

SMART HELMET FOR ACCIDENT DETECTION AND REPORTING SYSTEM

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Abstract: Increase in death rate due to road mishaps is rampant in India. Various factors responsible for road accidents are many such as reckless riding, drink and drive and the major factor is people refraining from wearing a helmet. However in this project the rider is compelled to wear a helmet which will reduce the death toll to some extent. If in case of accident the victim is assisted with timely and needy medical help.

KEYWORDS: GPS,GSM,IR and MQ3 Sensor,3axis-Accelometer,PIC Microcontroller Wi-Fi module

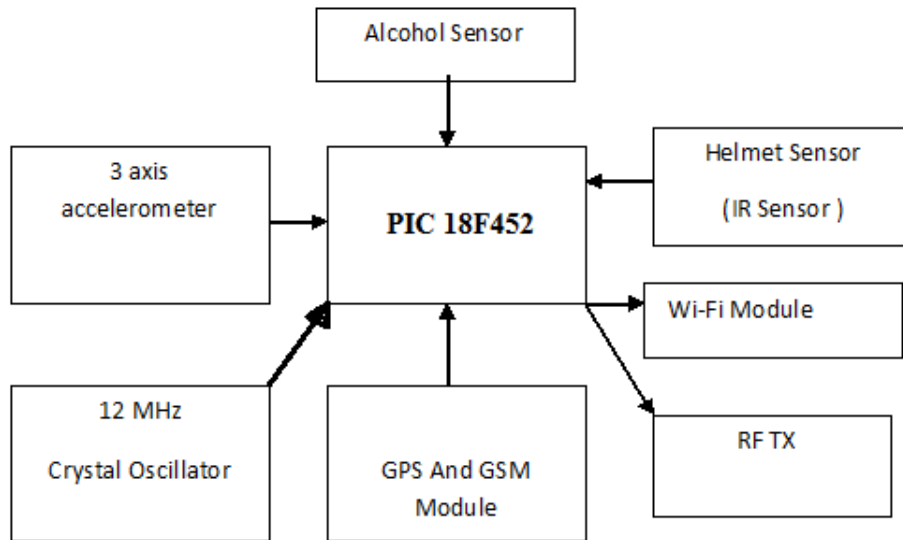
1 INTRODUCTION:

In the wake of accidents which are occurring in our country on a daily basis, this project comprises of modules which are mounted on the helmet, which makes riding safer than before. In this project, a microcontroller which is mounted on the helmet, monitors accident detection and reports the destination. The bike will start if and only if the helmet is being worn. The IC PIC18F452 is connected to GPS, GSM and WiFi module which send message along with the location on the saved mobile's number and displays on website via IOT principle. This system is a prototype of two units i.e. vehicle unit and the helmet unit. This system is beneficial for rider safety terms as it helps to start the bike only if helmet is worn, in occurrence of accident it sends message to the relatives, ambulance etc along with it's live location and displays it on the website too.

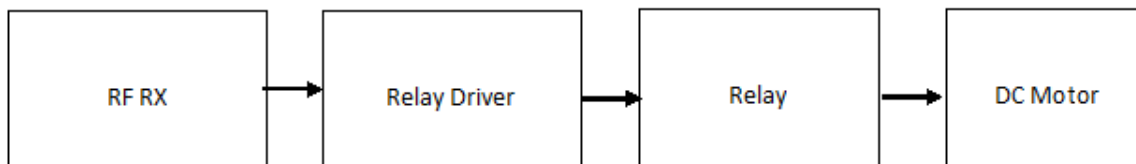
2 Objectives:

1. To make riding safer even before.
2. To help the victim with medical assistance, in case of an accident

3 Block Diagram:



Block diagram of Helmet unit.



Block diagram of vehicle unit

Description:

1. Microcontroller (PIC18F452): PIC18F452 Microcontroller has operating frequency 40MHz, which has 5 I/O Ports, 4 Timers, 10-Bit Analog to Digital Module for conversion, On-Chip Program Memory, Flash memory, On-Chip RAM and ROM (EEPROM) etc.
2. Accelerometer (ADXL335): It is a device that measures the acceleration of the body which is in motion. It extracts the latitude and longitude which embodies as a replica in the virtual world via x, y, z co-ordinates. It helps in monitoring the exact location where the mishap has occurred.
3. Alcohol Sensor (MQ-3): It is suitable for detecting alcohol content consumed by a person just like a breath analyser. It has features such as high sensitivity, fast response time, high durability. If MQ3 detects high content alcohol then the bike won't start.
4. GPS Modem: L80 module is a SMD type module with the compact 16mm x 16mm x 6.45mm form factor, which can be embedded in your applications through the 12 pads with 2.54mm pitch. It provides necessary hardware interfaces between the module and main board.
5. GSM Modem: It is a digital 2G mobile telephony system. It helps to send short text messages to the required authorities as per the application. This technology enables the system to be a wireless system with no specified range limits.
6. IR SENSOR: It is an infrared sensor which detects whether a transmission line is being blocked by an obstacle or not. In our project it is used to detect whether the user is wearing the helmet or not.
7. Wi-Fi Module (ESP8266): With the popularity of Wi-Fi IOT devices, there is an increase in demand for low cost and easy to use Wi-Fi modules. ESP8266 is a new player in this field; it's tiny with simple pin connection using serial TX/RX to send and receive Ethernet buffers and similarly using serial commands to query and change configuration of the Wi-Fi module.

8. Relay: Relay covers switching capacity by 10A in spite of miniature size to comply with user's wide selection. The employment of suitable plastic materials is applied under high temperature condition and various chemical solutions. Complete protective construction is designed for dust and soldering flux. If required, plastic sealed type is available for washing procedure.

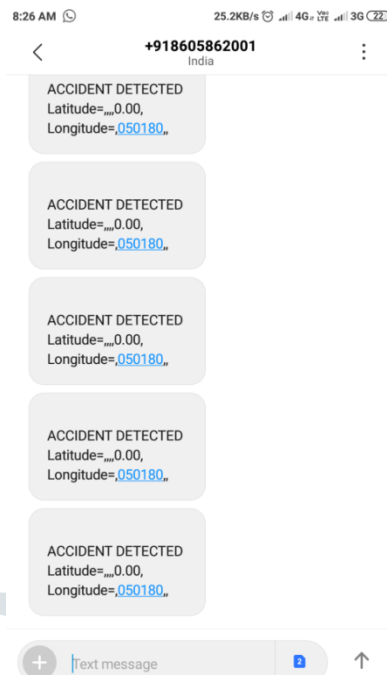
9. RX and TX (HTD12D AND HTD12E): RX has fast response time, High photo sensitivity Pb free. This product itself will remain within RoHS compliant version. PT333-3C is a high speed and high sensitive NPN silicon NPN epitaxial planar phototransistor moulded in a standard 5 mm package. Due to this water clear epoxy the device is sensitive to visible and near Infrared radiation. TX has high reliability, radiant intensity, low forward voltage, Pb free. EVERLIGHT infrared emitting diode is a high intensity diode, moulded in a blue transparent plastic package. The devices spectrally matched with phototransistor, photodiode and Infrared receiver module.

4 Methodology:

A tri-axial accelerometer, GPS, and micro controller are present on the helmet. The on-board accelerometer detects the variation in spatial components along 3 orthogonal directions x, y and z. A threshold value is provided giving allowances for minor levels of head tilt not pertaining to an accident. When a sudden change exceeding the threshold value in all 3 directions is observed simultaneously, the change in resultant acceleration is calculated. Average variation of resultant acceleration values is calculated over varying windows of time and the compared with the acceleration threshold. If the value is exceeded, then the processor detects a crash. If the rider is drunk and the alcohol sensor senses any traces of alcohol then bike won't start. GPS and GSM module will provide the exact location of the victim to control room as well as a message will be sent to the family members and the Ambulance if any accident has occurred. The Wi-Fi IOT devices will update the website and will report that the accident has occurred.

5 OUTPUT RESULT:





6 Applications:

- For smart vehicle system in real time use.
- Authenticated access for each rider.
- To get proper medical assistance for the needy.
- To avoid accident as much as possible.

7 CONCLUSION:

The smart helmet developed is a smart and reliable piece of technology that is cheap to develop and operate and yet does not compromise on safety. Additionally, it covers several advantages over the existing methods of accident detection and notification systems that rely heavily on the data collected from cellular devices of the drivers. Also, most of the systems that are available in the automobile market are designed for only four-wheeled vehicles. Thus, the Internet of Things based application, will prove to ensure greater safety for the motorists. The smart helmet is equipped to detect alcohol content in the breath of the motorist in order to keep a check on drunk and drive cases.

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