

AUTOMATIC DANGER WARNING SYSTEM IN CROSSROADS

The automatic danger warning system in crossroads consists in the installation of vehicle sensors and dynamic warning signs near to a crossroads which, due to their characteristics, configuration or history, it presents a high risk of accidents when vehicles incorporate to the main road.

The sensors installed detect vehicle so it allows to alert the vehicles driving on the main route about the presence of vehicles in the secondary route near the crossroad. For that purpose, dynamic signaling located on the main central lane is activated, as well as the embedded systems communicated through I2V protocols with the system (optional).

The elements necessary for the correct working of the system are:

- Detectors near the crossroad, in the stop line and, optionally, in the entry lane.
- Vertical variable signposting for each direction.
- I2V system for the danger situation transmission to on board units in the vehicles (optional).

WORKING MODE

The system is based on a SICE remote station (ERU). 24V powered by batteries and solar panels. The ERU has set up an internal traffic outpost that received the data from the loops installed, which are configured as simple logic detectors.

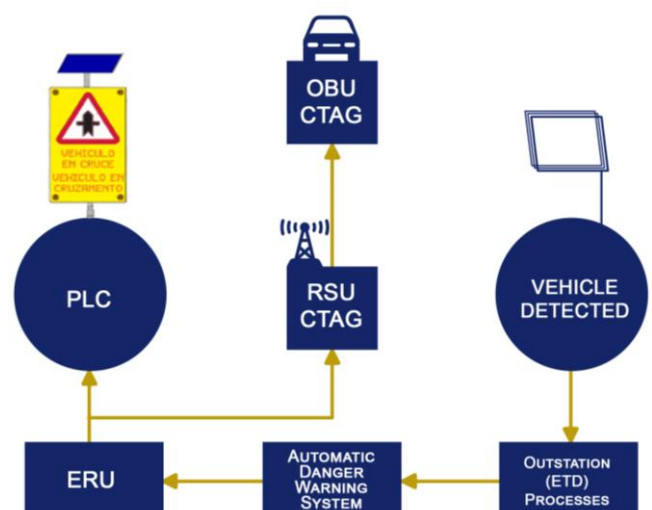
The ERU controls the switching on and off of two dynamics signs that warn the drivers circulating the main lane and approaching the crossroad about the existence of other vehicles at the crossroad. The control is made by two digital signals using Modbus/TCP protocol.

The SICE ERU-ETD is the element responsible for the implementation of the algorithm and perform the counting of vehicles.

The inductive loops detect the vehicles. The nearer loops are connected to the ERU by cable and the farer ones by WIMAX.

It is possible to use other technologies like radar, in case it can not use intrusive sensors or the state of the pavement is too bad.

Warning signs are used as a signaling element that report the vehicles of possible events. These signals can be variable message signs or permanent panels with luminous signals.



INTEGRATION WITH THE CONTROL CENTRE

It is expected the connection of the equipment with the with DGT (Spanish Traffic authority) Control Center.

The ERU communicates with the DGT traffic management center, it will integrate the ERU and alarms, as well as the internal ETD with its simple detectors



In addition to this, as an improvement, it is possible the dispatch to the CGT of the state of the signals installed at the crossroad (on/off) and other communication alarms.

VEHICLE-INFRASTRUCTURE COMMUNICATIONS

Optionally the system can have a RSU equipment that allows the transmission of the danger warning to On-Board Units by using I2V normalized protocols.

The RSU is located in the reserved space inside the cabinet of each ERUs. The OBU will be located in the vehicles.



The warning algorithm, simultaneously with the turning on of the sign, activates the sending of warnings by I2V technologies to the vehicles that approach the crossroad in that direction.

SOLAR POWER SUPPLY

The reduced energy consumption of the equipment allows the use of solar power system that allows provides autonomous power to the system through panels, batteries and inverters.



LOCATION OF THE EQUIPMENT

SICE's Traffic Engineering department, with extensive experience in both urban and interurban traffic, defines the exact location of vehicle sensors, as well the warning signs to obtain the appropriate system at each crossroad.

The warning signs are located at such distance from the intersection that the vehicle may stop in case a conflict happen in a safe way.

Depending on the location of the warning signs, the access detectors at the intersection are reset; stop line detectors and detectors in lanes of incorporation to the main road.

