DRIVING ASSISTANCE IN LOW VISIBILITY SITUATIONS WITH DETECTION BEACONS

The main goal of the detection beacons is to increase road safety by assisting the driver in road or motorway sections with frequent episodes of low visibility situations (heavy or torrential rain, foggy conditions, sand and dust storms, etc.). The system is based on providing the driver with a visual guide indicating where the boundaries of the roadway are by means of a set of luminous elements.

SICE goes one step further in guidance systems, by including in the system the detection of vehicles travelling along the highway. The information on the existence of vehicles on the road, and their position in the section controlled, allows the system to notify drivers of the presence of other vehicles ahead of them. In situations of low visibility, combining visual guidance and vehicle presence information are key factors in driver safety. This system continues the line of cost-effective solutions developed by SICE that bring great benefits in terms of road safety at a minimum cost.

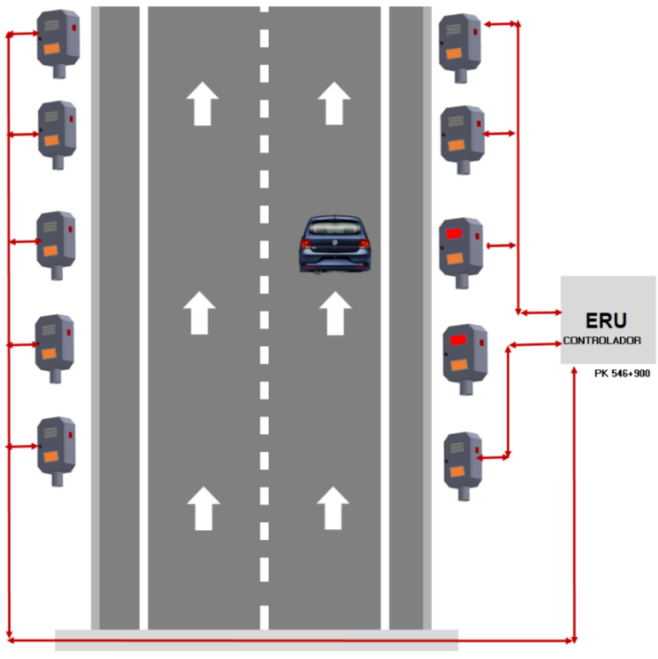
SYSTEM ARCHITECTURE

The system is structured into three hierarchical levels, with two of the levels being located at the side of the road, and the third one at the road management center (Control Center).

The set of beacons deployed on a certain road section, located at the sides of the road so that the thoroughfare is clearly defined from the visual perspective of the driver travelling thereon.

The equipment that concentrates the beaconed road section and enables the group of beacons on that section to communicate with a Control Center via a URS (Universal Remote Station) using the Modbus TCP IP communications protocol.

The integration of the beacon system into the corresponding Control Center's ITS traffic management application.
This will make it possible to configure and visualize the system's operation and the status of the different items of equipment.



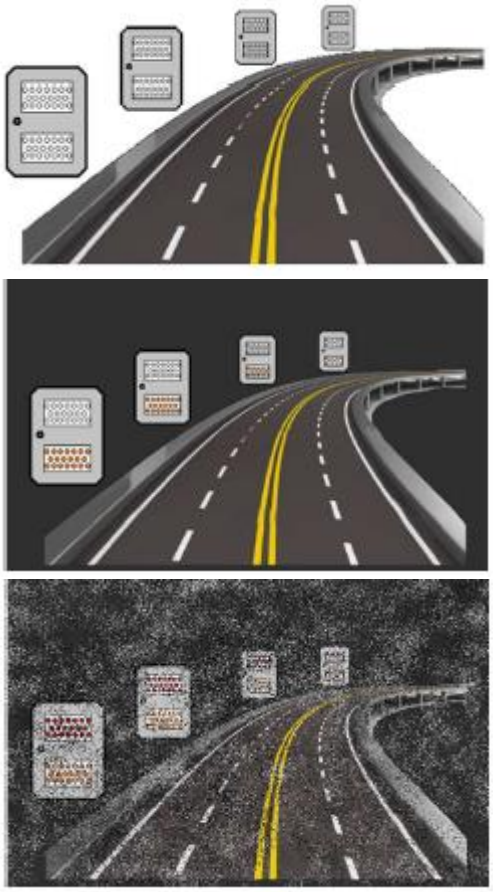
The Detection Beacon

The beacon consists of a detection equipment controlled by a microprocessor and two rectangular illuminated assemblies. Each illuminated assembly consists of an array of 3 rows of LEDs: one amber assembly and one red assembly. In addition, a Doppler technology radar sensor and a piezoelectric microphone are used to detect the passage of vehicles.

By detecting vehicles recorded in each beacon, a continuous check of vehicle correlation can be carried out between the different beacons to warn of possible incidents.

The typical arrangement consists of installing pairs of beacons, facing every 50 meters approximately. The amber LED window is used in conventional guidance mode and the red LED window is activated when the passage of a vehicle is detected in any visibility situation.

Operating Scenarios



Operation is designed exclusively for scenarios involving reduced visibility or environments where weather conditions prevent proper visibility. The system provides an illuminated element for guidance and road boundary marking in
auto amber and a warning and vehicle detection element in red. The predefined scenarios are the following (although they can be modified for other operating criteria):

In normal visibility conditions all the illuminated devices are turned off.

In low lighting conditions, although without adverse weather events (for example, a cloudy day or at nighttime), the amber boundary and guidance lights are turned on to act as road guidance signals.

In low visibility conditions, the guidance lights (amber) and vehicle detection lights (red) are activated simultaneously. When the beacon detects the passage of a vehicle it turns the red light device on for a preset time to warn the vehicle of the presence of another in front of it. The guidance lights (amber) are kept on as guidance signals.