Autonomous Vehicle Safety Considerations

Safety is a key component in TuSimple’s autonomous technology development process

Safe Development Processes
In place starting from software simulation to track to real traffic deployment

Functional Safety
Strong functional safety team and quality team in house; ISO 26262 compliance. Developing ISO 16949 quality practices

Operational Safety
Test driver and test engineer always present on truck; mission safety assessments; rigorous test driver
SPE Levels of Driving Automation

TuSimple has developed the world’s first L4 autonomous capable trucking solution

![Diagram showing SAE Levels of Driving Automation]

**0: No Automation**
- Zero autonomy
- Drivers perform all driving tasks

**1: Driver Assistance**
- Vehicle controlled by the driver
- Driving assist features available

**2: Partial Automation**
- Acceleration & steering automated
- Drivers must remain engaged at all times

**3: Conditional Automation**
- Drivers not required to monitor the environment
- Drivers must be ready to take control at all times with notice

**4: High Automation**
- Perform all driving functions under certain conditions
- Driver is not required in defined use case

**5: Full Automation**
- Perform all driving functions in all conditions
- Driver not required to operate
The Fundamental Challenges for Trucks

- 44% wider
- 300% longer
- 18 wheels
- 200% wider turn radius
- 12 gears
- Articulated
Lidar Limitation

LiDAR perception: <100m

Point cloud at 30m
Point cloud at 50m
Point cloud at 70m
Point cloud at 200m
Superior Camera Perception Range

Camera perception: 1000m
TuSimple’s in-house software stacks enable the L4 system to operate smoothly under adversarial weather conditions, such as:

- **Heavy Rain**
- **Severe Wind** (Level 9 in the Beaufort Scale)
- **Arizona’s Haboob** (Dust Storm)
Operation in Rain