AMPL | Autonomous Mobility and Perception Lab

www.ampl.es

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Autonomous Mobility and Perception Lab

Head: Prof. Fernando Garcia

- Prof. of The Systems Engineering and Automation at UC3M
- Member of the BoG of the IEEE-Intelligent Transportation Systems Society
- Director of UC3M Mobility Master
- EU digitalisationion Expert

Relevant publication activity

- More than 100 papers in the last 5 years
- 9 patents
- Relevant project portfolio (public and private)

Strong link with industry

- Partnership with European OEMs and Tier 1
- Relevant international activity
- National referents

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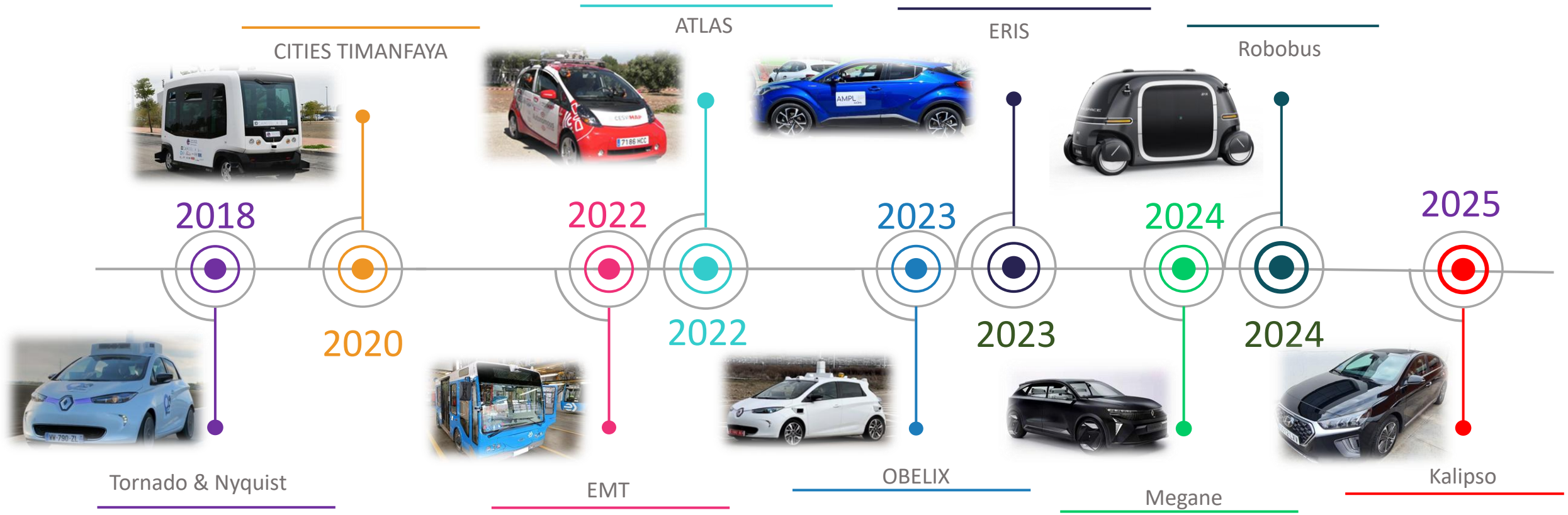
Experience

Involved in the development of 9 different Autonomous Vehicles Platforms in the lastest years



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ALTAS

Road test in Avila, in 2022

- Full vehicle design (L3/L4)
- Control & Perception
- AMPL test vehicle
- Map/GPS based or Mapless configuration
- Road users reactive

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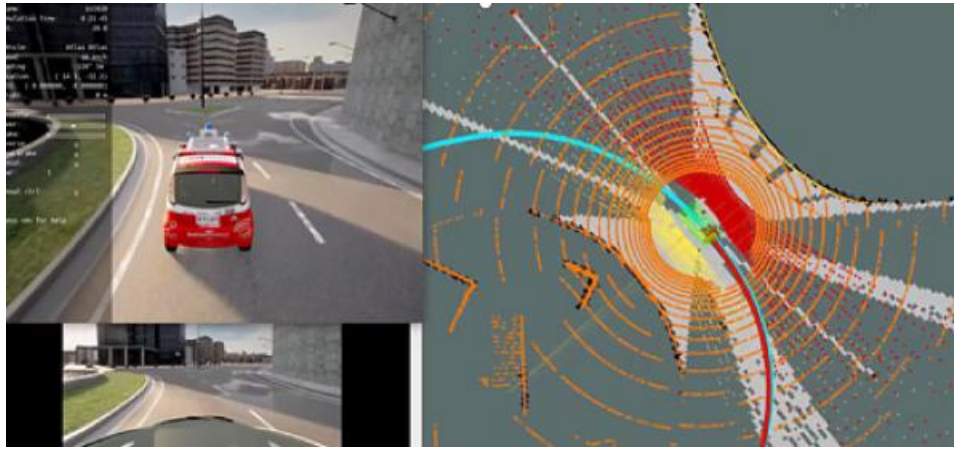
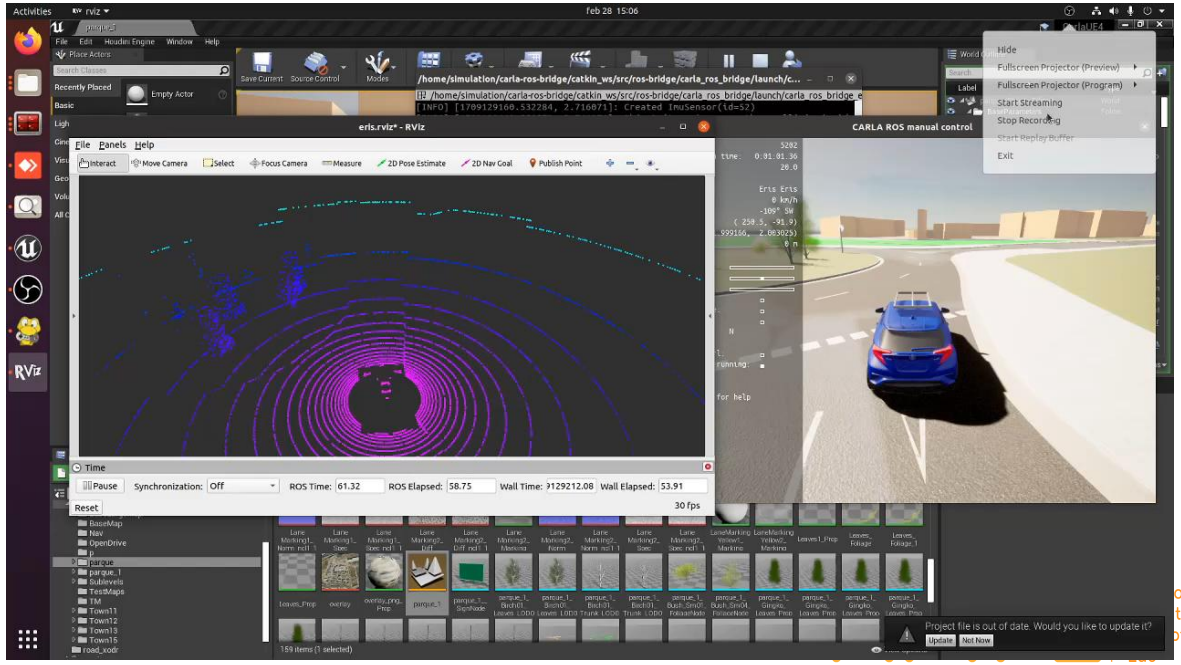
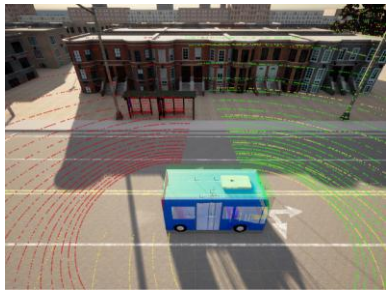
Digital twins

Digital twin

- Design of a test bench for our vehicle
- Based on real scenarios that can be enhanced with our own detections
- Test bench with hardware in the loop capabilities







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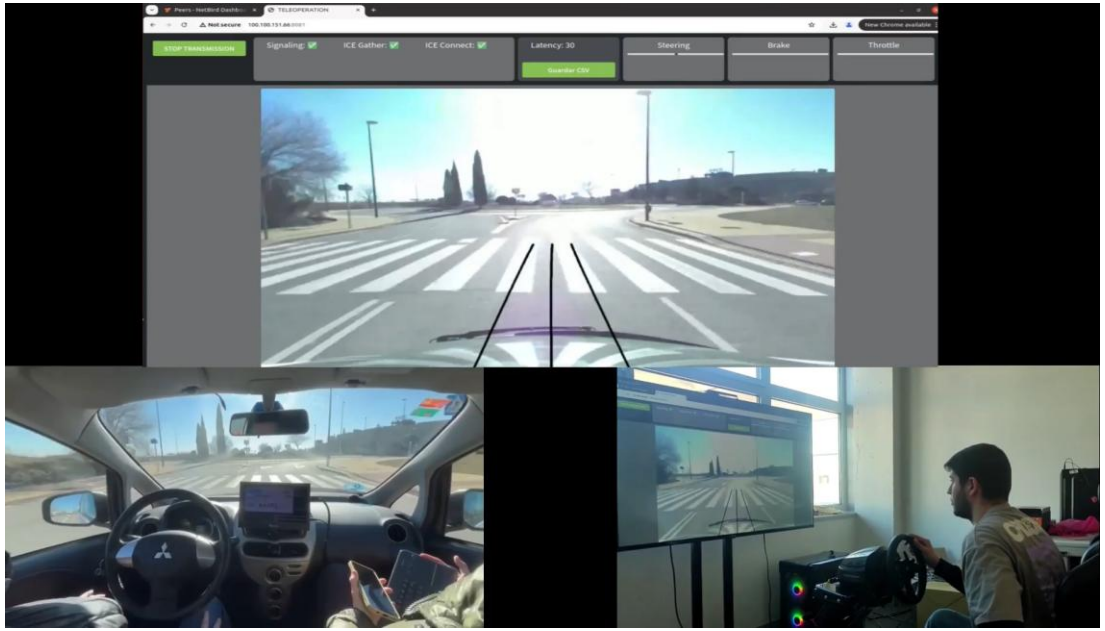
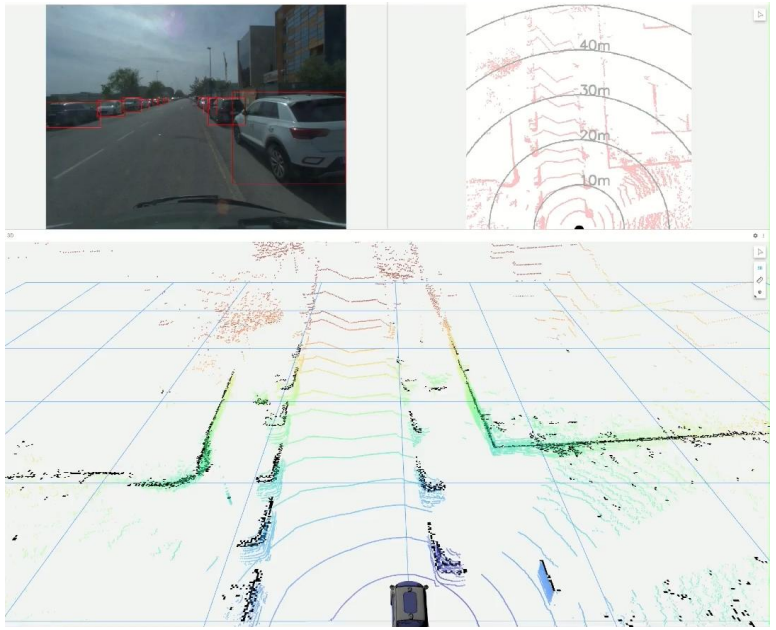
Autonomous Driving Technologies

Teleoperation and perception

Teleoperation tool



Detection pipeline



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Autonomous Driving Technologies

Teleoperation and perception

Mask R-CNN → Segmentation → 3D Estimation → Tracking

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Sensor validation

7 different vehicles and multiple use cases

Opportunity:

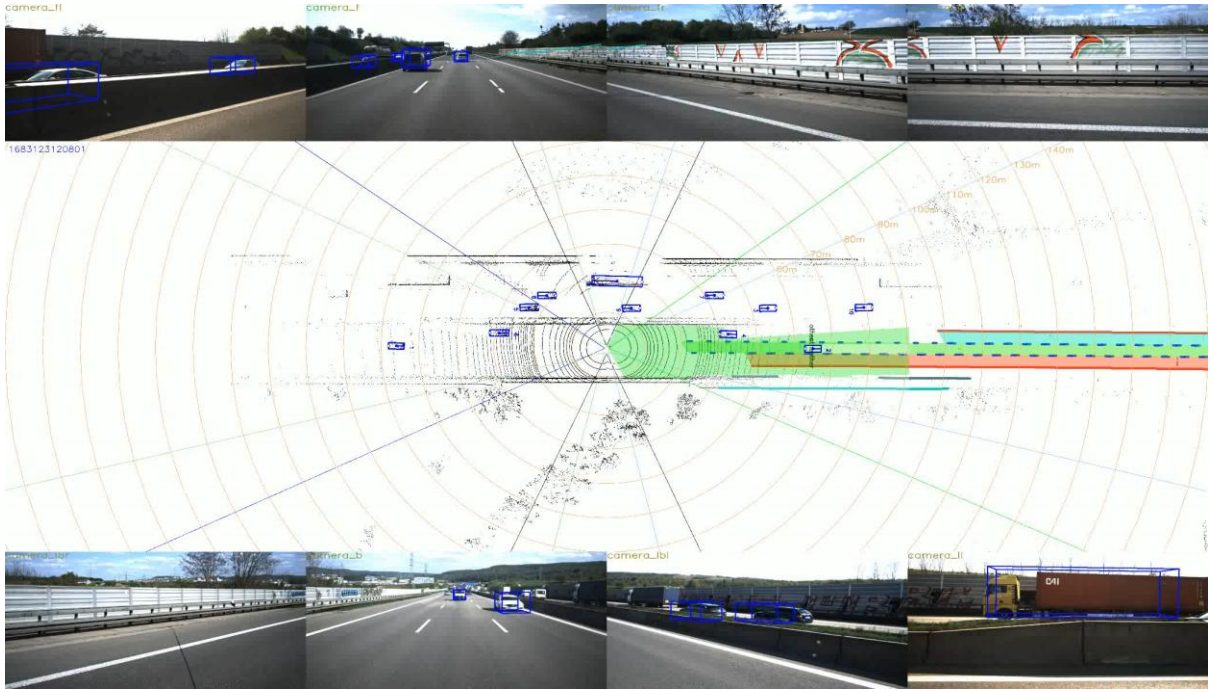
- Terabytes of raw data
- **Manual** labelling
- Manpower + **Time Consuming**

Our Solution

- Fully **Automated**
- **99%** of accuracy
- **Less** Processing **Time**

Design of the full solution:

- Sensor suite design
- Use case simulation
- CAD validation
- Recording tool
- Sensor calibration and synchronization
- Detection pipeline



This solution is being applied by Tier 1 companies and OEMS

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Smart Cities and Infrastructure

Automatic Digital Twin generation

- 3D-colored maps.
- A full 3D reconstruction of the environment, created by fusing LiDAR and RGB camera data.
- These maps are interactive and fully editable.

Navigation maps

- Data-driven navigation charts that store machine-readable information about an area
- Driving rules, traffic signals, and the classification of free and occupied spaces.

Main Features

- High efficiency in time and resources
- Georeferenced Infrastructure Inventory
- Centimetric accuracy
- Valid system for different infrastructure: highways, ports, airports, cities, etc.

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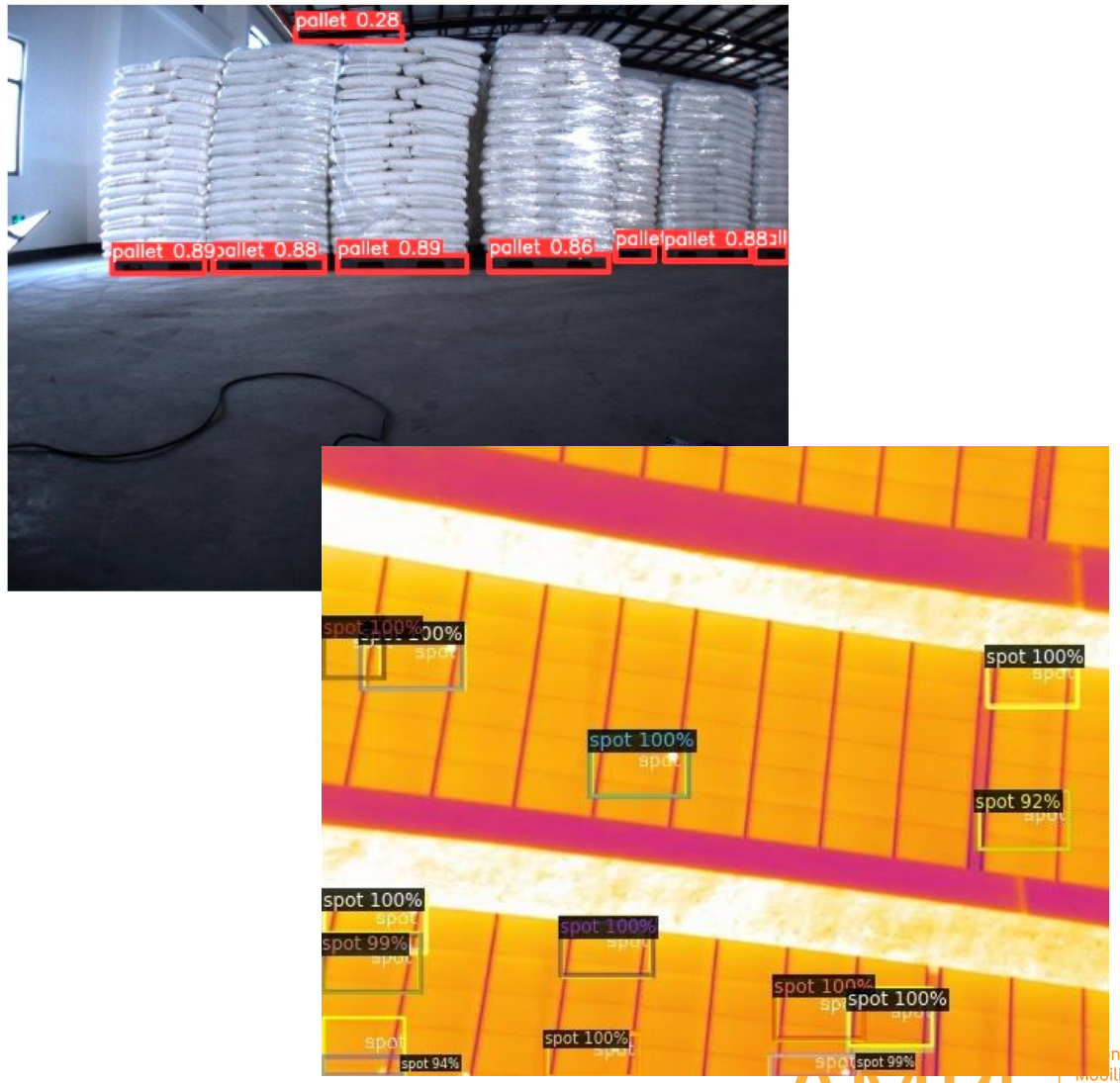
Smart Cities and Infrastructure

Our Solutions

- Computer Vision for Quality Control
- AI-based Solar Panel and Infrastructure Inspection
- AI-based Infrastructure Inventory
- Intelligent Warehouse Logistics

Our Approach

- Our localization and perception software enhance Logistics Robots safety towards collision avoidance
- Seeking efficiency in the supervision of renewable energy plants by adapting knowledge and applications from other industries



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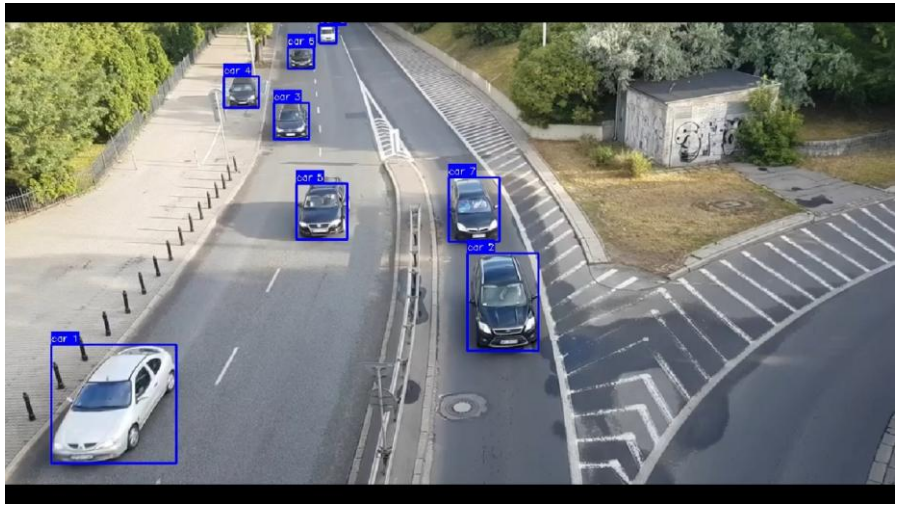
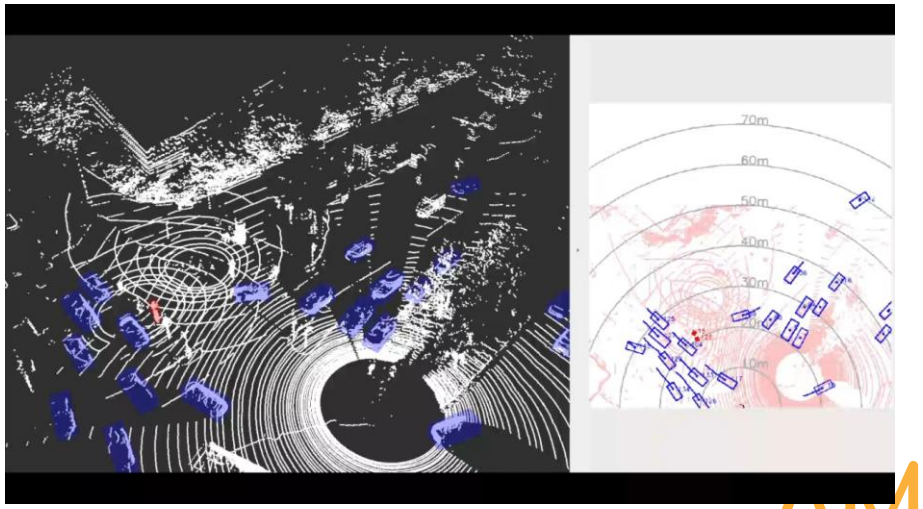
Smart Cities and Infrastructure

- Platform: **Infrastructure**
- Sensor Agnostic processing from:
  - LiDARs
  - Cameras
- Object recognition and tracking
- Working in day/night and different weather conditions
- Traffic statistics
  - Lane Heat Map
  - Traffic violations
  - Emergencies Alert





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Whats up?

- Research projects
  - 3 active EU projects
  - 3 active national projects
- Master CCAM
- Private companies
  - 5 private projects

Strong publication record

  - 10 patents in the last 5 years
  - 100 papers in the last 5 years
  - 8 PhD Thesis in the last 5 years – 5 in the last 3 years
  - 8 PhD Students
- Seevia (Spin-off)

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What's up?

Hades

- Manned vehicle
- Full 360 camera and Lidar
- Dataset and validation
- Communication capabilities

Kalipso

- Autonomous vehicle
- Full 360 camera and Lidar (Solid State and rotational)
- Autonomous driving software testing and validation
- Communication capabilities

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EU Calls and Projects

- AMPL has been involved in 3 EU Calls in 2025 and is currently involved in 2 more within 2025 calls (deadline in January)
- Working in consortiums for 2026
  - HORIZON-CL5-2026-10-D6-03: Generative AI for smarter CCAM: enhancing perception, decision-making, and validation
  - HORIZON-CL5-2026-10-D6-10: Enhanced resilience in multimodal passenger transport through digital technologies and generative and discriminative AI
  - Open to more calls in CL5 for CCAM

Collaborations?

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