

Intelligent Helmet Using Raspberry Pi Technology for Accident Detection and Reporting System

Sreepriya. Babu, Veena. S, Anfal. V.A, Naveen Anto, Hitha P S

Abstract— Nowadays almost all countries are making the use of helmets mandatory, but still in many places, the rules are being violated. In order to overcome this problem, a system named —Intelligent Helmet is proposed in this paper. A smart helmet is a special idea which makes motorcycle driving safer. The proposed system describes the interaction between modules mounted on the vehicle and helmet to ensure the vehicle can be started only when the user is wearing a helmet and is not under the influence of alcohol. Another feature of the proposed system is the ability to detect an accident and send the corresponding geographical coordinates of the accident spot to predefined numbers using a GPS and GSM system respectively.

Index Terms— Accelerometer Sensor, alcohol sensor, GSM, GPS, Raspberry Pi.

I. INTRODUCTION

A traffic accident is defined as any vehicle accident occurring on public highway roads. The thought of developing this project comes to do some good things towards the society. Two wheeler accidents are increasing day by day and lead to loss of many lives. The main aim of our project is to build a safety system to reduce the probability of two-wheeler accidents. If any accident occurs nobody is there to give information to the ambulance or parents. This is a situation we observe in our day to day life, a thought of finding some solution to resolve this problem come up with this idea of giving the information about accident as soon as possible and in time. Smart helmet focusing on three major applications which are helpful in our day to day life. At first and most one is the ignition of the bike will not happen if we are not wearing the helmet. Secondly alcoholic driving is not possible by using this smart helmet. If the rider is alcoholic, the bike will not start. Third application is accident detection. If person met with an accident, no one is there to help him and simply leaving or ignoring the person. In such situation informing to ambulance or family members through mobile to rescue him for an extent.

Smart Helmet Using GSM and GPS Technology for Accident Detection and Reporting system, vibration sensors are placed in different places of helmet where the probability of hitting is more which are connected to raspberry pi. So

when the rider crashes and the helmet hit the ground, these sensors sense and then raspberry pi extract GPS data and when the data exceeds minimum stress limit then GSM module automatically sends message to ambulance or family members. Hence smart helmet is a special idea which makes motorcycle driving safer than before. Alcohol detection, mainly to detect the alcohol drunken people. Alcohol sensors are used here to detect the alcohol content in the breath and if the rider is alcoholic the bike will not start. If the accident occurred then this system immediately transmit the location of the accident to phone number through SMS. The system design will be such that without wearing the helmet the rider cannot start two wheelers.

Smart Helmet for Indian Bike Riders, provides an excellent alternative to the existing accidental avoidance techniques. These include Hi-tech helmet and an electronic system which can be applied in mechanical system of two wheelers to avoid accidents on roads by compulsion of wearing helmet.

II. METHODOLOGY

The techniques here we used in our project are alcohol detection and accident prevention. The ignition of the bike starts only if we wore the helmet. For the above applications different sensors and GPS GSM interfacing also used.

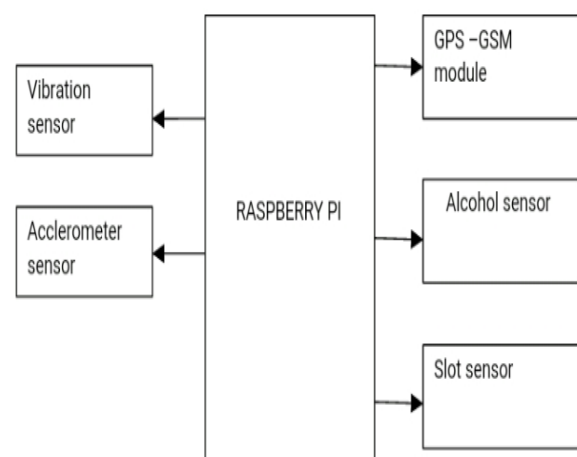


Fig 1. Block diagram of Intelligent Helmet

A. Smart Helmet Using raspberry pi

Our project is about a smart helmet which makes motorcycle driving safer than before. The aim of this project is to give information at accident spot to ambulance and family

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members. This is implemented using raspberry pi. This smart helmet was implemented by placing vibrations sensors in different places of helmet where the probability of hitting is more which are connected to raspberry pi. When the data exceeds minimum stress limit then the GSM module sends message to family members automatically.

The **Raspberry Pi** is a series of small single-board computers

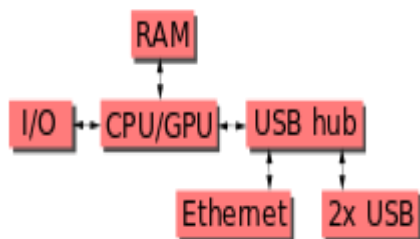


Fig2. Block diagram of Raspberry Pi

This block diagram describes Model B and B+; Model A, A+, and the Pi Zero are similar, but lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the Pi Zero, the USB port is connected directly to the system on a chip (SoC). On the Pi 1 Model B+ and later models the USB/Ethernet chip contains a five-port USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port. Unlike all other Pi models, the 40 pin GPIO connector is omitted on the Pi Zero with solderable through holes only in the pin locations. The Pi Zero WH remedies this.

B. GSM Module

GSM (Global System for Mobile Communications) is an open, digital cellular technology used for transmitting mobile voice and data services. Here we are using it only for transmitting and receiving the messages. GSM wireless data module is used for remote wireless applications, machine to machine or user to machine and remote data communications in many applications.

C. GPS Module

GPS (Global Positioning System) is based on time and the known position of specialized satellites. The satellites carry very stable atomic clocks that are synchronized with one another and to the ground. Any drift from true time maintained on the ground is corrected daily. Likewise, the satellite locations are known with great precision. GPS receivers have clocks as well; however, they are usually not synchronized with true time, and are less stable. GPS satellites continuously transmit their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities.

D. ADXL335(Accelerometer Sensor)

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale

range of ± 3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis. The ADXL335 is available in a small, low profile, 4 mm \times 4 mm \times 1.45 mm, 16-lead, plastic lead frame chip scale package (LFCSP_LQ).

E. Alcohol Sensor

Basically, it has 6 pins can use only 4 of them. Two of them are for the heating system and the other 2 are for connecting power and ground. Basically, this tube is a heating system that is made of aluminium oxide and tin dioxide and inside of it there are heater coils, which practically produce the heat. If the coil is heated up, SnO₂ ceramics will become the semi-conductor, so there are more movable electrons, which means that it is ready to make more current flow. Then, when the alcohol molecules in the air meet the electrode that is between alumina and tin dioxide, ethanol burns into acetic acid then more current is produced. So the more alcohol molecules there are, the more current we will get. Because of this current change, we get the different values from the sensor.

III. RESULT AND CONCLUSION

The two-wheeler safety system developed with smart helmet and intelligent bike system is reliable and aims to help in the prevention, detection and reporting of accidents hence reducing the probability of the drunk drive cases. It also has several advantages compared to the previous systems. Our proposed system gives the primary importance of preventing the accidents and ensures safety for a greater extent in two wheelers. Nowadays, most accident cases occur due to motor bike. The severities of those accidents are increased because of the absence of helmet or by the usage of alcoholic drinks. By implementing this system, a safe ride is possible which would decrease the head injuries throughout accidents caused due to the absence of helmet and additionally reduce the accident rate due to drunken driving. A GSM modem is used in this system that will send a message to the predefined numbers that are programmed using microcontroller in case of any accident.

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