Universidad de Ibagué

Electrónica Digital III

TK-care

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1. Abstract

One of the great innovations facing the world is the Internet of Things (IoT), which seeks to reduce human intervention in systems and make them more automated; All this in order to improve people's quality of life. This project, through the use of IoT, presents an initiative to solve a problem that every day advances more and on which not enough attention is paid.

2. Introduction

In recent years in Colombia, cyclists have been highly affected by traffic accidents, both young and old have been fatal victims of these. According to the National Institute of Legal Medicine and Forensic Sciences in recent years a total of 1,183 cyclists died in means of transport accidents, in different regions of the country. That is to say, on average every day in Colombia a cyclist dies. [1]

Therefore, many of these cyclists are not lucky enough to be treated quickly to prevent them from losing their lives. They are usually located in remote areas of the city where they make their respective routes, so, when suffering any type of accident it is difficult to receive immediate medical attention. In addition, most emergencies occur at night where the visibility of the roads is lower and puts cyclists in danger.

Currently, there are several companies that are responsible for reducing the risk of accident by implementing lighting systems in the cycles or warning that warn users when a car is very close. For example, an article published by the Technological University of Malaysia proposes a project that seeks to ensure that the vehicle can only move if the user is wearing safety accessories, such as the helmet [2].

Similarly, Mission on! Innovations in bike systems to provide a safe ride based on IOT published by IEEE is more focused on the safety of cyclists, verifying the speed of the vehicle approaching each side of the road and generating vibrations in the handlebars of the bicycle [3].

Likewise, our project is characterized by the completeness that it has, that is, our device not only offers one type of functionality; The user can guarantee their safety in different ways, either immediately informing their relatives about a possible accident through an email where they will send the location and images of the place and / or having a lighting system every time necessary, which allows the cyclist to be seen and that the other vehicles respect the minimum distance of the cyclist.

3. Framework

IoT

The Internet of Things (IoT) describes the network of physical objects (things) that have integrated sensors, software and other technologies in order to connect and exchange data with other devices and systems over the Internet. These devices range from everyday household objects to sophisticated industrial tools. With more than 7,000 million IoT devices currently connected, experts expect that this number will increase to 10,000 million in 2020 and 22,000 million in 2025.

Raspberry Pi

Raspberry Pi is a reduced-plate computer, single-plate computer or low-cost single-plate computer (SBC) developed in the United Kingdom by the Raspberry Pi Foundation, with the aim of stimulating computer education in schools. The original model became more popular than expected, even selling outside the target market for uses such as robotics. Does not include peripherals (such as keyboard and mouse) or housing.

Tilt sensor

Tilt sensors are essential components in today's security alarm systems. Independent tilt sensors detect the tilt angle or

movement. Tilt sensors can be implemented using mercury and roller ball technology, and can be mounted using mechanical threads, magnets or adhesives, depending on the type of surface on which they are mounted. When the tilt sensor is in an upright position, the ball inside the tilt sensor joins the two contacts, completing the circuit. When the board is tilted, the ball moves and the circuit opens. When in a vertical position, the module emits 0 V (L) and when tilted, it emits 5 V (H) through the digital output terminal (DO) of the 3-pin head. If the analog output (AO) of the module is connected to an analog input (for example A0) on the Arduino, you can expect to read a value of 0 (0V) when it is in an upright position. and 1023 (5V) when inclined.

light sensor
The Light sensor module bases its operation on a photoresistor, with it it measures the data of the ambient light intensity. The AO output will be at a high level until the light intensity exceeds the threshold that has been set with the help of the preset, so the module could differentiate an illuminated environment from a dark one. It also has two LED status indicators, one indicates that the module is powered and another is an indicator of the photoresistance signal, the OPAMP LM393, provides excellent performance as well as reliability.

4. Objectives

general objective
Streamline emergency services for cyclists and thus reduce the percentage of fatalities victims.

specific objectives

- Notify family members of cyclists when they are in a dangerous situation or in case of an accident
- Send the exact address of the place where the cycle is located
- Activate a light system when the cyclist is in a place with low light and can be seen
- Demarcate the minimum distance that other vehicles must respect

5. problem question definition

¿How quickly do the relevant agencies help when a cyclist suffers an accident?

6. proposed solution

To solve this problem, we think about the different situations that a cyclist can live along his route, such as loss of location, damage to his bicycle, lack of lighting or even suffer an accident. Therefore, it was decided to devise a system that solves or speeds up these situations.

Figura 1: TK-care

functioning
This device is designed to be portable so it has its own battery and is turned on by the switch. Once turned on, the system automatically starts up and its main objective is to alert of possible risk situations and / or accidents, so if the user feels that he is in a probable danger situation, he can send a message to his contacts by means of a button , with its location and an image captured by the system, using the GPS and camera included in the device. In the event that the user finds that he is traveling on his bicycle and suffers a fall, the device automatically detects the inclination of

the bicycle and activates an alarm by a bell, which will sound for ten seconds waiting for the user to cancel the shipment of the message, in case this does not happen, it will proceed to send the message. During these ten seconds, this operation can be canceled by pressing the black button or simply by lifting the bicycle again. Also, this device has a sensor that detects when the user is traveling through dark areas and activates a light system, which will be located in the front and rear, in addition to the laser beams that demarcate the lane. By pressing the white button, the user can change the way they turn on the lights and can leave them fixed or in stationary mode.

Figura 2: message triggered by accident

Figura 3: message triggered by button

Figura 4: system lighting

7. Conclusions

- With this project, it was possible to use and implement technology and the Internet of things (IoT) to find a solution to one of the many problems that are seen daily in the country and that affect many people in one way or another.

- It is important to take into account the current that some charges require the Raspberry, for this reason, it was decided to make a configuration with transistors in the connection of the Buzzer so that it will be powered by the battery.

- The GPS that was used needs to be outdoors away from as many buildings as possible to ensure that the signal it receives is efficient.

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- The system must be portable so that the installation is simple, in addition it must be protected against the weather and be sufficiently resistant against any impact without affecting its operation.

8. Bibliography

[1]"Muertes de ciclistas en las vías aumentan un 31

[2]M. Afiq Mohd Rasli, N. Madzhi and J. Johari, "Smart helmet with sensors for accident prevention", Kuala Lumpur, Malaysia, 2018.

[3]D. Archana, G. Boomija, J. Manisha and V. Kalaiselvi, "Mission on! Innovations in bike systems to provide a safe ride based on IOT", Chennai, India, 2017.