MAGNA

Forward. For all.

MIT Mobility Initiative Forum

David Doria, Director of Automated Driving, Magna Electronics

November 14, 2025

Agenda

01 Size, history and categories

02 Details on sensors, software stack, advantages/disadvantages

03 Scale (how many cars on road) and impact on safety

04 Integration challenges across platforms

05 L2 ADAS vs L3 AD vs L4

06 Future product lineup and vision

By the Numbers

$42.8B In Sales

337 Manufacturing Assembling Facilities

164,000+ Entrepreneurial Employees

#1 North America Market Position

#3 Global Market Position

AS OF Q3 2025

MAGNA

Global Presence

Our 337 operations span five continents and 28 countries, giving us a global footprint to support every major automaker in the world.

North America

141	Manufacturing / Assembly
23	Engineering / Product Development / Sales
70,950	Employees

South America

11	Manufacturing / Assembly
3	Engineering / Product Development / Sales
3,150	Employees

Europe

101	Manufacturing / Assembly
52	Engineering / Product Development / Sales
49,775	Employees

Africa

2	Manufacturing / Assembly
1	Engineering / Product Development / Sales
1,950	Employees

Asia

82	Manufacturing / Assembly
27	Engineering / Product Development / Sales
38,350	Employees

AS OF Q3 2025

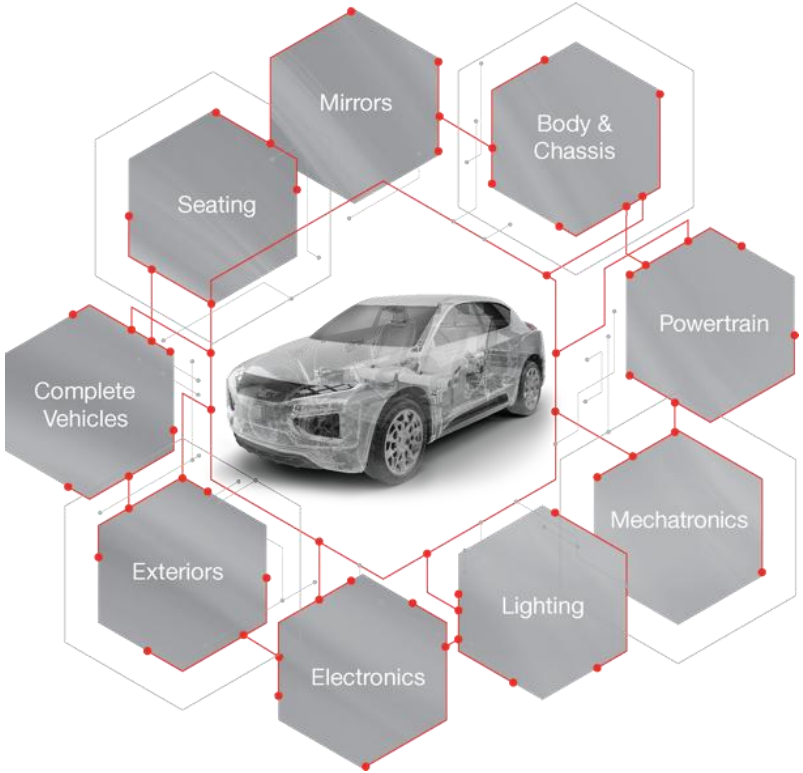
Our full-system approach is your competitive advantage in the new world of mobility.

The Power of Magna

Deep product expertise

Integrated systems level analysis and approach

Complete vehicle engineering and manufacturing



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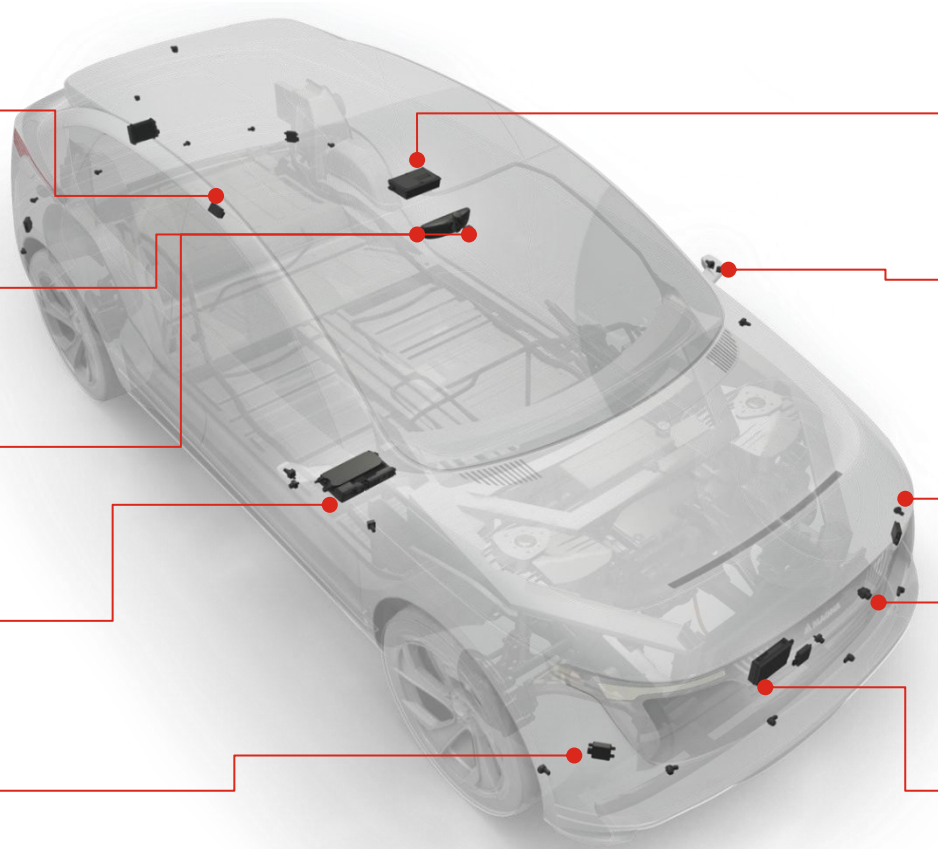
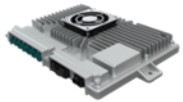
Comprehensive ADAS Sensor Portfolio



Interior Sensing Radar

Driver Facing Camera

Front Camera



Compute Units

Radar Belt

Lidar Integration

Remote Camera Heads

Ultrasonic Integration

Thermal Camera

Imaging Radar

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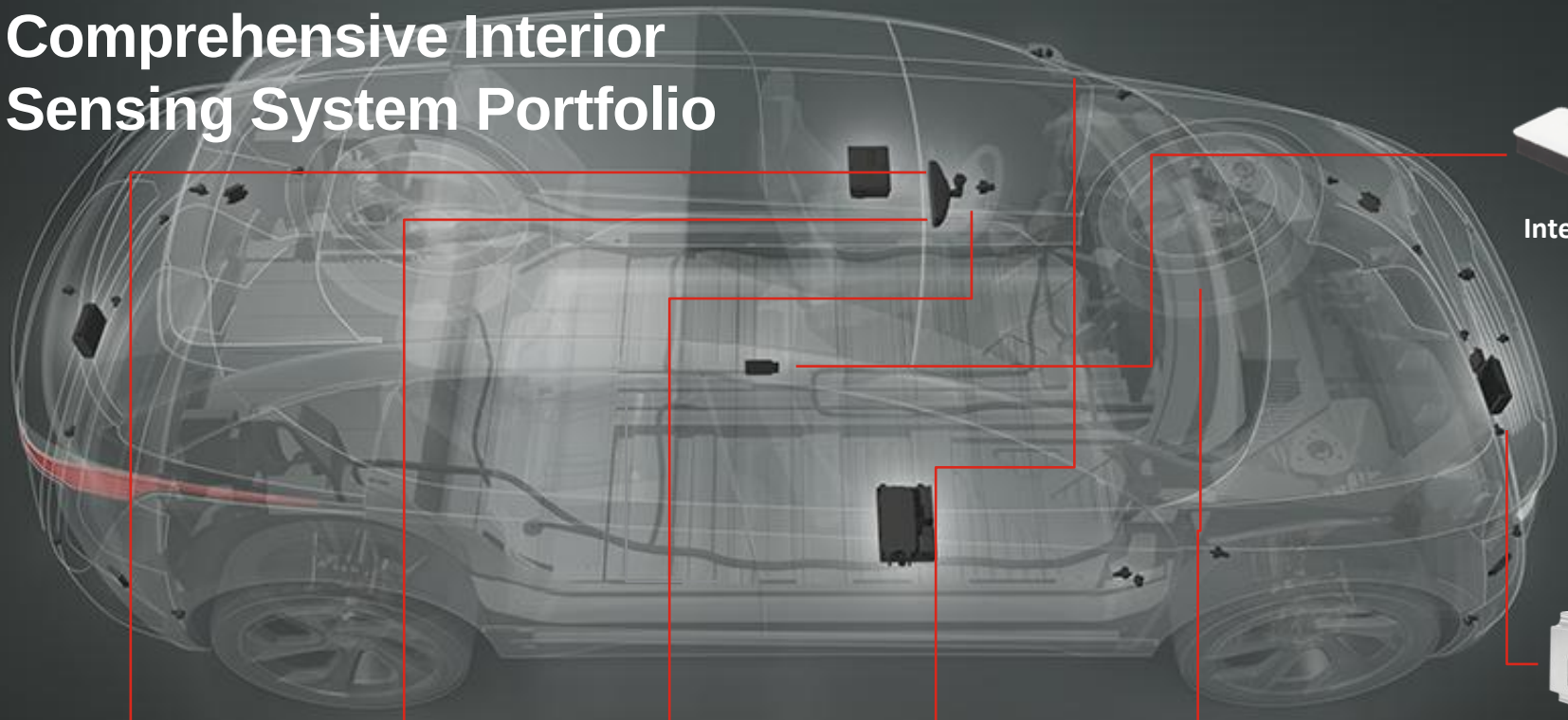
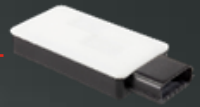
Comprehensive Interior Sensing System Portfolio





Interior Radar

Thermal Camera for ISS

Mirror integrated Interior Camera

Chin Integrated Interior Camera

Steering Column Interior Camera

A-Pillar Interior Camera

Center Stack Interior Camera

Comprehensive ADAS Feature Portfolio

Safety
(NCAP 5-star)


Blind Spot Detection


Lane Departure Warning


Automated Emergency Steering


Front & Rear Emergency Braking


Driver & Occupant Monitoring

Comfort & Automation


Adaptive Cruise Control


Traffic Jam Assist


Lane Centering Assist


Automated Lane Change


Highway Pilot

Viewing & Parking


Surround View


Automated Park Assist


Cross Traffic View


Advanced Trailering


Autonomous Valet Park

MAGNA

~ 169 million Cameras

~ 94 million Radar Sensors

~ 35 million Compute Units

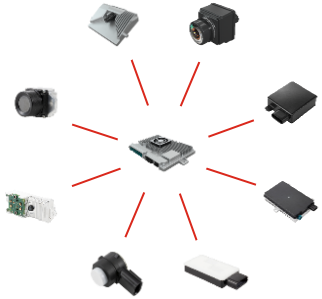
~ 1 million DMS

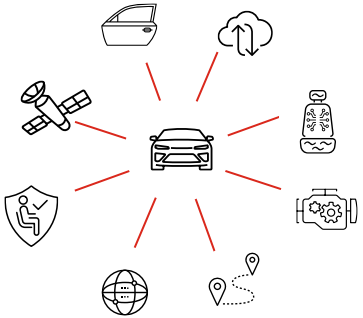
AS OF Q2 2025

We successfully launched **more than 10 system solutions** for parking and driving with our customers worldwide.

Delivering Automotive Safety

Serving Customers On All Levels





Components
(Component Partner)

- Smart sensors and features
- Vehicle integration and validation
- Fine-tuning specifically to customer application
- World-class KPIs through working closely with the customer

Integrator
(Engineering Partner)

- Trusted system integrator role
- Flexibility of both Magna and third-party solutions
- System level performance and validation
- Supports OEM focus on brand differentiation

System Solutions
(Strategic Business Partner)

- Full vehicle level ADAS design and delivery
- Supply & integration of sensor suite & software
- Complete responsibility, features, SW, middleware
- Vehicle level performance and validation
- Integration of non-ADAS features and functions
- Full focus of OEM on brand differentiation

ADAS Systems (L2, L2+, …)

“Features” Laundry List

- Automatic Emergency Braking
- Rear Automatic Emergency Braking
- Adaptive Cruise Control
- Adaptive Cruise Control Stop-and-Go
- Traffic Jam Assist
- …

Hardware

- Low-cost Sensors
- “Smart” sensors
- Low-power Compute

Each Feature may:

- Require/use different subsets of available sensors
- Require/use different environment model representations
- Use a different controller
- Need to be enabled separately by the user
- require separate testing
- Have legislative requirements on:
  - Performance (e.g., FMVSS127)
  - Necessitate extremely stringent performance requirements (minimal FPs, FNs)
  - Work in difficult conditions (e.g., darkness, adverse weather)
  - Imply overlap of multiple different sensor modalities to cover gaps

Autonomous Driving Systems (L4)

Software Approach – Single “Driver”

- Capabilities/Behaviors vs “Features”
  - E.G., “Planner will consider the width of the adjacent vehicle to determine ego position in the lane”

- Common Environment Model
- Common Controller
- Higher Spatial Accuracy Requirements
- Higher Performance Requirements

Hardware

- High-cost Sensors (Lidar, etc.)
- “Trunk Full Of Compute”
- Central compute

Performance

Cost

Why not move to L3?

Even more compute power and sensors needed ***(multiple redundancies required)***

Tricky driver interaction ***(unneeded in L4)***

Uncertainty around legal and ethical responsibilities ***(very clear in L4)***

Longer-range sensors

Next-Gen ADAS Feature Portfolio

Safety

Rear Turn
Across Path

AEB Left Turn
Across Path

V2X Alert
Features

Comfort & Automation

Rear-End
Collision Warning

Navigating On
Autopilot (NOA)

Accelerator Pedal
Misapplication
Prevention

Predictive Adaptive
Cruise Control

Viewing & Parking

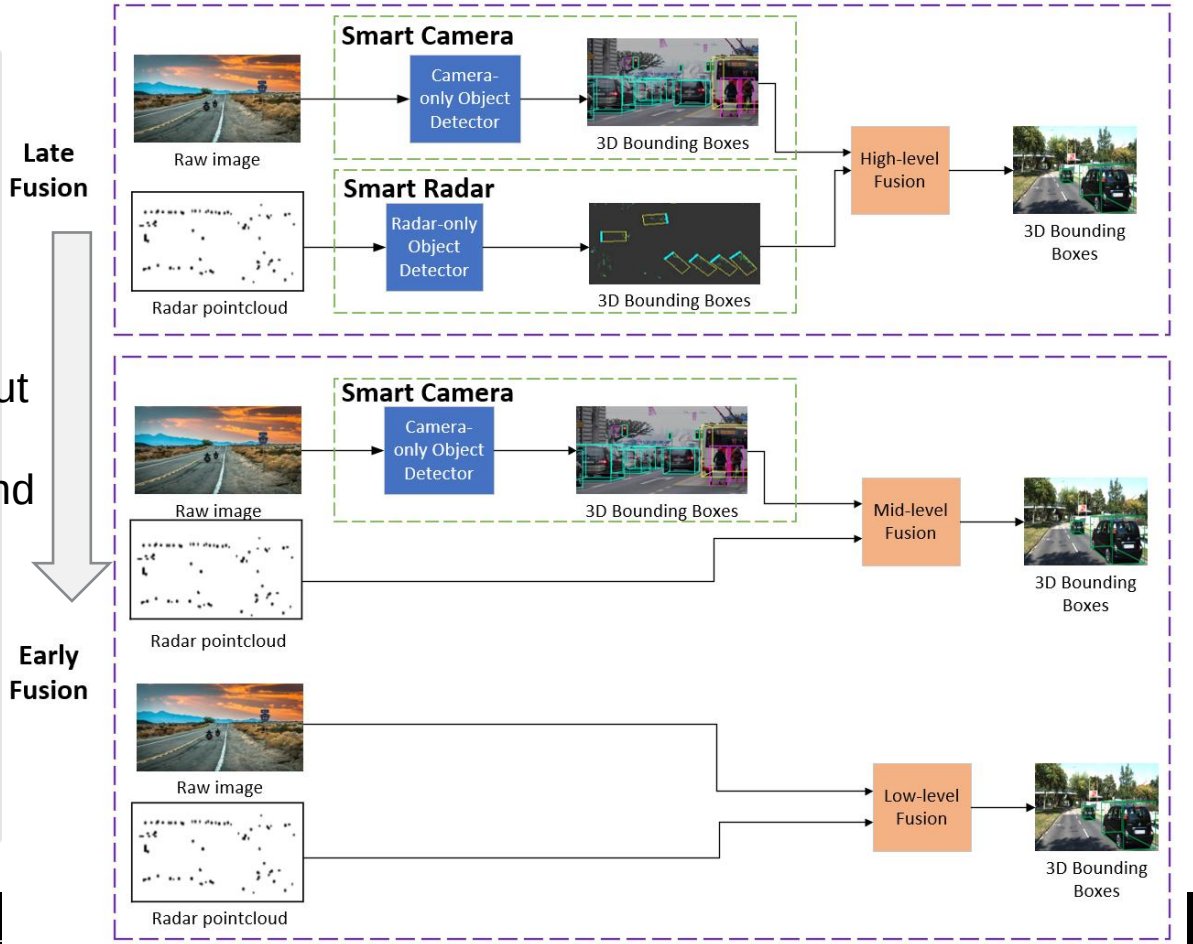
Automated Park
Assist

Autonomous
Valet Park

MAGNA

Sensor Fusion

Increasing performance, but increasing compute demand



MIT Mobility Initiative

Paul Schmitt
Sr. Mgr. Autonomy Software

Who We Are

Focused on L4 autonomous long-haul autonomy

Core product: the Virtual Driver

History

- Torc is a pioneer in autonomous vehicle technology.
- Independent subsidiary of Daimler Truck AG

TORC

- Blacksburg, Virginia
- Dallas/Fort Worth, Texas
- Ann Arbor, Michigan
- Montreal, Canada

TORC

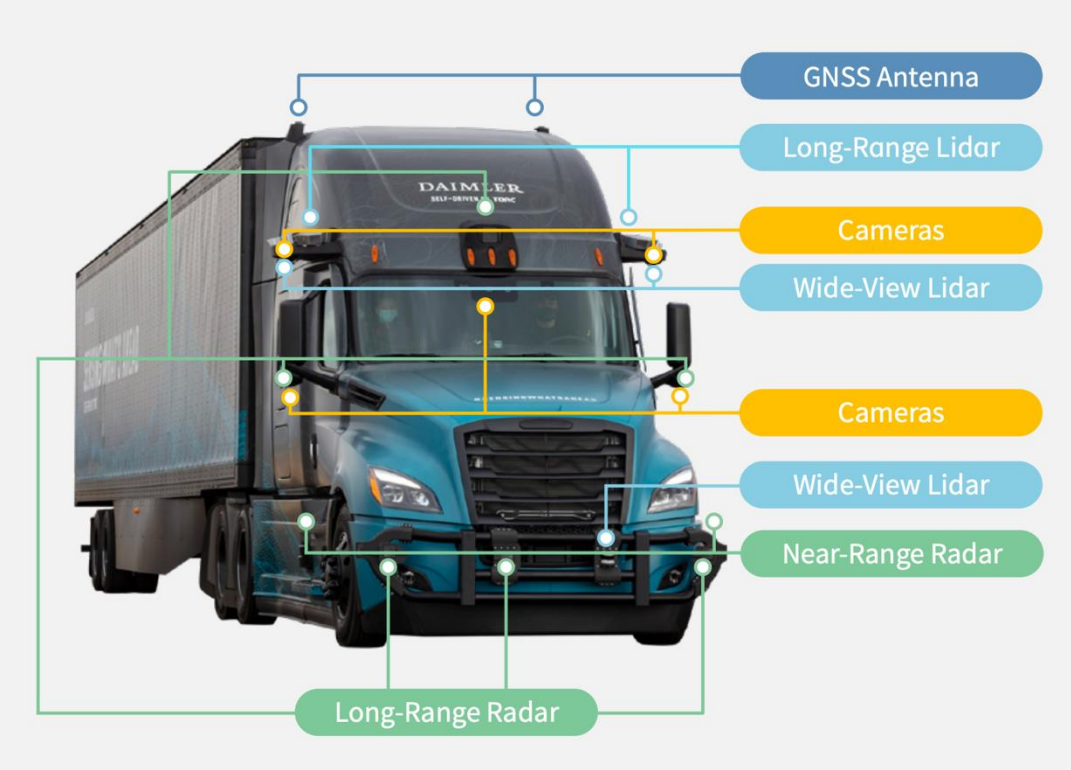
What We Do

- Level 4 autonomous long-haul trucking
- Freight logistics solutions
- 2026 product launch
- 2027 scalable market entry
- Focusing on safety, reliability, and operational efficiency

Freight Automation Challenges

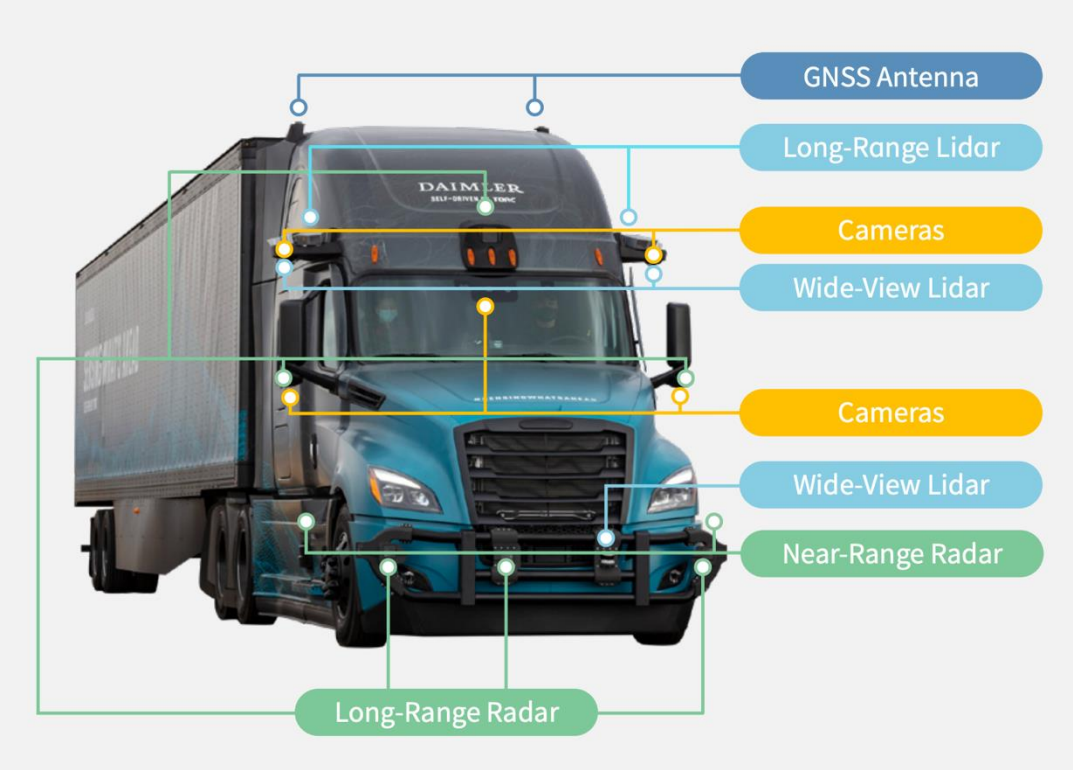
- **Duty cycle:** long hours, mileage, and highway speeds push compute/power/thermal design.
- **High GVW:** Long-range sensing bias for highway corridors.

Platform Vehicle Design



Sensors: multi-modal suite—cameras + long/short-range lidar + long/short-range radar—to build a 3D view and motion of surrounding actors.

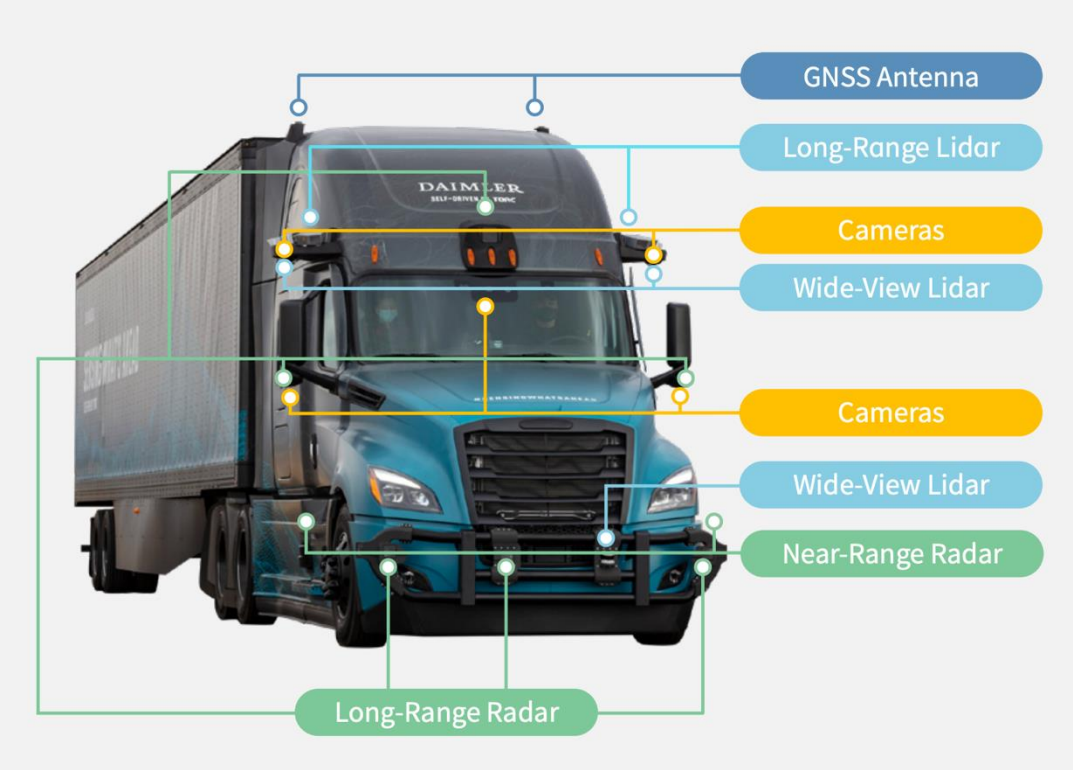
Platform Vehicle Design



Sensors: multi-modal suite—cameras + long/short-range lidar + long/short-range radar—to build a 3D view and motion of surrounding actors.

Actuation: autonomous-ready Cascadia adds control by-wire steering, braking, power delivery.

Platform Vehicle Design



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Actuation: autonomous-ready Cascadia adds control by-wire steering, braking, power delivery.

Performance and Redundancy: All weather conditions, fully fault tolerant

Compute Platform

Physical-AI platform: NVIDIA DRIVE-based compute integrated into Flex's Jupiter platform

- Quality
- Manufacturability
- Robustness
- Supply chain scale

AV 3.0: Software Blueprint

End-to-end Reinforcement Learning

- High performance AV driving

Heuristic Guardrails

- Enforce basic rules of driving
- Verifiability

AV 3.0: Software Blueprint

Modular AI

- Transparent and explainable
- Introspection at the module level
- Debugging and validation

Machine Learning and Safety

A Familiar Yet Novel Approach to AI Safety

Introducing The ML FMEA

A Safe Machine Learning Approach

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Figure 1a. The reference eleven-step ML Pipeline.

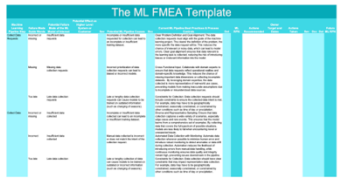


Figure 1b. Excerpt of the full ML FMEA Template containing the first two ML Pipeline steps: Collect Data Requests and Collect Data.

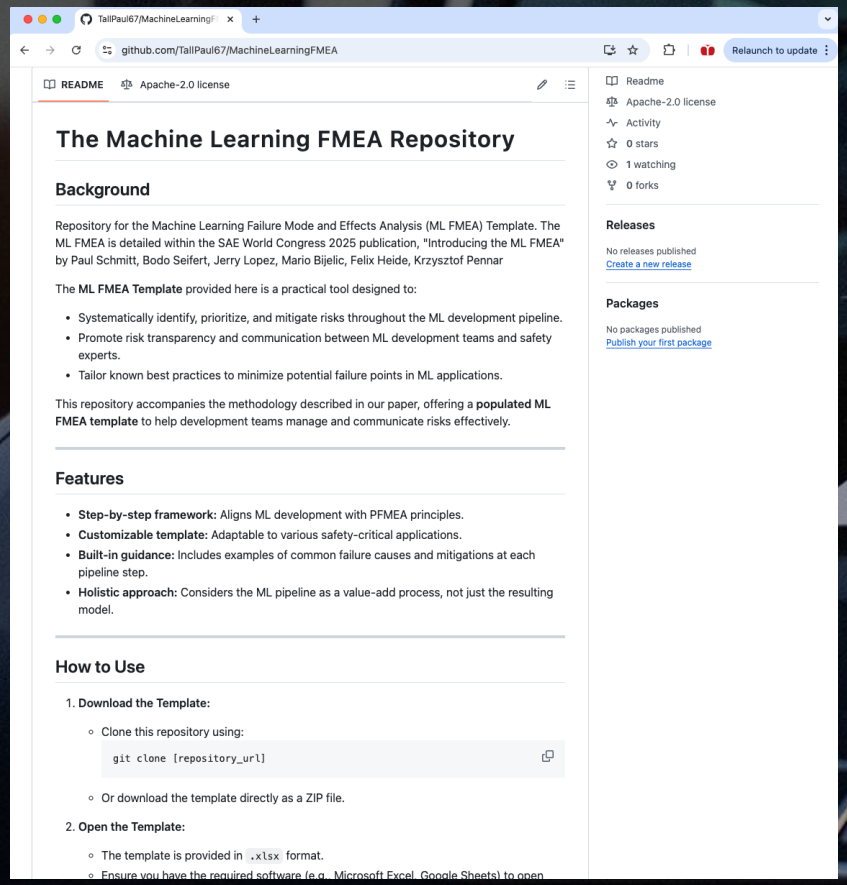
Abstract

The integration of Machine Learning (ML) into safety-critical applications continues to raise challenges related to risk management and standardization. This paper presents a structured approach to safe ML development, readily applicable to sectors such as automotive, autonomous vehicles and systems, defense, healthcare, pharmaceuticals, manufacturing, logistics, and aerospace. The proposed method addresses a current gap in existing AI and ML standards by combining established ML development practices with the Process Failure Mode and Effects Analysis (PFMEA) framework. This approach considers ML development as a holistic, iterative process, emphasizing the importance of

WCX™ April 8–10 2025

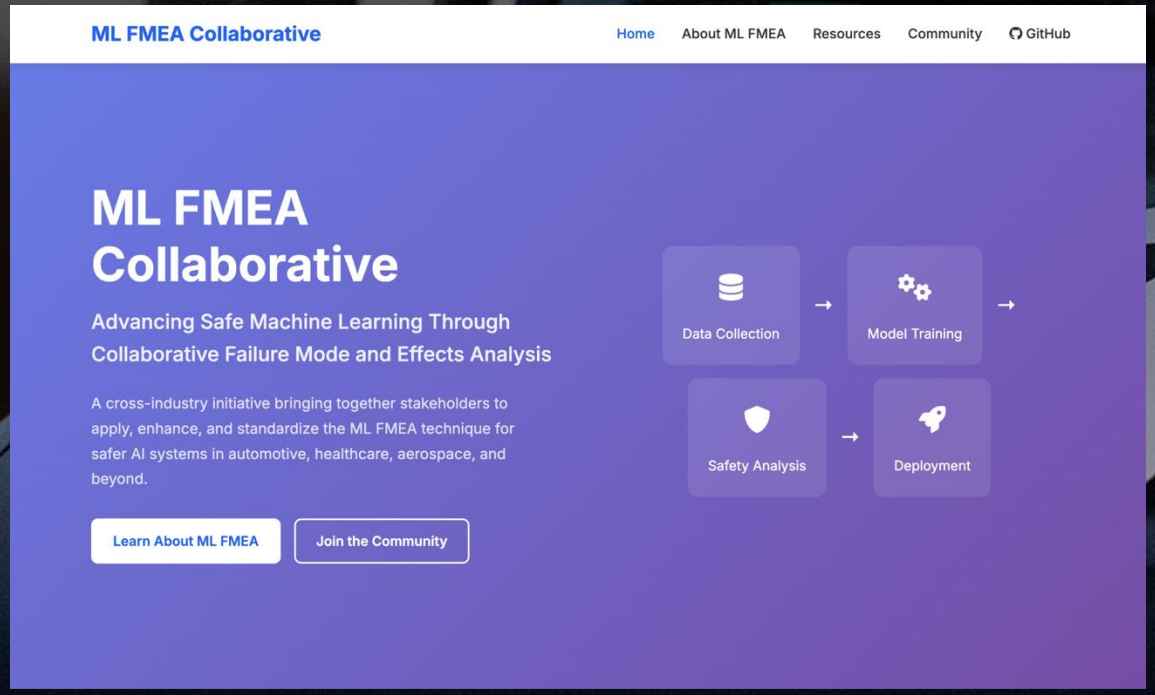
Download the paper

Open Source



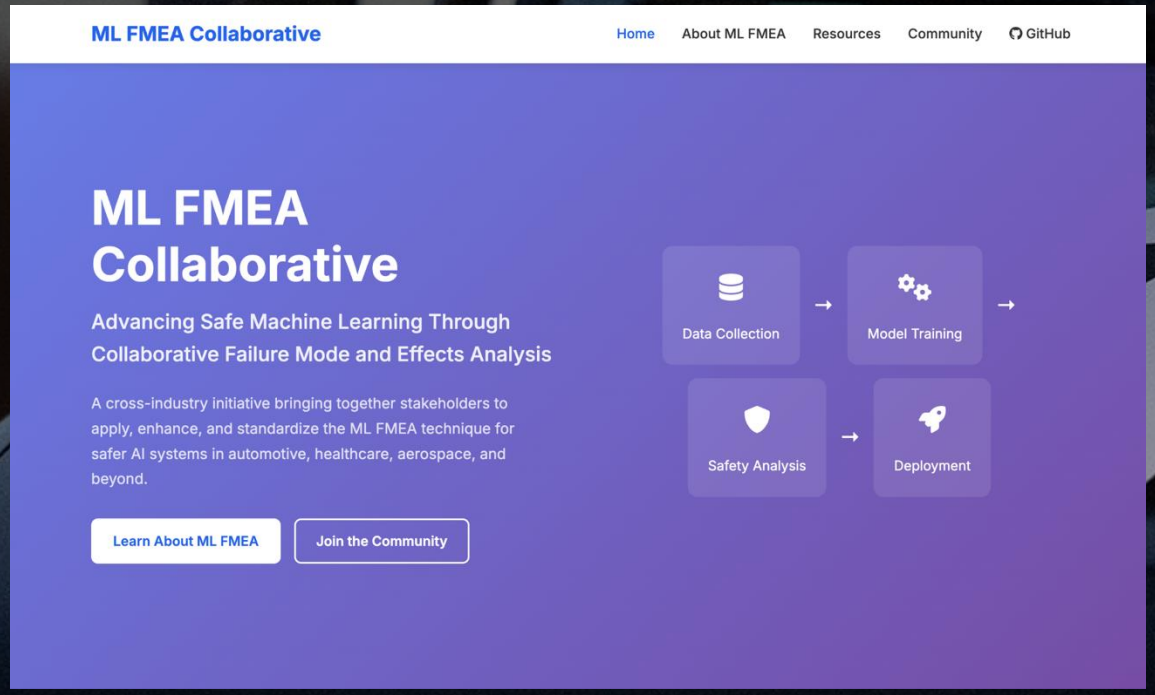
- Template available on github.com
- Inviting the community to use and improve the template. Across industries!

Join the Collaborative



- Six companies
- Two ML safety standard committee members
- Automotive, Space, Defense, Aero, Energy, Rail

Join the Collaborative



To learn more

What's next

Software: End-to-end architectures

Hardware: Integrated solutions

Ecosystem trend: closer work with policymakers/first responders for deployment readiness (e.g., Texas road tour).

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MAKING MOBILITY
SAFE & MORE PLEASANT
FOR EVERYONE

Harald Barth ▪ Product Marketing Manager, ADAS

SMART TECHNOLOGY FOR SMARTER MOBILITY

Smart Technology for Smarter Mobility

Safe and sustainable mobility

A balanced global presence

100 years of inventing, producing and widely deploying new solutions

Covering all ADAS Segments

One-stop solutions for
PARKING ASSISTANCE

LEADER in parking assistance and surround view systems

One-stop solutions for
SAFETY & ASSISTED DRIVING

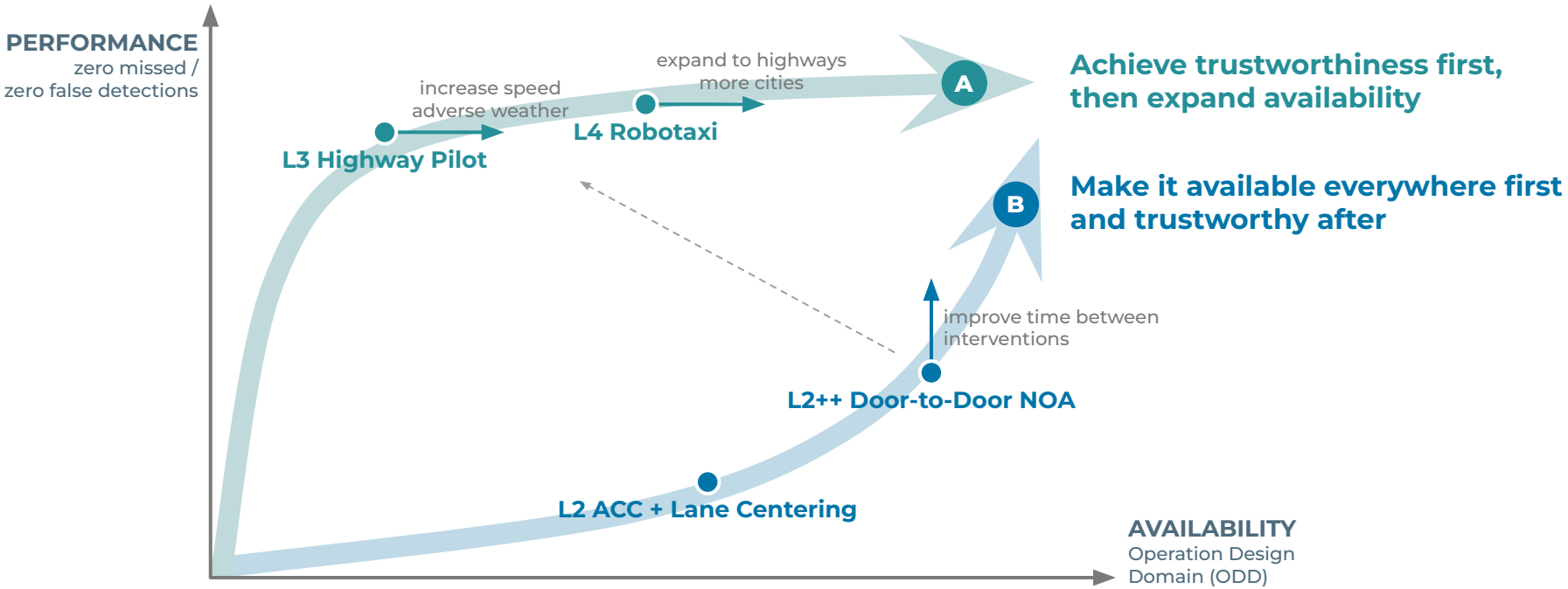
LEADER in smart front camera systems

Perception & Functions for
AUTOMATED DRIVING

LIDAR perception key enabler for first Level 3 systems in the market

Expertise for solutions ranging from individual components to complete turnkey systems

The AD Challenge: Performance vs. Availability



Performance without availability is nothing, but availability without performance is equally nothing

Sensors for a Reliable 360° Perception

Thermal
(1 per car)

LiDAR
(1-3 per car)

Microphone
(1-4 per car)

Ultrasonic
(3-12 per car)

Camera
(2-12 per car)

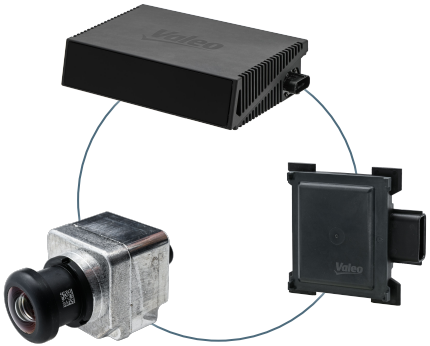
Radar
(1-5 per car)

From computer vision to AI-powered multi-modal perception for safe automation

Covering the Complete ADAS Stack

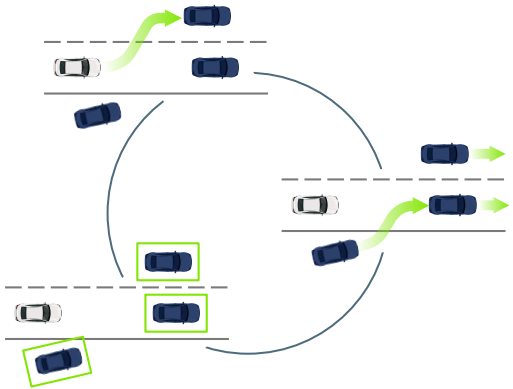
Sensors

Generate reliable data



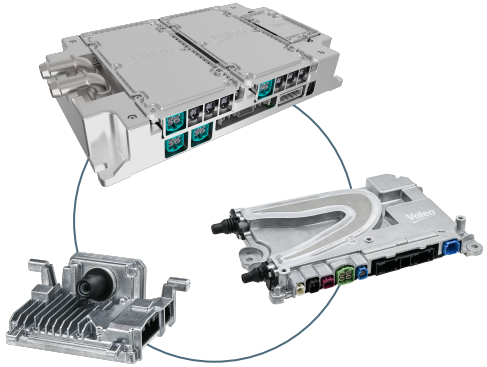
AI Software

Human-like driving policy



Hardware

Scalable real-time compute



Expertise for solutions ranging from individual components to complete turnkey systems

Valeo

MAKING MOBILITY
SAFE & MORE PLEASANT
FOR EVERYONE

SMART TECHNOLOGY FOR SMARTER MOBILITY