TuSimple Investor Presentation

September 2023
This presentation and any accompanying oral statements (together, this “Presentation”) contain forward-looking statements. All statements other than statements of historical fact contained in this letter, including statements as to future results of operations and financial position of TuSimple Holdings Inc. and its subsidiaries (the “Company”), planned products and services by the Company or any of its subsidiaries, business strategy and plans of the Company or any of its subsidiaries, launch dates of products or services in the United States or in any other territory, expected safety benefits of the Company’s autonomous semi-trucks, objectives of management for future operations of the Company, market size and growth opportunities in various global territories, competitive position and technological and market trends in various global territories, statements regarding strategies for the Company’s Asia business, are forward-looking statements. Forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified. In some cases, you can identify forward-looking statements by terms such as “will,” “expect,” “plan,” “anticipate,” “intend,” “target,” “project,” “predict,” “potential,” “explore” or “continue” or the negative of these terms or other similar words. The Company has based these forward-looking statements largely on its current expectations and assumptions and on information available as of the date of this letter. The Company assumes no obligation to update any forward-looking statements after the date of this letter, except as required by law.

The forward-looking statements contained in this Presentation are subject to known and unknown risks, uncertainties, assumptions and other factors that may cause actual results or outcomes to be materially different from any future results or outcomes expressed or implied by the forward-looking statements. These risks, uncertainties, assumptions and other factors include, but are not limited to, those related to the Company's restructuring plan including potential cost savings, the company's ability to regain compliance with Nasdaq listing standards, autonomous driving being an emerging technology, the development of the Company’s technologies and products, the Company’s limited operating history in a new market, the regulations governing autonomous vehicles, changes in the Company’s board of directors and senior management, the Company’s dependence on its senior management team, reliance on third-party suppliers, potential product liability or warranty claims, the protection of the Company’s intellectual property, securities class action litigation, strategic alternatives for the Company’s U.S. business, and government or regulatory policies, inquiries and actions. Moreover, the Company operates in a competitive and rapidly changing environment, and new risks may emerge from time to time. You should not put undue reliance on any forward-looking statements. Forward-looking statements should not be read as a guarantee of future performance or results and will not necessarily be accurate indications of the times at, or by, which such performance or results will be achieved, if at all. It is not possible for the Company to predict all risks, nor can the Company assess the impact of all factors on its business or the markets in which it operates or the extent to which any factor, or combination of factors, may cause actual results or outcomes to differ materially from those contained in any forward-looking statements the Company may make.

You should carefully consider the foregoing factors and the other risks and uncertainties described under the caption “Risk Factors” in our Annual Report on Form 10-K for the fiscal year ended December 31, 2022, filed with the Securities and Exchange Commission (the “SEC”) on September 7, 2023, and the Company’s other filings with the SEC. These SEC filings identify and address other important risks and uncertainties that could cause actual events and results to differ materially from those contained in the forward-looking statements. This Presentation also contains estimates, forecasts and other statistical data relating to market size and growth and other industry data. These data involve several assumptions and limitations, and you are cautioned not to give undue weight to such estimates. The Company has not independently verified the statistical and other industry data generated by independent parties and contained in this Presentation and, accordingly, it cannot guarantee their accuracy or completeness. In addition, assumptions and estimates of the Company’s future performance and the future performance of the markets in which the Company competes are necessarily subject to a high degree of uncertainty and risk due to a variety of factors. These and other factors could cause results or outcomes to differ materially from those expressed in the estimates.
TuSimple Investor Presentation

01. TuSimple Holdings at a Glance
02. Strong Investment Thesis for AV Trucking
03. Proven L4 Technology Leadership and Protected IP Portfolio
04. Concrete Development Roadmap with Clear Commercialization Strategy
05. Full Stack Autonomous Technology
06. 2023 Considerations and Long-Term Framework
01 TuSimple Holdings at A Glance
Our mission is to enable the most safe, fuel-efficient & low-cost freight capacity by developing the best L4 autonomous technology, hardware and go-to-market strategy.
TuSimple Holdings at a Glance

Industry Leading Technology with Many Industry Firsts

People, Fleet, and Facilities

- ~800
  - US: ~250
  - APAC: ~550
- ~70
  - US: ~35
  - APAC: ~35

6 R&D Facilities
- US: San Diego, Tucson
- APAC: Beijing, Shanghai, Tangshan, Tokyo

Corporate Headquarters
- San Diego, CA

Significant Accomplishments to Date

1. World’s First Driver Out & First Driver Out in China
2. Growing Patents
3. ~590 million miles driven
4. ~10 million miles driven
5. Safety - Third Party Safety Audit

Go-to-Market Strategy

- TuSimple: Freight Capacity
- Carrier-Owned: Freight Capacity
- ADS Core Capabilities: L2+/L3, SoC, AV, Data, Simulation, Offboard Toolchain

TuSimple | Investor Presentation

1. World’s First Driver Out was done on open public roads in the U.S. in December 2021
2. As of June 30, 2023
3. Primarily Driver-in miles
4. Passed an independent third-party (TÜV SÜD) safety audit with zero nonconformities
5. System on a chip
6. Autonomous Vehicle
Independent use cases (ODD), and hardware ecosystems resulted in the need for separate engineering teams to pursue different product roadmaps.

**Key Development Differences**

**Operational Design Domain**
- Traffic patterns
- Driving behavior
- Port drayage vs. US on-highway

**Hardware Ecosystem**
- Tier 1 supplier base
- Sensor selection and availability
- US Class 8 vs. chassis over engine

**Engineering Teams**
- Source code base
- Data repositories

**Development Tailored to Current Use Case Application**
- **US**
  - Medium to Long Haul Route
    - On highway
    - Traditional Class 8 Trailer
  - Port-to-Terminal Connection Route
    - Port drayage
    - Chassis over engine trucks
- **APAC**
  - Stand-alone HR systems, enterprise applications, and communication tools
  - Stand-alone end-markets, functional teams, source code, and data repositories

**Structure Today**
- One Holding Company
- Two Distinct Operations

**Cost Savings**
- Shared: Common reporting, treasury, and compliance functions
- US utilizes data annotation services and procures hardware from APAC ops
U.S.: Team Led by Seasoned Technology Leaders

Robert Rossi  
SVP, Co-Head Technology  
- 40+ years of experience in technology  
- SVP Engineering of Autonomous Driving, TomTom  
- Group Program Manager, Microsoft  
- Founder and Chief Engineer, multiple startups  
- 2 patents issued

Jing Zhu  
SVP, Co-Head Technology  
- 30+ years of experience in technology  
- General Manager, VIP.com  
- Chief Technology Officer, Shanda Online  
- Senior Director of Engineering, Yahoo  
- 8 patents issued

Adrian Thompson  
VP, Systems & Safety Eng.  
- 30+ years of experience in technology  
- Director of Systems Engineering, Waymo  
- Head of Systems Engineering and Test, Uber ATG  
- Director of Systems Engineering, L3

Graham Taylor  
VP, Hardware  
- 25+ years of experience in technology  
- Senior Engineering Manager, Zoox  
- Senior Engineering Manager, Jamco  
- Head of Engineering, B/E Aerospace

Tom Wang  
VP, Software Engineering  
- 25+ years of experience in technology  
- Director of Engineering, DeepMap  
- Software Architect and Lead, Apple  
- Software Architect, EMC

Note: Patents issued refers to lifetime issued patents (both in force and expired)
APAC: Experienced Management Team

**Jinan HAO**  
Head of China  
- Company founding member and overseeing R&D activity and operations  
- Over 10 years research experience in parallel & distributed computing  
- Former Research Scientist at Temasek National Laboratory

**Naiyan WANG**  
CTO  
- Overseeing AV full stack development  
- Renowned expert in computer vision and deep learning with over 50 papers published with more than 17,000 citations  
- 1st place in 2D Detection / 3rd place in 3D Detection of the first Waymo Open Dataset Challenges in 2020  
- Co-founder and early developer of open-source deep learning framework MXNet  
- Google PhD Fellowship candidates in 2014 (one of only 4 selected in China)

**Haiquan LI**  
VP of Engineering  
- Lead TuSimple APAC engineering organization  
- Over 8 years R&D experience in autonomous truck software /hardware and system integration  
- Lead APAC hardware selection (including the TDC), evaluation and production process

**Nan WU**  
Head of Japan  
- Over 13 years R&D experience in autonomous driving  
- Previously served as Assistant Researcher, Lecturer, Senior Researcher, and Visiting Associate Professor at Waseda University  
- Over 80 patents granted and more than 260 patent applications submitted in the field of autonomous driving
Strong Investment Thesis for AV Trucking
Large TAM With Secular Growth Drivers

An opportunity to revolutionize a traditional market with industry leading technology

Global Truck Freight Market (TAM1)

Global Truck Freight Market: $4tn

Global E-Commerce: $3.5tn

Global Automotive: $2.8tn

Regional Freight Industry TAM2

United States $800bn

APAC $1.6tn

Europe $400bn

## The Need for Autonomous Trucking Remains

### US
- ~3 million Class 8 semi-trucks in the US \(^1\)
- +70% of all freight in the US transported by trucks \(^2\)

### APAC
- ~8 million heavy-duty trucks in China \(^3\)
- ~1.2 million large-size trucks in Japan \(^4\)

### INCREASED DEMAND FROM E-COMMERCE TRENDS FACED WITH A GROWING SHORTAGE OF DRIVERS & SAFETY ISSUES

<table>
<thead>
<tr>
<th>Diminishing Supply</th>
<th>Increasing Demand</th>
<th>Safety Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ U.S. shortage of 78,000 drivers (^2)</td>
<td>▪ Rising e-commerce penetration</td>
<td>▪ 94% of all accidents are due to human error (^7)</td>
</tr>
<tr>
<td>▪ China drivers declined from 21 million to 17 million 2018 to 2020  (^5)</td>
<td>▪ Same or next-day shipping trends</td>
<td>▪ 47% increase in fatalities involving semi-trucks from 2009–2020 (^7)</td>
</tr>
<tr>
<td>▪ 45% of Japan’s drivers were aged 50 or older (^6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### THE TUSIMPLE OPPORTUNITY

<table>
<thead>
<tr>
<th>US</th>
<th>APAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Reduced costs: Labor makes up ~43% of per mile cost structure (^8)</td>
<td>▪ China: Middle mile accounts for ~60% of total freight market (^3)</td>
</tr>
<tr>
<td>▪ 10% of the nation’s trade corridors account for moving nearly 80% of all transported goods (^9)</td>
<td>▪ Japan: 50% of total long-haul transportation in freight corridor that connects Tokyo, Nagoya and Osaka (^10)</td>
</tr>
</tbody>
</table>

\(^{1}\) FMCSA. 2022 Pocket Guide to Large Truck and Bus Statistics. \(^2\) ATA. \(^3\) China National Bureau of Statistics. \(^4\) Japan Trucking Association. \(^5\) Ministry of Transport of China. \(^6\) Japan’s Ministry of Internal Affairs and Communications 2022 report. \(^7\) National Highway Traffic Safety Administration. \(^8\) ATRI. \(^9\) Freight Analysis Framework (Bureau of Transportation Statistics and the Federal Highway Administration). \(^10\) Japan’s MLIT. and JTA.
## Demonstrable Value Proposition

### Autonomous Vehicle Cost Elements

- **Driver Costs**
  - Elimination of human driver wages and benefits once operations are driverless
  - Addition of data transmission and storage, remote monitoring, and mapping maintenance costs

- **Vehicle Costs**
  - Costs for the base vehicle along with sensors, compute, and other hardware

- **Maintenance Costs**
  - Base vehicle maintenance along with incremental AV technology maintenance, calibration, and AV rescue

- **Fuel Costs**
  - 10%+ reduction in fuel cost from more efficient autonomous driver

- **Other**
  - Slight increase in insurance; tolls, and permits do not change

### Reduced Operating Costs Drive ROI for the Customer: Single Class-8 Truck Case Study

<table>
<thead>
<tr>
<th>Lifetime Miles</th>
<th>Human Operated Rate per Mile</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>750k – 1.25mm</td>
<td>~$2.50</td>
<td>~$1.9 – 3.1mm</td>
</tr>
<tr>
<td></td>
<td>Potential Net Savings per Mile</td>
<td>Potential Net Savings</td>
</tr>
<tr>
<td></td>
<td>$0.35 – $0.55(^4)</td>
<td>~$262 – 687k</td>
</tr>
</tbody>
</table>

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1. Based on company data in the U.S. 2. Does not include any expected terminal costs, drayage costs, development costs, and non-cash accounting costs (e.g., depreciation and amortization). 3. Assumes five-year life of truck. 4. Assumes cost of driver as $1.00 per mile; does not incorporate incremental capex associated with higher purchase price of TuSimple L4 truck; assumes virtual driver cost per mile is $0.45 – $0.65.
Momentum towards allowing for testing and deployment of ADS-equipped commercial trucks:

- **Kansas (2022)** passed legislation
- **West Virginia (2022)** passed legislation
- **Mississippi (2023)** passed legislation
- **California (2023)** held an AV workshop to discuss potential regulations

**California** bill (AB 316) prohibiting autonomous vehicles over 10,000 pounds from operating without a driver is in process.
APAC Regulatory Environment Supportive of Autonomous Freight Capacity

Regulatory Environment in China and Japan

**China**
- Shanghai first city in China to pass legislation to allow L4 fully driverless testing of autonomous trucks
- Clear strategic development goals set for AV industry by 2025, promoting all around development framework and L4 AV commercialization
- Regulatory rules issued to set industry standards for AV vehicles, road tests, infrastructure, etc.

**Japan**
- Autonomous truck testing allowed on most highways and local roads
- Government announced plans to launch a self-driving lane on some sections of the New Tomei Expressway by 2024
- Government has set targets for commercial operation of L4 fully autonomous trucks by 2026

Source: literature research
03 Proven L4 Technology Leadership and Protected IP Portfolio
A History of Industry Firsts

- Founded as one of the earliest AV trucking pure plays
- Began autonomous freight operations with UPS and USPS
- Demonstrated ~70 miles, 0 disengagement terminal-to-terminal run on CBS 60 minutes
- Launched Autonomous Freight Network
- Completed over 200,000 autonomous miles for UPS

2015
- Founded as one of the earliest AV trucking pure plays

2016
- Strategic partnership with Caofeidian Government on autonomous truck testing site

2017
- Began autonomous freight operations with UPS and USPS

2018
- First to demonstrate fully autonomous truck runs on surface streets and highways
- Received China’s first license for autonomous truck road testing in Shanghai

2019
- Selected as the first batch of "AI+ transportation" application scenarios in Shanghai, and participated in Yangshan Port/Donghai Bridge Autonomous Trucking Demonstration Project

2020
- Demonstrated ~70 miles, 0 disengagement terminal-to-terminal run on CBS 60 minutes
- Launched Autonomous Freight Network

2021
- First to publicly listed autonomous trucking company. Raised $1bn in net proceeds in traditional IPO
- Completed over 200,000 autonomous miles for UPS

2022
- Autonomous Domain Controller C-Samples announced
- First to demonstrate driver out fully autonomous truck runs on open public roads in China

2023
- First to achieve 10 million road miles
- Began road testing in Japan on the Tomei Expressway

1. As of September 30, 2022. 2. UPS North America Air Freight (NAAF)
Only Player to Complete Driver Out in the US

**Autonomous Vehicle Landscape**

<table>
<thead>
<tr>
<th>AV Trucking</th>
<th>Robotaxi</th>
</tr>
</thead>
<tbody>
<tr>
<td>More Complex Vehicle</td>
<td>Less Complex Vehicle</td>
</tr>
<tr>
<td>More Defined ODD²</td>
<td>More Expensive ODD²</td>
</tr>
<tr>
<td>40 Ton Average Weight</td>
<td>2 Ton Average Weight</td>
</tr>
<tr>
<td>200 Meter Braking Distance</td>
<td>100 Meter Braking Distance</td>
</tr>
</tbody>
</table>

**U.S. Driver Out Program Highlights**

- **0** Disengagements
- **112** Intersections
- **28** Traffic Lights
- **101** Lane Changes

- **34** Emergency Lane Vehicles Encountered
- **~7,000** Cars or Trucks Detected
- **8** Pedestrians Passed on Local Surface Streets

**Driverless**
- **tu simple**
- **Waymo One**
- **cruise**

**Safety Driver**
- **Aurora**
- **kodiak**
- **Motional**
- **Zoox**

**TuSimple | Investor Presentation**

1. Illustrative competitors only
2. Operational Design Domain
3. Waymo Via AV trucking development paused
4. Aurora focused primarily on trucking today
...and Only Player to Complete Driver Out in China

Autonomous Trucking Landscape

1. Illustrative competitors only

- No human in the vehicle
- No human Intervention
- Operated entirely by TuSimple’s Autonomous Driving System (ADS)

TuSimple

China Driver Out Program Highlights

- 11 total missions
- ~62 kilometer runs included Yangshan Deep-water Port and Donghai Bridge
- Lasting 45 minutes each
- In total over 600 kilometers driven
- On open public roads
- Including traffic signals, on and off ramps, partial lane closures, fog, and crosswinds

- 0 Disengagements
- ~12,000 Cars or Trucks Detected
- 236 Lane Changes
- 1.6km Distance traveled with reduced visibility from fog
Intellectual Property – A Leader in AV Trucking IP

Worldwide Patents and Applications

- **TuSimple**: 590+ global patents
- **Company A**: 400 patents
- **Company B**: 200 patents
- **Company C**: 1200 patents
- **Company D**: 1600 patents
- **Company E**: 0 patents
- **Company F**: 0 patents

Sample Patents

- **Semantic Segmentation (US9953236B1)**: Using dense upsampling convolution to semantic segmentation, producing a feature map from the image, then producing a semantic label map after a few operations.
- **Lane Bias Maneuver (US20230139551A1)**: Implement lane bias to avoid a vehicle, control device detects a vehicle from sensor data, comparing lateral distance to threshold distance, lane bias performed to reach threshold distance if necessary.

TuSimple Patent Portfolio

- One of the largest organically developed patent portfolios in AV trucking – 589 patents in total
- TuSimple is the world’s most inventive trucking focused AV company
- TuSimple has IP spanning across the entire autonomous trucking ecosystem

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1. As of June 30, 2023. TuSimple research utilizing PatSnap.
3. Measured by global patent asset originated.
Concrete Development Roadmap with Clear Commercialization Strategy
Clear Strategy to Commercializing First Autonomous Lane

Building on prior achievements, a clear and achievable roadmap in the U.S. and APAC to be first to launch commercial autonomous freight operations

<table>
<thead>
<tr>
<th>Driver Out Pilot</th>
<th>Expanded Safety</th>
<th>Increased Reliability</th>
<th>Improved Cost Effective</th>
<th>Commercial Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Driver Out Pilot</td>
<td>✓ Completion of Driver Out Pilot Safety Case</td>
<td>✓ One trip per week</td>
<td>x Non-scalable AV operations (survey vehicle, chase vehicle, pre-trip &amp; post-trip costs)</td>
<td>Feature Complete + Redundancy</td>
</tr>
<tr>
<td>Proof of Technology</td>
<td>✓ Completion of Driver Out Pilot</td>
<td>✓ U.S. Operate in nighttime</td>
<td>✓ China Operate in daytime</td>
<td></td>
</tr>
<tr>
<td>Customer-Focused</td>
<td>Commercial launch must meet the rigorous demands of a shipper, including a minimum “level of service” &amp; “freight capacity” reliability threshold &amp; clear line of sight on cost-per-mile that is competitive with human drivers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Commercial Launch</td>
<td>Completion of Expanded Driver Out Safety Case</td>
<td>Multiple round trips per day</td>
<td>Remove survey vehicle</td>
<td>Repeatable Ops + Improved Cost Efficiencies</td>
</tr>
<tr>
<td>Proof of Business Case</td>
<td>Completion of 3rd Party Audit¹</td>
<td>Operate in nighttime and daytime</td>
<td>Remove chase vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operate in dynamic construction zones</td>
<td>Reduce miles between returning to MRC</td>
<td>Improve AV operations</td>
<td></td>
</tr>
</tbody>
</table>

¹ Audited U.S. operations a SAE standard J3018 and AVSC AV Testing best practice. Audit performed on operations, ADS functionality safety audit in progress
Two Progressive Business Models

Accelerate path to scale with TuSimple Capacity, handling testing and maintenance, before full earnings potential is achieved with Carrier-Owned Capacity

Business Models applicable to U.S. and APAC

**TuSimple Capacity**

- **Ready to commercialize today**
- TuSimple enables automated freight routes
- Strategic route-by-route expansion where TuSimple controls the outcome
- Fastest path to market and critical for industry adoption

**Value Proposition**

- $ / mile Freight Rate
  - Capital Light Method
  - Uses Shared Terminals
  - Leverages Shared AFN\(^1\) Terminals

**Carrier-Owned Capacity**

- **Long-term business strategy**
- TuSimple enables OEMs to manufacture autonomous trucks
- Required to sell to third-party customers
- Dependent on OEM and hardware supply chain timelines

**Value Proposition**

- $ / mile Subscription Fee
  - Upfront investment with Payback <1 year
  - Controls Own Capacity
  - Uses Own Terminals
AFN Rollout and Expansion Plan

AFN Targeted Expansion in the U.S.

- Targeting expansion throughout the Sunbelt leveraging existing mapped routes by TuSimple across high-traffic freight routes including the “Texas Triangle”
- Once a route is mapped, the route can be automated with autonomous trucks dynamically updating the map as necessary
- Texas Triangle (Dallas, Houston, San Antonio, Austin) is highly trafficked by truck freight and well-suited to automation
- Illustrative development plan considers route in autonomy friendly jurisdictions

AFN Covering Major Shipping Routes in China

- Flexible business models adapted to local environment in China to maximize commercialization potential
- Beginning in the east and building out AFN covering major shipping routes in China
U.S. Development Roadmap and Plan

Commercialization roadmap strategically aligned with overall industry readiness

<table>
<thead>
<tr>
<th>Immediately Actionable: 2023 - 2026</th>
<th>Within Range: 2027 - 2029</th>
<th>On the Roadmap: 2030+</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Focus</strong></td>
<td><strong>Ecosystem Development</strong></td>
<td><strong>Number of Driver Out Trucks</strong></td>
</tr>
<tr>
<td>▪ Mature ADS technology for commercializing initial freight lane</td>
<td>▪ Development of AV-ready redundant base truck platforms &amp; components</td>
<td>▪ Progressive L4 Revenue Models</td>
</tr>
<tr>
<td>▪ Freeze complete ADS onboard software and hardware for contract upfitter</td>
<td>▪ Expanded self-operated AV fleet</td>
<td>▪ Initial Commercial Launch</td>
</tr>
<tr>
<td><strong>Arizona+</strong></td>
<td><strong>Texas Triangle+</strong></td>
<td><strong>TuSimple Capacity</strong></td>
</tr>
<tr>
<td><strong>Within Range: 2027 - 2029</strong></td>
<td><strong>Within Range: 2027 - 2029</strong></td>
<td><strong>Sunbelt+</strong></td>
</tr>
<tr>
<td>▪ Expand self-operated AV fleet</td>
<td>▪ Continued hardware maturity and optimization</td>
<td>▪ Scale AFN density and coverage</td>
</tr>
<tr>
<td>▪ Freeze complete ADS onboard software and hardware for OEM production programs</td>
<td></td>
<td>▪ Enable launch of OEM production vehicles</td>
</tr>
<tr>
<td><strong>Scaled production of integrated OEM produced AV trucks</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Number of Driver Out Trucks**
- **10s**
- **100s - 1,000**
- **10,000s**

**Initial Commercial Launch**
- **TuSimple Capacity**
- **Carrier-Owned Capacity**
**APAC Development Roadmap and Plan**

**Commercialization roadmap strategically aligned with overall industry readiness**

<table>
<thead>
<tr>
<th>Primary Focus</th>
<th>Immediately Actionable: 2023 – 2026</th>
<th>Within Range: 2027 – 2029</th>
<th>On the Roadmap: 2030+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enhance L4 technology; iterate through road tests in China and Japan to prove reliability for commercial applications</td>
<td>Build AFN in selected routes and regions with highest commercialization potential¹</td>
<td>Scale AFN density and coverage</td>
</tr>
<tr>
<td></td>
<td>Validate Driver Out operation capabilities with several pilots</td>
<td>Expand self-operated AV fleet</td>
<td>Enable launch of OEM production vehicles</td>
</tr>
</tbody>
</table>

**Ecosystem Development**

- Build the first L4 trucking lane along Donghai Bridge of Shanghai
- Continued hardware maturity and optimization
- Scaled production of integrated OEM produced AV trucks

**Number of Driver Out Trucks**

- 10s
- 100s
- 1,000s

**Progressive L4 Revenue Models**

- Initial Commercial Launch

1. Dependent on regulatory approval of L4 commercial operation
05 Full Stack Autonomous Technology
Note: For the avoidance of doubt, the ADS Onboard Software is not housed onboard the trailer. Other onboard functions include localization, calibration, embedded software, and more.
TuSimple’s combined technology platform and organizational capability encompass the overarching requirements to support continuous, scalable freight operations.

**A. ADS Onboard Software**
- **Best-in-class long-range perception**, multi-modality sensor-fusion to comprehend the road environment
- **Robust prediction, planning, and control** functionalities designed for navigating through diverse traffic scenarios including construction zones
- **Proprietary embedded software** providing and optimizing embedded compute as well as proprietary sensing unit, along with other L4 hardware

**B. ADS Hardware Solutions**
- **Proprietary ADS hardware solutions** for sensor suites, by-wire controls system, and compute platform
- **Camera-centric backbone** featuring custom layout design and packaging flexibly supporting multiple layouts and form factors
- **TuSimple Domain Controller (TDC)** developed from the ground up to serve as autonomous truck’s centralized compute unit

**C. Offboard Technology**
- **Holistic set of software tools** that covers the entire development cycle and accelerates the functionality iteration cycle
- **End-to-end simulation** to enable cost efficient, year-round testing
- **Scalable mapping** with low creation and maintenance
- **Autonomy visualization platform** supporting both development and deployment of AV operations

**D. Autonomous System Integration and Safety**
- **Mature development platform** combining automotive processes and agile technology development (Safety Case framework, V&V framework)
- **Experience upfitting and integrating critical safety systems** including both software and hardware with OEMs
- **Thorough testing operations** that are key to providing validation, system confidence, and continuous improvement
Proven L4 Capable Onboard Software Technology

Solved critical autonomous trucking challenges with long range perception key for semi-trucks, planning and prediction enabling maneuvers, and control that optimizes fuel economy and driving performance.

Onboard Software Components

Three differentiated and unified modules within onboard software that address the requirements of AV trucking:

- **Perception, Tracking, and Fusion**: Visualizing the road environment with robust long-range capabilities that address highway driving speeds and long stopping distance requirements.

- **Prediction and Planning**: Comprehends perception inputs to semantically represent environment constraints and generate feasible trajectories that obey driving rules to reach goals.

- **Control**: Software architecture with predictive control functionalities delivering smooth motion and superior driving performance.

Benefits of Long-Range Perception

- **Longer Braking Distances**
  - ~2x longer braking distance for semi-trucks due to larger size requires longer planning horizon.
  - TuSimple camera-based 1,000m perception range is designed to provide up to 35 second planning horizon.

Unprotected Left Hand Turn

- Semi-trucks take up to 16 seconds to make a safe left-hand turn, significantly longer than a passenger car.
- Lidar only systems do not provide a sufficient planning horizon for the elongated turn, therefore an autonomous semi-truck will not be able to make a safe unprotected left-hand turn if exclusively relying on lidar.

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TuSimple | Investor Presentation

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### Technology Highlights

<table>
<thead>
<tr>
<th>Driving Features Supported</th>
<th>Driving Behaviors Supported</th>
<th>Vehicle Dynamics</th>
<th>Intersection Handling</th>
<th>Conditional Prediction and Turn Signal Usage</th>
<th>Navigation and Routing</th>
<th>Decision-making and Behavior Hierarchy</th>
<th>Unified Attention Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction zones</td>
<td>Lane change/cancel lane change</td>
<td>Articulated kinematics and road slope considerations for both Ego and other vehicles</td>
<td>Handles intersections with global scene predictor with attention to non-compliant drivers</td>
<td>Creates better interactions and decisions by communicating Ego's intent</td>
<td>HD map integration informing localization and routing alternatives</td>
<td>Ensures explainability and accountability such as accident mitigation and preference</td>
<td>Based on complete scene understanding for better resource allocation and overall system performance</td>
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<tr>
<td>Traffic jams</td>
<td>Overtake/retreat</td>
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<tr>
<td>Road boundaries</td>
<td>Lane bias</td>
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<td>Accepting merges</td>
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<td>Emergency lane vehicles</td>
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<td>Emergency vehicles</td>
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<td></td>
<td>Vulnerable road users</td>
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</tbody>
</table>

### Capabilities and Maneuvers

- **Lane Bias**
- **Handling Aggressive Cut-in**
- **Proactive Lane Change**

#### Key Safety Scenarios

- Highway merging / on-ramps
- Unprotected left turns
- Stoplight / intersection interactions
- Slow vehicle overtakes
- Retreat to safe following distance

#### Other Maneuvers Covered

- Highway merging / on-ramps
- Protecting left turns
- Stoplight / intersection interactions
- Slow vehicle overtakes
- Retreat to safe following distance

#### Planning Behaviors Driven by Safety

- No premature decisions or pruning, all trajectories remain in consideration until the optimal trajectory is certain
- Proactive maneuvers help avoid dangerous road scenarios, e.g., a non-compliant vehicle fish-tailing and straddling or invading lane space
- Aggressive lane change abilities (“window chasing”) used only when necessary
- Top level decision making defined quantitatively

---

1. Ego denotes the TuSimple vehicle operating in autonomous mode.
Precise Control Delivers Superior Driving Performance

State of the art, predictive “all-in-one” optimal controller that can balance motion control/smoothness, minimize needed actuation, and maximize fuel economy

Predictive Control

- Capable of both local and highway driving regimens
- Innovative “hybrid mode”
- Integration of control and novel uncertainty model estimator
- Measured control performance
- Integration of an optimal uncertainty/envelope tracker
- Proprietary, high-speed loop solver
- Enhanced fuel economy driving techniques
- In-house simulation environment matches real truck control responses in our system in loop (SIL) digital simulator enabling millions of scenarios testing

Autonomous Driver Control Improvements

Lane Centering

- +/- 10.6” (3σ) lane centering performance far outperforms humans, leading to better safety outcomes

Throttle Control

- Smoother braking and acceleration lowers tire / brake wear

Fuel Economy

- 10%+ improvement in fuel economy in autonomous truck
- More efficient braking (engine braking) and momentum conservation

<table>
<thead>
<tr>
<th>Category</th>
<th>Manual MPG</th>
<th>Autonomy MPG</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway Cruise</td>
<td>7.54</td>
<td>7.97</td>
<td>5.75%</td>
</tr>
<tr>
<td>Front Vehicle Cut-In</td>
<td>10.63</td>
<td>13.50</td>
<td>27.00%</td>
</tr>
<tr>
<td>Slow Car Following</td>
<td>8.63</td>
<td>9.53</td>
<td>10.40%</td>
</tr>
<tr>
<td>Aggregated Highway</td>
<td>7.77</td>
<td>8.64</td>
<td>11.09%</td>
</tr>
</tbody>
</table>

1. 6 months of testing with over 30k miles in autonomy mode (Speed range: 40mph – 80mph, Road grade: -4% to 4%, Vehicle weight: 16 tons to 35 tons)
ADS Hardware Environment

Focused development since inception on critical ADS enabling hardware through multiple generations

ADS Hardware Systems and Components

- Competitive advantage driven by in-house camera design that matches onboard software capabilities
- Leverages off the shelf sensors or components where possible to remain capital efficient and focused on core competencies
- Focused on software and hardware development of critical components that allow for reliable testing and scaled production

ADS Hardware Systems and Components

TuSimple Sensing Unit
- Sensor pre-processing unit for all L4 sensors

Vehicle Control Unit
- Auto-grade ECU for direct command control of steering, powertrain, and braking

TuSimple Domain Controller
- Ground up hardware design serves as autonomous truck’s centralized compute unit

Compute and Communications

Ruggedized Compute Unit
- Central computing unit for driving function and overall L4 orchestration

Ruggedized Communications Gateway
- Ruggedized controller handles AV truck bi-directional communications

Sensor Suite

- Full suite of cameras, lidars, radars, GNSS, IMUs, microphones, rain / light detection, etc.
- Accurately capture environment in broad set ODD
- Multiple layouts for physical FOV, 360° coverage, and necessary redundancy
**TuSimple Domain Controller (“TDC”)**

**TDC Overview**
- Partnership between NVIDIA and TuSimple announced in January 2022
- Ground up hardware design serves as autonomous truck’s redundant centralized compute unit
- Enables TuSimple to provide fully integrated hardware & software autonomy solutions

**Benefits of the TDC**
- Partnership with NVIDIA for the SOC reference design; it’s fully proprietary hardware
- Proprietary designed system includes:
  - **Better Integration**
  - **Low Power Consumption**
  - **Shorter R&D Cycles**
  - **Lower End-User Costs**

---

**L4 Use Cases and Cost Efficiencies**

The TDC replaces distributed compute units as an integrated redundant controller

- High functional integrity as integrated domain controller
- Reliable / robust backup to primary controllers

---

**Additional Near-Term Revenue Opportunities**

The TDC serves as the single integrated domain controller in L2+ / L3 system

- Integrated across sensing, computing, and vehicle control
- Distributed electrical architecture utilizing a multitude of ECUs is inefficient for computing and updating software
- Unified central domain controller is much more efficient
- Flexibility to provide the perception module only, perception and planning & control, or full system
- Can support L2+ / L3 features including highway assist and highway pilot functions
TuSimple's AV Development Toolchain is a holistic set of software tools based on real world experience that cover the entire autonomous driving development cycle and deployment of AV operations.

**Machine Learning Infrastructure**
- Self-supervised active learning data pipeline
- Fast and scalable model training
- Large and elastic simulation workloads

**Simulation**
- Proprietary simulation toolchain
- End-to-end simulation
- Enable year-round testing across robust scenarios
- Automatically detects safety events within simulation

**Autonomy Visualization**
- Display and interact with the ADS
- Customizable workspace for every scenario
- Cloud replay and fast tagging of events
- Advanced plotting and direct measurement features

**HD Mapping**
- Scalable, automated nationwide mapping
- Low creation and maintenance costs
- Low latency updates
- High accuracy (5cm)

**Fleet Operations**
- Efficient deployment for AV testing and operations
- Scalable, low-cost AV fleet management
- Vehicle-to-cloud communication for remote monitoring
- User-friendly autonomy visualization – supporting different functions

**Petabytes of Data Managed on Platform**
- ~11,400+ Miles of HD Mapped Routes

**Key Functionalities Provided**
- On Path to L4 Autonomy
- Development & Deployment
- Holistic Interface
- Robust Validation
Complexity of autonomous vehicle operations necessitates a safety case that is designed to ensure adequate safety margins and that supporting operations are safe while addressing AI-specific challenges.

### What is Being Made Safe?

<table>
<thead>
<tr>
<th>Trucks</th>
<th>Autonomous Driving System</th>
<th>Remote Data Infrastructure</th>
<th>Fleet Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Base truck platform(s)</td>
<td>▪ Compute hardware</td>
<td>▪ Software development and deployment tools</td>
<td>▪ Fleet maintenance</td>
</tr>
<tr>
<td>▪ Truck hardware modifications</td>
<td>▪ Sensors</td>
<td>▪ Remote monitoring software and network</td>
<td>▪ Test fleet operations</td>
</tr>
<tr>
<td>▪</td>
<td>▪ Operating system and middleware</td>
<td></td>
<td>▪ Revenue fleet operations</td>
</tr>
<tr>
<td>▪</td>
<td>▪ Autonomy stack</td>
<td></td>
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<tr>
<td>▪</td>
<td>▪ Diagnostics and remote communications bridge</td>
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</tbody>
</table>
The TuSimple Safety Case

Structured arguments that define specific safety objectives, clearly state all assumptions, provide rationale, directly link evidence to impacted claims, clarify effectiveness of mitigants, and understand residual risk

- **System Safety**
  - **Technical Safety**
    - Reliable (Robust Design)
      - Mechanically stable
      - Reliable hardware
      - Reliable software
    - Fail-Safe (Functional Safety)
      - Functionally available
      - Hazard identified
      - Hardware fault tolerant
      - Software fault tolerant
    - Sufficient (SOTIF)
      - Robust to functional deficiencies
      - Resistant to foreseeable misuse
      - Behaviorally sound
    - Proven (Substantive Safety)
      - Statistically proven
      - Stress tested
  - **Operational Safety**
    - Prepared (Training)
      - Aware (risk assessed)
      - Capable (training)
      - Continuously improving (stress tested)
    - Proven (Stress Tested)
      - Tools and processes proven
      - Real-time operations proven
Combination of modular technology stack, development know-how, and proprietary domain controller enables use cases outside pure L4 autonomy

**Trends Driving Mobility Today**

- Automated Driving
- Software Defined Vehicles
- Connected Mobility

**Demand Challenging Requirements**

- Large dataset processing from multi-modal sensor suites
- Solve for complex computing with demands for cost efficiency and centralization
- Outperform multiple ECU1 architecture with better power, cost, and maintenance efficiency
- Overcome challenges in hardware-software integration

**Illustrative Use Cases & Plug-Ins**

- L2 & L3 ADAS all-in-one modules for passenger and commercial vehicles
- Offboard toolchain and simulation as a service
- White-labeling and contracted development
- Licensing and outsourcing of individual modules (e.g., perception or control)
- Development and sales of SoC products
- Low-cost automotive grade controllers for mining, ports, and warehouses

1. Electronic control unit
06 2023 Considerations and Long-Term Framework
2023 Key Considerations

TuSimple ended 2022 with ~$995mm in Cash and Short-Term Investments; Refined 2023 Strategy Reduces Revenue and OpEx While Protecting our Balance Sheet

Revenue
- Intentional reduction of loss-making freight capacity
- Reduce geographical footprint to match AV commercial launch roadmap

OpEx
- Greater than $120 mil. of annualized cash comp savings expected from restructuring
- Additional OpEx savings expected from company-wide improved efficiency

Capital Expenditure
- Reduced fleet size focused on testing
- No new operational facilities beyond Arizona nor IT hardware investments

2023 Cash & Short-Term Investments
- OpEx and CapEx savings expected to drive cash spend decrease while still funding technology development
- Improved management and yield generation of idle cash

1. Includes December 2022 and May 2023 restructurings
Focusing on What it Takes to Win

Striving to Create shareholder value through building on our technology leadership, setting a concrete development roadmap, and creating near-term monetization opportunities.

1. Investment Thesis for AV
   Trucking Remains Strong

2. Proven L4 Technology
   Leadership

3. One Holding Company,
   Two Distinct Businesses

4. Concrete Development
   Roadmap with Clear
   Commercialization
   Strategy

5. Modular Technology Stack Enables
   Near-Term Monetization
   Opportunities
Substantial Revenue and Network Scaling opportunity has not changed

TuSimple technology remains industry leading and we continue to believe we will capture market share.

Initial focus on commercial launch TuSimple Capacity, path to positive cash flow with ~500 trucks.

Launch of Carrier Owned Capacity required to scale to tens of thousands of trucks.

Timing: Factors impacting timeline provided at 2022 Investor Day

- Dependent on OEM development timeline to launch Carrier Owned Capacity
- Supply chain partners focused on near-term opportunities: EV and L2+ ADAS
Thank You