AN ON-BOARD PLATFORM OF SENSORS FOR ENHANCING SAFETY OF CYCLISTS

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The transportation sector has a relevant energetic and environmental impact. To reverse this situation there are multiple strategies implemented in this sector in order to minimize the energy and environmental damage. In addition to these impacts, the excessive dependence on individual motor vehicles contributes to the population sedentary lifestyle. In the last years, the use of the bicycle as a means of daily transportation has been increasing. However, one of the most relevant arguments given by people for not regularly use the bicycle is the lack of safety. The increase of the number of bicycles on the road infrastructure leads to the existence of conflicts with motor vehicles, thus there is a need for new devices and solutions that are able to prevent and avoid accidents.

The main objective of this Dissertation was to develop a prototype that could warn the cyclist of the proximity of obstacles, namely motor vehicles. It has two major components: the first one was based on the development of a sensor system to be installed on a bicycle to detect obstacles. For this, *Arduino Uno*, sensor distance MB1200 XL-MaxSonar-EZ0 and *Bluetooth* module HC-05 was used. The second component of this project was focused on the development of a smartphone app which allows the cyclist to be aware of the approaching of other vehicles in real time. The developed prototype shows the distance between an approaching vehicle and the bicycle. The mobile phone also vibrates with a greater frequency as the vehicle approaches. The development of the hardware included the study of the performance of different sensor solutions.

Several static tests were carried out to certificate the proper function of the device. Dynamic tests were also made in an urban context, in the city of Aveiro (Portugal), in different routes and under several levels of road traffic.

KEYWORDS: Safety, Instrumented Bicycle, Smartphone, Android, Arduino.

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