchip manufacturer, NVIDIA, to co-develop and validate critical components required for L4 autonomous semi-trucks. We will also need to identify and negotiate additional relationships with other third parties, such as those who can provide service centers, maintenance, refueling, roadside service, towing, sensor support, and financing services. We may not be able to successfully identify and negotiate definitive agreements with these third parties to provide the services we would require on terms that are attractive or at all, which would cause us to incur increased costs to develop and provide these capabilities.

Collaboration with these third parties is subject to risks, some of which are outside our control. For example, certain of our agreements with our partners grant our partner or us the right to terminate such agreements for cause or without cause, including in some cases by paying a termination for convenience fee. If any of our partnerships with semi-truck manufacturers, such as our agreement with Navistar, or with leading microchip manufacturers, such as our ongoing partnership with NVIDIA, are terminated, it may delay or prevent our efforts to produce purpose-built L4 autonomous semi-trucks at scale. In addition, such partnership agreements have in the past and may in the future contain certain exclusivity provisions which, if triggered, could preclude us from working with other businesses with superior technology or with whom we may prefer to partner for other reasons. We could experience delays to the extent our partners do not meet agreed upon timelines or experience capacity constraints. We could also experience disagreement in budget or funding for the joint development project. There is also a risk of other potential disputes with partners in the future, including with respect to intellectual property rights. Our ability to successfully commercialize could also be adversely affected by perceptions about the quality of our or our partners' trucks.

If our existing partner agreements were to be terminated, we may be unable to enter into new agreements on terms and conditions acceptable to us. The expense and time required to complete any transition, and to assure that vehicles manufactured at facilities of new third-party partners comply with our quality standards and regulatory requirements, may be greater than anticipated. Any of the foregoing could adversely affect our business, results of operations, and financial condition.

We rely on third party suppliers and because some of the raw materials and key components in our products come from limited or sole sources of supply, we are susceptible to supply shortages, long lead times for components, and supply changes, any of which could disrupt our supply chain and could delay deliveries of our products to users.

All of the components that are used to outfit semi-trucks with our autonomous technology and that will be used to manufacture our purpose-built L4 autonomous semi-trucks are sourced from third-party suppliers. To date, the semi-trucks we have used have had our autonomous technology added to an existing semi-truck design. We do not have any experience in managing a large supply chain to manufacture and deliver products at scale. In addition, some of the key components used to manufacture our L4 autonomous semi-trucks come from limited or sole sources of supply. For example, we depend on actuation suppliers to develop and design redundant actuation for steering, braking, and engine transmission. We are also dependent on our suppliers' production timeline for supplying automotive-grade LiDAR at scale. We are therefore subject to the risk of shortages and long lead times in the supply of these components and the risk that our suppliers discontinue or modify components used in our products. In addition, our agreements with our third party suppliers are non-exclusive. Our suppliers may dedicate more resources to other companies, including our competitors. We may in the future experience component shortages and price fluctuations of certain key components and materials, and the predictability of the availability and pricing of these components may be limited. Component shortages or pricing fluctuations could be material in the future. In the event of a component shortage, supply interruption or material pricing change from suppliers of these components, we may not be able to develop alternate sources in a timely manner or at all in the case of sole or limited sources. Developing alternate sources of supply for these components may be time-consuming, difficult, and costly and we may not be able to source these components on terms that are acceptable to us, or at all, which may undermine our ability to meet our requirements or to fill user orders in a timely manner. Any interruption or delay in the supply of any of these parts or components, or the inability to obtain these parts or components from alternate sources at acceptable prices and within a reasonable amount of time, would adversely affect our ability to meet scheduled product deliveries to users. This could adversely affect our relationships with our users and could cause delays in our ability to expand our operations, including with our partners manufacturing purpose-built L4 autonomous semi-trucks. Even where we are able to pass increased component costs along to our users, there may be a lapse of time before we are able to do so such that we must absorb the increased cost initially. If we are unable to buy these components in quantities sufficient to meet our requirements on a timely basis, we will not be able to have sufficient ability to meet user demand, which may result in users using competitive services instead of ours.

We depend on an international supply chain that is subject to risk of foreign regulatory requirements and trade policy.

Many of the components that we require for outfitting our trucks are sourced from international third-party suppliers. Changes in global political, regulatory and economic conditions, or in laws and policies governing foreign trade, manufacturing, development, and investment in the territories or countries where we currently purchase components, could adversely affect our business. The United States has recently instituted or proposed changes in trade policies that include the negotiation or termination of trade agreements, the imposition of higher tariffs on imports into the United States, economic sanctions on individuals, corporations or countries, and other government regulations affecting trade between the United States and other countries. A number of other nations have proposed or instituted similar measures directed at trade with the United States in response. As a result of these developments, there may be greater restrictions and economic disincentives on international trade that could adversely affect our business. For example, such changes could adversely affect the automotive market, and our ability to access key components. It may be time-consuming and expensive for us to alter our business operations to adapt to or comply with any such changes, and any failure to do so could have a material adverse effect on its business, financial condition and results of operations.

Risks Related to Our Financial Position and Need for Additional Capital

We are an early stage company with a history of losses, and expect to incur significant expenses and continuing losses for the foreseeable future.

We incurred net losses of \$177.9 million and \$732.7 million for the years ended December 31, 2020 and 2021, respectively. We have not recognized a material amount of revenue to date and had an accumulated deficit of \$1.1 billion as of December 31, 2021. We have developed and launched our AFN but there can be no assurance that it will be commercially successful at scale. Our potential profitability is dependent upon a number of factors, many of which are beyond our control.

We expect the rate at which we will incur losses to be significantly higher in future periods as we:

- design, develop, and manufacture purpose-built L4 autonomous semi-trucks with our OEM partners;
- seek to achieve and commercialize full L4 autonomy for our purpose-built L4 autonomous semi-trucks;
- seek to expand our AFN, on a nationwide basis in the United States and internationally;
- expand our design, development, maintenance, and repair capabilities;
- respond to competition in the autonomous driving market and from traditional freight transportation providers;
- respond to evolving regulatory developments in the nascent autonomous vehicle market;
- increase our sales and marketing activities;
- increase our headcount to accelerate our product launches and scale our network;
- increase our general and administrative functions to support the growth in our supply chain in connection with the mass production of L4 autonomous semi-trucks and for being a public reporting company.

Because we will incur the costs and expenses from these efforts before we receive any incremental revenue, our losses in future periods will be significant. In addition, we may find that these efforts are more expensive than we currently anticipate or that these efforts may not result in revenue, which would further increase our losses. In particular, we expect to incur substantial and potentially increasing research and development (“R&D”) costs. Because we account for R&D as an operating expense, these expenditures will adversely affect our results from operations in the future. Further, our R&D program may not produce successful results, and our new products may not achieve market acceptance, create additional revenue, or become profitable.

We expect to need to raise additional funds and these funds may not be available to us on attractive terms when we need them, or at all. If we cannot raise additional funds on attractive terms when we need them, our operations and prospects could be negatively affected.

The commercialization of L4 autonomous semi-trucks outfitted with our technology, purpose-built L4 autonomous semi-trucks manufactured by our OEM partners and our AFN and related technology is capital-intensive. To date, we have financed our operations primarily through the issuance of equity securities and convertible debt securities. We will need to raise additional capital to continue to fund our research and development and commercialization activities and to improve our liquidity position. Our ability to obtain the necessary financing to carry out our business plan is subject to a number of factors, including general market volatility, investor acceptance of our business plan, regulatory requirements, including foreign investment reviews, and the successful development of our autonomous technology. These factors may make the timing, amount, terms, and conditions of such financing unattractive or unavailable to us.

We may raise these additional funds through the issuance of equity, equity-related, or debt securities. To the extent that we raise additional financing by issuing equity securities or convertible debt securities, our stockholders may experience substantial dilution, and to the extent we engage in debt financing, we may become subject to restrictive covenants that could limit our flexibility in conducting future business activities. Financial institutions may request credit enhancements such as third-party guarantees and pledges of equity interests in order to extend loans to us. We cannot be certain that additional funds will be available to us on attractive terms when required, or at all. If we cannot raise additional funds when we need them, our financial condition, results of operations, business, and prospects could be materially adversely affected.

Future sales and issuances of our share capital or rights to purchase our share capital could result in substantial dilution to our existing stockholders. We may sell Class A common stock, convertible securities, and other equity securities in one or more transactions at prices and in a manner as we may determine from time to time. If we sell any such securities in subsequent transactions, investors may be materially diluted. New investors in such subsequent transactions could gain rights, preferences, and privileges senior to those of holders of our Class A common stock.

We may be subject to risks associated with potential future acquisitions.

Although we have no current acquisition plans, if appropriate opportunities arise, we may acquire additional assets, products, technology or businesses that are complementary to our existing business. Any future acquisitions and the subsequent integration of new assets and businesses would require significant attention from our management and could result in a diversion of resources from our existing business, which in turn could have an adverse effect on our operations, and consequently our results of operations and financial condition. Acquired assets or businesses may not generate the financial results we expect. Acquisitions could result in the use of substantial amounts of cash, potentially dilutive issuances of equity securities, significant goodwill impairment charges, amortization expenses for other intangible assets and exposure to potential unknown liabilities of the acquired business. Moreover, the costs of identifying and consummating acquisitions may be significant.

Risks Related to Our Business Operations

We depend on the experience and expertise of our senior management team, technical engineers, and certain key employees, and the loss of any executive officer or key employee, or the inability to identify and recruit executive officers, technical engineers, and key employees in a timely manner, could harm our business, operating results, and financial condition.

Our success depends largely upon the continued services of our key executive officers and certain key employees. We rely on our executive officers and key employees in the areas of business strategy, research and development, marketing, sales, services, and general and administrative functions. From time to time, there may be changes in our executive management team or key employees resulting from the hiring or departure of executives or key employees, which could disrupt our business. We do not maintain key-man insurance for any member of our senior management team or any other employee. We do not have employment agreements with our executive officers or other key personnel that require them to continue to work for us for any specified period and, therefore, they could terminate their employment with us at any time. The loss of one or more of our executive officers or key employees could have a serious adverse effect on our business.

To execute our growth plan, we must attract and retain highly qualified personnel. Competition for these personnel is intense in the technology industry, especially for engineers with high levels of experience in artificial intelligence and designing and developing autonomous driving related algorithms. Furthermore, it can be difficult to recruit personnel from other geographies to relocate to our Southern California location. We may also need to recruit highly qualified technical engineers internationally and therefore subject us to the compliance of relevant immigration laws and regulations. We have, from time to time, experienced, and we expect to continue to experience, difficulty in hiring and retaining employees with appropriate qualifications. Many of the companies with which we compete for experienced personnel have greater resources than we have and can offer more attractive compensation packages for new employees. If we hire employees from competitors or other companies, their former employers may attempt to assert that these employees or our company have breached their legal obligations, resulting in a diversion of our time and resources and potentially in litigation. In addition, job candidates and existing employees often consider the value of the equity awards they receive in connection with their employment. If the perceived value of our equity awards declines, it may adversely affect our ability to recruit and retain highly skilled employees. If we fail to attract new personnel on a timely basis or fail to retain and motivate our current personnel, we may not be able to commercialize and then expand our AFN in a timely manner and our business and future growth prospects could be adversely affected.

We have experienced rapid growth in recent periods and expect to continue to invest in our growth for the foreseeable future. If we fail to manage our growth effectively, we may be unable to execute our business plan, maintain high levels of service, or adequately address competitive challenges.

We have recently experienced a period of rapid growth in our headcount and operations. Our number of full-time employees has increased significantly over the last few years, from approximately 130 employees as of January 1, 2018 to approximately 1,400 full-time employees as of December 31, 2021. The recent rapid growth in our business has placed, and is expected to continue to place, a significant strain on our managerial, administrative, operational, and financial resources, as well as our infrastructure. We plan to continue to expand our operations in the future. Our success will depend in part on our ability to manage this growth effectively and execute our business plan. To manage the expected growth of our operations and personnel, we will need to continue to improve our operational, financial, and management controls and our reporting systems and procedures.

We rely heavily on information technology (“IT”) systems to manage critical business functions. To manage our growth effectively, we must continue to improve and expand our infrastructure, including our IT, financial, and administrative systems and controls. In particular, we may need to significantly expand our IT infrastructure as the amount of data we store and transmit increases over time, which will require that we both utilize existing IT products and adopt new technology. If we are not able to scale our IT infrastructure in a cost-effective and secure manner, our ability to offer competitive solutions will be harmed and our business, financial condition, and operating results may suffer.

We must also continue to manage our employees, operations, finances, research and development, and capital investments efficiently. Our productivity and the quality of our solutions may be adversely affected if we do not integrate and train our new employees quickly and effectively or if we fail to appropriately coordinate across our executive, research and development, technology, service development, analytics, finance, human resources, marketing, sales, operations, and customer support teams. As we continue to grow, we will incur additional expenses, and our growth may continue to place a strain on our resources, infrastructure, and ability to maintain the quality of our solutions. If we do not adapt to meet these evolving challenges, or if the current and future members of our management team do not effectively manage our growth, the quality of our solutions may suffer and our corporate culture may be harmed. Failure to manage our future growth effectively could cause our business to suffer, which, in turn, could have an adverse impact on our business, financial condition, and operating results.

Our management team has limited experience managing a public company.

Most of the members of our management team have limited experience managing a publicly-traded company, interacting with public company investors, and complying with the increasingly complex laws pertaining to public companies. Our management team may not successfully or efficiently manage our public company reporting obligations under the federal securities laws and the continuous scrutiny of securities analysts and investors. These new obligations and constituents have required and will continue to require significant attention from our senior management and could divert their attention away from the day-to-day management of our business, which could adversely affect our business, financial condition, and operating results.

Our L4 autonomous semi-trucks are expensive and, as a result, we, along with our users, may need to obtain financing to purchase or lease semi-trucks.

Because acquiring semi-trucks and then outfitting them with our autonomous technology is expensive, we will need to obtain committed financing capacity for our self-operated fleet to support our growth, and we may in the future be required to find financing solutions to help our users or us purchase or finance our purpose-built L4 autonomous semi-trucks manufactured in partnership with OEMs. Our ability to attract financing depends on many factors that are outside of our control, including our or our users' perceived creditworthiness and the condition of credit markets generally. If we are unable to procure financing partners willing to finance such deployments, our ability to grow our business may be harmed.

We will be required to make significant capital expenditures to maintain our fleet of L4 autonomous semi-trucks.

We expect our capital expenditure requirements will primarily relate to maintaining and upgrading our fleet of L4 autonomous semi-trucks to serve our users and remain competitive. The aging of our fleet will require us to make regular capital expenditures to maintain our level of service. In addition, changing competitive conditions or the emergence of any significant advances in autonomous driving technology could require us to invest significant capital in additional equipment or capacity in order to remain competitive. If we are unable to fund any such investment or otherwise fail to invest in new vehicles, our business, financial condition or results of operations could be materially and adversely affected.

We and our manufacturing partners may experience significant delays in the manufacture, launch, and financing of our purpose-built L4 autonomous semi-trucks, which could harm our business and prospects.

Any delay in the manufacture, launch, and financing of our purpose-built L4 autonomous semi-trucks could materially damage our brand, business, prospects, financial condition, and operating results. Vehicle manufacturers often experience delays in the manufacture and commercial release of new products. To the extent we delay the launch of our purpose-built L4 autonomous semi-trucks, our growth prospects could be adversely affected. Furthermore, we rely on third party suppliers for the provision and development of many of the key components and materials that will be used in our existing L4 autonomous semi-trucks and those that will be purpose-built. To the extent our suppliers experience any delays in providing us with or developing necessary components, we could experience delays in delivering on our timelines.

If our L4 autonomous semi-trucks fail to perform as expected, our ability to develop our AFN and market, sell or lease our purpose-built L4 autonomous semi-trucks could be harmed. Future product recalls involving our purpose-built L4 autonomous semi-trucks or hardware deployed on our L4 autonomous semi-trucks could materially and adversely affect our business, prospects, operating results, and financial condition.

Our L4 autonomous semi-trucks and, once production begins, our purpose-built L4 autonomous semi-trucks may contain defects in design and manufacture that may cause them not to perform as expected or may require repair. For example, our L4 autonomous semi-trucks currently use, and our purpose-built L4 autonomous semi-trucks are expected to use, a substantial amount of software to operate which will require modification and updates over the life of the vehicle. Software products are inherently complex and often contain defects and errors when first introduced. There can be no assurance that we will be able to detect and fix any defects in the semi-trucks' hardware or software prior to commencing user sales or during the life of the trucks. Our purpose-built L4 autonomous semi-trucks may not perform consistent with users' expectations or consistent with other trucks that may become available. Any product defects or any other failure of our purpose-built L4 autonomous semi-trucks to perform as expected could harm our reputation and ability to develop our AFN and result in adverse publicity, lost revenue, delivery delays, product recalls, product liability claims, and significant warranty and other expenses, and could have a material adverse impact on our business, financial condition, operating results, and prospects.

Once production begins, we may experience recalls involving our purpose-built L4 autonomous semi-trucks, which could adversely affect our brand in our target markets and could adversely affect our business, prospects, and results of operations. Any product recall in the future may result in adverse publicity, damage our brand, and materially adversely affect our business, prospects, operating results, and financial condition. In the future, we may voluntarily or involuntarily, initiate a recall if any of our purpose-built L4 autonomous semi-truck components (including LiDAR sensors, cameras, and other components) prove to be defective or noncompliant with applicable motor vehicle safety standards. Such recalls typically involve significant expense and diversion of management attention and other resources, which could adversely affect our brand image, as well as our business, prospects, financial condition, and results of operations.

If we are unable to establish and maintain confidence in our long-term business prospects among users, securities and industry analysts, and within our industries, or are subject to negative publicity, then our financial condition, operating results, business prospects, and access to capital may suffer materially.

Users may be less likely to purchase or use our L4 autonomous semi-trucks if they are not convinced that our business will succeed or that our service and support and other operations will continue in the long term. Similarly, suppliers and other third parties will be less likely to invest time and resources in developing business relationships with us if they are not convinced that our business will succeed. Accordingly, in order to build and maintain our business, we must maintain confidence among users, suppliers, securities and industry analysts, and other parties in our long-term financial viability and business prospects. Maintaining such confidence may be particularly complicated by certain factors including those that are largely outside of our control, such as our limited operating history at scale, user unfamiliarity with our solutions, any delays in scaling manufacturing, delivery, and service operations to meet demand, competition and uncertainty regarding the future of autonomous vehicles, and our performance compared with market expectations.

We have previously identified a material weakness in our internal control over financial reporting. In the future, we may identify additional material weaknesses that may cause us to fail to meet our reporting obligations or result in material misstatements of our financial statements. If we fail to remediate such material weaknesses or if we otherwise fail to establish and maintain effective control over financial reporting, our ability to accurately and timely report our financial results could be adversely affected.

We have in the past identified control deficiencies in the design and implementation of our internal control over financial reporting that constituted a material weakness. Although the material weakness had been remediated as of December 31, 2021, it is possible additional material weaknesses may be identified in the future. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of our financial statements will not be prevented or detected on a timely basis.

Our independent registered public accounting firm is not required to formally attest to the effectiveness of our internal control over financial reporting until after we are no longer an “emerging growth company” as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. At such time, our independent registered public accounting firm may issue a report that is adverse in the event it is not satisfied with the level at which our internal control over financial reporting is documented, designed, or operating. Any failure to implement and maintain effective internal control over financial reporting also could adversely affect the results of the period including management evaluations and annual independent registered public accounting firm attestation reports regarding the effectiveness of our internal control over financial reporting that we will eventually be required to include in our periodic reports that are filed with the SEC. Ineffective disclosure controls and procedures and internal control over financial reporting could also cause investors to lose confidence in our reported financial and other information, which would likely have a negative effect on the trading price of our Class A common stock. In addition, if we are unable to continue to meet these requirements, we may not be able to remain listed on the Nasdaq Global Select Market.

Pandemics and epidemics, including the ongoing COVID-19 pandemic, natural disasters, terrorist activities, political unrest, and other outbreaks could have a material adverse impact on our business, results of operations, financial condition, cash flows or liquidity, and the extent to which we will be impacted will depend on future developments, which cannot be predicted.

The COVID-19 pandemic has caused us to modify our business practices (such as employee travel plans and cancellation of physical participation in meetings, events, and conference), and we may take further actions as required by governmental authorities or that we determine are in the best interests of our employees, users, and business partners. It is possible that governmental authorities in the United States or elsewhere may impose a vaccination mandate that could require some or all of our employees, contractors, and other service providers to be vaccinated against COVID-19 while in the workplace, subject to limited exceptions. Any vaccination mandates adopted by governmental authorities are outside of our control, and, although we cannot predict the full impact of such vaccination requirements on our business and on any of our suppliers or business partners, we believe that vaccination mandates could adversely affect our operations. For example, if a vaccination requirement were implemented that prevented us from working with unvaccinated drivers, our ability to ship freight and our ability to continue testing our truck technology, including our driver-out pilot program, could be disrupted, which could potentially cause a material adverse impact on our business and results of operations, and we may not be able to mitigate the effects of such disruption in a timely manner through the engagement of replacement drivers or otherwise. In addition, the business and operations of our manufacturers, suppliers, and other business partners have also been adversely impacted by the COVID-19 pandemic and may be further adversely impacted in the future, which could result in delays in our ability to commercialize our autonomous trucking solutions.

As a result of social distancing, travel bans, and quarantine measures, access to our facilities, users, management, support staff, and professional advisors has been limited, which in turn has impacted, and will continue to impact, our operations, and financial condition.

The extent to which COVID-19 impacts our, and those of our partners and potential users, business, results of operations, and financial condition will depend on future developments, which are uncertain and cannot be predicted, including, but not limited to, the occurrence of future outbreaks from new variants, such as the “Delta variant” and the “Omicron variant,” duration and spread of the outbreaks, their severity, the actions to contain the virus or treat its impact, and how quickly and to what extent normal economic and operating conditions can resume. Even if the COVID-19 outbreak subsides, we may continue to experience materially adverse impacts to our business as a result of its global economic impact, including any recession that has occurred or may occur in the future.

We are also vulnerable to natural disasters and other calamities. Although we have servers that are hosted in an offsite location, our backup system does not capture data on a real-time basis and we may be unable to recover certain data in the event of a server failure. We cannot assure you that any backup systems will be adequate to protect us from the effects of fire, floods, typhoons, earthquakes, power loss, telecommunications failures, break-ins, war, riots, terrorist attacks or similar events. Any of the foregoing events may give rise to interruptions, breakdowns, system failures, technology platform failures or internet failures, which could cause the loss or corruption of data or malfunctions of software or hardware as well as adversely affect our ability to provide services.

Risks Related to Our Intellectual Property, Information Technology and Data Privacy

We may become subject to litigation brought by third parties claiming infringement, misappropriation or other violation by us of their intellectual property rights.

The industry in which our business operates is characterized by a large number of patents, some of which may be of questionable scope, validity or enforceability, and some of which may appear to overlap with other issued patents. As a result, there is a significant amount of uncertainty in the industry regarding patent protection and infringement. In recent years, there has been significant litigation globally involving patents and other intellectual property rights. Third parties have asserted, and may in the future assert, that we have infringed, misappropriated or otherwise violated their intellectual property rights. We have received letters from third parties that identify patents owned by third parties and invite us to obtain licenses to such patents. We work with patent counsel to evaluate the merits of their claims and sometimes we may decide to engage in licensing discussions. We may not be able to obtain a commercially reasonable license or a license that we obtain (if any) may not entirely resolve the potential risks of intellectual property infringement. As we face increasing competition and as a public company, the possibility of intellectual property rights claims against us grows. Such claims and litigation may involve one or more of our competitors focused on using their patents and other intellectual property to obtain competitive advantage, or patent holding companies or other adverse intellectual property rights holders who have no relevant product revenue, and therefore our own pending patents and other intellectual property rights may provide little or no deterrence to these rights holders in bringing intellectual property rights claims against us. There may be intellectual property rights held by others, including issued or pending patents and trademarks, that cover significant aspects of our technologies or business methods, and we cannot assure that we are not infringing or violating, and have not infringed or violated, any third-party intellectual property rights or that we will not be held to have done so or be accused of doing so in the future. In addition, because patent applications can take many years until the patents issue, there may be applications now pending of which we are unaware, which may later result in issued patents that our products may infringe. We expect that in the future we may receive notices that claim we or our collaborators have misappropriated or misused other parties' intellectual property rights, particularly as the number of competitors in our market grows.

To defend ourselves against any intellectual property claims brought by third parties, whether with or without merit, can be time-consuming and could result in substantial costs and a diversion of our resources. These claims and any resulting lawsuits, if resolved adversely to us, could subject us to significant liability for damages, impose temporary or permanent injunctions against our products, technologies or business operations, or invalidate or render unenforceable our intellectual property.

If our technology is determined to infringe a valid and enforceable patent, or if we wish to avoid potential intellectual property litigation on any alleged infringement, misappropriation, or other violation of third party intellectual property rights, we may be required to do one or more of the following: (i) cease development, sales, or use of our products that incorporate or use the asserted intellectual property right; (ii) obtain a license from the owner of the asserted intellectual property right, which may be unavailable on commercially reasonable terms, or at all, or which may be non-exclusive, thereby giving our competitors and other third parties access to the same technologies licensed to us; (iii) pay substantial royalties or other damages; or (iv) redesign our technology or one or more aspects or systems of our L4 autonomous semi-trucks to avoid any infringement or allegations thereof. The aforementioned options sometimes may not be commercially feasible. Additionally, in our ordinary course of business, we agree to indemnify our users, partners, and other commercial counterparties for any infringement arising out of their use of our intellectual property, along with providing standard indemnification provisions, so we may face liability to our users, business partners, or third parties for indemnification or other remedies in the event that they are sued for infringement.

We may also in the future license third party technology or other intellectual property, and we may face claims that our use of such in-licensed technology or other intellectual property infringes, misappropriates or otherwise violates the intellectual property rights of others. In such cases, we will seek indemnification from our licensors. However, our rights to indemnification may be unavailable or insufficient to cover our costs and losses.

We also may not be successful in any attempt to redesign our technology to avoid any alleged infringement. A successful claim of infringement against us, or our failure or inability to develop and implement non-infringing technology, or license the infringed technology on acceptable terms and on a timely basis, could materially adversely affect our business and results of operations. Furthermore, such lawsuits, regardless of their success, would likely be time-consuming and expensive to resolve and would divert management's time and attention from our business, which could seriously harm our business. Also, such lawsuits, regardless of their success, could seriously harm our reputation with users and in the industry at large.

Our business may be adversely affected if we are unable to adequately establish, maintain, protect, and enforce our intellectual property and proprietary rights or prevent third parties from making unauthorized use of our technology and other intellectual property rights.

Our intellectual property is an essential asset of our business. Failure to adequately protect our intellectual property rights could result in our competitors offering similar products, potentially resulting in the loss of our competitive advantage, and a decrease in our revenue which would adversely affect our business prospects, financial condition, and operating results. Our success depends, at least in part, on our ability to protect our core technology and intellectual property. We rely on a combination of intellectual property rights, such as patents, trademarks, copyrights, and trade secrets (including know-how), in addition to employee and third-party nondisclosure agreements, intellectual property licenses, and other contractual rights, to establish, maintain, protect, and enforce our rights in our technology, proprietary information, and processes. Intellectual property laws and our procedures and restrictions provide only limited protection and any of our intellectual property rights may be challenged, invalidated, circumvented, infringed or misappropriated. If we fail to protect our intellectual property rights adequately, we may lose an important advantage in the markets in which we compete. While we take measures to protect our intellectual property, such efforts may be insufficient or ineffective, and any of our intellectual property rights may be challenged, which could result in them being narrowed in scope or declared invalid or unenforceable. Other parties may also independently develop technologies that are substantially similar or superior to ours. We also may be forced to bring claims against third parties, or defend claims that they may bring against us, to determine the ownership of what we regard as our intellectual property. However, the measures we take to protect our intellectual property from unauthorized use by others may not be effective and there can be no assurance that our intellectual property rights will be sufficient to protect against others offering products, services, or technologies that are substantially similar or superior to ours and that compete with our business.

Litigation may be necessary in the future to enforce our intellectual property rights and to protect our trade secrets. Our efforts to enforce our intellectual property rights may be met with defenses, counterclaims, and countersuits attacking the validity and enforceability of our intellectual property. Any litigation initiated by us concerning the violation by third parties of our intellectual property rights is likely to be expensive and time-consuming and could lead to the invalidation of, or render unenforceable, our intellectual property, or could otherwise have negative consequences for us. Furthermore, it could result in a court or governmental agency invalidating or rendering unenforceable our patents or other intellectual property rights upon which the suit is based. We will not be able to protect our intellectual property if we are unable to enforce our rights or if we do not detect unauthorized use of our intellectual property. Our inability to protect our proprietary technology against unauthorized copying or use, as well as any costly litigation or diversion of our management's attention and resources, could delay the introduction and implementation of new technologies, result in our substituting inferior or more costly technologies into our products or injure our reputation. Moreover, policing unauthorized use of our technologies, trade secrets, and intellectual property may be difficult, expensive, and time-consuming, particularly in foreign countries where the laws may not be as protective of intellectual property rights as those in the United States and where mechanisms for enforcement of intellectual property rights may be weak. If we fail to meaningfully establish, maintain, protect, and enforce our intellectual property and proprietary rights, our business, operating results, and financial condition could be adversely affected.

Changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

There are a number of recent changes to the patent laws that may have a significant impact on our ability to protect our technology and enforce our intellectual property rights. For example, the Leahy-Smith America Invents Act (the "AIA") enacted in September 2011, resulted in significant changes in patent legislation. An important change introduced by the AIA is that, as of March 16, 2013, the United States transitioned from a "first-to-invent" to a "first-to-file" system for deciding which party should be granted a patent when two or more patent applications are filed by different parties claiming the same invention. Under a "first-to-file" system, assuming the other requirements for patentability are met, the first inventor to file a patent application generally will be entitled to a patent on the invention regardless of whether another inventor had made the invention earlier. A third party that files a patent application in the USPTO after that date but before us could therefore be awarded a patent covering an invention of ours even if we made the invention before it was made by the third party. Circumstances could prevent us from promptly filing patent applications on our inventions.

The AIA also includes a number of significant changes that affect the way patent applications will be prosecuted and also may affect patent litigation. These include allowing third party submission of prior art to the USPTO during patent prosecution and additional procedures to attack the validity of a patent by USPTO administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in United States federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. The AIA and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

Further, the standards applied by the USPTO and foreign patent offices in granting patents are not always applied uniformly or predictably. For example, there is no uniform worldwide policy regarding patentable subject matter or the scope of claims allowable for business methods. As such, we do not know the degree of future protection that we will have on our technologies, products, and services. While we will endeavor to try to protect our technologies, products, and services with intellectual property rights such as patents, as appropriate, the process of obtaining patents is time-consuming, expensive, and sometimes unpredictable.

Additionally, the U.S. Supreme Court has ruled on several patent cases in recent years, such as *Impression Products, Inc. v. Lexmark International, Inc.*, *Association for Molecular Pathology v. Myriad Genetics, Inc.*, *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* and *Alice Corporation Pty. Ltd. v. CLS Bank International*, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the U.S. Congress, the federal courts, and the USPTO, the laws and regulations governing patents could change in unpredictable ways that could weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

Our patent applications may not issue as patents, which may have a material adverse effect on our ability to prevent others from commercially exploiting products similar to ours.

We cannot be certain that we are the first inventor of the subject matter to which we have filed a particular patent application, or if we are the first party to file such a patent application. If another party has filed a patent application covering the same subject matter as we have, we may not be entitled to the protection sought by the patent application. Further, the scope of protection of issued patent claims is often difficult to determine. As a result, we cannot be certain that the patent applications that we file will issue, or that our issued patents will be broad enough to protect our proprietary rights or otherwise afford protection against competitors with similar technology. In addition, the issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability. Our competitors may challenge or seek to invalidate our issued patents, or design around our issued patents, which may adversely affect our business, prospects, financial condition or operating results. Also, the costs associated with enforcing patents, confidentiality and invention agreements, or other intellectual property rights may make aggressive enforcement impracticable.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting, maintaining, defending, and enforcing patents and other intellectual property rights on our technology in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from using our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection or other intellectual property rights to develop their own products and may export otherwise infringing, misappropriating, or violating products to territories where we have patent or other intellectual property protection, but enforcement rights are not as strong as those in the United States. These products may compete with our technologies, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of some countries do not favor the enforcement of patents and other intellectual property rights, which could make it difficult for us to stop the infringement, misappropriation, or other violation of our intellectual property rights generally. Proceedings to enforce our intellectual property rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, and the damages or other remedies awarded, if any, may not be commercially meaningful.

Many countries, including European Union countries, India, Japan, and China, have compulsory licensing laws under which a patent owner may be compelled under specified circumstances to grant licenses to third parties. In addition, many countries limit the enforceability of patents against government agencies or government contractors. In those countries, we may have limited remedies if patents are infringed or if we are compelled to grant a license to a third party, which could materially diminish the value of those patents. This could limit our potential revenue opportunities. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license, which could adversely affect our business, financial condition, results of operations, and prospects.

In addition to patented technology, we rely on our unpatented proprietary technology, trade secrets, processes, and know-how.

We rely on proprietary information (such as trade secrets, know-how, and confidential information) to protect intellectual property that may not be patentable, or that we believe is best protected by means that do not require public disclosure. We generally seek to protect this proprietary information by entering into confidentiality agreements, or consulting, services, or employment agreements that contain non-disclosure and non-use provisions with our employees, consultants, contractors, scientific advisors, and third parties. However, we cannot guarantee that we have entered into such agreements with each party that has or may have had access to our trade secrets or proprietary information and, even if entered into, these agreements may be breached or may otherwise fail to prevent disclosure, third-party infringement or misappropriation of our proprietary information, may be limited as to their term and may not provide an adequate remedy in the event of unauthorized disclosure or use of proprietary information. We have limited control over the protection of trade secrets used by our third-party manufacturers and suppliers and could lose future trade secret protection if any unauthorized disclosure of such information occurs. In addition, our proprietary information may otherwise become known or be independently developed by our competitors or other third parties. To the extent that our employees, consultants, contractors, and other third parties use intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain protection for our proprietary information could adversely affect our competitive business position. Furthermore, laws regarding trade secret rights in certain markets where we operate may afford little or no protection to our trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor or other third party, we would have no right to prevent them from using that trade secret to compete with us. If any of our trade secrets were to be disclosed (whether lawfully or otherwise) to or independently developed by a competitor or other third party, it could have a material adverse effect on our business, operating results, and financial condition.

We also rely on physical and electronic security measures to protect our proprietary information, but we cannot guarantee that these security measures provide adequate protection for such proprietary information or will never be breached. There is a risk that third parties may obtain unauthorized access to and improperly utilize or disclose our proprietary information, which would harm our competitive advantages. We may not be able to detect or prevent the unauthorized access to or use of our information by third parties, and we may not be able to take appropriate and timely steps to mitigate the damages (or the damages may not be capable of being mitigated or remedied).

We utilize open source software, which may pose particular risks to our proprietary software, technologies, products, and services in a manner that could harm our business.

We use open source software in our products and services and anticipate using open source software in the future. Some open source software licenses require those who distribute open source software as part of their own software products to publicly disclose all or part of the source code to such software product or to make available any modifications or derivative works of the open source code on unfavorable terms or at no cost. This could result in our proprietary software being made available in the source code form and/or licensed to others under open source licenses, which could allow our competitors or other third parties to use our proprietary software freely without spending the development effort, and which could lead to a loss of the competitive advantage of our proprietary technologies and, as a result, sales of our products and services. The terms of many open source licenses to which we are subject have not been interpreted by U.S. or foreign courts, and there is a risk that open source software licenses could be construed in a manner that imposes unanticipated conditions or restrictions on our ability to provide or distribute our products or services or retain our ownership of our proprietary intellectual property. Additionally, we could face claims from third parties claiming ownership of, or demanding release of, the open source software or derivative works that we developed using such software, which could include our proprietary source code, or otherwise seeking to enforce the terms of, or alleging breach of, the applicable open source license. These claims could result in litigation and could require us to make our proprietary software source code freely available, purchase a costly license, or cease offering the implicated products or services unless and until we can re-engineer them to avoid breach of the applicable open source software licenses or potential infringement. This re-engineering process could require us to expend significant additional research and development resources, and we cannot guarantee that we will be successful.

Additionally, the use of certain open source software can lead to greater risks than use of third-party commercial software, as open source licensors generally do not provide warranties or controls on the origin of software. There is typically no support available for open source software, and we cannot ensure that the authors of such open source software will implement or push updates to address security risks or will not abandon further development and maintenance. Many of the risks associated with the use of open source software, such as the lack of warranties or assurances of title, non-infringement, or performance, cannot be eliminated, and could, if not properly addressed, negatively affect our business. We have processes to help alleviate these risks, including a review process for screening requests from our developers for the use of open source software, but we cannot be sure that all open source software is identified or submitted for approval prior to use in our products and services. Any of these risks could be difficult to eliminate or manage, and, if not addressed, could adversely affect our ownership of proprietary intellectual property, the security of our vehicles, or our business, results of operations, and financial condition.

If our software contains serious errors or defects, we may lose revenue and market acceptance and may incur costs to defend or settle claims with our licensees, franchisees or other parties.

Software inevitably contains errors, defects, security vulnerabilities or software bugs, some of which are difficult to detect and correct, particularly when first introduced or when new versions or enhancements are released. Despite internal testing, our software may contain serious errors or defects, security vulnerabilities or software bugs that we may be unable to successfully detect or correct in a timely manner or at all, which could result in security incidents, data breaches, vehicle safety issues, product liability claims, lost revenue, significant expenditures of capital, a delay or loss in market acceptance, and damage to our reputation and brand, any of which could adversely affect our business, results of operations, and financial condition.

We are exposed to, and may be adversely affected by, interruptions to our information technology systems and networks and sophisticated cyber-attacks.

We collect and maintain information in digital form that is necessary to conduct our business, and we rely on information technology systems and networks ("IT systems") in connection with many of our business activities. Some of these networks and systems are managed by third-party service providers and are not under our direct control, and as a result, a number of third-party service providers may or could have access to our confidential information. Our operations routinely involve receiving, storing, processing, and transmitting confidential or sensitive information pertaining to our business, users, dealers, suppliers, employees, and other sensitive matters, including intellectual property, proprietary business information, and personal information. It is critical that we do so in a secure manner to maintain the confidentiality and integrity of such confidential or sensitive information. We have established physical, electronic, and organizational measures designed to safeguard and secure our systems to prevent a data compromise, and rely on commercially available systems, software, tools, and monitoring to provide security for our IT systems and the processing, transmission, and storage of digital information. Despite the implementation of preventative and detective security controls, such IT systems are vulnerable to damage or interruption from a variety of sources, including telecommunications or network failures or interruptions, system malfunction, natural disasters, malicious human acts, terrorism, and war. Such IT systems, including our servers, are additionally vulnerable to physical or electronic break-ins, security breaches from inadvertent or intentional actions by our employees, third-party service providers, contractors, consultants, business partners, and/or other third parties, or from cyber-attacks by malicious third parties (including the deployment of harmful malware, ransomware, denial-of-service attacks, social engineering, and other means to affect service reliability and threaten the confidentiality, integrity, and availability of information).

We have experienced data breaches, cyber-attacks, attempts to breach our systems, and other similar incidents, none of which have been material. Any future cyber incidents could, however, materially disrupt operational systems, result in the loss of trade secrets or other proprietary or competitively sensitive information, compromise personally identifiable information regarding users or employees and jeopardize the security of our facilities. The risk of a security breach or disruption, particularly through cyber-attacks or cyber intrusion, including by computer hackers, foreign governments, and cyber terrorists, has generally increased as the number, intensity, and sophistication of attempted attacks and intrusions from around the world have increased. We can provide no assurance that our current IT Systems, or those of the third parties upon which we rely, are fully protected against cybersecurity threats. It is possible that we or our third-party service providers may experience cybersecurity and other breach incidents that remain undetected for an extended period. Even when a security breach is detected, the full extent of the breach may not be determined immediately. Because techniques used to obtain unauthorized access or to sabotage systems change frequently and generally are not recognized until they are launched against a target, we may be unable to anticipate these techniques or to implement adequate preventative measures. Information technology security threats, including security breaches, computer malware, and other cyber-attacks are increasing in both frequency and sophistication and could cause us to incur financial liability, subject us to legal or regulatory sanctions or damage our reputation with users, dealers, suppliers, and other stakeholders. We continuously seek to maintain information security and controls, however our efforts to mitigate and address network security problems, bugs, viruses, worms, malicious software programs, and security vulnerabilities may not be successful and the impact of a material cybersecurity event could have a material adverse effect on our competitive position, reputation, results of operations, financial condition, and cash flows.

Unauthorized control or manipulation of systems in autonomous semi-trucks may cause them to operate improperly or not at all, or compromise their safety and data security, which could result in loss of confidence in us and our products, cancellation of contracts with certain of our OEM or Tier 1 partners and harm our business.

There have been reports of vehicles of certain OEMs being “hacked” to grant access to and operation of such vehicles to unauthorized persons. Our L4 autonomous semi-trucks contain complex IT systems and are designed with built-in data connectivity. We have designed, implemented, and tested security measures intended to prevent unauthorized access to our information technology networks and systems installed in our L4 autonomous semi-trucks. However, hackers may attempt to gain unauthorized access to modify, alter, and use such networks and systems to gain control of, or to change, our semi-trucks’ functionality, user interface and performance characteristics, or to gain access to data stored in or generated by our products. As techniques used to obtain unauthorized access to or sabotage systems change frequently and may not be known until launched against us or our third-party service providers, there can be no assurance that we will be able to anticipate, or implement adequate measures to protect against, these attacks. Any such security incidents could result in unexpected control of or changes to the vehicles’ functionality and safe operation and could result in legal claims or proceedings and negative publicity, which would negatively affect our brand and harm our business, prospects, financial condition, and operating results.

We collect, process, transmit, and store personal information in connection with the operation of our business and are subject to various data privacy and consumer protection laws. The costs to comply with, or our actual or perceived failure to comply with, changing U.S. and foreign laws related to data privacy, security, and protection, such as the California Consumer Privacy Act and the E.U. General Data Protection Regulation, or contractual obligations related to data privacy, security, and protection, could adversely affect our financial condition, operating results, and our reputation.

In operating our business and providing services and solutions to clients, we collect, use, store, transmit, and otherwise process employee, partner, and client data, including personal data, in and across multiple jurisdictions. We use the electronic systems of our L4 autonomous semi-trucks to log information about each semi-truck’s use in order to aid us in vehicle diagnostics, repair, and maintenance, as well as to help us collect data regarding drivers’ use patterns and preference in order to help us customize and optimize the driving and riding experiences. Our L4 autonomous semi-trucks also collect personal information of drivers and passengers, such as a voice command of a person, in order to aid the manual operation of our semi-trucks. When our L4 autonomous semi-trucks are in operation, the camera, LiDAR, and other sensing components of our semi-trucks will collect street view, mapping data, landscape images, and other LiDAR information, which may include personal information such as license plate numbers of other vehicles, facial features of pedestrians, appearance of individuals, GPS data, and geolocation data, in order to train the data analytics and artificial intelligence technology equipped in our semi-trucks for the purpose of identifying different objects, and predicting potential issues that may arise during the operation of our semi-trucks.

We leverage systems and applications that are spread over the United States, China, and Sweden, requiring us to regularly move data across national borders. As a result, we are subject to a variety of laws and regulations in the United States, China, the European Union, and other foreign jurisdictions as well as contractual obligations, regarding data privacy, protection, and security. Some of these laws and regulations require obtaining data subjects' consent to the collection and use of their data, honoring data subjects' request to delete their data or limit the processing of their data, providing notifications in the event of a data breach, and setting up the proper legal mechanisms for cross-border data transfers. Some users may refuse to provide consent to our collection and use of their personal information, or may restrict our use of such personal information, and in some cases it is not feasible to obtain consent from data subjects in the general public whose personal information may be captured by our L4 autonomous semi-trucks, all of which may hinder our ability to train our data analytics and artificial intelligence technology, and may harm the competitiveness of our technology. In many cases, these laws and regulations apply not only to the collection and processing of personal information from third parties with whom we do not have any contractual relationship, but also to the sharing or transfer of information between or among us, our subsidiaries and other third parties with which we have commercial relationships, such as our service providers, partners, and clients. The regulatory framework for data privacy, protection, and security worldwide is continuously evolving and developing and, as a result, interpretation and implementation standards and enforcement practices are likely to remain uncertain for the foreseeable future. In particular, some of these laws and regulations may require us to store certain categories of data collected from individuals residing in a jurisdiction only on servers physically located in such jurisdiction, and may further require us to conduct security assessments and/or adopt other cross-border data transfer mechanisms in order to transfer such data outside of such jurisdiction. With the continuously evolving and rapidly changing privacy regulatory regime, our ability to freely transfer data among our affiliates and with our partners in different jurisdictions may be impeded, or we may need to incur significant costs in order to comply with such requirements. In addition, the number of high-profile data breaches at major companies continues to accelerate, which will likely lead to even greater regulatory scrutiny.

The scope and interpretation of the laws and regulations that are or may be applicable to us are often uncertain and may be conflicting, particularly with respect to foreign laws. For example, the EU General Data Protection Regulation (the "GDPR"), which became effective in May 2018, greatly increased the European Commission's jurisdictional reach of its laws and added a broad array of requirements for handling personal data with respect to EU data subjects. EU member states are tasked under the GDPR to enact, and have enacted, certain implementing legislation that adds to and/or further interprets the GDPR requirements and potentially extends our obligations and potential liability for failing to meet such obligations. The GDPR, together with national legislation, regulations and guidelines of the EU member states and the United Kingdom governing the processing of personal data, impose strict obligations and restrictions on the ability to collect, use, retain, protect, disclose, transfer, and otherwise process personal data with respect to EU and UK data subjects. In particular, the GDPR includes obligations and restrictions concerning the consent and rights of individuals to whom the personal data relates, the transfer of personal data out of the EU or the United Kingdom, security breach notifications and the security and confidentiality of personal data. Among other stringent requirements, the GDPR restricts transfers of data outside of the EU to third countries deemed to lack adequate privacy protections (such as the U.S.), unless an appropriate safeguard specified by the GDPR is implemented. A July 16, 2020 decision of the Court of Justice of the European Union invalidated a key mechanism for lawful data transfer to the U.S. and called into question the viability of its primary alternative. As such, the ability of companies to lawfully transfer personal data from the EU to the U.S. is presently uncertain. Other countries have enacted or are considering enacting similar cross-border data transfer rules or data localization requirements. These developments could limit our ability to launch our products in the EU and other foreign markets. The GDPR authorizes fines for certain violations of up to 4% of global annual revenue or €20 million, whichever is greater. Such fines are in addition to any civil litigation claims by data subjects. Much remains unknown with respect to how to interpret and implement the GDPR and guidance on implementation and compliance practices is often updated or otherwise revised. Given the breadth and depth of changes in data protection obligations, including classification of data and our commitment to a range of administrative, technical and physical controls to protect data and enable data transfers outside of the EU and the United Kingdom, our compliance with the GDPR's requirements will continue to require time, resources and review of the technology and systems we use to satisfy the GDPR's requirements, including as EU member states enact their legislation. Further, while the United Kingdom enacted the Data Protection Act 2018 in May 2018 that supplements the GDPR, and has publicly announced that it will continue to regulate the protection of personal data in the same way post-Brexit, Brexit has created uncertainty with regard to the future of regulation of data protection in the United Kingdom.

The implementation of the GDPR has led other jurisdictions to amend, or propose legislation to amend, their existing data protection laws to align with the requirements of the GDPR, with the aim of obtaining an adequate level of data protection to facilitate the transfer of personal data to most jurisdictions from the EU. Accordingly, the challenges we face in the EU will likely also apply to other jurisdictions outside the EU that adopt laws similar in construction to the GDPR or regulatory frameworks of equivalent complexity. For example, the U.S., Brazil, the Cayman Islands, China, India, and Japan have also proposed or adopted sweeping new data protection laws, in some cases including data localization laws that will require that personal data stay within their borders.

The U.S. federal government and various states and governmental agencies also have adopted or are considering adopting various laws, regulations, and standards regarding the collection, use, retention, security, disclosure, transfer, and other processing of sensitive and personal information. In addition, many states in which we operate have laws that protect the privacy and security of sensitive and personal information. Certain state laws may be more stringent or broader in scope, or offer greater individual rights, with respect to sensitive and personal information than federal, international, or other state laws, and such laws may differ from each other, which may complicate compliance efforts. For example, California enacted the California Consumer Privacy Act of 2018 (the “CCPA”) on June 28, 2018, which came into effect on January 1, 2020. The CCPA creates individual privacy rights for California residents and increases the privacy and security obligations of entities handling personal data of California consumers and meeting certain thresholds. Failure to comply with the CCPA may result in attorney general enforcement action and damage to our reputation. The CCPA provides for civil penalties for violations, as well as a private right of action for data breaches that result in the loss of certain types of personal information. This private right of action may increase the likelihood of, and risks associated with, class action data breach litigation. In addition, the CCPA’s restrictions on “sales” of personal information may restrict our use of cookies and similar tracking technologies for advertising purposes. To the extent the CCPA applies to us, it will increase our compliance costs and potential liability. In addition, many similar laws have been proposed at the federal level and in other states. For instance, the state of Nevada recently enacted a law that went into force on October 1, 2019 and requires companies to honor consumers’ requests to no longer sell their data. Violators may be subject to injunctions and civil penalties of up to \$5,000 per violation. New legislation proposed or enacted in Illinois, Massachusetts, New Jersey, New York, Rhode Island, Washington, and other states, and a proposed right to privacy amendment to the Vermont Constitution, imposes, or has the potential to impose, additional obligations on companies that collect, store, use, retain, disclose, transfer, and otherwise process confidential, sensitive, and personal information, and will continue to shape the data privacy environment throughout the United States. State laws are changing rapidly and there is discussion in Congress of a new federal data protection and privacy law to which we would become subject if it is enacted. All of these evolving compliance and operational requirements impose significant costs that are likely to increase over time, may require us to modify our data processing practices and policies, and may divert resources from other initiatives and projects. Furthermore, non-compliance with data privacy laws and regulations, or a major breach of our network security and systems, could have serious negative consequences for our business and future prospects, including possible fines, penalties, and damages, reduced customer demand for our L4 autonomous semi-trucks, and harm to our reputation and brand, all of which may have a material and adverse impact on our business, financial condition, and operating results.

We outsource important aspects of the storage, processing, and transmission of personal information, and thus rely on third parties to manage functions that have material cybersecurity risks. In an attempt to address these risks, we may require third-party service providers who handle personal information to sign confidentiality agreements or data processing agreements (if required by applicable data privacy laws), which would contractually require them to safeguard personal information to the same extent that applies to us, and in some cases we require such service providers to complete information security questionnaires, quality verification questionnaires, or undergo third-party security examinations or provide data security certifications or security audit results. In addition, we periodically hire third-party security experts to assess and test our security posture. However, we cannot assure that these contractual measures and other safeguards will adequately protect us from the risks associated with the storage and transmission of the personal information of our users, employees, drivers, and passengers.

Many statutory requirements include obligations for companies to notify individuals of security breaches involving certain personal information, which could result from breaches experienced by us or our third-party service providers. For example, laws in all 50 U.S. states and the District of Columbia require businesses to provide notice to consumers whose personal information has been disclosed as a result of a data breach. These laws are not consistent, and compliance in the event of a widespread data breach is difficult and may be costly. Moreover, states have been frequently amending existing laws, requiring attention to changing regulatory requirements. We also may be contractually required to notify users or other counterparties of a security breach. Although we may have contractual protections with our third-party service providers, contractors, and consultants, any actual or perceived security breach could harm our reputation and brand, expose us to potential liability or require us to expend significant resources on data security and in responding to any such actual or perceived breach. Any contractual protections we may have from our third-party service providers, contractors or consultants may not be sufficient to adequately protect us from any such liabilities and losses, and we may be unable to enforce any such contractual protections.

In China, the PRC Cyber Security Law became effective on June 1, 2017. The Cyber Security Law reaffirms the basic principles and requirements specified in other existing laws and regulations on personal information protection, such as requirements on the collection, use, processing, storage, and disclosure of personal information. Specifically, it requires that network operators take technical measures and other necessary measures in accordance with applicable laws and regulations and the compulsory requirements of the national and industrial standards to safeguard the safe and stable operation of its networks, maintain the integrity, confidentiality, and availability of network data, take technical and other necessary measures to ensure the security of the personal information they have collected against unauthorized access, alteration, disclosure, or loss, and formulate contingency plans for network security incidents and remediation measures. It also requires a subset of network operators that meet certain thresholds to be critical information infrastructure operators (“CIIO”) to store personal information and important data collected and generated during its operation within the territory of China locally on servers in China. The interpretation of what network operators are qualified as CIIOs is unclear. If we are deemed to be a CIIO, we would become subject to additional requirements applicable to CIIOs. Any violation of the Cyber Security Law may subject a network operator to warnings, fines, confiscation of illegal gains, revocation of licenses, cancellation of filings, shutdown of websites, or criminal liabilities.

In addition to government regulation, privacy advocates and industry groups have and may in the future propose self-regulatory standards from time to time. These and other industry standards may legally or contractually apply to us, or we may elect to comply with such standards. We expect that there will continue to be new proposed laws and regulations concerning data privacy and security, and we cannot yet determine the impact such future laws, regulations, and standards may have on our business. New laws, amendments to or re-interpretations of existing laws, regulations, standards, and other obligations may require us to incur additional costs and restrict our business operations. Because the interpretation and application of laws, regulations, standards, and other obligations relating to data privacy and security are still uncertain, it is possible that these laws, regulations, standards, and other obligations may be interpreted and applied in a manner that is inconsistent with our data processing practices and policies or the features of our products and services. If so, in addition to the possibility of fines, lawsuits, regulatory investigations, public censure, other claims and penalties and significant costs for remediation and damage to our reputation, we could be required to fundamentally change our business activities and practices, which could adversely affect our business. We may be unable to make such changes and modifications in a commercially reasonable manner, or at all. Any inability to adequately address data privacy or security-related concerns, even if unfounded, or to comply with applicable laws, regulations, standards, and other obligations relating to data privacy and security, could result in additional cost and liability to us, harm our reputation and brand, damage our relationship with important clients, and affect our financial condition, operating results, and our reputation.

We make public statements about our use and disclosure of personal information through our privacy policy, information provided on our website and press statements. Also, we enter into contracts with third parties (such as our partners and clients) that contain provisions regarding the collection, sharing, and processing of personal information. Although we endeavor to comply with our public statements and documentation as well as our contractual and other privacy-related obligations, we may at times fail to do so or be alleged to have failed to do so. The publication of our privacy policy and other statements that provide promises and assurances about data privacy and security can subject us to potential government or legal action if they are found to be deceptive, unfair or misrepresentative of our actual practices. In addition, from time to time, concerns may be expressed about whether our products and services compromise the privacy of clients and others. Any concerns about our data privacy and security practices (even if unfounded), or any failure, real or perceived, by us to comply with our posted privacy policies, contractual obligations, or any legal or regulatory requirements, standards, certifications, or orders, or other privacy or consumer protection-related laws and regulations applicable to us, could cause our clients to reduce their use of our L4 autonomous semi-trucks and could affect our financial condition, operating results, and our reputation, and may result in governmental or regulatory investigations, enforcement actions, regulatory fines, criminal compliance orders, litigation, breach of contract claims, or public statements against us by government regulatory authorities, our partners and/or clients, data subjects, consumer advocacy groups, or others, all of which could be costly and have an adverse effect on our business.

Furthermore, enforcement actions and investigations by regulatory authorities related to data security incidents and privacy violations continue to increase. Non-compliance could result in proceedings against us by data protection authorities, governmental entities or others, including class action privacy litigation in certain jurisdictions, which would subject us to significant fines, penalties, judgments, and negative publicity, and may otherwise affect our financial condition, operating results, and our reputation. Given the complexity of operationalizing the GDPR and other data privacy and security laws and regulations to which we are subject, the maturity level of proposed compliance frameworks and the relative lack of guidance in the interpretation of the numerous requirements of the GDPR and other data privacy and security laws and regulations to which we are subject, we may not be able to respond quickly or effectively to regulatory, legislative, and other developments, and these changes may in turn impair our ability to offer our existing or planned products and services and/or increase our cost of doing business. In addition, if our practices are not consistent or viewed as not consistent with legal and regulatory requirements, including changes in laws, regulations, and standards or new interpretations or applications of existing laws, regulations and standards, we may become subject to audits, inquiries, whistleblower complaints, adverse media coverage, investigations, loss of export privileges, or severe criminal or civil sanctions, all of which may affect our financial condition, operating results, and our reputation. Unauthorized access or disclosure of personal or other sensitive or confidential data of Company (including data about third parties which the Company possesses), whether through systems failure, employee negligence, fraud, or misappropriation, by the Company, our service providers or other parties with whom we do business (if they fail to meet the standards we impose, or if their systems on which our data is stored experience any data breaches or security incidents) could also subject us to significant litigation, monetary damages, regulatory enforcement actions, fines, and criminal prosecution in one or more jurisdictions.

Risks Related to Regulations

Our business may be adversely affected by changes in automotive safety regulations or concerns that drive further regulation of the automobile safety market.

Government vehicle safety regulations have a substantial impact on our business, prospects, and our future plans. Government safety regulations are subject to change based on a number of factors that are not within our control, including new scientific or technological data, adverse publicity regarding industry recalls and safety risks associated with autonomous driving technology, accidents involving autonomous vehicles, domestic and foreign political developments or considerations, and litigation relating to autonomous vehicles. Changes in government regulations, especially in autonomous driving and the freight industry could adversely affect our business. If government priorities shift and we are unable to adapt to changing regulations, our business may be materially and adversely affected.

The costs of complying with safety regulations could increase as regulators impose more stringent compliance and reporting requirements in response to product recalls and safety issues in the automotive industry. As the semi-trucks that carry our systems go into production, we will be subject to existing stringent requirements under the National Traffic and Motor Vehicle Safety Act of 1966 (the “Vehicle Safety Act”), including a duty to report, subject to strict timing requirements, safety defects. The Vehicle Safety Act imposes potentially significant civil penalties for violations including the failure to comply with such reporting actions. We are also subject to the existing U.S. Transportation Recall Enhancement, Accountability and Documentation Act (the “TREAD Act”), which requires motor vehicle equipment manufacturers, such as us, to comply with “Early Warning” requirements by reporting certain information to the National Highway Traffic Safety Administration (the “NHTSA”) such as information related to defects or reports of injury. The TREAD Act imposes criminal liability for violating such requirements if a defect subsequently causes death or bodily injury. In addition, the National Traffic and Motor Vehicle Safety Act authorizes NHTSA to require a manufacturer to recall and repair vehicles that contain safety defects or fail to comply with U.S. federal motor vehicle safety standards. Sales into foreign countries may be subject to similar regulations. If we cannot rapidly address any safety concerns or defects with our products, our business, results of operations, and financial condition will be adversely affected.

The U.S. Department of Transportation issued regulations in 2016 that require manufacturers of certain autonomous vehicles to provide documentation covering specific topics to regulators, such as how automated systems detect objects on the road, how information is displayed to drivers, what cybersecurity measures are in place and the methods used to test the design and validation of autonomous driving systems. If the obligations associated with complying with safety regulations increase it may require increased resources, divert management’s attention, and adversely affect our business.

We are subject to substantial regulations, including regulations governing autonomous vehicles, and unfavorable changes to, or failure by us to comply with, these regulations could substantially harm our business and operating results.

Our L4 autonomous semi-trucks are subject to substantial regulation under international, federal, state, and local laws. Regulations designed to govern autonomous vehicle operation, testing and/or manufacture are still developing and may change significantly. These regulations could include requirements that significantly delay or narrowly limit the commercialization of autonomous vehicles, limit the number of autonomous vehicles that we can manufacture or use on our platform, impose restrictions on the number of vehicles in operation and the locations where they may be operated or impose significant liabilities on manufacturers or operators of autonomous vehicles or developers of autonomous vehicle technology. If regulations of this nature are implemented, we may not be able to commercialize our autonomous vehicle technology in the manner we expect, or at all. In addition, the costs of complying with such regulations could be prohibitive and prevent us from operating our business in the manner we intend.

Further, we are subject to international, federal, state, and local laws and regulations governing pollution, protection of the environment, and occupational health and safety, including those related to the use, generation, storage, management, discharge, transportation, disposal, and release of, and human exposure to, hazardous and toxic materials. Such laws and regulations have tended to become more stringent over time.

Fines, penalties, costs or liabilities associated with such existing or new regulations or laws, including as a result of our failure to comply, could be substantial and in certain cases joint and several, and could adversely impact our business, prospects, financial condition, and operating results.

Risks Related to Our International Operations

We face risks associated with our international operations, including unfavorable regulatory, political, tax, and labor conditions, which could harm our business.

While we currently have much of our operations in the United States, we still face risks associated with our current and future international operations. We have international operations in China and subsidiaries in China, Hong Kong, and Japan that are subject to the legal, political, regulatory, and social requirements, and economic conditions in these jurisdictions. Additionally, as part of our long-term growth strategy, we intend to expand our services into other international locations. We are and will be subject to a number of risks associated with international business activities that may increase our costs, impact our ability to expand on a global basis, and require significant management attention. These risks include:

- conforming the semi-trucks equipped with our autonomous technology to various international regulatory requirements as applicable;
- difficulty in staffing and managing foreign operations;
- difficulties attracting users in new jurisdictions;
- differing driving and traffic behavior and road designs and infrastructure in a range of countries, which could delay our ability to enter and expand in different markets;
- foreign government taxes, regulations, and permit requirements;
- fluctuations in foreign currency exchange rates and interest rates;
- United States and foreign government trade restrictions, tariffs, and price or exchange controls;
- compliance by us and our business partners with import and export control laws, tariffs, trade barriers, economic sanctions, and other regulatory limitations on our ability to provide our services and products in certain international markets;
- compliance with U.S. and foreign anti-bribery laws including the Foreign Corrupt Practices Act and the U.K. Anti-Bribery Act, violations of which could lead to significant fines, penalties, and collateral consequences for our company;
- difficulty in attracting, recruiting, and retaining talent internationally;
- foreign labor laws, regulations, and restrictions;
- changes in diplomatic and trade relationships;
- political instability, natural disasters, war or events of terrorism; and
- the strength of international economies.

If we fail to successfully address these risks, our business, prospects, operating results and financial condition could be materially harmed.

Changes to trade policy, tariffs, and import/export regulations may have a material adverse effect on our business, financial condition, and results of operations.

Changes in global political, regulatory and economic conditions, or in laws and policies governing foreign trade, manufacturing, development, and investment in the territories or countries where we currently purchase components, seek to offer our services, or conduct our business, could adversely affect our business. The United States has recently instituted or proposed changes in trade policies that include the negotiation or termination of trade agreements, the imposition of higher tariffs on imports into the United States, economic sanctions on individuals, corporations or countries, and other government regulations affecting trade between the United States and other countries. A number of other nations have proposed or instituted similar measures directed at trade with the United States in response. As a result of these developments, there may be greater restrictions and economic disincentives on international trade that could adversely affect our business. For example, such changes could adversely affect the automotive market and our ability to access key components. It may be time-consuming and expensive for us to alter our business operations to adapt to or comply with any such changes, and any failure to do so could have a material adverse effect on our business, financial condition and results of operations.

As we expand our operations to international markets, we may become subject to various restrictions under U.S. export control laws and regulations, including the U.S. Department of Commerce's Export Administration Regulations (EAR). The U.S. export control laws include restrictions or prohibitions on the sale or supply of certain products and services to U.S. embargoed or sanctioned countries, governments, persons, and entities, and also require authorization for the export of certain products using encryption technology. In addition, various countries regulate the import of certain artificial intelligence technology, including through import permitting and licensing requirements and have enacted or could enact laws that could limit our ability to distribute our services in those countries. Changes in our offerings, technologies, or semi-trucks, or changes in export and import laws, may delay the introduction and growth of our business in international markets, prevent our users with international operations from using our services or, in some cases, prevent the access or use of our services to and from certain countries, governments, persons, or entities altogether. Further, any change in export or import regulations or related laws, shift in the enforcement or scope of existing regulations, or change in the countries, governments, persons, or technology targeted by such regulations could result in decreased use of our services or in our decreased ability to export or sell our services to existing or potential users with international operations. Any decreased use of our services or products or limitation on our ability to export or sell our services or products would likely harm our business.

Investments in us have been and may be subject to U.S. foreign investment regulations which may impose conditions or limitations on certain investors (including, but not limited to, limits on purchasing our Common Stock, limits on information sharing with such investors, requiring a voting trust, governance modifications, forced divestiture, or other measures).

Certain investments that involve the acquisition of, or investment in, a U.S. business may be subject to review and approval by the Committee on Foreign Investment in the United States ("CFIUS" or the "Committee"), depending on the structure, beneficial ownership and control of interests in the U.S. business. CFIUS is a committee comprised of multiple U.S. government agencies, led by the Department of the Treasury, authorized to review and investigate certain transactions in which a foreign person acquires an interest in a U.S. business (including certain minority investments) in order to determine the effect of such transactions on the national security of the United States. Investments that result in control of a U.S. business by a foreign person are subject to CFIUS jurisdiction. Significant CFIUS reform legislation, which was fully implemented through regulations that became effective on February 13, 2020, among other things expanded the scope of CFIUS's jurisdiction to investments that do not result in control of a U.S. business by a foreign person but afford certain foreign investors certain information or governance rights in a U.S. business that has a nexus to "critical technologies," "critical infrastructure" and/or "sensitive personal data." Moreover, other countries continue to strengthen their own foreign investment clearance ("FIC") regimes, and investments and transactions outside of the U.S. may be subject to review by non-U.S. FIC regulators if such investments are perceived to implicate national security policy priorities. Any review and approval of an investment or transaction by CFIUS or another FIC regulator may have outsized impacts on transaction certainty, timing, feasibility, and cost, among other things. CFIUS and other FIC regulatory policies and practices are rapidly evolving, and in the event that CFIUS or another FIC regulator reviews one or more proposed or existing investment by investors in us, there can be no assurances that such investors will be able to maintain, or proceed with, such investments on terms acceptable to such investors. CFIUS has or another FIC regulator may seek to impose limitations or restrictions on, or prohibit, investments by such investors (including, but not limited to, limits on purchasing our Common Stock, limits on information sharing with such investors, requiring a voting trust, governance modifications, or forced divestiture, among other things).

On March 1, 2021, the CFIUS Staff Chairperson, acting at the direction of the Committee, requested that we file a written notice regarding the 2017 purchase of shares of our Series B redeemable convertible preferred stock by Sun Dream Inc., an affiliate of Sina Corporation (the "Sina Investment"). CFIUS formally accepted our notice, which was filed jointly with Sina Corporation.

After accepting our jointly filed notice, the Committee informed us that the transaction that is the subject of its review (the "2017 Transaction") is the 2017 acquisition of the U.S. business of TuSimple LLC by Tusimple (Cayman) Limited, rather than the Sina Investment.

On February 18, 2022, the Committee concluded its review of the 2017 Transaction and determined that there are no unresolved national security concerns.

As part of the resolution, on February 18, 2022, the Company entered into a National Security Agreement (“NSA”) with the U.S. government under which it has agreed to limit access to certain data and adopt a technology control plan, appoint a security officer and a security director, establish a government security committee of the board of directors of the Company to be chaired by the security director, and periodically meet with and report to certain CFIUS monitoring agencies. In addition, current directors of the Company representing Sun Dream Inc., one of our stockholders, have agreed that they will not stand for re-election to the board of directors of the Company upon expiration of their current terms, and Sun Dream, Inc. has agreed that it will not nominate replacement candidates or increase its current shareholdings in the Company.

Risks Related to Our Class A Common Stock

The dual class structure of our common stock has the effect of concentrating voting control with certain stockholders, in particular, our Founders, which will limit your ability to influence the outcome of important transactions, including a change in control.

Our Class B common stock has ten votes per share, and our Class A common stock has one vote per share. Our Founders, Mo Chen and Xiaodi Hou, are the only holders of our shares of Class B common stock and, as of December 31, 2021, together hold approximately 59% of the voting power of the outstanding common stock. Because of the ten-to-one voting ratio between Class B and Class A common stock, our Founders will continue to control a majority of the combined voting power of our common stock and therefore be able to control all matters submitted to our stockholders for approval so long as the shares of Class B common stock represent at least 50% of all outstanding voting power of our Class A and Class B common stock. This concentrated control will limit or preclude your ability to influence corporate matters for the foreseeable future.

Future transfers of Class B common stock by our Founders will generally result in those shares converting to Class A common stock, subject to limited exceptions, including the ability of each of our Founders to grant their voting proxy with respect to their Class B common stock to the other Founder. In addition, each share of our Class B common stock will automatically convert, on a one-for-one basis, into shares of Class A common stock on the earliest of (i) the date specified by a vote of the holders of Class B common stock representing 75% of the outstanding shares of Class B common stock, (ii) the date that is between 90 days and 270 days, as determined by the board of directors, after the death or incapacitation of the last Founder to die or become incapacitated or (iii) the date that is between 61 and 180 days, as determined by the board of directors, after the date on which the number of outstanding shares of Class B common stock held by the Founders (or their permitted affiliates) represents less than 50% of the total number of shares of Class B common stock held collectively by the Founders (or their permitted affiliates) at 11:59 pm Pacific Time on April 19, 2021. For a description of the dual class structure, see the section titled “Common Stock” within Exhibit 4.1 to this Annual Report on Form 10-K.

The dual class structure of our common stock may adversely affect the trading market for our Class A common stock.

Our dual class structure, combined with the concentrated control of our Founders, directors, officers and employees and their affiliates, may result in a lower or more volatile market price of our Class A common stock or in adverse publicity or other adverse consequences. For example, certain index providers have announced restrictions on including companies with multiple class share structures in certain of their indexes. In July 2017, FTSE Russell and Standard & Poor’s announced that they would cease to allow most newly public companies utilizing dual or multi-class capital structures to be included in their indices. Under the announced policies, our dual class capital structure would make us ineligible for inclusion in any of these indices. Given the sustained flow of investment funds into passive strategies that seek to track certain indexes, exclusion from stock indexes would likely preclude investment by many of these funds and could make our Class A common stock less attractive to other investors. As a result, the market price of our Class A common stock could be adversely affected.

Prior to the listing of our Class A common stock, there was no public market for our Class A common stock. Since our IPO in April 2021, the stock price of our Class A common stock has experienced volatility and the market prices of securities of other newly public companies have historically been highly volatile. The public trading price of our Class A common stock could be subject to fluctuations in response to various factors, including those listed in this Annual Report on Form 10-K, some of which are beyond our control. Factors that could cause fluctuations in the public trading price of our Class A common stock include the following:

- overall performance of the equity markets;
- our operating performance and the performance of other similar companies;
- changes in the estimates of our operating results that we provide to the public, our failure to meet these projections, or changes in recommendations by securities analysts that elect to follow our common stock;
- announcements of technological innovations, new products, acquisitions, strategic alliances, or significant agreements by us or by our competitors;

- announcements of user additions and user cancellations or delays;
- rumors and market speculation involving us or other companies in our industry, which may include short seller reports;
- any coordinated trading activities or large derivative positions in our Class A common stock, for example, a "short squeeze" (a short squeeze occurs when a number of investors take a short position in a stock and have to buy the borrowed securities to close out the position at a time that other short sellers of the same security also want to close out their positions, resulting in surges in stock prices, i.e., demand is greater than supply for the stock sold short);
- detrimental adverse publicity about us, our services, or our industry;
- recruitment or departure of key personnel;
- the impact of the COVID-19 pandemic;
- litigation involving us, our industry, or both, or investigations by regulators into our operations or those of our competitors;
- new laws or regulations or new interpretations of existing laws or regulations applicable to our business;
- the economy as a whole, market conditions in our industry, and the industries of our users;
- trading activity by a limited number of stockholders who together beneficially own a majority of our outstanding common stock;
- the expiration of market standoff or contractual lock-up agreements; and
- sales of shares of our Class A common stock by us or our stockholders.

We may fail to meet our publicly announced guidance or other expectations about our business, which could cause our stock price to decline.

We may provide from time to time guidance regarding our expected financial and business performance, which may include projections regarding sales and production, as well as anticipated future revenues, gross margins, profitability, and cash flows. Correctly identifying key factors affecting business conditions and predicting future events is inherently an uncertain process, and our guidance may not ultimately be accurate and has in the past been inaccurate in certain respects, such as the timing of new products. Our guidance is based on certain assumptions such as those relating to anticipated production and sales, average sales prices, supplier and commodity costs, and planned cost reductions. If our guidance is not accurate or varies from actual results due to our inability to meet our assumptions or the impact on our financial performance that could occur as a result of various risks and uncertainties, the market value of our common stock could decline significantly.

Because we do not expect to pay dividends in the foreseeable future, investors must rely on price appreciation of our Class A common stock for return on the investment.

We currently intend to retain most, if not all, of our available funds and any future earnings to fund the growth of our business. As a result, we do not expect to pay any cash dividends in the foreseeable future. Therefore, you should not rely on an investment in our Class A common stock as a source for any future dividend income.

Our board of directors has complete discretion as to whether to distribute dividends. Even if our board of directors decides to declare and pay dividends, the timing, amount, and form of future dividends, if any, will depend on, among other things, our future results of operations and cash flow, our capital requirements and surplus, our financial condition, contractual restrictions, and other factors deemed relevant by our board of directors. Accordingly, the return on your investment in our Class A common stock will likely depend entirely upon any future price appreciation of our Class A common stock. There is no guarantee that our Class A common stock will appreciate in value or even maintain the price at which you purchased the Class A common stock. You may not realize a return on your investment in our Class A common stock and you may even lose your entire investment in our Class A common stock.

If securities or industry analysts do not publish research or reports about our business or if they issue an adverse or misleading opinion regarding our Class A common stock, our share price and trading volume could decline.

The trading market for our Class A common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. We do not have any control over these analysts. If any of the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, our financial statements, our intellectual property or our share performance, our share price would likely decline. If one or more of these analysts cease coverage of us or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our share price or trading volume to decline.

Sales of a substantial number of shares of our Class A common stock in the public market could cause our share price to fall.

Sales of substantial amounts of our Class A common stock in the public market, or the perception that these sales could occur, could adversely affect the market price of our Class A common stock and could materially impair our ability to raise capital through equity offerings in the future. Many of our existing security holders have substantial unrecognized gains on the value of the equity they hold, and may take, or attempt to take, steps to sell, directly or indirectly, their shares or otherwise secure, or limit the risk to, the value of their unrecognized gains on those shares.

We are an “emerging growth company,” and the reduced disclosures applicable to emerging growth companies may make our common stock less attractive to investors.

We are an “emerging growth company,” as defined in the JOBS Act, and for as long as we are an emerging growth company, we may choose to take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not “emerging growth companies,” including, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a non-binding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

The JOBS Act also provides that an emerging growth company does not need to comply with any new or revised financial accounting standards until such date that a private company is otherwise required to comply with such new or revised accounting standards. We cannot predict if investors will find our common stock less attractive if we choose to rely on these exemptions. If some investors find our common stock less attractive as a result of any choices to reduce future disclosure, there may be a less active trading market for our common stock, and our share price may be more volatile.

The requirements of being a public company, particularly after we are no longer an “emerging growth company”, may materially strain our resources, divert management’s attention, and affect our ability to attract and retain qualified board members.

As a public company, and particularly after we cease to be an “emerging growth company”, we have incurred, and will continue to, incur significant legal, accounting and other expenses that we did not incur as a private company. In addition, changing laws, regulations and standards relating to corporate governance and public disclosure, including regulations implemented by the Public Company Accounting Oversight Board, the SEC, and the Nasdaq Global Select Market, have increased and will continue to increase our legal and financial compliance costs and make some activities more time consuming. These laws, regulations, and standards are subject to varying interpretations, and as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. We intend to invest resources to comply with evolving laws, regulations, and standards, and this investment may result in increased general and administrative expenses and a diversion of management’s time and attention from revenue-generating activities to compliance activities. If, notwithstanding our efforts, we fail to comply with new laws, regulations, and standards, regulatory authorities may initiate legal proceedings against us and our business may be harmed.

Failure to comply with these rules might also make it more difficult for us to obtain certain types of insurance, including director and officer liability insurance, and we might be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these events could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, or on committees of our board of directors, or as members of senior management.

In addition, as a result of our disclosure obligations as a public company, we will have reduced strategic flexibility and will be under pressure to focus on short-term results, which may adversely affect our ability to achieve long-term profitability.

Our failure to timely and effectively implement controls and procedures required by Section 404(a) of the Sarbanes-Oxley Act could have a material adverse effect on our business.

As a public company, we are required to provide management’s assessment regarding internal control over financial reporting in our second Annual Report on Form 10-K. The standards required for a public company under Section 404(a) of the Sarbanes-Oxley Act are significantly more stringent than those required of TuSimple as a private company. Management may not be able to effectively and timely implement controls and procedures that adequately respond to the increased regulatory compliance and reporting requirements that became applicable after transitioning from a private company. If we are not able to implement the additional requirements of Section 404(a) in a timely manner or with adequate compliance, we may not be able to assess whether our internal controls over financial reporting are effective, which may subject us to adverse regulatory consequences and could harm investor confidence and the market price of our securities.

We may be subject to securities litigation, which is expensive and could divert our management's attention.

In the past, companies that have experienced volatility in the market price of their securities have been subject to securities class action litigation. We may be the target of this type of litigation in the future. Regardless of the merits or the ultimate results of such litigation, securities litigation brought against us could result in substantial costs and divert our management's attention from other business concerns.

Anti-takeover provisions in our charter documents may discourage our acquisition by a third party, which could limit our stockholders' opportunity to sell their shares, at a premium.

Our amended and restated certificate of incorporation includes provisions that could limit the ability of others to acquire control of our company, could modify our structure or could cause us to engage in change-of-control transactions. These provisions could have the effect of depriving our stockholders of an opportunity to sell their shares at a premium over prevailing market prices by discouraging third parties from seeking to obtain control in a tender offer or similar transaction. Among other things, the charter documents provide:

- for a dual class common stock structure, which provides our Founders with the ability to control the outcome of matters requiring stockholders' approval;
- until the first date on which the outstanding shares of Class B common stock represent less than 40% of the total voting power of our common stock, we shall not consummate any transaction that would result in a change in control of us without first obtaining the affirmative vote of the holders of a majority of the then-outstanding shares of Class B common stock voting as a separate class;
- certain amendments to our restated certificate of incorporation or bylaws will require the approval of two-thirds of the combined vote of our then-outstanding shares of Class A and Class B common stock;
- at any time after our 2022 annual meeting of stockholders when the outstanding shares of our Class B common stock represent less than 40% of the total voting power of our common stock (the "Voting Threshold Date"), directors will be able to be removed only for cause and only by the affirmative vote of the holders of at least two-thirds of the voting power of our common stock;
- at any time after the Voting Threshold Date, our board of directors will be classified into three classes of directors with staggered three-year terms;
- at any time after the Vesting Threshold Date, subject to the rights of any series of preferred stock then outstanding, stockholders will no longer be able to act by written consent in lieu of a meeting; and
- our board of directors has the authority, without further action by our stockholders, to issue preferred stock in one or more series and to fix their designations, powers, preferences, privileges, and relative participating, optional, or special rights, and the qualifications, limitations, or restrictions, including dividend rights, conversion rights, voting rights, terms of redemption, and liquidation preferences, any or all of which may be greater than the rights associated with our Class A common stock.

Our amended and restated certificate of incorporation designates the Court of Chancery of the State of Delaware and federal court within the State of Delaware as the exclusive forum for certain types of actions and proceedings that our stockholders may initiate, which could limit a stockholder's ability to obtain a favorable judicial forum for disputes with us or our directors, officers or employees.

Our amended and restated certificate of incorporation provides that, subject to limited exceptions, the Court of Chancery of the State of Delaware and federal court within the State of Delaware will be exclusive forums for any:

- derivative action or proceeding brought on our behalf;
- action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders;
- action asserting a claim against us arising pursuant to any provision of the DGCL, our amended and restated certificate of incorporation or bylaws; or
- other action asserting a claim against us that is governed by the internal affairs doctrine.

This choice of forum provision does not apply to actions brought to enforce a duty or liability created under the Exchange Act. Our amended and restated certificate of incorporation also provides that the federal district courts of the United States are the exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. We intend for this provision to apply to any complaints asserting a cause of action under the Securities Act despite the fact that Section 22 of the Securities Act creates concurrent jurisdiction for the federal and state courts over all actions brought to enforce any duty or liability created by the Securities Act or the rules and regulations promulgated thereunder. There is uncertainty as to whether a court would enforce such a provision with respect to claims under the Securities Act, and our stockholders will not be deemed to have waived our compliance with the federal securities laws and the rules and regulations thereunder. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to the provisions of our amended and restated certificate of incorporation described above.

These choice of forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, or other employees, which may discourage such lawsuits against us and our directors, officers and employees. Alternatively, if a court were to find these provisions of our amended and restated certificate of incorporation inapplicable to, or unenforceable in respect of, one or more of the specified types of actions or proceedings, we may incur additional costs associated with resolving such matters in other jurisdictions, which could adversely affect our business and financial condition.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our corporate headquarters is located in San Diego, California, consisting of approximately 80,000 square feet of office space, primarily for corporate administration as well as research and development, pursuant to leases that expire in September 2027. In addition to our headquarters, we have also leased a number of our facilities in the U.S. and internationally. We believe that our office space is adequate for our current needs, and we believe that we will be able to obtain additional space on commercially reasonable terms if needed.

ITEM 3. LEGAL PROCEEDINGS

From time to time, we are involved in various legal proceedings arising from the normal course of business activities. We are not presently a party to any litigation the outcome of which, we believe, if determined adversely against us, would individually or taken together have a material adverse effect on our business, operating results, cash flows or financial condition. Defending such proceedings may be costly and can impose a significant burden on management and employees. We may receive unfavorable preliminary or interim rulings in the course of litigation, and there can be no assurances that favorable final outcomes will be obtained.

Update on CFIUS Review

On March 1, 2021, Staff Chairperson of the Committee on Foreign Investment in the United States ("CFIUS" or the "Committee"), acting at the direction of the Committee, requested that we file a written notice regarding the 2017 purchase of our redeemable convertible preferred stock by Sun Dream Inc., an affiliate of Sina Corporation (the "Sina Investment"). CFIUS formally accepted our notice, which was filed jointly with Sina Corporation.

After accepting our jointly filed notice, the Committee informed us that the transaction that is the subject of its review (the "2017 Transaction") is the 2017 acquisition of the U.S. business of TuSimple LLC by Tusimple (Cayman) Limited, rather than the Sina Investment.

On February 18, 2022, the Committee concluded its review of the 2017 Transaction and determined that there are no unresolved national security concerns.

As part of the resolution, on February 18, 2022, the Company entered into a National Security Agreement ("NSA") with the U.S. government under which it has agreed to limit access to certain data and adopt a technology control plan, appoint a security officer and a security director, establish a government security committee of the board of directors of the Company to be chaired by the security director, and periodically meet with and report to certain CFIUS monitoring agencies. In addition, current directors of the Company representing Sun Dream Inc, one of our stockholders, have agreed that they will not stand for re-election to the board of directors of the Company upon expiration of their current terms, and Sun Dream, Inc. has agreed that it will not nominate replacement candidates or increase its current shareholdings in the Company.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information for Common Stock

Our Class A Common Stock has been listed on the Nasdaq Global Select Market under the symbol "TSP" since April 15, 2021. Prior to that date, there was no public trading market for our common stock.

Holders of our Common Stock

As of January 31, 2022, there were 23 holders of record of our Class A Common Stock and two holders of record of our Class B Common Stock. We believe the actual number of stockholders of our Class A Common Stock is greater than the corresponding number of record holders and includes stockholders who are beneficial owners but whose shares are held in street name by brokers and other nominees.

Dividend Policy

We have never declared or paid cash dividends on our capital stock. We intend to retain all available funds and future earnings, if any, to fund the development and expansion of our business, and we do not anticipate declaring or paying any cash dividends in the foreseeable future. The terms of certain of our outstanding debt instruments restrict our ability to pay dividends or make distributions on our common stock, and we may enter into credit agreements or other borrowing arrangements in the future that will restrict our ability to declare or pay cash dividends or make distributions on our capital stock. Any future determination regarding the declaration and payment of dividends, if any, will be at the discretion of our board of directors and will depend on then-existing conditions, including our financial condition, operating results, contractual restrictions, capital requirements, business prospects, and other factors our board of directors may deem relevant.

Securities Authorized for Issuance under Equity Compensation Plans

The information concerning our equity compensation plans is incorporated by reference herein to the section of the Proxy Statement entitled "Equity Compensation Plan Information."

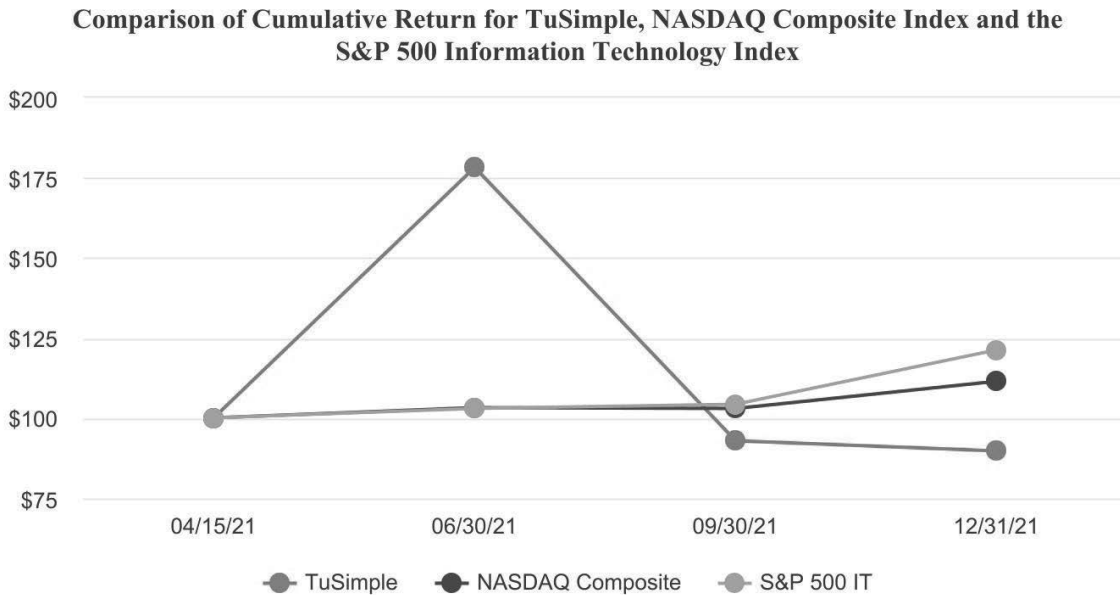
Use of Proceeds

The Registration Statement on Form S-1 (File No. 333-254616) for the IPO was declared effective by the SEC on April 14, 2021. There has been no material change in the planned use of proceeds from the IPO from that described in the prospectus filed with the SEC pursuant to Rule 424(b)(4) under the Securities Act, as amended, on April 16, 2021.

Performance Graph

This performance graph shall not be deemed to be “filed” with the SEC for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any filing of TuSimple Holdings, Inc. under the Securities Act, or the Exchange Act.

The following graph compares the cumulative total return to stockholders on our Class A Common Stock relative to the cumulative total returns of the NASDAQ Composite Index and S&P 500 Information Technology Index. An investment of \$100 (with reinvestment of all dividends) is assumed to have been made in our Class A Common Stock and in each index on April 15, 2021, the date our common stock began trading on the Nasdaq Global Select Market, and its relative performance is tracked through December 31, 2021. The returns shown are based on historical results and are not indicative of, or intended to suggest, future performance.



ITEM 6. [Reserved]

ITEM 7. MANAGEMENT’S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the consolidated financial statements and the accompanying notes thereto included in Part II, Item 8, “Financial Statements and Supplementary Data” of this Annual Report on Form 10-K.

In addition to our historical consolidated financial information, the following discussion contains forward-looking statements that reflect our plans, estimates, and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. You should review the section titled “Special Note Regarding Forward-Looking Statements” for a discussion of forward-looking statements and in Part I, Item 1A, “Risk Factors”, for a discussion of factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis and elsewhere in this Annual Report on Form 10-K. Our historical results are not necessarily indicative of the results that may be expected for any period in the future.

Overview

We are an autonomous technology company that is revolutionizing the estimated \$4 trillion global truck freight market. We have developed industry-leading autonomous technology specifically designed for semi-trucks, which has enabled us to build the world's first Autonomous Freight Network ("AFN") in partnership with world-class shippers, carriers, railroads, freight brokers, fleet asset owners, and truck hardware partners. We believe that our technology and our AFN will make long haul trucking significantly safer as well as more reliable, efficient, and environmentally friendly, creating significant benefits for all who rely on the freight ecosystem to deliver essential goods.

Our AFN provides autonomous freight capacity as a service through multiple service models based on users' needs. We believe that allowing our users the flexibility to select different service models is critical to our superior customer experience and will help drive rapid adoption of our network.

- **Carrier-Owned Capacity.** Shippers, carriers, and railroads that prefer to own their fleet will be able to purchase our purpose-built L4 autonomous semi-truck from a semi-truck original equipment manufacturer ("OEM") partner and subscribe to TuSimple Path—a comprehensive turnkey product to enable autonomous operations across our network. TuSimple Path includes features such as our on-board autonomous driving software, TuSimple Connect cloud-based autonomous operations oversight system, HD digital route mapping support, and emergency roadside assistance. Users will pay TuSimple a per mile, usage-based fee for access to TuSimple Path and benefit from lower overall freight costs, which we believe will offer a payback period of less than one year on their upfront incremental capital investment to purchase our purpose-built L4 autonomous semi-trucks.
- **TuSimple Capacity.** Our fleet of purpose-built L4 autonomous semi-trucks, financed through third party fleet asset owners, will serve users that desire access to safe, reliable, low cost, and more environmentally friendly freight transportation without owning semi-truck assets. Users of TuSimple Capacity can range from relatively smaller users of freight logistics to large shippers, carriers, and railroads seeking to supplement their own captive fleet for incremental freight capacity. We will charge users of TuSimple Capacity a per mile rate to ship freight, which we expect will be at a meaningful discount to prevailing market freight rates. We believe that our competitive advantage in terms of pricing will be enabled by our anticipated cost structure, which is expected to be significantly lower than that of human-operated semi-trucks. We believe users will benefit directly from lower shipping costs compared to conventional truck freight.

We are also working in partnership with a leading semi-truck Original Equipment Manufacturer ("OEM"), TRATON Group ("TRATON"), specifically with its Navistar and Scania semi-truck brands, as well as components partners to build a purpose-built L4 autonomous semi-truck to be operated exclusively on our network. We believe that this collaborative approach to create semi-trucks designed and built with integrated auto-grade components and sensors will increase our AFN's reliability at scale. Vertically integrating through partnerships with OEMs and Tier 1 suppliers allows us to maintain strong supply chain and hardware design control while remaining capital light and primarily focusing on developing proprietary autonomous technology.

We have developed a robust ecosystem of shippers, carriers, railroads, freight brokers, fleet asset owners, and third party service providers, including UPS, McLane, U.S. Xpress, Werner, Schneider, Ryder, DHL, Union Pacific, and CN, that provide critical validation and enhance the network effect benefits of our approach. We believe that our partnership network creates a significant and sustainable competitive advantage, especially as we work with shippers, carriers, and railroads to strategically locate our AFN terminals near their distribution centers. The continued growth of our AFN infrastructure and partnerships will continue to improve our user experience and drive more users to our platform which will allow us to further densify our strategic terminal network and reinforce rapid network growth. We currently expect to initially commercialize in the "Texas triangle", a major freight area running between Dallas, San Antonio, and Houston, under our TuSimple Capacity, by the end of 2023.

Coronavirus ("COVID-19") Impact

The extensive impact of the pandemic caused by COVID-19 and the measures taken in response thereto has resulted and will likely continue to result in significant disruption to the global economy, as well as businesses and capital markets around the world. In an effort to halt the outbreak of COVID-19, a number of countries, states, counties and other jurisdictions have imposed, and may impose in the future, various measures, including but not limited to, voluntary and mandatory quarantines, stay-at-home orders, travel restrictions, limitations on gatherings of people, reduced operations, extended closures of businesses and vaccine requirements.

The COVID-19 pandemic and measures to prevent its spread have had the following impact on our business:

- **Our Workforce.** Employee health and safety is our priority. In response to COVID-19, we established new protocols to help protect the health and safety of our workforce. We will continue to stay up-to-date and follow county and CDC guidelines regarding requirements for a healthy work environment.

- *Operations and Supply Chain.* As a result of COVID-19, we experienced some delays in our supply chains which temporarily limited our ability to outfit semi-trucks with key components during the second quarter of 2020; however, we have not experienced material disruptions in our shipping activity or in our ability to continue developing our AFN to date. In the future, we may experience supply chain disruptions from third party suppliers and any such supply chain disruptions could cause delays in our development timelines. We will continue to monitor the situation for any potential adverse impacts and execute appropriate countermeasures, as necessary.

While we have not experienced significant disruptions to our business due to the COVID-19 pandemic to date, the broader and long-term implications of the COVID-19 pandemic, and the measures taken in response thereto, on our workforce, operations and supply chain, user demand, results of operations, and overall financial performance remain uncertain.

See Part I, Item 1A, “Risk Factors” of this Annual Report on Form 10-K for further discussion of the possible impact of COVID-19 on our business.

Operational Highlights

	As of December 31,		% Change
	2020	2021	
Research and Development (R&D) Full Time Employees ("FTEs")	~670	~1,100	64%
Global FTEs	~830	~1,400	69%
Patents Issued	247	387	57%
Cumulative Road Miles (in thousands) ⁽¹⁾	~2,900	~6,300	117%
Total Truck Reservations (EOY) ⁽²⁾	~4,675	~6,975	49%
Total Mapped Miles (EOY) ⁽³⁾	~3,800	~11,200	195%
Revenue Miles (in thousands) ⁽⁴⁾⁽⁵⁾	~1,364	~3,446	153%

⁽¹⁾ The total miles our autonomous trucks have run on open public roads. We use this metric to track progress on the development of our L4 autonomous semi-trucks.

⁽²⁾ The total reservations for our purpose-built L4 semi-trucks. We use this metric to track our customer relationships and demand for our purpose-built L4 autonomous semi-trucks that are in development.

⁽³⁾ The cumulative unique miles on the AFN which we have built a map compatible with our autonomous driving software. We use this metric to track progress on the development of our AFN.

⁽⁴⁾ The total miles our autonomous trucks have run during the years presented that generates revenues. We use this metric to track our revenue growth.

⁽⁵⁾ Revenue Miles presented above are non-cumulative and represent activity for the years ended December 31, 2020 and 2021.

Highlights for 2021

In 2021, we completed the world's first driverless semi-truck runs on open public roads and continued driver-out operations scaling for commercial viability currently targeted by the end of 2023.

Cumulative Road Miles driven and Total Mapped Miles increased 117% and 195%, respectively, to approximately 6.3 million and approximately 11,200, respectively, as of December 31, 2021 as we continued expansion of our AFN.

We experienced strong growth in our TuSimple Capacity operations, achieving approximately 3.4 million Revenue Miles, an increase of 153%, as we expanded our operations and continued to grow our customer base.

Demand for our planned purpose-built L4 autonomous semi-trucks continued to grow as our Carrier-Owned Capacity reservations increased 49%, totaling approximately 6,975 as of December 31, 2021.

Our Patents Issued increased 57% as we continued to add world-class talent to our R&D team.

We ended 2021 with \$1.3 billion in cash and cash equivalents.

Initial Public Offering ("IPO")

On April 14, 2021, our Registration Statement on Form S-1 (File No. 333-254616) related to our IPO was declared effective by the SEC and our Class A common stock began trading on the Nasdaq Stock Exchange on April 15, 2021. Our IPO closed on April 19, 2021.

Components of Results of Operations

Revenue

To date, all of our revenue recognized has been from freight capacity services provided through the TuSimple Capacity service model on our AFN. Revenue is recognized over time as the goods are transported from one location to another based on the number of miles traveled. Shipments are completed within a short period of time, typically spanning one to two days. As we continue to grow and improve our technology, we expect a new revenue stream through our Carrier-Owned Capacity service model. We expect to derive revenue from per-mile fees charged to users of Carrier-Owned Capacity on our AFN. Recognition of this future revenue will be subject to the terms of any arrangements with our partners or users, which have not yet been negotiated. To date, we have not recorded any revenue under the Carrier-Owned Capacity service model.

Cost of Revenue

Our cost of revenue consists primarily of fuel costs, insurance costs, depreciation of property and equipment (including semi-trucks acquired under capital leases), labor costs, and other costs directly attributable to the provision of freight capacity services. Currently, we operate a large portion of our semi-trucks with two occupants, a safety engineer and a safety driver. We expect to gradually lower the average number of occupants in our semi-trucks as we continue to improve our autonomous technology and to the extent we ultimately remove all occupants upon achievement of full driver-out, L4 autonomous operations.

Research and Development

Research and development costs consist primarily of personnel-related expenses, including stock-based compensation costs, associated with software developers and engineering personnel and consultants responsible for the design, development, and testing of our autonomous truck driving solutions, depreciation of equipment used in research and development, and allocated overhead costs. Research and development costs are expensed as incurred. We expect our research and development expenses to increase in absolute dollars as we increase our investment in scaling our AFN through our proprietary technologies and as we continue to expand our technical workforce, which would impact our personnel-related and stock-based compensation costs.

Selling, General and Administrative

Selling, general and administrative costs consist primarily of personnel-related expenses, including stock-based compensation costs, associated with our sales, marketing, management and administration activities, professional service fees, advertising expenses, sponsorship, public relations and other related marketing activities, and other general corporate expenses.

We expect that our selling, general and administrative expenses will increase in absolute dollars from period to period as we further scale our AFN, educate market participants on the benefits of autonomous trucking and our autonomous trucking solutions, increase our marketing activities, grow our domestic and international operations, build brand awareness, and continue to incur costs related to operating as a public company, including expenses related to compliance with the rules and regulations of the SEC and stock exchange listing standards, additional insurance expenses, investor relations activities, and other administrative and professional services. We also expect to increase the size of our selling, general and administrative function and to continue to expand our workforce, which would impact our personnel-related and stock-based compensation costs, to support the growth of our business.

Change in Fair Value of Warrants Liability

The change in the fair value of warrants liability consists of the net changes in the fair value of our outstanding warrants to purchase redeemable convertible preferred stock that are remeasured at the end of each reporting period and upon their exercise or expiration. All outstanding warrants were exercised or expired during 2021 and we recorded one final remeasurement at fair value as of the exercise date.

Change in Fair Value of Related Party Convertible Loan

The change in the fair value of related party convertible loan consists of the net changes in the fair value of our related party convertible loan that was remeasured at the end of each reporting period and upon their redemption. The related party convertible loan was converted into Series E-1 redeemable convertible preferred stock during December 2020 and a final remeasurement was recorded as of the conversion date.

Gain on Loan Extinguishment

The gain on loan extinguishment was a result of the Paycheck Protection Program (“PPP”) loan forgiveness by the lender.

Other Income (Expense), Net

Other income (expense), net consists primarily of interest income earned on our cash and cash equivalents, interest expense on our related party borrowings, and foreign currency exchange gains (losses), net of remeasurement of transactions and monetary assets and liabilities denominated in currencies other than the functional currency at the end of the period.

Provision for Income Taxes

Provision for income taxes consists primarily of U.S. federal and state income taxes and income taxes in certain foreign jurisdictions in which we conduct business. Since inception, we have incurred operating losses and, accordingly, have not recorded a provision for income taxes for any of the periods presented.

We have a full valuation allowance for net deferred tax assets, including federal and state net operating loss carryforwards and research and development credit carryforwards. We expect to maintain this valuation allowance until it becomes more likely than not that the benefit of our federal and state deferred tax assets will be realized by way of expected future taxable income.

Results of Operations

The following table sets forth our consolidated results of operations data for the periods presented (in thousands):

	Years Ended December 31,		
	2019	2020	2021
Revenue	\$ 710	\$ 1,843	\$ 6,261
Cost of revenue	1,595	5,293	12,369
Gross loss	(885)	(3,450)	(6,108)
Operating expenses:			
Research and development ⁽¹⁾	63,619	132,001	287,167
Selling, general and administrative ⁽¹⁾	22,776	38,613	118,076
Total operating expenses	86,395	170,614	405,243
Loss from operations	(87,280)	(174,064)	(411,351)
Change in fair value of related party convertible loan	—	(5,556)	—
Change in fair value of warrants liability	—	1,816	(326,900)
Gain on loan extinguishment	—	—	4,183
Other income (expense), net	2,397	(66)	1,395
Loss before provision for income taxes	(84,883)	(177,870)	(732,673)
Provision for income taxes	—	—	—
Net loss	(84,883)	(177,870)	(732,673)
Net loss attributable to noncontrolling interests	43	—	—
Net loss attributable to TuSimple	\$ (84,840)	\$ (177,870)	\$ (732,673)
Accretion of redeemable convertible preferred stock	(201)	(20,959)	(4,135)
Deemed dividend on exchange of Series A-2 redeemable convertible preferred stock for common stock	(60,000)	—	—
Net loss attributable to common stockholders	\$ (145,041)	\$ (198,829)	\$ (736,808)

(1) Includes stock-based compensation expense as follows (in thousands)

	Years Ended December 31,		
	2019	2020	2021
Research and development	\$ —	\$ 917	\$ 71,201
Selling, general and administrative	—	11,846	51,395
Total share-based compensation expense	\$ —	\$ 12,763	\$ 122,596

Comparison of the Years Ended December 31, 2019, 2020, and 2021

Revenue

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Revenue	\$ 710	\$ 1,843	\$ 6,261	160 %	240 %

2020 compared to 2021. Revenue increased by \$4.5 million, or 240%, in the year ended December 31, 2021 as compared to the year ended December 31, 2020, primarily due to growth in our U.S. business from an increase in paid miles through increased commercial utilization of TuSimple fleets and partners' fleets (brokerage) that supplement our capacity and increases in our rate per mile charged. During the year ended December 31, 2021, we expanded our revenue-miles by 153% from the year ended December 31, 2020 as a result of expanded routes and commercial partnerships.

2019 compared to 2020. Revenue increased by \$1.1 million, or 160%, in the year ended December 31, 2020 as compared to the year ended December 31, 2019 primarily due to the expansion of our AFN, including the growth of our L4 autonomous semi-truck fleet, AFN terminals, and HD digital mapped routes.

Cost of Revenue

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Cost of Revenue	\$ 1,595	\$ 5,293	12,369	232 %	134 %

2020 compared to 2021. Cost of revenue increased by \$7.1 million, or 134%, in the year ended December 31, 2021 as compared to the year ended December 31, 2020, primarily due to increased operating costs associated with the generation of revenue. Gross loss margin for the year ended December 31, 2021 was 98%, an improvement from the gross loss margin for the year ended December 31, 2020 of 187%. This improvement is a result of increased revenue-miles per truck, improved leverage through better fixed cost utilization, and an increase in the number of semi-trucks in our TuSimple fleet.

2019 compared to 2020. Cost of revenue increased by \$3.7 million, or 232%, in the year ended December 31, 2020 as compared to the year ended December 31, 2019 due to increased operating costs associated with the generation of revenue. Gross loss margin for the year ended December 31, 2020 was 187%, an increase from the gross loss margin for the year ended December 31, 2019 of 125%. This increase is a result of increased spend while growing our customer base and a significant increase in the number of semi-trucks in our TuSimple fleet prior to reaching the necessary scale to achieve improved leverage through better fixed cost utilization.

Research and Development

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Research and Development	\$ 63,619	\$ 132,001	287,167	107 %	118 %

2020 compared to 2021. Research and development expenses increased by \$155.2 million, or 118%, in the year ended December 31, 2021 as compared to the year ended December 31, 2020. The increase was primarily attributable to an increase of \$146.4 million in personnel-related costs, mainly driven by an increase in employee headcount and increased stock-based compensation expense of \$70.3 million. The stock-based compensation expense for this period includes a one-time charge of \$21.9 million incurred in connection with the IPO, with the remaining increase due to time-based vesting and additional grants in the period. The remainder of the increase in research and development expense was primarily driven by an increase of \$13.3 million in equipment, supplies, and materials, an increase of \$11.0 million in depreciation and allocated facility costs, driven by an increase in headcount and expansion of our facilities, an increase of \$9.9 million in research and development costs incurred under our joint development agreements, primarily driven by costs incurred under the Joint Development Agreement ("JDA") with Navistar, which was entered into in July 2020, and an increase of \$7.0 million in vehicle and equipment-related costs, mainly driven by an increase in the number of semi-trucks in our fleet. These increased costs were partially offset by a one-time, non-cash charge of \$32.3 million related to the excess fair value of redeemable convertible preferred stock warrants issued over the cash proceeds received in conjunction with the issuance of shares of Series D-1 redeemable convertible preferred stock and redeemable convertible preferred stock warrants to TRATON recorded in the year ended December 31, 2020.

2019 compared to 2020. Research and development expenses increased by \$68.4 million, or 107%, in the year ended December 31, 2020 as compared to the year ended December 31, 2019. The increase was primarily attributable to a one-time, non-cash charge of \$32.3 million related to the excess fair value of redeemable convertible preferred stock warrants issued over the cash proceeds received in conjunction with the issuance of shares of Series D-1 redeemable convertible preferred stock and redeemable convertible preferred stock warrants to TRATON, an increase of \$25.1 million in personnel-related costs, mainly driven by an increase in employee headcount and increased stock-based compensation of \$0.9 million, an increase of \$6.5 million in depreciation and allocated facility costs, driven by an increase in headcount and expansion of our facilities, an increase of \$2.5 million in vehicle and equipment-related costs, mainly driven by an increase in the number of semi-trucks in our fleet, and an increase of \$2.0 million in joint development cost, mainly driven by our JDA with Navistar.

Selling, General and Administrative

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Selling, General and Administrative	\$ 22,776	\$ 38,613	\$ 118,076	70 %	206 %

2020 compared to 2021. Selling, general and administrative expenses increased by \$79.5 million, or 206%, in the year ended December 31, 2021 as compared to the year ended December 31, 2020. The increase was primarily attributable to an increase of \$58.4 million in personnel-related costs, mainly driven by an increase in employee headcount and increased stock-based compensation expense of \$39.5 million. The stock-based compensation expense for this period includes a one-time charge of \$20.7 million incurred in connection with the IPO, with the remaining increase due to time-based vesting and additional grants in the period. The remainder of the increase in selling, general and administrative expenses for the period was primarily driven by an increase of \$12.1 million in office and facility-related costs, driven by the acquisition of director and officer insurance and the expansion of facility and operations, an increase of \$3.6 million in legal, accounting and other professional services, driven by increased usage of professional service firms to prepare for public company reporting and other complex matters, and an increase of \$2.5 million in sales and marketing expenses as we continue to expand our business.

2019 compared to 2020. Selling, general and administrative expenses increased by \$15.8 million, or 70%, in the year ended December 31, 2020 as compared to the year ended December 31, 2019. The increase was primarily attributable to an increase of \$16.7 million in personnel-related costs, mainly driven by an increase in employee headcount and an increased stock-based compensation of \$11.8 million, and an increase of \$1.3 million in legal, accounting and other professional services, driven mainly by additional rounds of financing, partially offset by a decrease of \$1.7 million in office and facility-related costs, driven primarily by the transition to a remote working situation and a decrease of \$1.6 million in travel costs, driven mainly by reduced traveling due to COVID-19 restrictions.

Change in Fair Value of Related Party Convertible Loan

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Change in Fair Value of Related Party Convertible Loan	\$ —	\$ (5,556)	\$ —	*	*

* Percentage not meaningful

Loss from the change in fair value of related party convertible loan of \$5.6 million in the year ended December 31, 2020 was driven by the remeasurement of the related party convertible loan at fair value each period until its conversion into Series E-1 redeemable convertible preferred stock during December 2020. There were no such outstanding convertible loans in the years ended December 31, 2019 or 2021.

Change in Fair Value of Warrants Liability

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Change in Fair Value of Warrants Liability	\$ —	\$ 1,816	\$ (326,900)	*	*

* Percentage not meaningful

2020 compared to 2021. Loss from the change in fair value of warrants liability of \$326.9 million for the year ended December 31, 2021 was driven by the remeasurement of redeemable convertible preferred stock warrants at fair value immediately prior to their exercise dates during the period.

2019 compared to 2020. Gain from the change in fair value of warrants liability of \$1.8 million in the year ended December 31, 2020 was driven by the remeasurement of redeemable convertible preferred stock warrants at fair value each period. There were no such warrants outstanding in the year ended December 31, 2019.

Gain on Loan Extinguishment

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Gain on Loan Extinguishment	\$ —	\$ —	\$ 4,183	*	*

* Percentage not meaningful

2020 compared to 2021. Gain on loan extinguishment of \$4.2 million for the year ended December 31, 2021 was driven by the forgiveness of the PPP loan by the lender.

Other Income (Expense), Net

(In thousands, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Other Income (Expense), Net	\$ 2,397	\$ (66)	\$ 1,395	(103)%	(2214)%

2020 compared to 2021. Other income (expense), net increased by \$1.5 million, from expense of \$0.1 million for the year ended December 31, 2020 to income of \$1.4 million for the year ended December 31, 2021. The increase was primarily attributable to an increase in interest income earned on cash and cash equivalents.

2019 compared to 2020. Other income (expense), net decreased by \$2.5 million, or 103%, from income of \$2.4 million in 2019 to expense of \$0.1 million in 2020. The decrease was primarily attributable to a decrease in income from government grants and decreased interest income earned on cash and cash equivalents.

Key Metric and Non-GAAP Financial Measure

(In millions, except percentages)	Years Ended December 31,			2019 to 2020 % Change	2020 to 2021 % Change
	2019	2020	2021		
Loss from operations	\$ (87.3)	\$ (174.1)	\$ (411.4)	99 %	136 %
Adjusted EBITDA ⁽¹⁾	\$ (81.6)	\$ (153.3)	\$ (278.9)	88 %	82 %

* Percentage not meaningful

⁽¹⁾ Adjusted EBITDA is a non-GAAP financial measure. For more information regarding our use of this financial measure and a reconciliation of this financial measure to the most comparable GAAP measure, see "Reconciliation of Non-GAAP Financial Measure".

Adjusted EBITDA

Adjusted EBITDA is a performance measure that our management uses to assess our operating performance in our business. Since Adjusted EBITDA facilitates internal comparisons of our historical operating performance on a more consistent basis, we use this measure for business planning purposes. Accordingly, we believe that Adjusted EBITDA provides useful information to investors and others in understanding and evaluating our operating results in the same manner as our management team and board of directors.

We calculate Adjusted EBITDA as loss from operations, adjusted to exclude:

- depreciation and amortization;
- stock-based compensation expense;
- capital lease interest expense included within cost of sales.

For more information regarding the limitations of Adjusted EBITDA and a reconciliation of loss from operations to Adjusted EBITDA, see the section titled "Reconciliation of Non-GAAP Financial Measure."

Reconciliation of Non-GAAP Financial Measure

We use Adjusted EBITDA in conjunction with GAAP measures as part of our overall assessment of our performance, including the preparation of our operating budget and quarterly forecasts, to evaluate the effectiveness of our business strategies, and to communicate with our board of directors concerning our financial performance. Because non-GAAP financial measures are not standardized, it may not be possible to compare this measure with other companies' non-GAAP measures having the same or similar names. In addition, other companies may not publish similar metrics. Furthermore, this measure has certain limitations in that it does not include the impact of certain expenses that are reflected in our consolidated statements of operations that are necessary to run our business. Thus, our Adjusted EBITDA should be considered in addition to, not as a substitute for, or in isolation from, measures prepared in accordance with GAAP.

The following table provides a reconciliation of reported net loss from operations determined in accordance with GAAP to non-GAAP adjusted EBITDA (in thousands):

	Year Ended December 31,		
	2019	2020	2021
Loss from Operations	\$ (87,280)	\$ (174,064)	\$ (411,351)
Stock-based compensation expense	—	12,763	122,596
Depreciation and amortization	5,565	7,683	9,450
Capital lease interest expense	164	333	418
Adjusted EBITDA	\$ (81,551)	\$ (153,285)	\$ (278,887)

Liquidity and Capital Resources

We have financed our operations primarily through the sale of capital stock, which has historically been sufficient to meet our working capital and capital expenditure requirements. As of December 31, 2021, our principal sources of liquidity were \$1.3 billion of cash and cash equivalents, exclusive of restricted cash of \$1.5 million. In April 2021, we closed our IPO and concurrent private placement, resulting in net proceeds of \$1.0 billion and \$35.0 million, respectively. Cash and cash equivalents consist primarily of cash on deposit with banks, certificates of deposit and money market funds. Based on our current operating plan, we believe that the net proceeds from our IPO and concurrent private placement, together with our existing cash and cash equivalents and anticipated cash generated from sales of our services, will be sufficient to meet our anticipated cash needs for at least the next 12 months.

Our future capital requirements will depend on many factors, including, but not limited to, the rate of our growth, our ability to attract and retain users and their willingness to pay for our services, and the timing and extent of spending to support our efforts to develop our L4 autonomous semi-trucks and AFN. Further, we may enter into future arrangements to acquire or invest in businesses, products, services, strategic partnerships, and technologies. As such, we may be required to seek additional equity and/or debt financing. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interest of our stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of common stockholders. The incurrence of indebtedness would result in increased fixed obligations and could result in operating covenants that would restrict our operations. If we are unable to maintain sufficient financial resources, our business, financial condition and results of operations may be materially and adversely affected.

Material Cash Requirements

As of December 31, 2021, there were future minimum lease payments of \$5.0 million and \$49.7 million for capital and operating leases, respectively. See Note 7. Commitments and Contingencies of Part II, Item 8. "Financial Statements and Supplementary Data." of this Annual Report on Form 10-K for further information.

Cash Flows

The following table summarizes our cash flows for the periods presented (in thousands):

	Years Ended December 31,		
	2019	2020	2021
Net cash (used in) provided by:			
Operating activities	\$ (76,333)	\$ (103,848)	\$ (259,033)
Investing activities	(10,435)	(4,412)	(13,637)
Financing activities	51,830	356,495	1,299,151

Operating Activities

Net cash used in operating activities was \$76.3 million, \$103.8 million, and \$259.0 million for the years ended December 31, 2019, 2020, and 2021, respectively.

Net cash used in operating activities during the year ended December 31, 2019, was primarily due to net loss of \$84.9 million, offset slightly by non-cash charges for depreciation and amortization expense of \$5.6 million and favorable changes in operating assets and liabilities of \$2.1 million.

Net cash used in operating activities during the year ended December 31, 2020, was primarily due to net loss of \$177.9 million, offset by a one-time, non-cash charge of \$32.3 million related to the excess fair value of redeemable convertible preferred stock warrants issued over proceeds received in conjunction with the issuance of Series D-1 redeemable convertible preferred stock and redeemable convertible preferred stock warrants to TRATON, non-cash charges for stock-based compensation of \$12.8 million, depreciation and amortization expense of \$7.7 million, non-cash loss from change in fair value of related party convertible loan of \$5.6 million, and favorable changes in operating assets and liabilities of \$17.3 million.

Net cash used in operating activities during the year ended December 31, 2021, was primarily due to net loss of \$732.7 million, offset by a non-cash charge for changes in the fair value of the warrants liability of \$326.9 million, stock-based compensation expense of \$122.6 million, depreciation and amortization expense of \$9.5 million, and favorable changes in operating assets and liabilities of \$18.9 million.

Investing Activities

Net cash used in investing activities was \$10.4 million, \$4.4 million, and \$13.6 million for the years ended December 31, 2019, 2020, and 2021, respectively, as we continue to invest in technological assets and equipment to expand our AFN.

Additionally, non-cash acquisitions of property and equipment included in liabilities were \$0.3 million, \$2.8 million, and \$10.5 million for the years ended December 31, 2019, 2020, and 2021, respectively.

Financing Activities

Net cash provided by financing activities was \$51.8 million, \$356.5 million, and \$1.3 billion for the years ended December 31, 2019, 2020, and 2021, respectively, driven primarily by our continued financing rounds.

During the year ended December 31, 2019, we had proceeds from the issuance of redeemable convertible preferred stock of \$52.3 million, partially offset by principal payments on capital lease obligations and principal payments on related party loans.

During the year ended December 31, 2020, we had proceeds from the issuance of redeemable convertible preferred stock of \$291.7 million, proceeds from issuance of related party convertible loan of \$50.0 million, proceeds from issuance of redeemable convertible preferred stock warrants of \$11.9 million, proceeds from related party loans of \$5.0 million, proceeds from the Small-Business Administration Paycheck Protection Program (“PPP”) loans of \$4.1 million, and proceeds of \$2.5 million from the exercise of warrants for Series D-1 redeemable convertible preferred stock. These were partially offset by principal payments on related party loans of \$7.9 million,

During the year ended December 31, 2021, we had net proceeds from the sale of Class A common stock in our IPO and concurrent private placement of approximately \$1.0 billion, net of issuance costs, proceeds from the exercise of warrants for redeemable convertible preferred stock of \$183.0 million, and proceeds from the issuance of redeemable convertible preferred stock of \$54.7 million, net of offering costs, offset slightly by principal payments on related party loans of \$4.4 million.

Critical Accounting Policies and Estimates

We prepare our consolidated financial statements in accordance with U.S. generally accepted accounting principles (“GAAP”). The preparation of these consolidated financial statements in conformity with GAAP requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. We base our estimates on historical experience and other assumptions that we believe are reasonable under the circumstances. Our actual results could differ significantly from these estimates under different assumptions and conditions. We believe that the accounting policies discussed below are critical to understanding our historical and future performance as these policies involve a greater degree of judgment and complexity.

Revenue Recognition

We recognize revenue primarily from providing freight capacity services. Revenue is recognized when the customer obtains control of promised services in an amount that reflects the consideration we expect to receive in exchange for those services.

Satisfaction of Performance Obligation

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the basis of revenue recognition in accordance with GAAP. To determine the proper revenue recognition method for contracts, we evaluate whether two or more contracts should be combined and accounted for as one single contract and whether the combined or single contract should be accounted for as more than one performance. For most of our contracts, the customer contracts with us to provide distinct services within a single contract, such as freight capacity services. The majority of our contracts with customers for freight capacity services include only one performance obligation, the freight capacity services. However, if a contract is separated into more than one performance obligation, we allocate the total transaction price to each performance obligation in an amount based on the estimated relative standalone selling prices of the promised goods or services underlying each performance obligation. We frequently sell standard freight capacity services with observable standalone sales prices. In these instances, the observable standalone sales are used to determine the standalone selling price.

For freight capacity services, revenue is recognized over time as we perform the services in the contract because of the continuous transfer of control to the customer. Our customers receive the benefit of our services as the goods are transported from one location to another. If we were unable to complete delivery to the final location, another entity would not need to reperform the transportation service already performed. As control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation. The selection of the method to measure progress towards completion requires judgment and is based on the nature of the products or services to be provided. As control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation. Management estimates the progress based on mileage completed to total mileage to be transported. Revenues are recorded net of value-added taxes and surcharges.

Contract Modification

Contracts may be modified to account for changes in the rates we charge our customers or to add additional distinct services. We consider contract modifications to exist when the modification either creates new enforceable rights and obligations or alters the existing arrangement. Contract modifications that add distinct goods or services are treated as separate performance obligations. Contract modifications that do not add distinct goods or services typically change the price of existing services. These contract modifications are accounted for prospectively as the remaining performance obligations are executed.

Contract Assets and Liabilities

Contract assets include billed and unbilled amounts resulting from in-transit packages, as we have an unconditional right to payment only once all performance obligations have been completed (e.g., packages have been delivered). Contract assets are generally classified as current and the full balance is converted each quarter based on the short-term nature of the transactions. Our contract liabilities consist of advance payments and billings in excess of revenue. The full balance of contract liabilities is converted each quarter based on the short-term nature of the transactions.

Payment Terms

Under the typical payment terms of our customer contracts, the customer pays at periodic intervals (i.e. every 14 days, 30 days etc.) for shipments included on invoices received. It is not customary business practice to extend payment terms past 90 days, and as such, we do not have a practice of including a significant financing component within its contracts with customers.

Stock-Based Compensation

We account for stock-based compensation expense in accordance with the fair value recognition and measurement provisions of GAAP, which requires compensation cost for the grant-date fair value of stock-based awards to be recognized over the requisite service period. We determine the fair value of stock-based awards granted or modified on the grant date (or modification date, if applicable) at fair value, using appropriate valuation techniques.

Time-Based Service Awards

For stock-based awards with time-based vesting conditions only, generally being restricted stock units (“RSUs”) and stock options, stock-based compensation is recognized straight-line over the requisite service period, which is generally four years. The fair value of RSUs is measured on the grant date based on the fair value the underlying common stock. The fair value of stock option awards is estimated on the grant date using the Black-Scholes option-pricing model. The Black-Scholes option-pricing model requires the input of highly subjective assumptions, including the fair value of the underlying common stock, the expected stock price volatility over the term of the award, actual and projected employee stock option exercise behaviors, the risk-free interest rate for the expected term of the award and expected dividends. We account for forfeitures as they occur instead of estimating the number of awards expected to be forfeited.

Performance-Based Awards

We have granted RSUs, share value awards (“SVAs”), and stock options that vest only upon the satisfaction of both time-based service and performance-based conditions. The time-based service condition for these awards generally is satisfied over four years. The performance-based conditions, other than with respect to the CEO Performance Award discussed in Note 9. Stock Based Compensation, are satisfied upon the occurrence of a qualifying event, defined as the earlier of (i) the closing of certain specific liquidation or change in control transactions, or (ii) an IPO. We record stock-based compensation expense for performance-based equity awards such as RSUs, SVAs, and stock options on an accelerated attribution method over the requisite service period, which is generally four years, and only if performance-based conditions are considered probable to be satisfied. Upon completion of the IPO, we recorded a cumulative one-time stock-based compensation expense determined using the grant-date fair values. Stock-based compensation related to remaining time-based service after the qualifying event is recorded over the remaining requisite service period. For performance-based RSUs and SVAs, we determine the grant-date fair value as the fair value of our common stock on the grant date. For performance-based stock options, we determine the grant-date fair value using the Black-Scholes option-pricing model described above.

For the CEO Performance Award with a vesting schedule based entirely on the attainment of both performance and market conditions, stock-based compensation expense associated with each tranche is recognized over the longer of (i) the expected achievement period for the operational milestones for such tranche and (ii) the expected achievement period for the related market capitalization milestone determined on the grant date, beginning at the point in time when the relevant operational milestones are considered probable of being met. If such operational milestones become probable any time after the grant date, we will recognize a cumulative catch-up expense from the grant date to that point in time. If the related market capitalization milestone is achieved earlier than its expected achievement period, then the stock-based compensation expense will be recognized over the expected achievement period for the operational milestones, which may accelerate the rate at which such expense is recognized. The fair value of such awards is estimated on the grant date using Monte Carlo simulations. Refer to Note 9. Stock Based Compensation for further information.

JOBS Act Accounting Election

We are an emerging growth company, as defined in the Jumpstart Our Business Startups (JOBS) Act. The JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This provision allows an emerging growth company to delay the adoption of some accounting standards until those standards would otherwise apply to private companies. We have elected to use the extended transition period under the JOBS Act for the adoption of certain accounting standards until the earlier of the date we (i) are no longer an emerging growth company or (ii) affirmatively and irrevocably opt out of the extended transition period provided in the JOBS Act. As a result, our financial statements may not be comparable to companies that comply with new or revised accounting pronouncements as of public company effective dates.

We expect to lose EGC status and meet all applicable criteria to become a large accelerated filer by December 31, 2022.

Recent Accounting Pronouncements

For information on recently issued accounting pronouncements, refer to Note 1. Description of Business and Summary of Significant Accounting Policies of Part II, Item 8. “Financial Statements and Supplementary Data.” of this Annual Report on Form 10-K.

ITEM 7A. QUALITATIVE AND QUANTITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to market risks in the ordinary course of our business, which primarily relate to fluctuations in foreign exchange rates.

Foreign Currency Exchange Risk

The functional currency of our foreign subsidiaries is the local currency or U.S. dollar depending on the nature of the subsidiaries’ activities. Foreign currency transactions recognized in the consolidated statements of operations are converted to the functional currency by applying the exchange rate prevailing on the date of the transaction. Our results of operations and cash flows are subject to fluctuations due to changes in foreign currency exchange rates. During the years ended December 31, 2020 and 2021, the foreign currency translation adjustment recorded to other comprehensive income was \$0.4 million and \$0.4 million, respectively. The effect of a hypothetical 10% change in foreign currency exchange rates applicable to our business would not have had a material impact on our historical consolidated financial statements for the years ended December 31, 2020 and 2021. As the impact of foreign currency exchange rates has not been material to our condensed consolidated financial statements, we have not engaged in any foreign currency hedging strategies. As our international operations grow, we will continue to reassess our approach to manage our risk relating to fluctuations in currency rates.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of TuSimple Holdings, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Tusimple Holdings Inc. and subsidiaries (the Company) as of December 31, 2021 and December 31, 2020, the related consolidated statements of operations, comprehensive loss, redeemable convertible preferred stock and stockholders' equity (deficit), and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and December 31, 2020, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2021, in conformity with U.S. generally accepted accounting principles.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP

We have served as the Company's auditor since 2020.

San Diego, California
February 23, 2022

TuSimple Holdings, Inc.
Consolidated Balance Sheets
(in thousands, except share data)

	December 31,	
	2020	2021
Assets		
Current assets:		
Cash and cash equivalents	\$ 310,815	\$ 1,337,586
Accounts receivable, net	1,144	1,599
Prepaid expenses and other current assets	3,816	13,995
Amounts due from related parties	3,708	—
Total current assets	319,483	1,353,180
Property and equipment, net	22,116	36,053
Other assets	4,986	7,090
Total assets	\$ 346,585	\$ 1,396,323
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Equity (Deficit)		
Current liabilities:		
Accounts payable	\$ 4,542	\$ 4,544
Amounts due to related parties	4,360	—
Amounts due to joint development partners	1,355	7,394
Accrued expenses and other current liabilities	22,961	41,698
Short-term debt	4,623	1,524
Warrants liability	42,452	—
Capital lease liabilities, current	805	766
Total current liabilities	81,098	55,926
Capital lease liabilities, noncurrent	3,767	2,872
Long-term debt	1,807	5,543
Other liabilities	595	5,004
Total liabilities	87,267	69,345
Commitments and contingencies (Note 7)		
Redeemable convertible preferred stock, \$0.0001 par value; 138,102,770 and zero shares authorized as of December 31, 2020 and 2021, respectively; 102,074,703 and zero shares issued and outstanding as of December 31, 2020 and 2021, respectively; aggregate liquidation preference of \$598,842 and \$0 as of December 31, 2020 and 2021, respectively	664,791	—
Stockholders' equity (deficit):		
Common Stock, \$0.0001 par value, 361,897,230 and 4,876,000,000 Class A shares authorized as of December 31, 2020 and 2021, respectively; 60,543,337 and 197,833,195 Class A shares issued and outstanding as of December 31, 2020 and 2021, respectively; zero and 24,000,000 Class B shares authorized as of December 31, 2020 and 2021; zero and 24,000,000 Class B shares issued and outstanding as of December 31, 2020 and 2021, respectively	6	22
Additional paid-in capital	—	2,464,730
Accumulated deficit	(405,178)	(1,137,851)
Accumulated other comprehensive income (loss)	(301)	77
Total stockholders' equity (deficit)	(405,473)	1,326,978
Total liabilities, redeemable convertible preferred stock and stockholders' equity (deficit)	\$ 346,585	\$ 1,396,323

The accompanying notes are an integral part of these consolidated financial statements.

TuSimple Holdings, Inc.
Consolidated Statements of Operations
(in thousands, except share and per share data)

	Years Ended December 31,		
	2019	2020	2021
Revenue	\$ 710	\$ 1,843	\$ 6,261
Cost of revenue	1,595	5,293	12,369
Gross loss	(885)	(3,450)	(6,108)
Operating expenses:			
Research and development	63,619	132,001	287,167
Selling, general and administrative	22,776	38,613	118,076
Total costs and expenses	86,395	170,614	405,243
Loss from operations	(87,280)	(174,064)	(411,351)
Change in fair value of related party convertible loan	—	(5,556)	—
Change in fair value of warrants liability	—	1,816	(326,900)
Gain on loan extinguishment	—	—	4,183
Other income (expense), net	2,397	(66)	1,395
Loss before provision for income taxes	(84,883)	(177,870)	(732,673)
Provision for income taxes	—	—	—
Net loss	(84,883)	(177,870)	(732,673)
Net loss attributable to noncontrolling interests	43	—	—
Net loss attributable to TuSimple	\$ (84,840)	\$ (177,870)	\$ (732,673)
Accretion of redeemable convertible preferred stock	(201)	(20,959)	(4,135)
Deemed dividend on exchange of Series A-2 redeemable convertible preferred stock for common stock	(60,000)	—	—
Net loss attributable to common stockholders	\$ (145,041)	\$ (198,829)	\$ (736,808)
Net loss per share attributable to common stockholders, basic and diluted	\$ (2.47)	\$ (3.37)	\$ (4.36)
Weighted-average shares used in computing net loss per share attributable to common stockholders, basic and diluted	58,700,441	58,929,271	169,080,392

The accompanying notes are an integral part of these consolidated financial statements.

TuSimple Holdings, Inc.
Consolidated Statements of Comprehensive Loss
(in thousands)

	Years Ended December 31,		
	2019	2020	2021
Net loss	\$ (84,883)	\$ (177,870)	\$ (732,673)
Other comprehensive income (loss):			
Foreign currency translation adjustment	(208)	401	378
Comprehensive loss	(85,091)	(177,469)	(732,295)
Less: Comprehensive loss attributable to noncontrolling interests	(33)	—	—
Comprehensive loss attributable to TuSimple	\$ (85,058)	\$ (177,469)	\$ (732,295)

The accompanying notes are an integral part of these consolidated financial statements.

TuSimple Holdings Inc.
Consolidated Statements of Redeemable Convertible Preferred Stock and Stockholders' Equity (Deficit)
(in thousands, except share data)

	Redeemable Convertible Preferred Stock		Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Total TuSimple Holdings, Inc. Stockholders' Equity (Deficit)	Noncontrolling Interests	Total Stockholders' Equity (Deficit)
	Shares	Amount	Shares	Amount						
Balance as of December 31, 2018	60,249,352	\$ 181,236	64,734,628	\$ 6	\$ —	\$ (440)	\$ (73,677)	\$ (74,111)	\$ (11)	\$ (74,122)
Exchange of Series A-2 redeemable convertible preferred shares for ordinary shares	8,218,203	60,000	(8,218,203)	—	—	—	(60,000)	(60,000)	—	(60,000)
Issuance of Series D-1 redeemable convertible preferred shares, net of issuance costs	6,471,833	52,299	—	—	—	—	—	—	—	—
Accretion of Series D-1 redeemable convertible preferred shares to redemption value	—	201	—	—	—	—	(201)	(201)	—	(201)
Foreign currency translation adjustment	—	—	—	—	—	(218)	—	(218)	10	(208)
Net loss	—	—	—	—	—	—	(84,840)	(84,840)	(43)	(84,883)
Balance as of December 31, 2019	74,939,388	293,736	56,516,425	6	—	(658)	(218,718)	(219,370)	(44)	(219,414)
Issuance of Series D-1 redeemable convertible preferred shares, net of issuance costs	1,854,177	3,098	—	—	—	—	—	—	—	—
Reclassification of Series D-1 redeemable convertible preferred share warrants from equity to liabilities	—	—	—	—	(394)	—	—	(394)	—	(394)
Issuance of Series D-1 redeemable convertible preferred shares from the exercise of warrants	308,182	2,894	—	—	—	—	—	—	—	—
Issuance of Series E redeemable convertible preferred shares, net of issuance costs	21,044,019	288,548	—	—	—	—	—	—	—	—
Conversion of related party convertible loan to Series E-1 redeemable convertible preferred shares	3,928,937	55,556	—	—	—	—	—	—	—	—
Issuance of ordinary shares from exercise of options	—	—	2,127,232	—	—	—	—	—	—	—
Issuance of restricted ordinary shares	—	—	1,899,680	—	—	—	—	—	—	—
Accretion of redeemable convertible preferred shares to redemption value	—	20,959	—	—	(12,369)	—	(8,590)	(20,959)	—	(20,959)
Share-based compensation	—	—	—	—	12,763	—	—	12,763	—	12,763
Acquisition of noncontrolling interest in subsidiary	—	—	—	—	—	(44)	—	(44)	44	—
Foreign currency translation adjustment	—	—	—	—	—	401	—	401	—	401
Net loss	—	—	—	—	—	—	(177,870)	(177,870)	—	(177,870)
Balance as of December 31, 2020	102,074,703	\$ 664,791	60,543,337	6	—	(301)	(405,178)	(405,473)	—	(405,473)
Issuance of Series E redeemable convertible preferred Stock, net of issuance costs	4,650,999	61,631	—	—	—	—	—	—	—	—
Issuance of Series E redeemable convertible preferred Stock from exercise of warrants	9,477,073	379,084	—	—	—	—	—	—	—	—
Issuance of Series E-2 redeemable convertible preferred Stock from exercise of warrants	4,331,644	173,275	—	—	—	—	—	—	—	—
Accretion of redeemable convertible preferred stock to redemption value	—	4,135	—	—	(4,135)	—	—	(4,135)	—	(4,135)
Conversion of redeemable convertible preferred stock to common stock in connection with initial public offering	(120,534,419)	(1,282,916)	120,534,419	12	1,282,904	—	—	1,282,916	—	1,282,916
Issuance of common stock in connection with initial public offering, net of offering costs	—	—	27,027,027	3	1,027,371	—	—	1,027,374	—	1,027,374
Issuance of common stock related to private placement	—	—	874,999	—	35,000	—	—	35,000	—	35,000
Issuance of common stock from exercise of options	—	—	8,580,984	1	910	—	—	911	—	911
Issuance of common stock related to release of RSUs and SVAs	—	—	4,272,429	—	—	—	—	—	—	—
Vesting of early exercised stock options	—	—	—	—	84	—	—	84	—	84
Stock-based compensation	—	—	—	—	122,596	—	—	122,596	—	122,596
Foreign currency translation adjustment	—	—	—	—	—	378	—	378	—	378
Net loss	—	—	—	—	—	—	(732,673)	(732,673)	—	(732,673)
Balance as of December 31, 2021	—	\$ —	221,833,195	22	\$ 2,464,730	\$ 77	\$ (1,137,851)	\$ 1,326,978	\$ —	\$ 1,326,978

The accompanying notes are an integral part of these consolidated financial statements

TuSimple Holdings, Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Years Ended December 31,		
	2019	2020	2021
Cash flows from operating activities:			
Net loss	\$ (84,883)	\$ (177,870)	\$ (732,673)
Adjustments to reconcile net loss to net cash used in operating activities			
Share-based compensation	—	12,763	122,596
Accretion of asset retirement obligations	19	35	—
Bad debt expense	—	—	42
Depreciation and amortization	5,565	7,683	9,450
Gain (loss) on disposal of property and equipment	873	134	(19)
Non-cash research and development expense	—	32,325	—
Change in fair value of related party convertible loan	—	5,556	—
Change in fair value of warrants liability	—	(1,816)	326,900
Gain on loan extinguishment	—	—	(4,183)
Changes in operating assets and liabilities:			
Accounts receivable	(116)	(1,004)	(497)
Prepaid expenses and other current assets	(1,539)	274	(10,209)
Other assets	(941)	(682)	(1,777)
Accounts payable	139	4,196	(181)
Amounts due to related parties	143	(205)	—
Amounts due to joint development partners	—	1,355	6,039
Accrued expenses and other current liabilities	5,012	13,112	25,486
Other liabilities	(605)	296	(7)
Net cash used in operating activities	(76,333)	(103,848)	(259,033)
Cash flows from investing activities:			
Advances to related parties	(8)	—	—
Repayments from advances to related parties	—	8	—
Purchases of property and equipment	(10,328)	(4,303)	(13,321)
Purchases of intangible assets	(161)	(306)	(416)
Proceeds from disposal of property and equipment	62	189	100
Net cash used in investing activities	(10,435)	(4,412)	(13,637)
Cash flows from financing activities:			
Proceeds from issuance of redeemable convertible preferred stock	52,299	291,646	54,693
Proceeds from exercise of warrants for redeemable convertible preferred stock	—	2,500	183,007
Proceeds from issuance of related party convertible loan	—	50,000	—
Proceeds from issuance of warrants	—	11,943	—
Proceeds from early exercised stock options	—	—	1,163
Proceeds from issuance of common stock upon initial public offering, net of offering costs	—	—	1,030,965
Proceeds from issuance of common stock related to private placement	—	—	35,000
Proceeds from related party loan	—	5,000	—
Proceeds from loans	—	4,134	—
Return of guarantee deposit on related party loan	—	—	3,715
Principal payments on related party loan	(146)	(7,900)	(4,398)
Payment of third-party costs in connection with initial public offering	—	—	(3,591)
Principal payments on capital lease obligations	(323)	(713)	(783)
Principal payments on loans	—	(115)	(620)
Net cash provided by financing activities	51,830	356,495	1,299,151
Effect of exchange rate changes on cash, cash equivalents and restricted cash	234	6	260
Net increase (decrease) in cash, cash equivalents and restricted cash	(34,704)	248,241	1,026,741
Cash, cash equivalents and restricted cash at beginning of period	98,814	64,110	312,351
Cash, cash equivalents and restricted cash at end of period	\$ 64,110	\$ 312,351	\$ 1,339,092

The accompanying notes are an integral part of these consolidated financial statements.

TUSIMPLE HOLDINGS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(in thousands)

	Years Ended December 31,		
	2019	2020	2021
Reconciliation of cash, cash equivalents, and restricted cash to the consolidated balance sheets:			
Cash and cash equivalents	\$ 63,610	\$ 310,815	\$ 1,337,586
Restricted cash included in prepaid expenses and other current assets	500	1,536	1,506
Total cash, cash equivalents and restricted cash	<u>\$ 64,110</u>	<u>\$ 312,351</u>	<u>\$ 1,339,092</u>
Supplemental disclosure of cash flow information:			
Cash paid for interest	\$ 496	\$ 1,177	\$ 786
Supplemental schedule of non-cash investing and financing activities:			
Acquisitions of property and equipment included in liabilities	\$ 266	\$ 2,765	\$ 10,542
Purchase of property and equipment under capital lease	\$ 5,608	\$ —	\$ —
Exchange of Series A-2 redeemable convertible preferred stock for common stock	\$ 60,000	\$ —	\$ —
Accretion of redeemable convertible preferred stock	\$ 201	\$ 20,959	\$ 4,135
Reclassification of Series D-1 redeemable convertible preferred share warrants to liabilities	\$ —	\$ 394	\$ —
Cashless exercise of share options for common stock	\$ —	\$ 975	\$ —
Conversion of related party convertible loan into Series E-1 redeemable convertible preferred stock	\$ —	\$ 55,556	\$ —
Vesting of early exercised stock options	\$ —	\$ —	\$ 84
Exercise of liability-classified warrants	\$ —	\$ —	\$ 369,352
Conversion of redeemable convertible preferred stock into common stock upon initial public offering	\$ —	\$ —	\$ 1,282,916

The accompanying notes are an integral part of these consolidated financial statements.

TuSimple Holdings, Inc.
Notes to Consolidated Financial Statements

Note 1. Description of Business and Summary of Significant Accounting Policies

Description of Business

TuSimple Holdings, Inc. (the “Company” or “TuSimple”) is principally engaged in the operation and development of autonomous trucks and an autonomous freight network (“AFN”). The Company is headquartered in San Diego, California.

TuSimple was originally incorporated as Tusimple (Cayman) Limited, a limited liability company in the Cayman Islands, on October 25, 2016. In February 2021, the Company deregistered as a Cayman Islands exempted company and continued and domesticated as a corporation incorporated under the laws of the State of Delaware (the “Domestication”). The business, assets and liabilities of the Company and its subsidiaries on a consolidated basis, as well as its principal locations and fiscal year, were the same immediately after the Domestication as they were immediately prior to the Domestication. In addition, the directors and executive officers of the Company immediately after the Domestication were the same individuals who were directors and executive officers, respectively, of the Company immediately prior to the Domestication.

Initial Public Offering and Private Placement

On April 19, 2021, the Company closed its initial public offering (“IPO”) and concurrent private placement, in which it issued and sold 27,027,027 shares and 874,999 shares, respectively, of its authorized Class A common stock at \$40.00 per share, resulting in net proceeds of \$1.0 billion after deducting underwriting discounts and commissions of \$50.1 million and offering costs.

Immediately prior to the closing of the IPO, (i) the Company filed an amended and restated certificate of incorporation, which authorized 4,876,000,000 shares of Class A common stock and reclassified all outstanding common stock into Class A common stock, authorized 24,000,000 shares of Class B common stock, which are not publicly traded, and authorized 100,000,000 shares of undesignated preferred stock, (ii) Xiaodi Hou and Mo Chen (the “Founders”) each exchanged 12,000,000 shares of their newly designated Class A common stock for an equivalent number of shares of Class B common stock, and (iii) all shares of the Company’s outstanding redeemable convertible preferred stock automatically converted into 120,534,419 shares of Class A common stock.

The rights of the holders of Class A common stock and Class B common stock are identical, except with respect to voting, conversion, and transfer rights. The holders of Class A common stock are entitled to one vote per share and the holders of Class B common stock are entitled to 10 votes per share. Additionally, each share of Class B common stock will automatically convert, on a one-for-one basis, into shares of Class A common stock on the earliest of (i) the date specified by a vote of the holders of Class B common stock representing 75% of the outstanding shares of Class B common stock, (ii) the date that is between 90 days and 270 days, as determined by the board of directors, after the death or incapacitation of the last Founder to die or become incapacitated, or (iii) the date that is between 61 days and 180 days, as determined by the board of directors, after the date on which the number of outstanding shares of Class B common stock held by the Founders (or their permitted affiliates) is less than 12,000,000 shares.

Upon the closing of the IPO, the Company recognized \$42.6 million of stock-based compensation expense related to stock options, restricted stock units (“RSUs”), and share value awards (“SVAs”), for which the time-based vesting conditions had been satisfied or partially satisfied and the performance-based conditions were satisfied upon the closing of the IPO.

Additionally, the Company recorded \$4.3 million within operating expenses to former employees in connection with post-employment agreements for which payment was contingent upon the occurrence of an IPO or Sale Event (as such terms are defined in the post-employment agreements).

Basis of Presentation and Consolidation

The accompanying consolidated financial statements (“Financial Statements”) have been prepared in accordance with accounting principles generally accepted in the United States (“GAAP”) and applicable rules and regulations of the Securities and Exchange Commission (“SEC”) regarding financial reporting. The consolidated financial statements include the accounts of the Company and its consolidated subsidiaries. All significant intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of consolidated financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Significant items subject to such estimates and assumptions include, but are not limited to, the useful lives of long-lived assets, the valuation of stock-based compensation, the fair value of preferred share warrants and related party convertible loans, the measurement of deferred tax assets, the recoverability of long-lived assets, and the fair value of equipment under capital leases. On an ongoing basis, management evaluates these estimates and assumptions; however, actual results could materially differ from these estimates.

Cash, Cash Equivalents, and Restricted Cash

Cash and cash equivalents consist of cash in banks and highly liquid investments, primarily certificates of deposit, purchased with an original maturity of three months or less.

Restricted cash is pledged as security for letters of credit or other collateral amounts established by the Company for certain lease obligations, corporate credit cards, and other contractual arrangements. Restricted cash is recorded as prepaid expenses and other current assets in the consolidated balance sheets based on the term of the remaining restriction.

Fair Value Measurements

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The Company measures financial assets and liabilities at fair value at each reporting period using a fair value hierarchy which requires the Company to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. A financial instrument's classification within the fair value hierarchy is based upon the lowest level of input that is significant to the fair value measurement. The levels of inputs used to measure fair value are:

- Level 1 — Observable inputs such as quoted prices in active markets for identical assets or liabilities.
- Level 2 — Observable inputs other than Level 1 prices such as quoted prices for similar assets or liabilities in active markets, quoted prices in markets that are not active or inputs other than the quoted prices that are observable either directly or indirectly for the full term of the assets or liabilities.
- Level 3 — Unobservable inputs in which there is little or no market data that are significant to the fair value of the assets or liabilities.

The Company's primary financial instruments include cash equivalents, accounts receivable, accounts payable, amounts due to and from related parties, amounts due to joint development partners, accrued expenses, short-term and long-term debt, the related party convertible loan and the warrants liability. The estimated fair value of cash equivalents, accounts receivable, accounts payable, short-term debt, and accrued expenses approximates their carrying value due to the short-term nature of these instruments. Amounts due from related parties is comprised of a guarantee deposit paid in cash, which approximates fair value. Amounts due to related parties approximate fair value due to the short-term nature of these instruments. The warrants liability and related party convertible loan are stated at fair value on a recurring basis. Refer to Note 3. Fair Value Measurements and Note 6. Debt for further information.

Accounts Receivable, Net

Accounts receivable are recorded at invoiced amounts, net of allowance for doubtful accounts, and do not bear interest. The allowance for doubtful accounts is based on the Company's assessment of the collectability of accounts. The Company regularly reviews the adequacy of the allowance for doubtful accounts based on a combination of factors. In establishing any required allowance, the Company considers historical losses adjusted to take into account current market conditions and customers' financial condition, the amount of any receivables in dispute, the current receivables aging, and the current payment terms. Accounts receivable deemed uncollectible are charged against the allowance for doubtful accounts when identified. As of December 31, 2020 and 2021 the allowance for doubtful accounts was immaterial.

Property and Equipment, Net

Property and equipment, net, are stated at cost less accumulated depreciation or amortization and any recorded impairment. Property and equipment under capital leases are initially recorded at the present value of minimum lease payments. Depreciation and amortization is computed using the straight-line method over the estimated useful lives of the assets, as follows:

<u>Property and Equipment</u>	<u>Estimated Useful Life</u>
Electronic equipment	1-4 years
Vehicles	5-6 years
Office and other equipment	4-6 years
Leasehold improvements	Shorter of lease term or estimated useful life of the asset

When assets are retired or otherwise disposed of, the cost, accumulated depreciation and amortization are removed from the accounts and any resulting gain or loss is reflected in the consolidated statements of operations in the period realized. Maintenance and repairs that do not enhance or extend the asset's useful life are charged to operating expense as incurred.

Assets acquired under a capital lease are amortized in a manner consistent with the Company's depreciation policy for owned assets if the lease transfers ownership to the Company by the end of the lease term or contains a bargain purchase option. Otherwise, assets acquired under a capital lease are amortized over the lease term.

Intangible Assets, Net

Intangible assets represent patents, which are carried at cost and amortized on a straight-line basis over their estimated useful lives of 20 years and presented within other assets in the Company's consolidated balance sheet. The Company reviews intangible assets for impairment under the long-lived asset model described in the Impairment of Long-Lived Assets section. There have been no impairment charges recorded in any of the periods presented in the accompanying consolidated financial statements. As of December 31, 2020 and 2021, intangible assets are immaterial.

Impairment of Long-Lived Assets

The Company evaluates long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of assets held and used is measured by comparison of the carrying amount of an asset or asset group to estimated undiscounted future cash flows expected to be generated by the asset or asset group. If the carrying amount of an asset or asset group exceeds estimated undiscounted future cash flows, then an impairment charge is recognized based on the excess of the carrying amount of the asset or asset group over its fair value. There were no impairment charges recognized related to long-lived assets during the periods presented in the accompanying consolidated financial statements.

Leases

The Company categorizes leases at their inception as either operating or capital leases. As the lessee, a lease is a capital lease if any of the following conditions exists: a) ownership is transferred to the lessee by the end of the lease term, b) there is a bargain purchase option, c) the lease term is at least 75% of the property's estimated remaining economic life, or d) the present value of the minimum lease payments at the beginning of the lease term is 90% or more of the fair value of the leased property to the lessor at the inception date. A capital lease is accounted for as if there was an acquisition of an asset and an incurrence of an obligation at the inception of the lease. As of December 31, 2020 and 2021, assets under capital leases represent semi-trucks used for research and development and providing freight capacity services. Refer to Note 7. Commitments and Contingencies for further information.

All other leases are accounted for as operating leases wherein lease costs are recognized on a straight-line basis once control of the space is obtained, without regard to deferred payment terms such as rent holidays that defer the commencement date of required payments or escalating rents. Additionally, incentives received are treated as a reduction of costs over the term of the agreement.

Revenue Recognition

On January 1, 2019, the Company adopted Accounting Standards Update ("ASU") No. 2014-09, Revenue from Contracts with Customers ("Topic 606") as discussed further in Recently Adopted Accounting Pronouncements below. Topic 606 establishes a principle for recognizing revenue upon the transfer of promised goods or services to customers, in an amount that reflects the expected consideration received in exchange for those goods or services. Topic 606 also includes Subtopic 340-40, Other Assets and Deferred Costs—Contracts with Customers, which requires the deferral of incremental costs of obtaining a contract with a customer. The impact of adopting Topic 606 on the Company's revenue is not material to any of the periods presented.

The Company recognizes revenue primarily from providing freight capacity services. Revenue is recognized when the customer obtains control of promised services in an amount that reflects the consideration the Company expects to receive in exchange for those services. To date, the Company has not generated revenue from carrier-owned services.

Satisfaction of Performance Obligation

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the basis of revenue recognition in accordance with GAAP. To determine the proper revenue recognition method for contracts, the Company evaluates whether two or more contracts should be combined and accounted for as one single contract and whether the combined or single contract should be accounted for as more than one performance. For most of the Company's contracts, the customer contracts with the Company to provide distinct services within a single contract, such as freight capacity services. The majority of the Company's contracts with customers for freight capacity services include only one performance obligation, the freight capacity services. However, if a contract is separated into more than one performance obligation, the Company allocates the total transaction price to each performance obligation in an amount based on the estimated relative standalone selling prices of the promised goods or services underlying each performance obligation. The Company frequently sells standard freight capacity services with observable standalone sales prices. In these instances, the observable standalone sales are used to determine the standalone selling price.

For freight capacity services, revenue is recognized over time as the Company performs the services in the contract because of the continuous transfer of control to the customer. The Company's customers receive the benefit of the Company's services as the goods are transported from one location to another. If the Company were unable to complete delivery to the final location, another entity would not need to re-perform the freight capacity service already performed. As control transfers over time, revenue is recognized based on the extent of progress towards completion of the performance obligation. The selection of the method to measure progress towards completion requires judgment and is based on the nature of the products or services to be provided. Management estimates the progress based on mileage completed to total mileage to be transported. Revenues are recorded net of value-added taxes and surcharges.

Contract Modification

Contracts may be modified to account for changes in the rates the Company charges its customers or to add additional distinct services. The Company considers contract modifications to exist when the modification either creates new enforceable rights and obligations or alters the existing arrangement. Contract modifications that add distinct goods or services are treated as separate performance obligations. Contract modifications that do not add distinct goods or services typically change the price of existing services. These contract modifications are accounted for prospectively as the remaining performance obligations are executed.

Contract Assets and Liabilities

Contract assets include billed and unbilled amounts resulting from in-transit packages, as the Company has an unconditional right to payment only once all performance obligations have been completed (e.g., packages have been delivered). Contract assets are generally classified as current and the full balance is converted each quarter based on the short-term nature of the transactions. The Company's contract liabilities consist of advance payments and billings in excess of revenue. The full balance of contract liabilities is converted each quarter based on the short-term nature of the transactions.

The Company did not have any contract assets or contract liabilities as of December 31, 2020 and 2021, respectively.

Payment Terms

Under the typical payment terms of the Company's customer contracts, the customer pays at periodic intervals (i.e. every 14 days, 30 days etc.) for shipments included on invoices received. It is not customary business practice to extend payment terms past 90 days, and as such, the Company does not have a practice of including a significant financing component within its contracts with customers.

Contract Costs

Incremental costs of obtaining contracts are expensed as incurred if the amortization period of the assets is one year or less. These costs are included within cost of revenue in the consolidated statements of operations.

Disaggregation of Revenue and Remaining Performance Obligations

The Company earns all of its revenue within the U.S. and there is no revenue related to any other geographies. Additionally, due to the short-term nature of the Company's contracts, there are no remaining unsatisfied performance obligations as of December 31, 2021.

Cost of Revenue

Cost of revenue consists primarily of fuel costs, insurance costs, depreciation of property and equipment (including semi-trucks acquired under capital leases), labor costs and other costs directly attributable to providing freight capacity services.

Software Development Costs

The Company evaluates capitalization of certain software development costs subsequent to the establishment of technological feasibility. Based on the Company's product development process and substantial development risks, technological feasibility for the Company's purpose-built L4 autonomous semi-trucks and supporting applications has not been established. Accordingly, the Company has charged all such costs to research and development expense in the period incurred.

Research and Development

Research and development costs consist primarily of personnel-related expenses, including stock-based compensation costs, associated with software developers and engineering personnel and consultants responsible for the design, development, and testing of the Company's autonomous truck driving solutions, depreciation of equipment used in research and development, and allocated overhead costs. Research and development costs are expensed as incurred.

Selling, General and Administrative

Selling, general and administrative costs consist primarily of personnel-related expenses, including stock-based compensation costs, associated with the Company's sales, marketing, management and administration activities, professional service fees, advertising expenses, sponsorship, public relations and other related marketing activities, and other general corporate expenses. Selling, general and administrative costs are expensed as incurred.

Stock-Based Compensation

The Company accounts for stock-based compensation expense in accordance with the fair value recognition and measurement provisions of GAAP, which requires compensation cost for the grant-date fair value of stock-based awards to be recognized over the requisite service period. The Company determines the fair value of stock-based awards granted or modified on the grant date (or modification date, if applicable) at fair value, using appropriate valuation techniques.

Time-Based Service Awards

For stock-based awards with time-based vesting conditions only, generally being RSUs and stock options, stock-based compensation is recognized straight-line over the requisite service period, which is generally four years. The fair value of RSUs is measured on the grant date based on the fair value of the underlying common stock. The fair value of stock option awards is estimated on the grant date using the Black-Scholes option-pricing model which incorporates various assumptions, including the fair value of the underlying common stock, the expected stock price volatility over the term of the award, the risk-free interest rate for the expected term of the award and the expected dividends. The Company accounts for forfeitures as they occur.

Performance-Based Awards

The Company has granted RSUs, SVAs, and stock options that vest only upon the satisfaction of both time-based service and performance-based conditions. The time-based service condition for these awards generally is satisfied over four years. The performance-based conditions, other than with respect to the CEO Performance Award discussed in Note 9. Stock Based Compensation, are satisfied upon the occurrence of a qualifying event, defined as the earlier of (i) the closing of certain specific liquidation or change in control transactions, or (ii) an IPO. The Company records stock-based compensation expense for performance-based equity awards such as RSUs, SVAs, and stock options using the accelerated attribution method over the requisite service period, which is generally four years, and only if performance-based conditions are considered probable to be satisfied. Upon completion of the IPO, the Company recorded a cumulative one-time stock-based compensation expense determined using the grant-date fair values. Stock-based compensation related to remaining time-based service after the qualifying event is recorded over the remaining requisite service period.

For performance-based RSUs and SVAs, the Company determines the grant-date fair value as the fair value of the Company's common stock on the grant date.

For performance-based stock options, the Company determines the grant-date fair value using the Black-Scholes option-pricing model described above.

For the CEO Performance Award with a vesting schedule based entirely on the attainment of both performance and market conditions, stock-based compensation expense associated with each tranche is recognized over the longer of (i) the expected achievement period for the operational milestones for such tranche and (ii) the expected achievement period for the related market capitalization milestone determined on the grant date, beginning at the point in time when the relevant operational milestones are considered probable of being met. If such operational milestones become probable any time after the grant date, the Company will recognize a cumulative catch-up expense from the grant date to that point in time. If the related market capitalization milestone is achieved earlier than its expected achievement period, then the stock-based compensation expense will be recognized over the expected achievement period for the operational milestones, which may accelerate the rate at which such expense is recognized. The fair value of such awards is estimated on the grant date using Monte Carlo simulations. Refer to Note 9. Stock Based Compensation for further information.

Employee Stock Purchase Plan ("ESPP")

The Company recognizes stock-based expense related to shares issued pursuant to the ESPP on a straight-line basis over the offering period. The ESPP provides for six-month offering periods. The ESPP allows eligible employees to purchase shares of Class A common stock at a 15% discount on the lower of our stock price on either (i) the offering period beginning date or (ii) the purchase date. No employee may purchase shares under the ESPP at a rate in excess of \$25,000 worth of Class A common stock based on the fair market value per share of Class A common stock at the beginning of an offering for each calendar year such purchase right is outstanding or 1,500 shares. The Company estimates the fair value of shares to be issued under the ESPP based on a combination of options valued using the Black-Scholes option-pricing model. Volatility is determined over an expected term of six months based on the Company's historical volatility. The expected term is estimated based on the contractual term.

Income Taxes

Current income taxes are provided for in accordance with the relevant statutory tax laws and regulations.

Income taxes are accounted for under the asset and liability method of accounting. Under this method, deferred tax assets and liabilities are determined based on the differences between the financial reporting and the tax bases assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse. A valuation allowance is provided when it is more likely than not that a deferred tax asset will not be fully realized. Due to our lack of earnings history, the net deferred tax assets have been fully offset by a valuation allowance.

The Company records liabilities related to uncertain tax positions when, despite the Company's belief that the Company's tax return positions are supportable, the Company believes that it is more likely than not that those positions may not be fully sustained upon review by tax authorities. Accrued interest and penalties related to unrecognized tax benefits are classified as income tax expense. The Company did not recognize a liability for uncertain tax positions as of December 31, 2020 and 2021 due to the availability of net operating loss and tax credit carryforwards.

Foreign Currency

The functional currency of the Company's foreign subsidiaries is the local currency or U.S. dollar depending on the nature of the subsidiaries' activities. Foreign currency transactions recognized in the consolidated statements of operations are converted to the functional currency by applying the exchange rate prevailing on the date of the transaction. Monetary assets and liabilities denominated in currencies other than the functional currency are remeasured monthly using the month-end exchange rate. Gains and losses resulting from foreign currency transactions and the effects of remeasuring monetary assets and liabilities are recorded in other income in the consolidated statements of operations. Subsidiary assets and liabilities with non-U.S. dollar functional currencies are translated at the month-end rate, retained earnings and other equity items are translated at historical rates, and revenues and expenses are translated at average exchange rates during the year. Cumulative translation adjustments are recorded within accumulated other comprehensive loss, a separate component of stockholders' equity (deficit).

Comprehensive Loss

Comprehensive loss consists of two components: net loss and other comprehensive loss. Other comprehensive loss refers to losses that are recorded as an element of stockholders' equity (deficit) and are excluded from net loss. The Company's other comprehensive loss is composed of foreign currency translation adjustments.

Net Loss Per Share Attributable to Common Stockholders

The Company computes net loss per share using the two-class method required for participating securities. The two-class method requires income available to common stockholders for the period to be allocated between common stock and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Prior to conversion to common stock upon the Company's IPO, the holders of the redeemable convertible preferred stock would have been entitled to dividends in preference to common stockholders, at a rate no less than the rate at which dividends are paid to common stockholders, prior to any payment of dividends to common stockholders. These participating securities do not contractually require the holders of such shares to participate in the Company's losses. As such, net losses for the periods presented were not allocated to the redeemable convertible preferred stock.

The Company's basic net loss per share attributable to common stockholders is calculated by dividing net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period, without consideration of potentially dilutive securities. The diluted net loss per share is calculated by giving effect to all potentially dilutive securities outstanding for the period using the treasury stock method or the if-converted method based on the nature of such securities. Diluted net loss per share is the same as basic net loss per share in periods when the effects of potentially dilutive common stock are anti-dilutive.

Segment Information

The Company operates in one operating segment. Operating segments are defined as components of an enterprise about which separate financial information is evaluated regularly by the chief operating decision maker (“CODM”), which is the management committee of the board of directors, in deciding how to allocate resources and assessing performance. The CODM allocates resources and assess performance based upon consolidated financial information.

Commitments and Contingencies

In the normal course of business, the Company is subject to loss contingencies, such as legal proceedings arising out of its business, that cover a wide range of matters. An accrual for a loss contingency is recognized when it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. If a potential material loss contingency is not probable but is reasonably possible, or is probable but cannot be estimated, then the nature of the contingent liability, together with an estimate of the range of possible loss if determinable and material, is disclosed.

Reclassifications

Certain prior period balances have been reclassified to conform to the current period presentation in the consolidated financial statements and the accompanying notes. Restricted cash has been reclassified to prepaid expenses and other current assets, accrued expenses incurred under joint development agreements have been reclassified to be presented separately from amounts due to related parties, and sales and marketing expense have been reclassified to selling, general and administrative expense.

Recently Adopted Accounting Pronouncements

In August 2018, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) No. 2018-15, *Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that Is a Service Contract*, which aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). The Company adopted the guidance as of January 1, 2021 with no material impact to the Financial Statements.

In December 2019, the FASB issued ASU No. 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*. This ASU simplifies the accounting for income taxes by eliminating some exceptions to the general approach in ASC 740, Income Taxes, for recognizing deferred taxes for investments, performing intraperiod allocation and calculating income taxes in interim periods. The Company adopted the guidance as of January 1, 2021 with no material impact to the Financial Statements.

Recently Issued Accounting Pronouncements

As an emerging growth company (“EGC”), the Jumpstart Our Business Startups Act (“JOBS Act”) allows the Company to delay adoption of new or revised accounting pronouncements applicable to public companies until such pronouncements are applicable to private companies. The Company has elected to use this extended transition period under the JOBS Act until such time the Company is no longer considered to be an EGC. The adoption dates discussed below reflect this election.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*, as amended by subsequently issued supplemental or clarifying ASUs (collectively, “Topic 842”). The core principle of the ASU improves transparency and comparability related to the accounting and reporting of leasing arrangements, including balance sheet recognition for assets and liabilities associated with rights and obligations created by leases with terms greater than twelve months, among other changes. For the Company, the effective date of these ASUs is for fiscal years beginning after December 15, 2021 and early adoption is permitted. The Company will adopt these ASUs on January 1, 2022 under a modified retrospective basis through a cumulative adjustment to the opening balance of accumulated deficit. The Company will not adjust the comparative period financial information or make the new required lease disclosures for periods before the effective date. In addition, the Company has elected the package of practical expedients allowing the Company to not reassess (i) whether any expired or existing contracts are or contain leases, (ii) the lease classification for any expired or existing leases, and (iii) the initial direct costs for any existing leases. The Company has also elected the short-term lease recognition exemption that allows lease agreements that are twelve months or less to be excluded from the balance sheet. The Company has not elected the use-of-hindsight practical expedient. The Company has identified its leases or other contracts impacted by the new standard and is in the process of (i) finalizing the implementation of a software solution to manage and account for leases under the new standard and (ii) updating its business processes and related policies, systems and controls to support recognition and disclosure under the new standard. In connection with the adoption of these ASUs, the Company expects a significant increase in assets and liabilities on its consolidated balance sheet, primarily due to recognition of right-of-use assets and lease liabilities in the range of \$35.0 million to \$45.0 million, respectively, for contracts that contain operating leases. The Company does not expect the adoption of these ASUs to have a material impact on its consolidated statement of operations or the consolidated statement of cash flows.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments—Credit Losses (Topic 326), Measurement of Credit Losses on Financial Instruments*, as amended by subsequently issued ASUs 2018-19, 2019-04, 2019-05, 2019-10 2019-11 and 2020-02 and 2020-03 (collectively, “Topic 326”), which requires an entity to utilize a new impairment model known as the current expected credit loss (“CECL”) model to estimate its lifetime “expected credit loss” and record an allowance that, when deducted from the amortized cost basis of the financial asset, presents the net amount expected to be collected on the financial asset. The CECL model is expected to result in more timely recognition of credit losses. This guidance also requires new disclosures for financial assets measured at amortized cost, loans and available-for-sale debt securities. For the Company, the new standard is effective for annual reporting periods beginning after December 15, 2022, including interim periods within those annual periods. Early adoption is permitted. Entities will apply the standard’s provisions as a cumulative-effect adjustment to retained earnings as of the beginning of the first reporting period in which the guidance is adopted. The Company is currently evaluating the impact the adoption of this standard will have on its consolidated financial statements.

In August 2020, the FASB issued ASU No. 2020-06, *Debt – Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging Contracts – Contracts in Entity’s Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity’s Own Equity*, which amends the guidance on convertible instruments and the derivatives scope exception for contracts in an entity’s own equity, and also improves and amends the related EPS guidance for both Subtopics. The amendments in the new standard are to address issues identified as a result of the complexity associated with applying GAAP for certain financial instruments with characteristics of liabilities and equity. For the Company, the new standard will be effective for annual reporting periods beginning after December 15, 2023, including interim periods within those fiscal years. Early adoption is permitted for annual reporting periods beginning after December 15, 2020. The Company does not expect the adoption of this standard to have a material impact on its consolidated financial statements.

In October 2020, the FASB issue ASU No. 2020-10, *Codification Improvements*, which updates various codification topics by clarifying or improving disclosure requirements to align with the SEC’s regulations. For the Company, the new standard will be effective for annual reporting periods beginning after December 15, 2021 and interim periods within fiscal years beginning after December 15, 2022. The Company is currently evaluating the impact the adoption of this standard will have on its consolidated financial statements.

Note 2. Concentrations and Risks

Concentration of Credit Risk

The Company’s cash and cash equivalents may consist of deposits held with banks, money market funds, certificates of deposit, or other highly liquid investments that may at times exceed federally insured limits. Cash equivalents are financial instruments that potentially subject the Company to concentrations of risk, to the extent of amounts recorded in the balance sheets. The Company performs evaluations of its cash and cash equivalents and the relative credit standing of these financial institutions and limits the amount of credit exposure with any one institution. Management believes that the Company is not exposed to significant credit risk due to the financial position of the depository institutions in which those deposits are held. The Company has not experienced any losses to date related to these concentrations.

Currency Convertibility Risk

The revenues and expenses of the Company’s subsidiaries in the PRC are generally denominated in Renminbi (“RMB”) and their assets and liabilities are primarily denominated in RMB, which is not freely convertible into foreign currencies. The Company’s cash denominated in RMB that is subject to such government controls amounted to RMB 28.2 million (equivalent to \$4.2 million) and RMB 49.2 million (equivalent to \$7.7 million) as of December 31, 2020 and 2021, respectively. The value of the RMB is subject to changes in the central government policies and international economic and political developments affecting the supply and demand of RMB in the PRC foreign exchange trading system market. In the PRC, certain foreign exchange transactions are required by law to be transacted only by authorized financial institutions at exchange rates set by the People’s Bank of China (the “PBOC”). Remittances from China in currencies other than RMB by the Company must be processed through the PBOC or other China foreign exchange regulatory bodies which require certain supporting documentation in order to process the remittance.

Note 3. Fair Value Measurements

The following table presents the Company's assets and liabilities that are measured at fair value on a recurring basis and indicates the fair value hierarchy of the valuation (in thousands):

	As of December 31, 2020			
	Total	Level 1	Level 2	Level 3
Assets:				
Cash equivalents:				
Certificates of deposit	\$ 279,279	\$ 279,279	\$ —	\$ —
Total	\$ 279,279	\$ 279,279	\$ —	\$ —
Liabilities:				
Warrants liability	\$ 42,452	\$ —	\$ —	\$ 42,452
Total	\$ 42,452	\$ —	\$ —	\$ 42,452

	As of December 31, 2021			
	Total	Level 1	Level 2	Level 3
Assets:				
Cash equivalents:				
Money market funds	\$ 1,077,550	\$ 1,077,550	\$ —	\$ —
Total	\$ 1,077,550	\$ 1,077,550	\$ —	\$ —

Warrants Liability

As of December 31, 2020, the fair value of the warrants liability was estimated using the Black-Scholes option-pricing model. The fair value of the underlying redeemable convertible preferred stock used within the Black-Scholes option-pricing model was estimated using a hybrid between a probability-weighted expected return method ("PWERM") and option pricing model ("OPM"), estimating the probability-weighted value across multiple scenarios, while using an OPM to estimate the allocation of value within one or more of these scenarios. Discrete future outcomes considered under the PWERM include an IPO of the Company's common stock, as well as continued operation as a private company. The significant unobservable inputs into the valuation model included the timing and probability of occurrence of these discrete future outcomes and a discount for the lack of marketability of the redeemable convertible preferred stock.

In February and March 2021, TRATON Group ("TRATON") and its subsidiary Navistar, Inc. ("Navistar") exercised warrants to purchase 4,331,644 and 9,477,073 shares of Series E-2 and Series E redeemable convertible preferred stock at an exercise price of \$11.31 and \$14.14, resulting in proceeds of \$49.0 million and \$134.0 million, respectively. Immediately prior to their exercise, the fair value of the warrants liability was remeasured using the Black-Scholes model. The warrants exercised by TRATON represented only a portion of their total and the unexercised warrants expired as of the exercise date. As of December 31, 2021, there were no warrants outstanding. Refer to Note 8. Redeemable Convertible Preferred Stock, Preferred Stock Warrants, and Stockholders' Equity (Deficit) for further information.

The Company used the following assumptions in the model:

	As of		
	December 31, 2020	February 26, 2021	March 19, 2021
Discount for lack of marketability	9.00% - 30.00%	—	—
Fair value of underlying securities	\$14.14	\$40.00	\$40.00
Expected volatility	53.90% - 76.90%	62.95%	60.85%
Expected term (in years)	0.33 - 1.91	1.76	0.79
Risk-free interest rate	0.10% - 0.13%	0.14%	0.08%

The following table sets forth a summary of the changes in the estimated fair value of the Company's warrants liability (in thousands):

	Warrant Liabilities
Balance as of December 31, 2019	\$ —
Issuance of warrants	44,268
Reclassification of warrants from equity to liability	394
Exercises during the period	(394)
Change in fair value of warrants	(1,816)
Balance as of December 31, 2020	\$ 42,452
Change in fair value of warrants	326,900
Exercises during the period	(369,352)
Balance as of December 31, 2021	\$ —

Note 4. Property and Equipment, Net

Property and equipment as of December 31, 2020 and 2021 were as follows (in thousands):

	As of December 31,	
	2020	2021
Electronic equipment	\$ 11,429	\$ 12,761
Office and other equipment	6,152	9,423
Vehicles	12,775	21,043
Leasehold improvements	7,340	11,984
Construction in progress	225	5,258
Property and equipment, gross	37,921	60,469
Accumulated depreciation and amortization	(15,805)	(24,416)
Property and equipment, net	\$ 22,116	\$ 36,053

Depreciation and amortization expense was \$5.6 million, \$7.7 million, and \$9.5 million for the years ended December 31, 2019, 2020, and 2021, respectively.

As of December 31, 2020 and 2021, property and equipment financed under capital leases was \$4.5 million and \$3.3 million, net of accumulated amortization of \$1.5 million and \$2.5 million, respectively.

Note 5. Accrued Expenses and Other Current Liabilities

Accrued expenses and other current liabilities as of December 31, 2020 and 2021 were as follows (in thousands):

	As of December 31,	
	2020	2021
Accrued payroll	\$ 11,941	\$ 33,225
Accrued professional fees	7,865	1,938
Other	3,155	6,535
Accrued expenses and other current liabilities	\$ 22,961	\$ 41,698

Note 6. Debt

Scania Loan

In April 2020, in connection with the Development Agreement entered into with Scania CV AB ("Scania"), an affiliate of TRATON, the Company received a \$5.0 million loan from Scania to cover the Company's costs related to the program. The loan does not accrue interest and is repayable upon the acquisition by Scania or a Scania Affiliate of shares or other financial instruments in the Company. In September 2020, TRATON acquired 1,232,370 of the Company's Series D-1 redeemable convertible preferred shares and the loan was repaid in full in October 2020. Refer to Note 7. Commitments and Contingencies for further detail over the Development Agreement.

Payroll Protection Program (“PPP”) Loan

In April 2020, the Company received loan proceeds in the amount of \$4.1 million under the Small Business Administration Paycheck Protection Program established under Section 1102 of the Coronavirus Aid, Relief and Economic Security (“CARES”) Act. The loan accrued interest at a rate of 1.0% per annum and originally matured in 24 months. All of the proceeds of the PPP Loan were used by the Company to pay eligible payroll costs and the Company maintained its headcount and otherwise complied with the terms of the PPP Loan.

In October 2020, the Company applied for forgiveness of the PPP Loan and corresponding accrued interest, which was approved by the SBA in June 2021, resulting in a gain on loan extinguishment of \$4.2 million.

Related Party Convertible Loan

In June 2020, the Company entered into a convertible loan agreement with SUN Dream, Inc., a preferred shareholder in the Company, to issue convertible debt in the amount of \$50.0 million (“Convertible Loan”). The Convertible Loan accrued interest at a rate of 10.0% per annum and originally matured in June 2021. On or before the maturity date, the Convertible Loan, at the option of SUN Dream, Inc., could be converted in whole or in part into the Company’s shares issued in the next round of financing (“Next Financing”) equal to the quotient of the outstanding principal amount of the Convertible Loan divided by a price per share equal to 90% of the applicable purchase price in such financing (“Discounted Conversion Price”); provided that the New Financing was consummated within six months following the issuance of the Convertible Loan and the Discounted Conversion Price was not lower than the original issue price of Series D-1 redeemable convertible preferred shares, which was \$8.11.

In December 2020, in connection with the Company’s Series E financing, the Convertible Loan converted into 3,928,937 Series E-1 redeemable convertible preferred shares at a conversion price of \$12.73.

Truck Purchase Loans

During 2020 and 2021, the Company entered into multiple loan agreements with aggregate principal amount of \$1.9 million and \$5.6 million, respectively, to finance its purchase of trucks. The 2020 loans accrue interest at a rate of 8.95% per annum and have original maturities of 42 months. The 2021 loans accrue interest at rates from 6.96% to 9.73% per annum and have original maturities of 60 months.

As of December 31, 2021, the current portion of the truck loan principal amount is \$1.5 million and the noncurrent portion of the truck loan principal amount is \$5.2 million, which are included in short-term debt and the long-term debt in the consolidated balance sheets, respectively.

Note 7. Commitments and Contingencies

Lease Commitments

The Company has entered into various noncancelable operating leases for its facilities with various expiry dates through 2034.

Future minimum lease payments for non-cancelable operating and capital leases as of December 31, 2021 are as follows (in thousands):

	Capital Leases	Operating Leases
2022	\$ 1,253	\$ 7,660
2023	978	7,891
2024	963	5,126
2025	1,761	3,435
2026	—	3,049
Thereafter	—	22,524
Total minimum lease payments	4,955	\$ 49,685
Amount representing interest	(1,317)	
Present value of minimum lease payments	\$ 3,638	

Rental expenses were \$4.4 million, \$4.6 million, and \$5.7 million for the years ended December 31, 2019, 2020, and 2021, respectively.

Joint Development Agreements

In April 2020, the Company entered into a Development Agreement with Scania relating to a hub-to-hub pilot program using Scania vehicles and the Company's autonomous technology. Under the Development Agreement, each party will fund its own costs related to the program. There are no reimbursements paid between the parties and there are no spending floors included within the Development Agreement. Upon successful completion of the development activities, the parties intend to set up a long-term cooperation agreement covering development, maintenance, operation and sales of self-driving systems on a global scale. The terms and conditions of such arrangement will be negotiated by the parties and included in a separate Partnership Agreement.

In July 2020, the Company entered into a Joint Development Agreement ("JDA") with Navistar under which the parties will work collaboratively to develop a purpose-built L4 autonomous semi-truck. Under the JDA, the parties grant each other rights to their background intellectual property to permit them to conduct research and development activities. Pursuant to the JDA, the Company agrees to reimburse Navistar up to \$10.0 million for research and development expenses incurred. Payment of reimbursements is deferred to align with the achievement of certain milestones and reimbursements due are recorded within accrued expenses in the Company's consolidated balance sheets. All reimbursements are expected to be paid within 12 months of the Company incurring the obligation. Upon successful completion of the development activities under the JDA, the parties will enter into good faith negotiations for a production license agreement. Products developed will be jointly commercialized by the parties.

As of December 31, 2021, expenses incurred by Navistar for reimbursement under the JDA are \$10.0 million .

Litigation and Legal Proceedings

The Company is not currently a party to any pending material litigation or other legal proceeding or claims.

Note 8. Redeemable Convertible Preferred Stock and Preferred Stock Warrants, and Stockholders' Equity (Deficit)

In July 2020, the Company entered into a Sale and Purchase Agreement with Navistar, under which the Company issued 621,447 shares of Series D-1 redeemable convertible preferred stock at \$8.11 per share and a warrant to purchase shares issued in the Company's next equity financing for aggregate proceeds of \$5.0 million. The warrant was recorded at fair value, which equaled \$2.0 million, and was treated as a reduction of the proceeds allocated to the Series D-1 redeemable convertible preferred stock. The Company elected to accrete the shares to redemption value immediately and \$2.0 million of accretion was recorded within additional paid-in capital within the consolidated statements of redeemable convertible preferred stock and stockholders' equity (deficit). In March 2021, Navistar exercised warrants to purchase 9,477,073 shares of Series E redeemable convertible preferred stock at an exercise price of \$14.14 per share, resulting in proceeds of \$134.0 million.

In August 2020, the Company entered into a Sale and Purchase Agreement with TRATON, under which the Company agreed to issue 1,232,730 shares of Series D-1 redeemable convertible preferred stock at \$8.11 per share and a warrant to purchase shares issued in the Company's next equity financing for aggregate proceeds of \$10.0 million. The warrant was recorded at fair value, which equaled \$42.3 million, and was treated as a reduction of the proceeds allocated to the Series E redeemable convertible preferred stock. The excess of \$32.3 million in fair value allocated to the warrants over the cash proceeds received upon issuance was considered compensation paid to TRATON and recorded as research and development expense within the consolidated statements of operations. In February 2021, TRATON exercised warrants to purchase 4,331,644 shares of Series E-2 redeemable convertible preferred stock at an exercise price of \$11.31 per share, resulting in aggregate proceeds of \$49.0 million.

In November 2020, warrants issued in conjunction with the Company's Series D-1 financing in prior years were exercised and the Company issued 308,182 shares of Series D-1 redeemable convertible preferred stock at \$8.11 per share for aggregate proceeds of \$2.5 million.

In November 2020, the Company entered into a Sale and Purchase Agreement with new and existing investors to issue Series E redeemable convertible preferred shares at \$14.14 per share.

From December 2020 to January 2021, the Company issued an aggregate of 25,695,018 shares of Series E redeemable convertible preferred stock for aggregate proceeds of \$363.3 million. The Company incurred issuance costs of \$13.1 million, which were recorded as a reduction in the carrying value of the Series E redeemable convertible preferred shares. The Company recorded \$9.0 million of accretion to redemption value immediately upon the issuance within accumulated deficit and another \$4.1 million of accretion within additional paid-in capital in the consolidated statements of redeemable convertible preferred stock and stockholders' equity (deficit).

Upon the closing of the IPO, all shares of the Company's outstanding redeemable convertible preferred stock automatically converted into 120,534,419 shares of common stock. As of December 31, 2021, there were no shares of the Company's redeemable preferred stock issued and outstanding.

The following table is a summary of redeemable convertible preferred stock immediately prior to the conversion into common stock (in thousands, except share amounts and per share amounts):

Series	Shares Authorized	Shares Issued and Outstanding	Per Share Liquidation Preference	Aggregate Liquidation Preference	Per Share Initial Conversion Price	Net Carrying Value
A	20,000,000	20,000,000	\$ 0.3925	\$ 7,850	\$ 0.3925	\$ 7,850
A-2	8,218,203	8,218,203	—	—	7.3009	60,000
B-1	7,080,000	7,080,000	2.5000	17,700	2.5000	17,700
B-2	3,000,000	3,000,000	0.7667	2,300	0.7667	2,300
B-3	3,465,372	3,465,372	0.8657	3,000	0.8657	3,000
C	14,993,041	14,993,041	3.6941	55,386	3.6941	55,386
D-1	20,345,131	20,345,131	8.1121	165,042	8.1121	165,435
E	50,000,000	35,172,091	14.1401	497,336	14.1401	742,414
E-1	3,928,937	3,928,937	12.7261	50,000	12.7261	55,556
E-2	7,072,086	4,331,644	11.3121	49,000	11.3121	173,275
	<u>138,102,770</u>	<u>120,534,419</u>		<u>\$ 847,614</u>		<u>\$ 1,282,916</u>

Note 9. Stock-Based Compensation

2017 Share Plan

In April 2017, the Company adopted the 2017 Share Plan (the “2017 Plan”) under which employees, directors, and consultants may be granted various forms of equity incentive compensation at the discretion of the board of directors, including stock options, restricted shares, RSUs, and SVAs.

Stock options granted under the 2017 Plan have a contractual term of ten years and have varying vesting terms, but generally vest over a requisite service period of four years. The exercise price of the stock options granted may not be less than the par value of the common stock on the grant date for non-U.S. tax residents and may not be less than the fair market value of the common stock on the grant date for U.S. tax residents. Certain stock options contain a performance condition and are only exercisable subject to the grantee’s continuous service and the completion of an IPO. Such performance conditions were satisfied upon the closing of the Company’s IPO.

In March 2021, the Company’s board of directors approved an amendment to the 2017 Plan to increase the number of shares of common stock reserved for issuance by 2,300,000 shares, for a total of 24,267,694 shares reserved.

The 2017 Plan was terminated in connection with the Company’s IPO in April 2021, and the Company will not grant any additional awards under the 2017 Plan. However, the 2017 Plan will continue to govern the terms and conditions of the outstanding awards previously granted under the 2017 Plan.

2021 Equity Incentive Plan

In March 2021, the board of directors adopted the 2021 Equity Incentive Plan (the “2021 Plan”), which became effective upon its approval by the board of directors, but for which no awards were eligible to be granted prior to the Company’s IPO in April 2021. The 2021 Plan provides for the grant of stock options, stock appreciation rights (“SARs”), restricted stock, and RSUs to the Company’s employees, directors, and consultants. The number of shares of the Company’s Class A common stock reserved for issuance under the 2021 Plan is 20,134,146 plus up to 19,892,067 shares of Class A common stock subject to awards under the Company’s 2017 Plan. In the event that the aggregate number of shares of Class A common stock that are available for issuance under the 2021 Plan as of the last day of a fiscal year is less than 5.0% of the Company’s fully-diluted capitalization, then for the duration of the 2021 Plan, on the first day of each fiscal year of the Company thereafter, the number of shares of Class A common stock available for issuance under the 2021 Plan will automatically increase by either (i) 2.5% of the Company’s fully-diluted capitalization as of the last day of the immediately preceding fiscal year or (ii) such other amount as determined by the board of directors.

2021 Employee Stock Purchase Plan

In March 2021, the board of directors adopted the 2021 Employee Stock Purchase Plan (the “2021 ESPP”), which became effective upon the Company’s IPO in April 2021. The 2021 ESPP authorizes the issuance of shares of Class A common stock pursuant to purchase rights granted to employees. A total of 2,013,414 shares of the Company’s Class A common stock have been reserved for future issuance under the 2021 ESPP, subject to annual increases authorized by the board of directors; however, the aggregate number of shares of Class A common stock that may be approved for issuance under the 2021 ESPP in any given fiscal year may not exceed 1% of the total number of shares of common stock issued and outstanding on the last business day of the prior fiscal year.

The stock-based compensation expense recognized for the 2021 ESPP was \$0.6 million during the year ended December 31, 2021. During the year ended December 31, 2021, no shares were purchased under the 2021 ESPP.

As of December 31, 2021, unrecognized stock-based compensation expense related to the 2021 ESPP was \$0.3 million, which is expected to be recognized over a weighted-average period of 0.16 years.

The estimated grant-date fair value of the ESPP purchase rights was calculated using the Black-Scholes option-pricing model, based on the following assumptions:

	Year Ended December 31, 2021
Risk-free interest rate	0.06%
Expected dividend yield	—
Expected volatility	97.10%
Expected term (in years)	0.50
Fair value of common stock	\$44.39

Stock Options

A summary of the stock option activities, including the CEO Performance Award, for the year ended December 31, 2021 is as follows (in thousands, except share amounts, per share amounts, and years):

	Options Outstanding	Weighted- Average Exercise Price	Weighted- Average Remaining Life (Years)	Aggregate Intrinsic Value
Outstanding at December 31, 2020	13,295,497	\$ 1.29	7.99	\$ 97,986
Granted	3,767,968	22.36		
Exercised	(8,580,984)	0.14		
Cancelled/Forfeited	(797,703)	1.27		
Outstanding at December 31, 2021	<u>7,684,778</u>	\$ 12.91	9.04	\$ 188,722
Vested and exercisable at December 31, 2021	<u>1,996,923</u>	\$ 4.38	8.80	\$ 62,843

There were no stock options granted during the year ended December 31, 2019. The weighted-average grant-date fair value of stock options granted during the years ended December 31, 2020 and 2021 was \$3.61 and \$27.98 per share, respectively. There were no options exercised during the year ended December 31, 2019. The aggregate intrinsic value of options exercised during the year ended December 31, 2020 and 2021 was \$3.7 million and \$11.1 million, respectively.

As of December 31, 2021, there was \$92.5 million of unrecognized stock-based compensation expense related to unvested stock options, which is expected to be recognized over a weighted-average service period of 3.21 years.

Upon the closing of the Company's IPO, the Company recognized \$18.8 million of stock-based compensation expense relating to stock options for which the time-based vesting condition has been satisfied or partially satisfied on that date, and for which the performance condition was satisfied upon the occurrence of the IPO.

The estimated grant-date fair value of the Company's stock-based option awards was calculated using the Black-Scholes option-pricing model, based on the following assumptions:

	Years Ended December 31,		
	2019	2020	2021
Risk-free interest rate	—	0.14% - 0.44%	0.33% - 1.25%
Expected dividend yield	—	—	—
Expected volatility	—	51.00% – 60.00%	50.00%
Expected term (in years)	—	2.21 – 6.06	4.05 - 6.22
Fair value of common stock	—	\$1.52 – \$8.24	\$32.18 - \$47.79

These assumptions and estimates were determined as follows:

Fair Value of Common Stock – Prior to the Company's IPO, the fair value of the common stock underlying the options was determined by the Company's board of directors given the absence of a public trading market, with input from management and valuation reports prepared by third-party valuation specialists. Stock-based compensation for financial reporting purposes is measured based on updated estimates of fair value when appropriate, such as when additional relevant information related to the estimate becomes available in a valuation report issued as of a subsequent date. Subsequent to the Company's IPO, the fair value of the Class A common stock is determined based upon the closing sale price per share of the Company's Class A common stock on the date of grant.

Risk-Free Interest Rate – The risk-free interest rate for the expected term of the options is based on the U.S. Treasury yield curve in effect at the time of the grant.

Expected Term – The expected term of options represents the period of time that options are expected to be outstanding. The Company's historical share option exercise experience does not provide a reasonable basis upon which to estimate an expected term due to a lack of sufficient data. For options granted to-date, the expected term is estimated using the simplified method. The simplified method calculates the expected term as the average of the time-to-vesting and the contractual life of the options.

Expected Volatility – As the Company does not have a sufficient trading history for its Class A common stock, the expected volatility was estimated by taking the average historic price volatility for industry peers, consisting of several public companies in the Company's industry that are either similar in size, stage of life cycle, or financial leverage, over a period equivalent to the expected term of the awards.

Expected Dividend Yield – The Company has never declared or paid any cash dividends and does not presently plan to pay cash dividends in the foreseeable future. As a result, an expected dividend yield of zero percent was used.

CEO Performance Award

In March 2021, included in the stock options discussed above, the Company granted 1,150,000 stock option awards to its CEO with an exercise price of \$14.14 per share and a contractual life of ten years that vest upon the attainment of both operational milestones (performance conditions) and market conditions, assuming continued employment as CEO through the vesting date (the "CEO Performance Award"). The options will vest upon certification by the Board of Directors that all the following milestones have been attained: (i) the average market capitalization of the Company during any consecutive 180-day period is no less than \$25.0 billion, (ii) the average number of L4 autonomous semi-trucks operating on the Company's Autonomous Freight Network in any 90-day period is no less than 1,500, and (iii) the Company's revenues from its Autonomous Freight Network for any 12-month period exceed \$200.0 million.

As of December 31, 2021, there was a total of \$25.1 million unrecognized stock-based compensation expense for the operational milestones that were considered probable to achieve which will be recognized over a period of 2.92 years. For the year ended December 31, 2021, the Company recorded stock-based compensation expense of \$7.1 million related to the CEO Performance Award.

RSUs

The following table summarizes the activity related to RSUs for the year ended December 31, 2021:

	RSUs Outstanding	Weighted- Average Grant Date Fair Value per Share
Unvested and Outstanding at December 31, 2020	1,100,000	\$ 14.14
Granted	6,197,229	47.57
Vested	(1,217,573)	22.42
Cancelled	(129,858)	47.42
Unvested and outstanding at December 31, 2021	<u>5,949,798</u>	<u>\$ 46.54</u>
Vested and outstanding at December 31, 2021	<u>15,603</u>	<u>\$ 40.35</u>

SVAs

The following table summarizes the activity related to SVAs for the year ended December 31, 2021:

	SVAs Outstanding	Weighted- Average Grant Date Fair Value per Share
Unvested and Outstanding at December 31, 2020	3,653,146	\$ 3.20
Vested	(3,070,459)	3.08
Cancelled	(267,128)	5.77
Unvested and outstanding at December 31, 2021	315,559	\$ 5.29
Vested and outstanding at December 31, 2021	—	\$ —

As of December 31, 2021, there was \$243.3 million of unrecognized stock-based compensation expense related to RSUs and SVAs, which is expected to be recognized over a weighted-average service period of 3.12 years.

Upon the closing of the Company's IPO, the Company recognized \$23.8 million of stock-based compensation expense relating to RSUs and SVAs for which the time-based vesting condition has been satisfied or partially satisfied on that date and for which the performance condition was satisfied upon the occurrence of the IPO.

Restricted Share Awards

During 2020, the Company issued 1,899,680 shares of Class A common stock to two employees under a restricted share agreement at a grant date fair value of \$3.62 per share, totaling \$6.9 million. Compensation expense related to these awards was recorded as selling, general and administrative expense within the consolidated statements of operations. All of the shares were vested as of December 31, 2021.

Stock-based Compensation Expense

Total stock-based compensation expense was as follows:

	Years Ended December 31,		
	2019	2020	2021
Research and development	\$ —	\$ 917	\$ 71,201
Selling, general and administrative	—	11,846	51,395
Total stock-based compensation expense	\$ —	\$ 12,763	\$ 122,596

Note 10. Income Taxes

Loss before provision for income taxes consisted of the following (in thousands):

	Years Ended December 31,		
	2019	2020	2021
US	\$ (57,789)	\$ (95,000)	\$ (673,941)
Cayman Islands	(1,144)	(50,358)	—
Foreign	(25,950)	(32,512)	(58,732)
Loss before provision for income taxes	\$ (84,883)	\$ (177,870)	\$ (732,673)

Provision for income taxes consisted of the following (in thousands):

	Years Ended December 31,		
	2019	2020	2021
Current:			
US	\$ —	\$ —	\$ —
Cayman Islands	—	—	—
Foreign	—	—	—
Total current provision	—	—	—
Deferred:			
US	\$ —	\$ —	\$ —
Cayman Islands	—	—	—
Foreign	—	—	—
Total deferred provision	—	—	—
Total provision for income taxes	\$ —	\$ —	\$ —

Prior to February 2021, the Company was a Cayman Islands incorporated holding company and subject to taxation under the laws of Cayman Islands, for which there is no current tax regime. In February 2021, the Company completed a domestication pursuant to Section 388 of the Delaware General Corporation Law pursuant to which it became a Delaware corporation and was no longer subject to the laws of the Cayman Islands. Following the Domestication, the U.S. federal income tax rate is the applicable statutory rate. The provision for income taxes differs from the amount computed by applying the U.S. statutory tax rate of 21% and Cayman Islands statutory tax rate of 0% as follows (in thousands):

	Years Ended December 31,		
	2019	2020	2021
Tax at statutory rate	\$ —	\$ —	\$ (153,862)
State and local taxes (net of federal tax benefit)	—	—	(3,531)
Tax rate change	—	—	11,317
Change in valuation allowances	26,011	38,984	99,129
Foreign tax rate differential	(20,883)	(30,633)	2,354
Research and development tax credits	(5,841)	(8,874)	(15,465)
Warrant fair market value adjustment	—	—	68,649
Section 162(m) limitation - officers compensation	—	—	6,672
Uncertain tax position reserves	724	364	1,800
Stock-based compensation	—	(354)	(16,344)
Other	(11)	513	(719)
Total	\$ —	\$ —	\$ —

The effective tax rate for 2019, 2020, and 2021 was 0% and is primarily due to the valuation allowances recorded on US and other local jurisdiction activities that the Company concluded do not meet the more likely than not criteria for realization.

The Company recognizes the benefit of tax positions taken or expected to be taken in its tax returns in the consolidated financial statements when it is more likely than not that the position will be sustained upon examination by authorities. Recognized tax positions are measured at the largest amount of benefit that is greater than 50% likely of being realized upon settlement. The total amount of unrecognized tax benefits (“UTBs”) at December 31, 2021 was \$6.9 million. If recognized in the future, \$5.8 million of the UTBs would impact the effective tax rate (prior to consideration of valuation allowance). The Company does not believe its total amount of unrecognized tax benefits will significantly increase or decrease within 12 months of the balance sheet date.

A reconciliation of the beginning and ending balance to total unrecognized tax position is as follows (in thousands):

	Years Ended December 31,		
	2019	2020	2021
Unrecognized tax benefit, beginning of year	\$ 2,850	\$ 4,029	\$ 4,766
Increases related to current year tax positions	1,179	737	2,134
Unrecognized tax benefit, end of year	\$ 4,029	\$ 4,766	\$ 6,900

The Company classifies interest expense and penalties related to the underpayment of income taxes in the consolidated financial statements as income tax expense. As of December 31, 2019, 2020, and 2021 the Company recorded no accrued interest or penalties related to unrecognized tax benefits.

The Company is subject to tax examination in U.S. federal and state and other local country jurisdictions for tax years 2016 to the present.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amount of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of the Company's deferred tax assets and liabilities are as follows (in thousands):

	Years Ended December 31,		
	2019	2020	2021
Deferred tax assets:			
Net operating loss carryforwards	\$ 39,489	\$ 74,417	\$ 155,088
Tax credit carryforwards	4,879	9,833	18,769
Lease liability	1,320	1,116	797
Other	225	631	2,479
Stock-based compensation	—	264	8,887
Gross deferred tax assets	45,913	86,261	186,020
Valuation allowance	(43,985)	(84,852)	(184,892)
Net deferred tax assets	1,928	1,409	1,128
Deferred tax liabilities:			
Property, plant and equipment	438	352	395
Intangible assets	10	—	—
Capital lease assets	1,480	1,057	733
Net deferred tax liabilities	1,928	1,409	1,128
Net deferred tax asset/(liability)	\$ —	\$ —	\$ —

As of December 31, 2021, the Company had net operating loss ("NOL") carryforwards of \$971.5 million. Of these NOL carryforwards, \$445.9 million expire at various times between 2022 and 2041 and \$525.6 million does not expire. Additionally, as of December 31, 2021, \$40.3 million of California state net operating losses are not more-likely-than-not to be sustained upon examination by the relevant taxing authority.

As of December 31, 2021, the Company had a U.S. federal and state research and development tax credit carryforward resulting in a deferred tax asset of \$23.7 million, of which \$16.2 million will expire between 2035 and 2041 and \$7.5 million does not expire.

The Company's ability to utilize the net operating losses and tax credit carryforwards is subject to limitations in the event of an ownership change as defined in Section 382 of the Internal Revenue Code ("IRC") of 1986, as amended, and similar state law. In general, an ownership change occurs if the aggregate share ownership of certain stockholders increases by more than 50 percentage points over such stockholders' lowest percentage ownership during the testing period. While the Company incurred multiple ownership changes and its NOL and tax credit carryforwards are subject to Section 382 limitations, the Company does not expect resulting limitations on its ability to utilize NOLs or other tax attributes once it achieves profitability. Due to the existence of the valuation allowance, limitations created by future ownership changes, if any, related to the Company's operations in the United States will not impact the Company's effective tax rate.

The Company recorded a valuation allowance to reflect the estimated amount of certain U.S. federal and state and other local jurisdictions deferred tax assets that, more likely than not, will not be realized. In making such a determination, the Company evaluates a variety of factors including the Company's operating history, accumulated deficit, and the existence of taxable or deductible temporary differences and reversal periods. The net change in total valuation allowance for the years ended December 31, 2019, 2020, and 2021 was an increase of \$25.8 million, an increase of \$40.9 million, and an increase of \$100.0 million, respectively. The valuation allowance increases were driven primarily by U.S. federal and state and other local jurisdictions NOL carryforwards that are not expected on a more likely than not basis to be realized.

Under the Corporate Income Tax Law ("CIT Law") in the PRC, Foreign Investment Enterprises and domestic companies are subject to corporate income tax at a uniform rate of 25%. The Company also has subsidiaries that qualify for the High and New-Technology Enterprise program, which has a preferential CIT rate of 15%.

Note 11. Net Loss Per Share Attributable to Common Stockholders

Basic net loss per share attributable to common stockholders is computed by dividing the net loss attributable to common stockholders by the weighted-average shares of common stock outstanding during the period. Diluted loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders for all years presented because the effects of potentially dilutive items were antidilutive given the Company's net loss in each period presented.

The following table presents the calculation of basic and diluted net loss per share attributable to common stockholders (in thousands, except share and per share amounts):

	Years Ended December 31,		
	2019	2020	2021
Numerator:			
Net loss	\$ (84,840)	\$ (177,870)	\$ (732,673)
Less: Accretion of redeemable convertible preferred stock	(201)	(20,959)	(4,135)
Less: Deemed dividend on exchange of Series A-2 redeemable convertible preferred stock for Class A common stock	(60,000)	—	—
Net loss attributable to common stockholders, basic and diluted	<u>\$ (145,041)</u>	<u>\$ (198,829)</u>	<u>\$ (736,808)</u>
Denominator:			
Weighted-average shares used in computing net loss per share, basic and diluted	<u>\$ 58,700,441</u>	<u>\$ 58,929,271</u>	<u>\$ 169,080,392</u>
Net loss per share:			
Net loss per share attributable to common stockholders, basic and diluted	<u>\$ (2.47)</u>	<u>\$ (3.37)</u>	<u>\$ (4.36)</u>

The following outstanding potentially dilutive ordinary share equivalents have been excluded from the computation of diluted net loss per share attributable to common stockholders for the periods presented due to their antidilutive effect:

	Years Ended December 31,		
	2019	2020	2021
Redeemable convertible preferred stock	74,939,388	102,074,703	—
Options to purchase common stock	7,571,031	13,295,497	7,684,778
RSUs subject to future vesting	—	1,100,000	5,949,798
SVAs subject to future vesting	—	3,653,146	315,559
Redeemable convertible preferred stock warrants	—	16,459,024	—
Early exercised options subject to future vesting	—	—	40,000
Common stock contingently issuable under ESPP	—	—	31,514
Total	<u>82,510,419</u>	<u>136,582,370</u>	<u>14,021,649</u>

Note 12. Related Party Transactions

At December 31, 2020, the Company had short-term, unsecured, interest free loans outstanding of approximately \$0.6 million due to its executive chairman and approximately \$3.7 million due to Jinzhuo Hengbang Technology (Beijing) Co., Ltd. (“Jinzhuo Hengbang”), an affiliated company of Sina Corporation, the ultimate parent company of one of the Company’s investors. Additionally, the Company paid a guarantee deposit of \$3.7 million to Sina Corporation in connection with the loans borrowed by the Company from Jinzhuo Hengbang, which was outstanding at December 31, 2020. During the year ended December 31, 2021, the Company paid off these loans in their entirety, and received a refund of the guarantee deposit paid to Sina Corporation.

Note 13. Subsequent Events

On February 18, 2022, the Committee on Foreign Investment in the United States (“CFIUS”) concluded its review of the 2017 acquisition of the U.S. business of TuSimple LLC by Tusimple (Cayman) Limited and determined that there are no unresolved national security concerns.

As part of the resolution, on February 18, 2022, the Company entered into a National Security Agreement (“NSA”) with the U.S. government under which it has agreed to limit access to certain data and adopt a technology control plan, appoint a security officer and a security director, establish a government security committee of the board of directors of the Company to be chaired by the security director, and periodically meet with and report to certain CFIUS monitoring agencies. In addition, current directors of the Company representing Sun Dream Inc, one of our stockholders, have agreed that they will not stand for re-election to the board of directors of the Company upon expiration of their current terms, and Sun Dream, Inc. has agreed that it will not nominate replacement candidates or increase its current shareholdings in the Company.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURES

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our disclosure controls and procedures are designed to ensure that information we are required to disclose in reports that we file or submit under the Securities Exchange Act of 1934, as amended (the “Exchange Act”) is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Our management, with the participation and supervision of our Chief Executive Officer and our Chief Financial Officer, have evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered by this Annual Report on Form 10-K. Based on such evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that as of December 31, 2021, our disclosure controls and procedures were effective at a reasonable assurance level.

Exemption from management’s report on internal control over financial reporting for the fiscal year ended December 31, 2021

This Annual Report on Form 10-K does not include a report of management’s assessment regarding internal control over financial reporting or an attestation report of our registered public accounting firm due to a transition period established by the rules of the SEC for newly public companies.

Changes in Internal Control over Financial Reporting

As of December 31, 2020, we identified a material weakness in our internal control over financial reporting, as defined by the standards established by the Sarbanes-Oxley Act of 2002. This material weakness related to a lack of appropriately designed and implemented controls over the review and approval of manual journal entries (including consolidation entries) and the related supporting journal entry calculations. We have concluded that this material weakness arose because, as a private company, we did not have the necessary business processes, systems, personnel, and related internal controls necessary to satisfy the accounting and financial reporting requirements of a public company.

During the year ended December 31, 2021, we commenced measures to remediate the identified material weakness, including: (i) the hiring of additional finance and accounting personnel over time to augment our accounting staff and to provide more resources for complex accounting matters and financial reporting; (ii) further developing and implementing formal policies, processes and documentation procedures relating to our financial reporting; and (iii) the adoption of new technological solutions.

The actions we took were subject to ongoing executive management review and also to audit committee oversight. To date, we have hired additional financial and accounting personnel with technical accounting experience, implemented new technology solutions to assist with our financial reporting process, refined our month-end reconciliation process by adding robust documentation and detailed support for journal entries, and implemented formal policies, processes, and documentation procedures related to the review and approval of manual journal entries. As of December 31, 2021, the material weakness has been remediated, and costs associated with the remediation plan were not considered material.

Except as otherwise described herein, there were no changes in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this Annual Report on Form 10-K that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Limitations on the Effectiveness of Controls

The effectiveness of any system of disclosure controls and procedures and internal control over financial reporting, including ours, is subject to inherent limitations, including the exercise of judgment in designing, implementing, operating, and evaluating the controls and procedures, and the inability to eliminate misconduct completely. Accordingly, in designing and evaluating the disclosure controls and procedures, management recognizes that any system of internal control over financial reporting, including ours, no matter how well designed and operated, can only provide reasonable assurance, not absolute assurance of achieving the desired control objectives. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply its judgment in evaluating the benefits of possible controls and procedures relative to their costs. Moreover, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. We intend to continue to monitor and upgrade our internal controls as necessary or appropriate for our business but cannot assure you that such improvements will be sufficient to provide us with effective internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

None.

ITEM 9C. DISCLOSURE REGARDING FOREIGN JURISDICTION THAT PREVENT INSPECTIONS

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this Item 10 of Form 10-K will be included in our Proxy Statement to be filed with SEC in connection with the solicitation of proxies for our 2022 Annual Meeting of Stockholders (the "Proxy Statement") and is incorporated herein by reference. The Proxy Statement will be filed with SEC within 120 days after the end of the fiscal year to which this report relates.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this Item 11 of Form 10-K will be included in our Proxy Statement and is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNER AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this Item 12 of Form 10-K will be included in our Proxy Statement and is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this Item 13 of Form 10-K will be included in our Proxy Statement and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this Item 14 of Form 10-K will be included in our Proxy Statement and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES.

- a) Documents Filed with Report.
 - 1) Financial Statements
 - 2) Financial Statement Schedules. All financial statement schedules have been omitted because the information required to be presented in them is not applicable or is shown in the financial statements or related notes, which is incorporated herein by reference
 - 3) Exhibits

Exhibit Number	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit	Filing Date	
3.1	Amended and Restated Certificate of Incorporation.	10-Q	001-40326	3.1	5/11/2021	
3.2	Amended and Restated Bylaws.	10-Q	001-40326	3.2	5/11/2021	
4.1	Description of the Registrant's Securities Registered Pursuant to Section 12 of the Exchange Act of 1934					X
10.1	Form of Indemnification Agreement between the Registrant and each of its directors and executive officers.	S-1	333-254616	10.1	3/23/2021	
10.2	Ordinary Share Purchase Agreement by and between the Registrant and Classic Elite Limited dated January 8, 2021.	S-1	333-254616	10.9	3/23/2021	
10.3	Ordinary Share Purchase Agreement by and between the Registrant and Perry Creek Capital Partners LP dated January 22, 2021.	S-1	333-254616	10.10	3/23/2021	
10.4	Ordinary Share Purchase Agreement by and between the Registrant and Perry Creek Capital Fund II LP dated January 22, 2021.	S-1	333-254616	10.11	3/23/2021	
10.5	Series E-2 Preferred Stock Purchase Agreement by and among the Registrant, TRATON International S.A. and other parties thereto dated February 26, 2021.	S-1	333-254616	10.12	3/23/2021	
10.6	2017 Share Plan and forms of agreements thereunder.	S-1	333-254616	10.13	3/23/2021	
10.7	2021 Equity Incentive Plan and forms of agreements thereunder.	S-1	333-254616	10.14	3/23/2021	
10.8	2021 Employee Stock Purchase Plan.	S-1	333-254616	10.15	3/23/2021	
10.9	Employment Agreement, dated as of March 22, 2021, by and between Mo Chen and the Registrant.	S-1	333-254616	10.17	3/23/2021	
10.10	Employment Agreement, dated as of March 22, 2021, by and between Xiaodi Hou and the Registrant.	S-1	333-254616	10.18	3/23/2021	
10.11	Employment Agreement, dated as of March 22, 2021, by and between Cheng Lu and the Registrant.	S-1	333-254616	10.19	3/23/2021	
10.12	Employment Agreement, dated as of March 22, 2021, by and between Patrick Dillon and the Registrant.	S-1	333-254616	10.20	3/23/2021	
10.13	Employment Agreement, dated as of March 22, 2021, by and between James Mullen and the Registrant.	S-1	333-254616	10.21	3/23/2021	
10.14	Severance and Change in Control Agreement, dated as of March 22, 2021, by and between Mo Chen and the Registrant.	S-1	333-254616	10.22	3/23/2021	
10.15	Severance and Change in Control Agreement, dated as of March 22, 2021, by and between Xiaodi Hou and the Registrant.	S-1	333-254616	10.23	3/23/2021	
10.16	Severance and Change in Control Agreement, dated as of March 21, 2021, by and between Cheng Lu and the Registrant.	S-1	333-254616	10.24	3/23/2021	
10.17	Severance and Change in Control Agreement, dated as of March 22, 2021, by and between Patrick Dillon and the Registrant.	S-1	333-254616	10.25	3/23/2021	
10.18	Severance and Change in Control Agreement, dated as of March 21, 2021, by and between James Mullen and the Registrant.	S-1	333-254616	10.26	3/23/2021	
10.19	Director Offer Letter, dated January 19, 2021, by and between Karen C. Francis and the Registrant.	S-1	333-254616	10.27	3/23/2021	
10.20	Director Offer Letter, dated January 19, 2021, by and between Brad Buss and the Registrant.	S-1	333-254616	10.28	3/23/2021	
21.1	List of Subsidiaries					X
23.1	Consent of Independent Registered Accounting Firm.					X
24.1	Power of Attorney (contained in the signature page to this report)					X
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.1*	Certification of Principal Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
32.2*	Certification of Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					X
101.INS	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because XBRL tags are embedded within the Inline XBRL document.					X
101.SCH	Inline XBRL Taxonomy Extension Schema Document					X
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document					X
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document					X
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document					X
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document					X
104	Cover Page Interactive Data File (formatted as inline XBRL and contained in Exhibit 101)					X

* The certifications attached as Exhibit 32.1 and 32.2 that accompany this Annual Report on Form 10-K are not deemed filed with the Securities and Exchange Commission and are not to be incorporated by reference into any filing of TuSimple Holdings Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date of this Annual Report on Form 10-K, irrespective of any general incorporation language contained in such filing.

- b) Exhibits. See Item 15(a)(3) above.
- c) Financial Statement Schedules. See Item 15(a)(2) above.

ITEM 16. FORM 10-K SUMMARY

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

TUSIMPLE HOLDINGS INC.

By: /s/ Cheng Lu

Name: Cheng Lu

Title: *President and Chief
Executive Officer*

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Cheng Lu and Patrick Dillon, and each of them, as his or her true and lawful attorney-in-fact and agent with full power of substitution, for him or her in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto and other documents in connection therewith, with the SEC, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully for all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or his substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1934, this report has been signed by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ Mo Chen</u> Mo Chen	Director, Co-Founder and Executive Chairman	February 23, 2022
<u>/s/ Xiaodi Hou</u> Xiaodi Hou	Director, Co-Founder and Chief Technology Officer	February 23, 2022
<u>/s/ Cheng Lu</u> Cheng Lu	Director, President and Chief Executive Officer (Principal Executive Officer)	February 23, 2022
<u>/s/ Patrick Dillon</u> Patrick Dillon	Chief Financial Officer (Principal Financial Officer)	February 23, 2022
<u>/s/ Eric Tapia</u> Eric Tapia	Chief Accounting Officer	February 23, 2022
<u>/s/ Brad Buss</u> Brad Buss	Director	February 23, 2022
<u>/s/ Charles Chao</u> Charles Chao	Director	February 23, 2022
<u>/s/ Karen C. Francis</u> Karen C. Francis	Director	February 23, 2022
<u>/s/ Bonnie Yi Zhang</u> Bonnie Yi Zhang	Director	February 23, 2022
<u>/s/ Michelle Sterling</u> Michelle Sterling	Director	February 23, 2022

**DESCRIPTION OF REGISTRANT'S SECURITIES REGISTERED PURSUANT TO
SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934**

The following description of the capital stock of TuSimple Holdings Inc. ("we," "our," "us," or the "Company") is a summary of the rights of our capital stock and summarizes certain provisions of our amended and restated certificate of incorporation and amended and restated bylaws affecting the rights of holders of our capital stock. This summary does not purport to be complete and is qualified in its entirety by the provisions of our amended and restated certificate of incorporation and amended and restated bylaws, copies of which have been filed as exhibits to this Annual Report on Form 10-K, as well as to applicable provisions of the Delaware General Corporation Law.

Our authorized capital stock consists of 5,000,000,000 shares, all with a par value of \$0.0001 per share, of which:

- 4,876,000,000 shares are designated Class A common stock;
- 24,000,000 shares are designated Class B common stock; and
- 100,000,000 shares are designated preferred stock.

Common Stock

We have two classes of authorized common stock: Class A common stock and Class B common stock. The rights of the holders of Class A common stock and Class B common stock are identical, except with respect to voting, conversion and transfer rights.

Dividend Rights

Subject to preferences that may apply to shares of preferred stock outstanding at the time, the holders of outstanding shares of our common stock are entitled to receive dividends out of funds legally available if our board of directors, in its discretion, determines to issue dividends and only then at the times and in the amounts that our board of directors may determine.

Voting Rights

The holders of our Class A common stock are entitled to one vote per share and the holders of our Class B common stock are entitled to 10 votes per share. Stockholders do not have the ability to cumulate votes for the election of directors. Our amended and restated certificate of incorporation and amended and restated bylaws provide for, immediately following any time after our 2022 annual meeting of stockholders when the outstanding shares of our Class B common stock represent less than 40% of the total voting power of our common stock (the "Voting Threshold Date"), a classified board of directors consisting of three classes of approximately equal size, each serving staggered three-year terms. The board of directors is authorized to assign members of the board of directors already in office immediately prior to the Voting Threshold Date. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. The holders of our Class A common stock and Class B common stock vote together as a single class, unless otherwise required by law or our amended and restated certificate of incorporation.

Our amended and restated certificate of incorporation provides as long as any shares of Class B common stock remain outstanding, we shall not, without the prior affirmative vote of the holders of a majority of the outstanding shares of Class B common stock, voting as a separate class, in addition to any other vote required by applicable law or our amended and restated certificate of incorporation:

- amend, alter, or repeal any provision of our amended and restated certificate of incorporation or amended and restated bylaws that modifies the voting, conversion or other powers, preferences, or other special rights or privileges, or restrictions of our Class B common stock; or
- reclassify any of our outstanding shares of Class A common stock into shares having rights as to dividends or liquidation that are senior to our Class B common stock or the right to more than one (1) vote for each share thereof.

Delaware law or our amended and restated certificate of incorporation could require either holders of our Class A common stock or our Class B common stock to vote separately as a single class in the following circumstances:

- if we were to seek to amend our amended and restated certificate of incorporation to increase the authorized number of shares of a class of stock, or to increase or decrease the par value of a class of stock, then that class would be required to vote separately to approve the proposed amendment;
- if we were to seek to amend our amended and restated certificate of incorporation in a manner that alters or changes the powers, preferences or special rights of a class of stock in a manner that affected its holders adversely, then that class would be required to vote separately to approve the proposed amendment; and
- so long as our outstanding shares of Class B common stock represent 40% or more of the total voting power of the company, any transaction that would result in a change in control of our company will require the approval of a majority of our outstanding Class B common stock voting as a separate class.

The holders of common stock will not have cumulative voting rights in the election of directors. Accordingly, holders of a majority of the voting power of the shares of common stock entitled to vote in any election of directors may elect all of the directors standing for election. Except for the election of directors, if a quorum is present, an action on a matter is approved if it receives the affirmative vote of the holders of a majority of the voting power of the shares of capital stock present in person or represented by proxy at the meeting and entitled to vote on the matter, unless otherwise required by applicable law, the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws. The election of directors will be determined by a plurality of the votes cast in respect of the shares present in person or represented by proxy at the meeting and entitled to vote, meaning that the nominees with the greatest number of votes cast, even if less than a majority, will be elected. The rights, preferences and privileges of holders of common stock are subject to, and may be impacted by, the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

No Preemptive or Similar Rights

Except the conversion provisions with respect to our Class B common stock described below, holders of our common stock have no preemptive rights and are not subject to conversion, redemption, or sinking fund provisions.

Right to Receive Liquidation Distributions

Upon our dissolution, liquidation, or winding-up, the assets legally available for distribution to our stockholders are distributable ratably among the holders of our common stock, subject to prior satisfaction of all outstanding debt and liabilities and the preferential rights and payment of liquidation preferences, if any, on any outstanding shares of preferred stock.

Conversion of our Class B Common Stock

Each share of our Class B common stock is convertible at any time at the option of the holder into one share of our Class A common stock.

Each share of our Class B common stock will automatically convert, on a one-for-one basis, into shares of our Class A common stock on the earliest of (i) the date specified by a vote of the holders of Class B common stock representing 75.0% of the outstanding shares of Class B common stock, (ii) the date that is between 90 days and 270 days, as determined by the board of directors, after the death or incapacitation of the last of Mo Chen and Xiaodi Hou (each, a "Founder") to die or become incapacitated or (iii) the date that is between 61 and 180 days, as determined by the board of directors, after the date on which the number of outstanding shares of Class B common stock held by the Founders and their permitted affiliates represents less than 50.0% of the total number of shares of Class B common stock held collectively by the Founders and their permitted affiliates at 11:59 pm Pacific Time on the date that we filed our amended and restated certificate of incorporation.

Additionally, each share of our Class B common stock will convert automatically into one share of our Class A common stock upon any transfer, sale, assignment, conveyance, hypothecation or other transfer or disposition of such share, whether or not for value and whether voluntary or involuntary or by operation of law, except certain permitted transfers described in our amended and restated certificate of incorporation, including, but not limited to:

- any transfer of Class B common stock by a holder that is a record holder of such Class B common stock prior to the date that our amended and restated certificate of incorporation was accepted for filing by the Secretary of State of the State of Delaware to (i) a trust for the benefit of such record holder or one or more family members of such record holder, (ii) any general partnership, limited partnership, limited liability company, corporation or other entity owned exclusively by such record holder or (iii) a Founder; and
- any grant of a voting proxy with respect to Class B common stock by either Founder to the other Founder.

Once transferred and converted into Class A common stock, the Class B common stock will not be reissued.

Preferred Stock

No shares of preferred stock are outstanding, but we are authorized, subject to limitations prescribed by Delaware law, to issue preferred stock in one or more series, to establish from time to time the number of shares to be included in each series and to fix the designation, powers, preferences, and rights of the shares of each series and any associated qualifications, limitations or restrictions. Our board of directors also can increase or decrease the number of shares of any series, but not below the number of shares of that series then outstanding, without any further vote or action by our stockholders. Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the Class A common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in control of our company and may adversely affect the market price of our Class A common stock and the voting and other rights of the holders of Class A common stock. We have no current plan to issue any shares of preferred stock.

Anti-Takeover Provisions

Delaware Law

We are governed by the provisions of Section 203 of the Delaware General Corporation Law regulating corporate takeovers. This section prevents some Delaware corporations from engaging, under some circumstances, in a business combination, which includes a merger or sale of at least 10% of the corporation's assets with any interested stockholder, meaning a stockholder who, together with affiliates and associates, owns or, within three years prior to the determination of interested stockholder status, did own 15% or more of the corporation's outstanding voting stock, unless:

- the transaction is approved by the board of directors prior to the time that the interested stockholder became an interested stockholder;
- upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned (i) by persons who are directors and also officers and (ii) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- at or subsequent to such time that the stockholder became an interested stockholder the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by at least two-thirds of the outstanding voting stock which is not owned by the interested stockholder.

A Delaware corporation may "opt out" of these provisions with an express provision in its original certificate of incorporation or an express provision in its certificate of incorporation or amended and restated bylaws resulting from a stockholders' amendment approved by at least a majority of the outstanding voting shares. We have not opted out of these provisions. As a result, mergers or other takeover or change in control attempts of us may be discouraged or prevented.

Certificate of Incorporation and Bylaws Provisions

Our amended and restated certificate of incorporation and our amended and restated bylaws include a number of provisions that may have the effect of deterring hostile takeovers or delaying or preventing changes in control of our

management team, including the following:

- **Dual Class Stock.** As described above in “—Common Stock—Voting Rights,” our amended and restated certificate of incorporation provides for a dual class common stock structure pursuant to which our Founders and their permitted affiliates holding Class B common stock will have the ability to control the outcome of matters requiring stockholder approval, even if they own significantly less than a majority of the shares of our outstanding Class A and Class B common stock, including the election of directors and significant corporate transactions, such as a merger or other sale of our company or its assets.
- **Separate Class B Vote for Certain Transactions.** Our amended and restated certificate of incorporation provides that so long as our outstanding shares of Class B common stock represent 40% or more of the total voting power of the company, any transaction that would result in a change in control of our company will require the approval of a majority of our outstanding Class B common stock voting as a separate class. This provision could delay or prevent the approval of a change in control that might otherwise be approved by a majority of outstanding shares of our Class A and Class B common stock voting together on a combined basis.
- **Supermajority Approvals.** Our amended and restated certificate of incorporation and amended and restated bylaws provide that certain amendments to our amended and restated certificate of incorporation or amended and restated bylaws by stockholders will require the approval of two-thirds of the combined vote of our then-outstanding shares of Class A and Class B common stock. This may have the effect of making it more difficult to amend our amended and restated certificate of incorporation or amended and restated bylaws to remove or modify certain provisions.
- **Board of Directors Vacancies.** Our amended and restated certificate of incorporation and amended and restated bylaws authorize our board of directors to fill vacant directorships, including newly-created seats. In addition, the number of directors constituting our board of directors is set only by resolution adopted by a majority vote of our entire board of directors. These provisions may prevent a stockholder from increasing the size of our board of directors and gaining control of our board of directors by filling the resulting vacancies with its own nominees.
- **Classified Board.** Our board of directors is not currently classified. Our amended and restated certificate of incorporation and amended and restated bylaws provide that, immediately after the Voting Threshold Date, our board of directors will be classified into three classes of directors, each of which will hold office for a three-year term. In addition, after the Voting Threshold Date, directors may only be removed from the board of directors for cause and only by the approval of two-thirds of the combined vote of our then outstanding shares of Class A and Class B common stock. A third party may be discouraged from making a tender offer or otherwise attempting to obtain control of us as it is more difficult and time consuming for stockholders to replace a majority of the directors on a classified board of directors.
- **Stockholder Action; Special Meeting of Stockholders.** Our amended and restated certificate of incorporation provides that after the Voting Threshold Date, stockholders will not be able to take action by written consent, and will only be able to take action at annual or special meetings of our stockholders. Stockholders are not permitted to cumulate their votes for the election of directors. Our amended and restated certificate of incorporation further provides that special meetings of our stockholders may be called only by a majority vote of our entire board of directors, the chairman of our board of directors, the executive chairman or our chief executive officer.
- **Advance Notice Requirements for Stockholder Proposals and Director Nominations.** Our amended and restated bylaws provides advance notice procedures for stockholders seeking to bring business before our annual meeting of stockholders, or to nominate candidates for election as directors at any meeting of stockholders. Our amended and restated bylaws also specify certain requirements regarding the form and content of a stockholder’s notice. These provisions may preclude our stockholders from bringing matters before our annual meeting of stockholders or from making nominations for directors at our meetings of stockholders.
- **Issuance of Undesignated Preferred Stock.** Our board of directors has the authority, without further action by the holders of Class A common stock, to issue up to 100,000,000 shares of undesignated preferred stock with rights and preferences, including voting rights, designated from time to time by the board of directors. The existence of authorized but unissued shares of preferred stock may enable our board of directors to render more difficult or discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest, or otherwise.

Choice of Forum

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware is the exclusive forum for any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our amended and restated certificate of incorporation or our amended and restated bylaws or any action asserting a claim against us that is governed by the internal affairs doctrine. This choice of forum provision does not apply to actions brought to enforce a duty or liability created by the Securities Exchange Act of 1934, as amended, or any other claim for which federal courts have exclusive jurisdiction. Furthermore, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States shall be the exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act of 1933, as amended (the "Securities Act"). We intend for this provision to apply to any complaints asserting a cause of action under the Securities Act despite the fact that Section 22 of the Securities Act creates concurrent jurisdiction for the federal and state courts over all actions brought to enforce any duty or liability created by the Securities Act or the rules and regulations promulgated thereunder. The enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that a court could find these types of provisions in our certificate of incorporation to be inapplicable or unenforceable.

Transfer Agent and Registrar

The transfer agent and registrar for our Class A common stock is American Stock Transfer and Trust Company, LLC. The transfer agent's address is 6201 15th Avenue, Brooklyn, New York 11219, and its telephone number is +1-(800) 937-5449 or +1-(718) 921-8124.

Listing

Our Class A common stock is listed on the Nasdaq Global Select Market under the symbol "TSP."

SUBSIDIARIES OF TUSIMPLE HOLDINGS INC.

Name of Subsidiary	Jurisdiction of Organization
TuSimple, Inc.	United States of America
TS Logistics, Inc.	United States of America
AFN Carriers Inc.	United States of America
TuSimple Research, Inc.	Canada
TuSimple Sweden AB	Sweden
TuSimple Germany GmbH	Germany
Tusimple (Hong Kong) Limited	Hong Kong
Tusimple (Hong Kong) Auto Tech Limited	Hong Kong
TuSimple Japan Co. Ltd	Japan
Beijing Tusen Zhitu Technology Co., Ltd.	China
Beijing Tusen Weilai Technology Co., Ltd.	China
Shanghai Tusen Weilai AI Technology Co., Ltd.	China
Tangshan Tusen Weilai Logistics Co., Ltd.	China
Beijing Weilai Chengyun Auto Tech Co., Ltd.	China
Junlian Tusen Technology Co., Ltd.	China
Shanghai Kuangtu Logistics Co., Ltd.	China
Tusen Zhiyun (Shenzhen) Auto Tech Co., Ltd.	China

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the registration statement (No. 333-255233) on Form S-8 of our report dated February 23, 2022, with respect to the consolidated financial statements of TuSimple Holdings Inc..

/s/ KPMG LLP

San Diego, California
February 23, 2022

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Cheng Lu, certify that:

1. I have reviewed this Annual Report on Form 10-K of TuSimple Holdings Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 23, 2022

By: /s/ Cheng Lu

Cheng Lu

President and Chief Executive Officer
(Principal Executive Officer)

**CERTIFICATION PURSUANT TO
RULES 13a-14(a) AND 15d-14(a) UNDER THE SECURITIES EXCHANGE ACT OF 1934,
AS ADOPTED PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Patrick Dillon, certify that:

1. I have reviewed this Annual Report on Form 10-K of TuSimple Holdings Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (c) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 23, 2022

By: /s/ Patrick Dillon

Patrick Dillon
Chief Financial Officer
(Principal Financial Officer)

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

I, Cheng Lu, Chief Executive Officer of TuSimple Holdings Inc. (the "Company"), do hereby certify, to the best of my knowledge and pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Annual Report on Form 10-K of the Company for the annual period ended December 31, 2021 (the "Report"), fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

Date: February 23, 2022

By: /s/ Cheng Lu

Cheng Lu

President and Chief Executive Officer
(Principal Executive Officer)

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

I, Patrick Dillon, Chief Financial Officer of TuSimple Holdings Inc. (the "Company"), do hereby certify, to the best of my knowledge and pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Annual Report on Form 10-K of the Company for the annual period ended December 31, 2021 (the "Report"), fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and result of operations of the Company.

Date: February 23, 2022

By: /s/ Patrick Dillon

Patrick Dillon
Chief Financial Officer
(Principal Financial Officer)

