**technology and Innovation to Promote Road Safety**

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**Project Summary**

EMT Madrid and Sistemas ADAS have collaborated on a public-private partnership project to improve road safety and the coexistence of vulnerable road users with public transport vehicles, specifically buses. The project involved adapting a driver assistance system designed to meet new vehicle regulations in an existing EMT Madrid bus, allowing it to anticipate the new GSR-II standards—European Union regulations that mandate various ADAS systems for new M2, M3 vehicles starting in July 2024—and exceed their requirements.

This prototype, in addition to enhancing the protection of vulnerable users, is pioneering as it has been installed for the first time in a vehicle in circulation within the European Union. With its implementation, we have improved the safety of EMT Madrid's fleet, equipping it with the highest safety standards required by the EU and ensuring the standardization of its fleet in terms of safety without the need to completely renew its vehicle fleet.

**Background**

Cities host the highest population densities, directly impacting the need for efficient and safe mobility management. EMT Madrid, a public company established in 1947, has been intrinsically linked to Spain's capital and has continuously transformed its bus network to meet both urban and demographic needs.

In recent years, there has been a demand for faster and more effective passenger transport, as well as increased requirements for pedestrian-friendly and vulnerable user-adapted mobility, aiming for a quieter, cleaner, and healthier environment. Achieving this balance has been and continues to be one of EMT Madrid's main challenges.

The promotion of sustainable mobility and the emergence of new traffic participants in cities provide an effective solution for environmental protection but also reveal potential dangers in their coexistence with other road users, such as buses, trucks, and various types of heavy vehicles circulating in the city.

It should be noted that urban accident rates, compared to interurban networks, are characterized by different factors, as accidents mainly occur at intersections, with pedestrian accidents being particularly significant, as well as accidents involving bicycles, scooters, and public transport. This is why the current mobility debate focuses on how to make urban heavy vehicle traffic coexist with vulnerable users, increasingly present on the roads. These users, including cyclists, pedestrians, and electric scooters, are already a major concern for Europe, demonstrated by a greater emphasis on the risks they face due to heavy mobility, such as blind spots (limited driver vision due to vehicle dimensions).

**Project Approach**

With the premise of continuing to improve road safety in its operations and zero tolerance for accidents, EMT Madrid and Sistemas ADAS have joined forces in a public-private collaboration project to bring the highest safety standards not only to new vehicles but also to those already in circulation.

By equipping them with the functions defined in the regulations and defining a specific configuration for the unique characteristics of the city of Madrid—given its high density of vulnerable users and lane configurations that allow for the coexistence of different modes of transport—this project goes beyond the regulations by expanding the detection capabilities of these vehicles in key urban areas of Madrid.

The project involved defining, implementing, and parameterizing three EMT Madrid buses in circulation with a driver assistance system designed for original equipment that not only meets the GSR-II regulatory requirements but also expands them with additional sensors that increase the driver's field of vision. This collaboration not only achieved the project's main objectives but also, thanks to the advanced capabilities of this technology, expanded the implementation of this solution in vehicles not affected by the regulations.

**Specifications**

The system incorporated into the EMT Madrid bus is Mobileye Fisheye, a driver assistance solution for any heavy vehicle. Its incorporation provides the following functions:

* **Frontal Area:**
  + Alert of imminent collision with a pedestrian or cyclist.
  + Alert of imminent frontal collision with a vehicle or motorcycle.
  + Lane departure warning.
  + Monitoring safe distance with the vehicle in front, alerting the driver if the distance becomes unsafe.
  + Intelligent speed assistant, displaying the recognized speed limit and indicating if the vehicle is traveling above it.
* **Blind Spots or Low Visibility Areas:**
  + **MOIS (UNECE R159):** Startup information systems for detecting pedestrians and cyclists in the vehicle's frontal area.
  + **BSIS (UNECE R151):** Information systems about blind spots on the vehicle's sides, informing the driver of the presence of bicycles in the surroundings and alerting of collision risks during turns, one of the riskiest maneuvers for a bus in the urban environment.

These systems comply with the GSR-II regulation requirements for new vehicles and expand on them with additional features.

**Implementation**

The project's trial was conducted in July 2023. An EMT Madrid bus, specifically the Scania N280 GNC with Castrosua bodywork, was selected for the installation.

This extensive integration of technology aims to ensure that circulating vehicles achieve the same—if not higher—safety levels as new vehicles, placing EMT Madrid at the forefront of innovation and bus safety in Europe. This advancement in road safety technology will benefit both drivers and road users, significantly improving fleet safety without the substantial investment required for new vehicles.