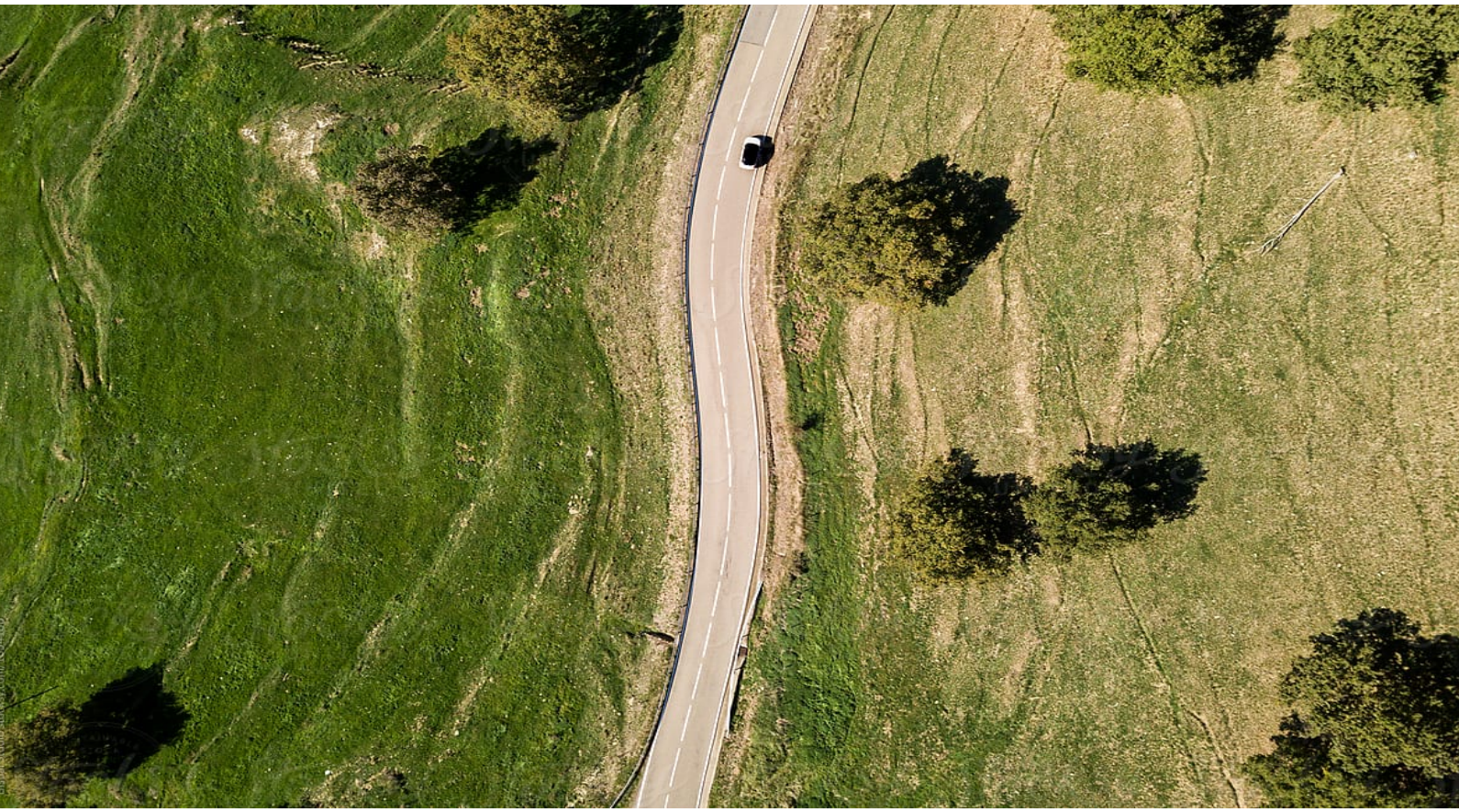
Deusto
Universidad de Deusto

SAFE DRIVERS

Road Sensors



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1. Introduction

In the following document we specify all the necessary information and documentation related to our minimum viable product related to our project SmartLights.

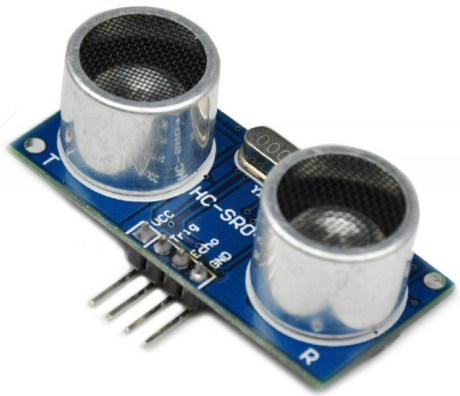
The main objective of this demo is to show the complete operation of our lighting system that will be installed primarily on rural roads. In the following points we will explain everything necessary and used to carry out the demo, from the necessary hardware sensors, together with the communication protocols used, to the information storage and visualization software modules that the system uses.

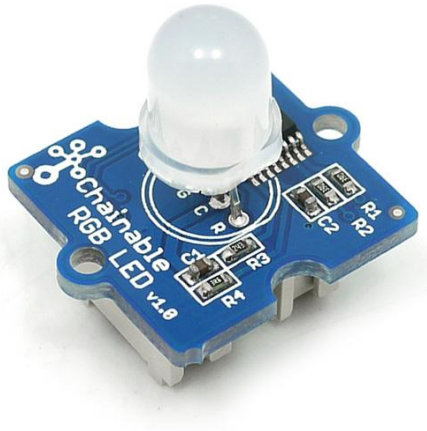
2. Sensors

For our project we have used several sensors that have helped us to finalize the base prototype or minimum viable product.

Among them, we have a distance ultrasonic sensor, which detects the approach of the vehicle to the area where we have installed our system, and on the other hand, we use LED sensors that simulate the luminous bollards that we will use on real roads.

The proximity sensor is an OcioDual module HRE-04 compatible with Raspberry Pi systems. Also, we use a basic LED, which will simulate with flashes the different situations that the real bollard could adopt.





3. OS and Raspberry resource management

The final division of our software is made in 3 scripts.

In the first script we have carried out the development of the main methods to be used in the rest of the scripts. This script would be as if we called it our personal "library" with which we will work later.

In the second script we have made a series of calls to the methods of the first script. This division was made because we needed an isolated script to be executed continuously every hour, thanks to the crontab tool.

In the third script we have carried out the development of a small interface that serves for example to verify that the state of the bulbs is correct by executing from this script. This interface also communicates with the first script, with our methods library.

For the operation of the bulbs, it will be the sensors who consult this first script to know the state in which they have to be maintained.

Finally we carry out the development of the fourth script which brings together all the code necessary for the light bulbs to turn the expected color. In addition, these bulbs only light up in case of noticing a movement in the vicinity.

4. Incorporation of additional data sources

As for the interaction of API's we make use of 2.

The first one allows us to know the current position of the sensor while the second one allows us to know the time of that location. The rest of the information transformations are carried out in our scripts without the need for external APIs.

5. Data storage and visualization

As for our cloud solution provided, we have decided to use Corylis as we saw in class, as it fits perfectly to the needs of our project. In this cloud database we are hosting every 30 minutes thanks to the execution of the crontab of our script runnable.py, information about the time and the main necessary parameters as well as the state in which the bulb should be at that moment..

The format we have kept for our information is the one ported by the temperature, humidity, percentage of clouds, and the state of the bulb as a result of the execution of the script before the dump of this new row of information obtained.

6. Additional tools

As for the additional tools that we thought it would be valuable to add, it has been a graphical interface that brings together all the scripts made. This interface shows by means of a combo box all the locations where the main master sensors are located in such a way that selecting one of them will give us the climatic values of that position as well as the state of the bulb. This would be useful for example if a technician had to go to repair, he could run this interface and see if the state of the bulbs is the same to detect possible failures.