

Smart Helmet for Accident Detection

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Abstract- Smart helmet for accident detection will be used to save lives of people. As in India it is observed that medical emergency don't arrive on time because they are informed late due to various reasons. People think they will be asked many questions by police officers so they don't care to report the accident. Smart Helmet solves this problem by reporting the accident and sending the location to the concerned authorities through a text message. Smart helmet is a concept based on a Arduino using various technologies like bluetooth, gsm and gps. An android application is used to control the functions of helmet. Smart helmet can be used and implemented all over the world where vehicles are used. This will bring down the accident rate and will save many lives.

Keywords- Arduino, Android, Bike-safety, Helmet.

1. Introduction

There's an increase in accident rates due to lack of safety gears used by people. And even after accident happens people lose their lives because the accident is not reported immediately and there's a delay in the arrival of medical services. To overcome these difficulties we have designed the concept of smart helmet. Smart helmet will be used for accident detection and thus helping the victims to get medical services on time. Smart helmet uses Arduino uno, gsm, gps, limit switch, alcohol sensor and IR sensor. There will be an Android application to for communication between user and helmet. The IR sensor is used to detect if the rider has put on his helmet or not. If the rider has not put on his helmet the biker will not be able to start his bike. After wearing the helmet the IR sensor detects that the user has put on his helmet. The sensor also checks for the alcohol consumption, if the rider has consumed alcohol he won't be able to start this bike. There will be a limit switch attached in the front of the bike. If there's a collision then the limit switch is closed and a text will be sent to the concerned authorities with the rider's location.

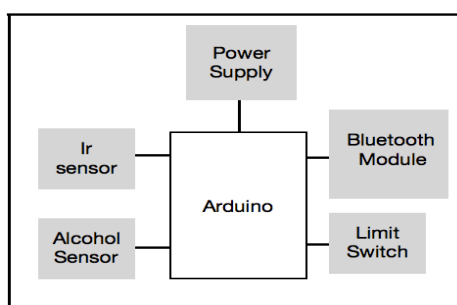


Fig 1. Block diagram

2. Methodology

2.1. Arduino

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.

The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.



Fig.2.1. Arduino Uno

2.2. Power Supply

The power Supply will be provided to arduino through batteries. The power supply is important to keep the arduino running and active all the time while the rider is riding the bike. The power supply will keep all the components active by providing the electric charge.

2.3. IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, The resistances and these output voltages, change in proportion to the magnitude of the IR light received.



Fig.2.3. IR Sensor

2.4. Limit Switch

In electrical engineering a **limit switch** is a switch operated by the motion of a machine part or presence of an object. They are used for controlling machinery as part of a control system, as a safety interlocks, or to count objects passing a point.^[1] A limit switch is an electromechanical device that consists

of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection.



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Fig. 2.4. Limit Switch

2.5. Alcohol Sensor

This sensor is used to detect if the rider has consumed any alcohol or not. If the rider is found to be under the influence of an alcohol the rider won't be able to start his bike.



Fig 2.5. Alcohol Sensor

2.6. Bluetooth Module

The bluetooth module is used for the connectivity between helmet, android application and limit switch. The bluetooth technology is a used to connect to devices which are present in the area around them. It is used for short range connections.

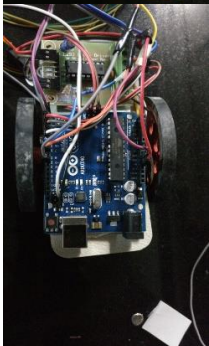
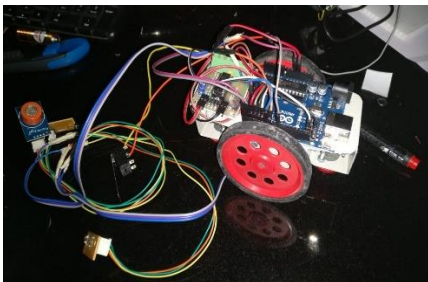


Fig. 2.6. Bluetooth Module

3. Implementation

The smart helmet will be used for accident detection. When a rider gives the ignition to the bike without wearing the helmet the bike won't start because the IR sensor hasn't detected any change. As soon as the rider wears the helmet the IR sensor detects it and sends the message to the transmitter attached to the bike's ignition system. After wearing the helmet the helmet will check for the alcohol consumption. If the biker hasn't

consumed any alcohol the biker can then start the bike. If the biker has consumed alcohol then alcohol sensor senses the alcohol and prevents the biker from starting his bike. The Arduino uses bluetooth module to connect with the mobile device. The android application on the device will display all the processes. The limit switch will be used for this. The limit switch is attached in the front of the vehicle in open state to detect collision. In case of collision the limit switch closes which detects collision of vehicle. This indicates that the rider has met with an accident. The closing of limit switch sends a signal to the Arduino kit attached to the helmet. The Arduino then sends signal to the ignition system to turn the ignition off and another signal to the mobile device. The mobile device then sends the pre-defined message to the saved emergency contact with the location of the rider. The location can be seen using google maps and the necessary medical services can be sent to the rider on time.



4. Hardware Requirements

- Arduino kit
- Bluetooth module
- IR sensor
- Limit switch
- Alcohol Sensor
- Mobile device
- Batteries

5. Software Requirements

- Arduino
- Android

6. Advantages

- It will be able to save lives in case of accident of rider.
- It will help in prevention of accidents in case the driver is drunk.
- It will help to improve rider's safety.

7. Disadvantages

- In case the battery runs out the helmet will become non-functional.
- The helmet becomes heavy due to the kit installed on the helmet.

8. Conclusion

The conclusion of the paper is that the smart helmet should be made compulsory for all the bikers. The new bikes should come with pre-installed settings for smart helmet. This will save many people's lives and will improve the safety of people on road. Smart helmet will save many people during accidents. Thus it is necessary to implement this idea on a large scale.

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