



Autonomous electric vehicles for goods and passenger transport

**ZERO EMISSION, AUTONOMOUS
AND CONNECTED VEHICLE
(CCAM) WITH ADVANCE AI-BASED
SENSORS FOR THE TRANSPORT OF
PEOPLE IN MERCAMADRID**

alsa



CONTEXT OF THE MOBILITIES FOR EU PROJECT

Current situation

GLOBAL:

Lack of public transport solutions with autonomous vehicles at the international level.

In Madrid, Alsa operates the only vehicle in Spain operating in open traffic on a regular CRTM line (Cantoblanco Autonomous University campus).

The autonomous vehicles deployed so far are of low capacity (approx. 12 passengers).

MERCAMADRID:

There is no public transport solution within the complex, only 2 passing city bus lines.

Predominance of private transport.

Complex traffic environment.



PROPOSED SOLUTION

ZEV, Autonomous and Connected Vehicle (CCAM)

Regular commissioning of an electric midibus (ZEV) and autonomous (SAE Level 4+) with more than 20 seats, located in a collaborative and interconnected environment (CCAM) within the Mercamadrid area.

This autonomous electric midibus will operate in a real open traffic space during 8-12 hours a day on a recurring basis.

Proposed interior route to connect the main mobility attraction nodes of the complex, although it is foreseen to be updated throughout the project to adapt it to the needs of people.

Additionally, we are designing a Zero Emissions Mobility Plan specifically for Mercamadrid, with a strong customer centric focus, so that the circulation of the CCAM bus can achieve a real transformative effect on mobility in coordination with other environmentally friendly modes.



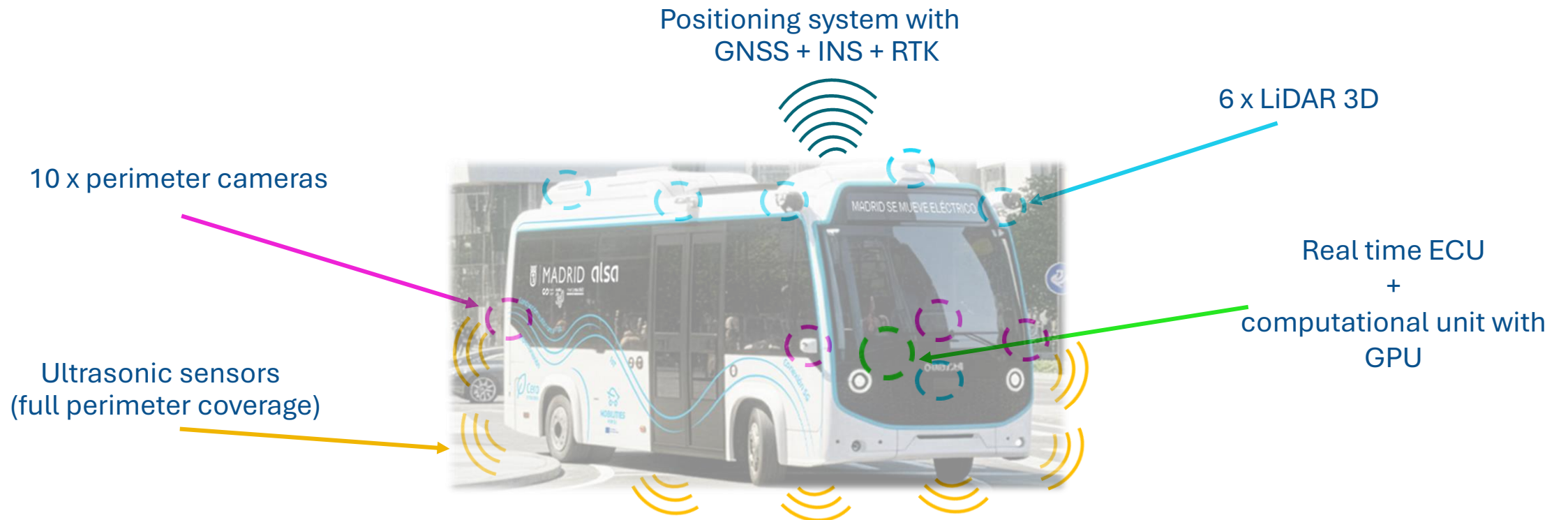
PROGRESS MADE

- ✓ International benchmarking of solutions implemented in other cities and prospecting of autonomous vehicle manufacturers.
- ✓ Definition of technical criteria for bidirectional charging points to be compatible with the EMT Madrid fleet.
- ✓ Identification of key technical signals and KPIs to feed/receive from the shared data space for all partners.
- ✓ Preliminary design of the internal route based on attraction nodes and detected potential black spots.
- ✓ Definition of baselines to measure the improvement achieved with the project.
- ✓ Purchase and reception of the autonomous vehicle.
- ✓ Technical homologation of the vehicle and special permits with regulator.
- ✓ Training and qualification of the new role of on-board assistants.
- ❑ Design of studies, surveys, and work for specialized research on mobility and people's needs regarding the new service – *First surveys ongoing.*
- ❑ Identification and installation of additional onboard equipment (information screens, people counters, cameras, etc.) – *Final stage.*



AUTONOMOUS DRIVING SENSORS

Autonomous vehicle SAE Level 4+



AUTONOMOUS DRIVING SENSORS

Autonomous vehicle SAE Level 4+



Full longitudinal and lateral control

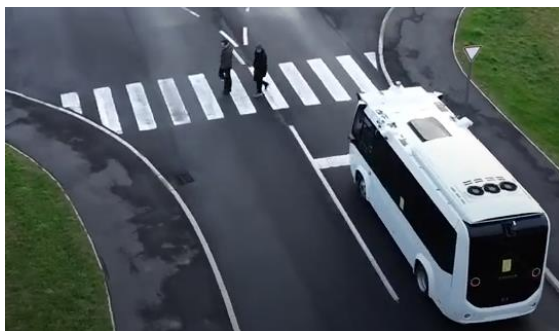


Total perception of the
surroundings of the vehicle
and the course of the route



AUTONOMOUS DRIVING CAPABILITIES

Advanced software based on AI with the newest advancements on autonomous driving
All of them tested and validated on day, night and rain conditions



Reaction to yield signs and pedestrian crossings



Driving in and exit roundabouts and other intersections



Approaching to and leaving from passenger stops



Overtaking / side shift

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Interaction with temporary construction site objects



Overtaking Vulnerable Road Users (VRUs) on lane



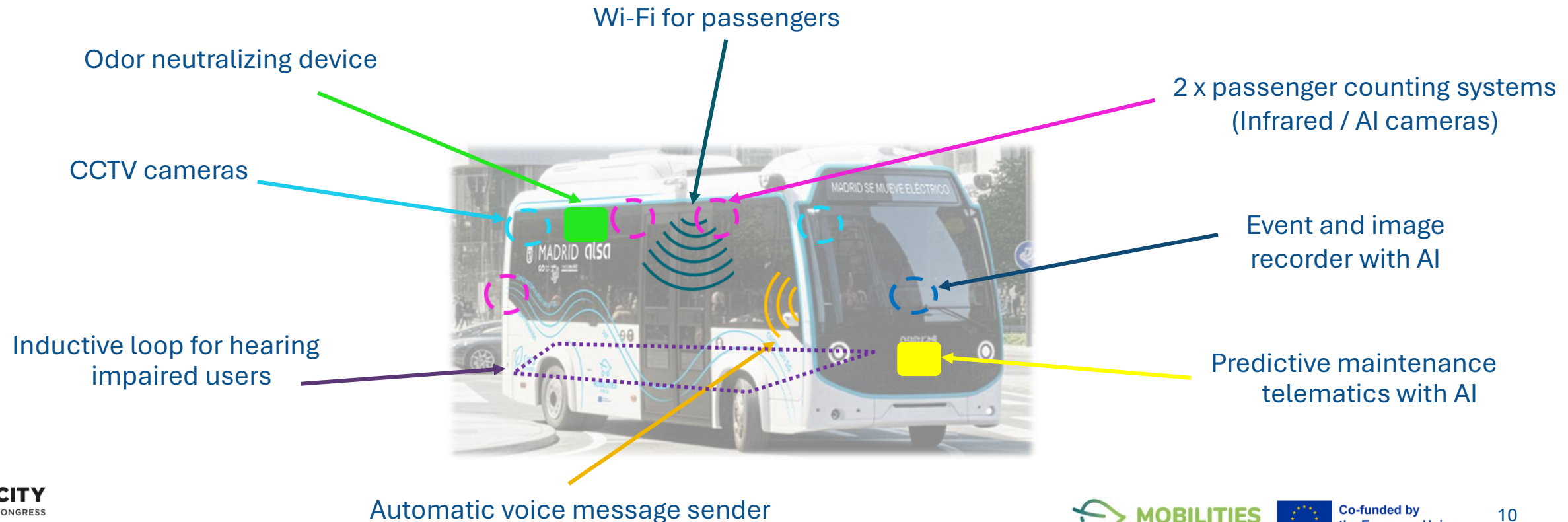
Collision avoidance with VRUs crossing the lane



Collision avoidance caused by "cut-in" maneuvers of other vehicles

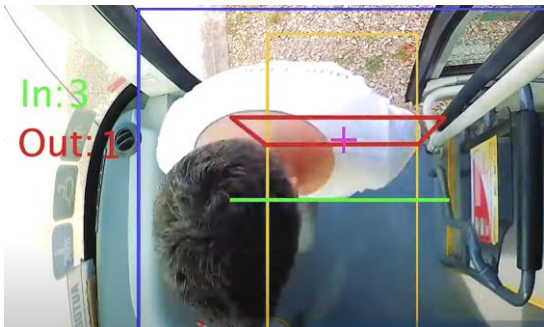
ADDITIONAL ONBOARD EQUIPMENT

Several safety and comfort improvements onboard



ADDITIONAL ONBOARD EQUIPMENT

Focus on the AI based additional systems fitted



Passenger counting system

Based on AI and deep learning, these cameras can detect the entry/exit of each passenger and other attributes such as: pushchairs, wheelchairs, shopping trolleys...



Event and image recorder

Based on Machine Vision and AI, the system includes dashboard interior and exterior cameras and accelerometers to identify safety risks such as: collisions, ABC events, etc. It also records a short video clip of every event as evidence for further action.



Predictive maintenance telematics

Integrated into the vehicle's CAN bus, the system captures a broad range of technical signals and processes them using AI algorithms to perform remote diagnostics and make predictive maintenance recommendations before components fail.

FINAL STEPS

In the upcoming weeks, we will have intense activity around the following lines of action:

- Final installation and testing of additional on-board equipment.
- Integration and bilateral communication with the new dataspace for MOBILITIES consortium.
- Adaptation of the road infrastructure for the operation of the vehicle (horizontal/vertical signage, etc.).
- Carrying out tests with the autonomous vehicle, at our facilities and on the real route.
- Drafting and validation of the Zero Emission Mobility Plan for Mercamadrid and the Customer-Centric Service Design associated with this new mobility solution.

Official inauguration of the new service and carrying out dynamization and dissemination campaigns



[HTTPS://MOBILITIES-FOR.EU/](https://mobilities-for.eu/)



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