Accident Detection using GSM , GPS module and Solar Cell

Manjiri N. Pise, Nikita D. Tembhe, Kalyani A. Salodkar, Vishal B. Wandile, Vrushabh D. Gaurkar

Computer Engineering Department, Nagpur University, Wardha, Maharashtra, India

ABSTRACT

In today's era, particularly within the young generation the craze to ride bike is increasing. The middle class family prefers to buy two wheeler over a four wheeler because of their low price. That's why the number of two wheelers on the road is increasing. Currently accidents are most important problem which is faced by a rider. Sometimes riders have to loss their lives because of no one at the place where accident occurs to inform to the family members and ambulance. To overcome this problem we built a helmet. A smart helmet could be a special plan that makes bike driving safer than before. This is often enforced victimization GSM and GPS technology. The operating of this sensible helmet is extremely easy, vibration sensors are placed in numerous places of helmet wherever the chance of touching is a lot of that is connected to microcontroller board. Thus once the rider crashes and therefore the helmet hit the bottom, these sensors sense and offers to the microcontroller board, then controller extract GPS information victimization the GPS module that's interfaced thereto. Once the information exceeds minimum stress limit then GSM module mechanically sends message to motorcar or relations.

Keywords: Helmet, sensors, GPS, GSM, Microcontroller, Arduino

I. INTRODUCTION

It is a well-known fact that young generation prefers bikes and motorcycle over four wheelers. A survey indicates that more than 70% of the riders avoid wearing helmet without any specific reason.

The idea of developing this work comes from our social responsibility towards society. In many accidents that occur around us, there is a huge loss of life [1]. In keeping with a survey of Asian country, there are around "7500" folks die on roads annually that occur because of bike accidents. There are varied reasons for accidents like not having adequate ability to drive, defective 2 wheelers, rash driving, "drinking and driving", etc. Nearly 1/2 cut folks die because of lack of treatment in correct time. There might reasons for this like late arrival of motorcar, nobody at the place wherever accident happens. Therefore, it's vital that there ought to be a facility to attenuate the when effects of those accidents.

A thought of finding some solution to resolve this problem come up with this idea of giving information about accident as soon as possible and in time ! After all time matters a lot.

The idea of this work is to give information about the rider wearing the helmet or not, whether the rider drunken or not and also, he met with an accident it gives an information about location where he is met with an accident through GSM module to mobile numbers family members, so I have chosen GSM technology to give the information by sending SMS, using GSM module which has SIM card slot to place the SIM and send SMS. Sending SMS alone can't help the driver, if we send and an 2 SMS saying that accident had occurred where the ambulance will

come without knowing the location of the accident. So to trace out the location where exactly accident occur using GPS module, and gives to microcontroller, then it sends the SMS which contains the latitude and longitude of an area to family members mobile numbers For this we use GPS module to extract the location of the accident, the GPS data will contain the latitude and longitude values using which we can find the accurate position of the accident place.
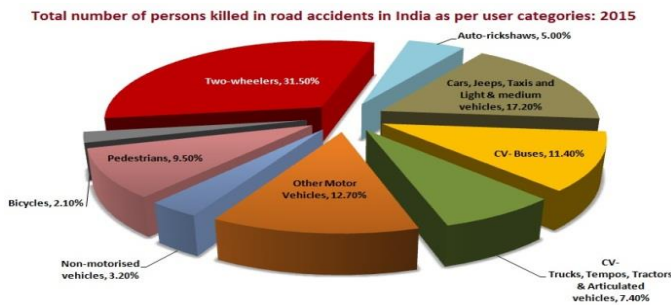

Figure 1. Percentage of accident due to different transportation mode (2015)

A. Objective

1. Force the riders to wear their helmets. As per the law and to maximize the survivability of the rider in case of an accident, wearing helmet is must. If the rider isn't wearing his helmet, he should not be able to start his two wheeler.

2. Detect accidents reliably by removing false positives. The threshold for acceleration change to be classified as an accident should be suitable. Too high a threshold would discard the accidents and too low a threshold would lead to false positives.

3. Report accidents to authorities and to the assigned emergency contact. The notification should also have the location of the accident so that help can be sent immediately.

4. Consolidate and plot the accidents on a map to prevent future accidents by identifying accident hot-spots. This is done with the help of Google maps.

5. Sending SMS from GSM module to mobile phone.

II. PROPOSED SYSTEM

At the time of accident, the method to intimate and locating the place of the victim could be a bit troublesome task that's to be discovered. The credentials of the victim square measure unknown that is tedious throughout crucial moments for the individuals at the accidental spot. the most motive of the project is to style AN IOT detection and coverage system. The distinctive feature of the system is to find the victim and report the accident with the relevant info to ambulances and his involved individuals to produce a fast medical care to the victim. A Microcontroller chip is employed and a novel code is programmed during this module to attain this practicality. Vibration sensors square measure interfaced with the Microcontroller chip that senses the vibration frequency of the accident. A most stress limit of the vibration threshold is programmed within the module. The GPS module is connected to the Microcontroller and everyone this square measure embedded within the helmet. The GPS module is useful for the relations and therefore the friends, to trace the victim's location. Figure 2.1 describes the data flow of the system.
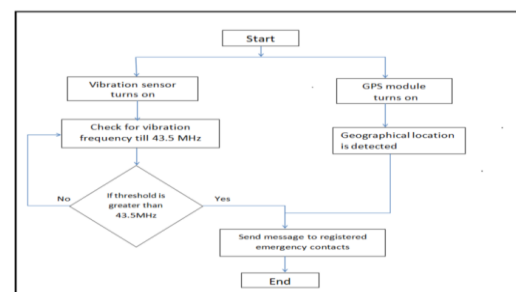

Figure 2. Data Flow Diagram

A. Proposed Architecture

The report describes the epitome of a wise helmet that aims to observe and report accidents occurring in 2 wheelers. Microcontroller interfaced with measuring instrument and GSM module and cloud service infrastructures square measure utilized to attain the ultimate objectives of notification and coverage. The helmet is developed in a way to detect an accident in two wheelers and send the geographical co-ordinates of the accident to the emergency authorities and the emergency contacts of the victim. A 6-axis

accelerometer is mounted on the helmet which continuously monitors the acceleration levels of the helmet. When an accident is detected due to inconsistent acceleration levels and exceeds the threshold, it gathers the GPS co-ordinates from the GPS module and sends a message to the emergency authorities' web server which then sends an emergency message to the assigned emergency contact of the victim.
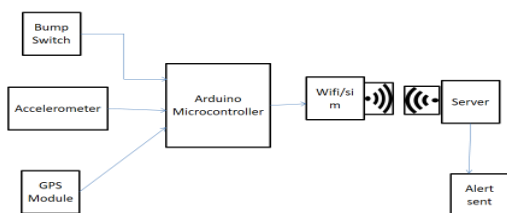

Figure 3. Architecture of System

B. Technical Studies

Hardware Requirements

- Microcontroller
- Vibration Sensor
- Alcohol Sensor
- GSM Module
- GPS Module
- Solar Cell

Software Requirements

- Programming in "C" using keil software.
- RIDE Compiler
- Microcontroller 1.2 Software

Table 1. Components

Sr. No.	Component	Quantity	Rating
1.	Microcontroller	1	
2.	Pressure Sensor	1	
3.	Vibration Sensor	1	
4.	Alcohol Sensor	1	
5.	Temperature sensor	1	
6.	GSM module	1	900 MHz
7.	GPS module	1	2.4GHz
8.	RF Transmitter	1	47 MHz
9.	Solar cell	1	6 volt
10.	LCD Display	1	
11.	LED	1	

I) Microcontroller

This is the core of the device, an inexpensive and simply offered and programmable Arduino NANO clone, with Atmega 328. It provides restricted process capability, however it's enough for our purpose. It's little, and compact, that is a crucial issue as a result of the complete hardware must be fitted within a helmet. When the device is started for the first time, the application prompts to calibrate the helmet. Upon calibrating, the calibrated values of the accelerometer are stored in the microcontroller's ROM. This is used to calculate the 'tilt' of the helmet while riding the motorbike. The microcontroller performs other operations as shown in the flowcharts later in this section.

Figure 4. Microcontroller chip

II) GPS Module

The Global Positioning System (GPS) may be a satellite-based navigation system that is employed to sight the placement wherever the accidents are going to be taken place. It detects the line of longitude and Latitude values of specific place and sends it to GSM module. It works all told weather. It additionally helps to see different units like speed, distance, time, etc. There are three pins of GPS module that is employed during this project. Receiver pin of GPS is connected to the transmitter pin of GSM module and Transmitter pin of GPS is connected to the receiver pin of GSM module and third pin is connected to Vcc.

Figure 5. GPS MODEM available in local market

III) GSM Technology

GSM (Global System for Mobile communication) may be a digital mobile telephone system that's wide utilized in Europe and different elements of the planet. GSM uses a variation of your time division multiple access (TDMA) and that the foremost wide used of the 3 digital wireless telephone technologies (TDMA, GSM and CDMA). GSM abbreviates as international System for Mobile communication. It's accustomed establish association between a laptop and GSM system. It includes customary interfaces like RS232, USB, etc.

Figure 6. GSM MODEM available in local market

IV) Gas Sensor (MQ3)

This detector is employed to sight alcohol content in biker's breath. It runs on voltage offer of 2-3.3V. It needs heater voltage with operative temperature of -10 to seventy degrees C. Its heater consumption is a smaller amount than 750mW. Its dimensions are sixteen.8mm in diameter and nine.3mm tall while not pins. It's a high sensitivity and quick interval.

Figure 7. MQ3 Sensor

V) Vibration Sensor

This detector buffers an electricity electrical device. Because the electrical device is displaced from the mechanical neutral axis, bending creates strain inside the electricity part and generates voltages. The Vibration detector Detector is meant for the safety apply once Vibration detector Alarm acknowledges movement or vibration, it sends a symbol to either board Developed a replacement form of Omni-directional high sensitivity Security Vibration Detector with Omni-directional detection.

VI) Solar Cell

A photovoltaic cell, or solar cell, is associate device that converts the energy of sunshine directly into electricity by the electrical phenomenon result, that may be a physical and natural phenomenon. it's a variety of sensing element, outlined as a tool whose electrical characteristics, like current, voltage, or resistance, vary once exposed to lightweight. Individual photovoltaic cell devices is combined to make modules, otherwise called star panels. In basic terms one junction element photovoltaic cell will manufacture a most open-circuit voltage of roughly zero.5 to 0.6 volts.

III. IMPLEMENTATION

Figure 8. Vibration sensor

Here we connect the Arduinowith a vibration sensor. For that we install a vibration sensor with aArduino. Arduino coded with Arduino Software. After we note down the observations of vibration senser. Up to the range of vibration is from 0 to 1023. The lowest range is 0 and highest range is 1023.
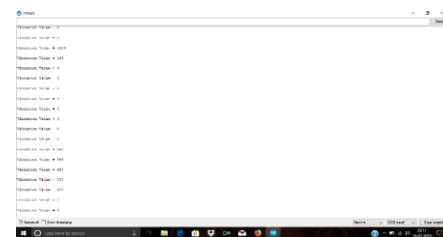

Figure 9. Reading of Vibration sensor

IV. CONCLUSION

As the final a part of this project, we'd wish to say that- "Without correct action at correct time, danger a

waits North American nation with a much bigger face". We have a tendency to should act on time once an individual is abraded. We have a tendency to should watch out of person the method it means that it's meant. Otherwise, a valuable life should be lost we'd like to grasp however precious lives of individuals are and what importance first-aid carries in saving this precious lives. The proposed work offers a solution to this problem by introducing accident detection and reporting system aiming to save at least half the lives that are lost due to bike accidents In future, this method may well be enforced for lock protection and for different safety functions. It may even be enforced to manage the speed of the vehicle and to forestall the rider from over dashing by passing the data to the rider's family. The early detection and reporting will account to the responsibility of saving many lives.

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