International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

Smart Helmet with Accident Detection

Navya Sri K[1], M Pavan Reddy[2], G Lavan Kumar[3]

[1, 2, 3]Sreenidhi Institute of Science and Technology, Yamnampet, 501-301India

Abstract: ***Accidents are increasing day by day. Wearing helmets are made compulsory by the government. Even then most of the bike riders are neglecting it. Due to this, even small accidents are becoming fatal. Also, accidents occurring at remote places are becoming fatal due to the slow reach of treatment. This project aims at solving those problems. This prototype helmet won't allow the rider to ride the bike if he doesn't wear the helmet. The ignition will only start when the rider wears the helmet. Also, this helmet can detect accidents by using the accelerometer. It will send the information and location to the contacts saved in the ROM. This helmet can also be used to track the rider.***

Keywords: GSM, Tracking, RF, accelerometer

1. Introduction

Road safety is a major issue nowadays. According to the WHO, road accidents caused an estimated 1.25 million deaths worldwide in the year 2013. Most of the accidents occurring cause severe deaths due to rash driving, not using safety measures. Many people don't realize that wearing a helmet reduces the risk of a severe brain injury or even death (in some cases). During a fall or collision, most of the impact energy is absorbed by the helmet rather than your head and brain. People are charged when they don't put on their helmets, yet they completely ignore the significance of it and cost their life for it. We've found a way to make helmets compulsory who is riding a bike. An easy, cost-efficient, comfortable way where the rider's safety is given utmost priority. In this project, the bike starts only when the rider puts on his helmet. Here, the RF transmitter is present inside the helmet and only when the person wears it, the connection is established and the signal is sent to the RF receiver present in the bike which starts the ignition or start of the bike. So the bike will not start unless the person puts on the helmet. GPS, GSM module and Accelerometer are also installed in the helmet which helps us know when a sudden accident occurs (by monitoring accelerometer) and sends the location to our family. A tracking system is enabled and can be monitored (if required) if the person is being followed by an unknown person or any such risks. In this way, the person will never ignore or forget to wear the helmet and upholds his safety in a very easy and comfortable way.

2. Literature Survey

Nimisha Chaturvedi[1] proposed a system with GPS and GSM for accident detection. It uses a button sensor to detect an accident and if the accident occurs a buzzer is turned on and location will be sent to the contact list saved in EEPROM. If the rider pushes the reset button the sending of the message is terminated.

Prof. K. Y. Rajput. [2] proposed a system which uses the IR sensor to check whether the helmet is worn or not. It uses a Gas sensor for alcohol detection. In this system, switches are placed on the bike. If the accident occurs and switches have pressed the information along with location will be sent to emergency contacts using GPS and GSM.

Manjesh N [3] demonstrated a smart helmet which has vibration sensors in it. When the rider crashes and helmet hits the ground the sensors will sense and GPS location is extracted and sent to contacts via GSM.

Shrutika S [4] proposed a system where force sensor is used to detect the helmet. GPS and GSM sensors are used to send the location to the contacts when the accident occurs.

3. Problem Definition

Many people die because of not wearing the helmet. They also die because of not being able to get treatment in time. If an accident occurs at a remote place its hard for the emergency service to know that an accident has occurred. Many lives can be saved simply by wearing a helmet. About 60% of deaths in an accident can be prevented just by getting treatment in time. This project will make sure that rider wears the helmet and notifies the emergency service in case of an accident.

4. Methodology

4.1 Hardware description

4.1.1 Arduino Nano

It is an open source tool to which we can interface sensors and modules. It has a microcontroller Atmega328P. It contains 22 Digital (I/O pins)[5]. We can program it by C, embedded C or C++. Arduino provides open source IDE to program the device. Operating voltage is 5V. Its clock speed is 16MHz. We can power it by using adaptor or USB cable. We can program it by C, embedded C or C++. Arduino provides open source IDE to program the device.

Figure 1: Arduino Nano

4.1.2 GPS Module

GPS is a device that is capable of receiving information from the GPS satellite and then to calculate the device's geographical position. GPS module needs at least 4 satellites to calculate the location[6]. It calculates location by using the trilateration method. It works at operating voltage of 3.3 V to 5 V. In this project we used GPS to find the location of the rider for tracking and in case of emergency.

Figure 2: GPS

4.1.3 GSM Module

Gsm module is used to call, send and receive SMS, and to access the internet. It establishes a connection between the device and the Global System for Mobile Communications. To start the connection it needs 5 V. Its idle operating voltage is 3.3 V [7]. In this project we used it to send the location of rider via SMS to the selected contacts in case of emergency or while tracking.

Figure 3: GSM

4.1.4 RF Module

An RF module is an electronic device used to transmit and/or receive radio signals between two devices. It contains the transmitter and receiver. It works at 433 MHz frequency[8]. RF signals travel from the transmitter to receiver even when there is an obstruction. In this project, we placed the transmitter in helmet and receiver in the bike. The transmitter sends the information whether the rider wore the helmet or not. The receiver receives the information.

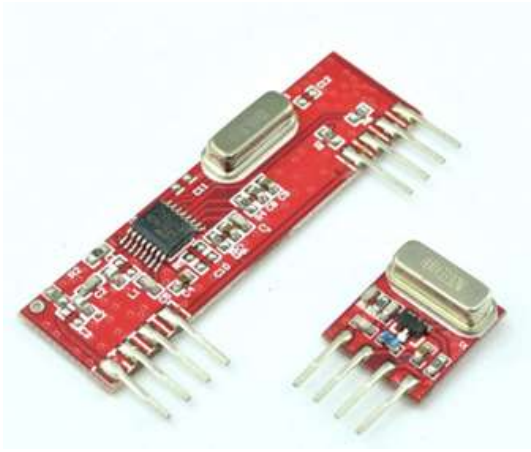

Figure 4: RF Module

4.1.5 Accelerometer

An accelerometer is an electromechanical device used to measure acceleration forces. It works at an operation voltage of 5V [9]. We used it to detect accidents by checking for a sudden change in speed or to detect falling. We can also use it to notify over speed.

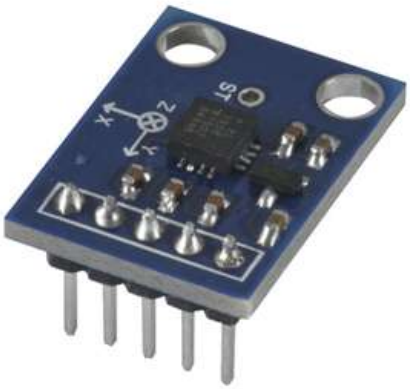

Figure 5: Accelerometer

4.1.6 Contact Sensors

These are nothing but a sensitive circuit which is open. When the rider places the helmet the body will pass some current and circuit is closed. By this, we can know when the rider wears the helmet.

4.2 Block Diagram

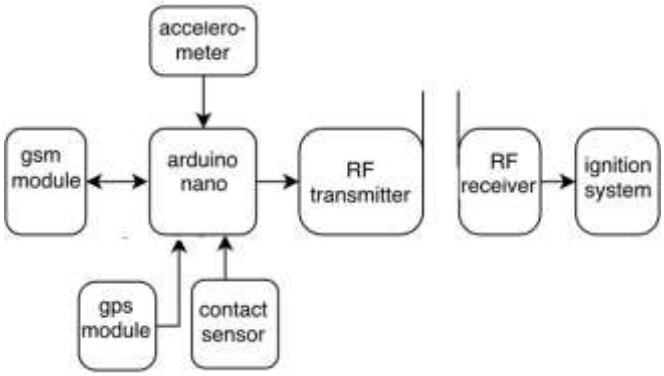

Figure 6: Block Diagram

4.3 Working

There are three main parts of this project

4.3.1 Helmet detection

The first is to check whether the rider wore the helmet or not. When the bike lock is opened the rf receiver will wait for the signal from the helmet. When the rider wears the helmet the transmitter will send the signal to the receiver so that bike can be started. If the rider doesn't wear the helmet the ignition won't start. If at any time the helmet is removed the bike will give a warning and after 2 minutes the ignition will stop.

4.3.2 Accident detection

We will detect the crash or accident by using the accelerometer. If there is any sudden change in accelerometer readings system will beep continuously and will wait for 20 seconds. if the driver pushes the button on the helmet to tell its a false case no SMS will be sent. If its a real accident the GPS location will be retrieved. The information and location will be sent to emergency contacts stored in EEPROM using GSM module.

4.3.3 Tracking

We can know the live location of the rider by using GPS. This can be used in situations like, when someone follows the rider or when we want to know where the rider is going. This works when the rider pushes the button on helmet thrice. The tracking system will be activated and repeated SMS with location will be sent to the contact we gave by using GPS and GSM.

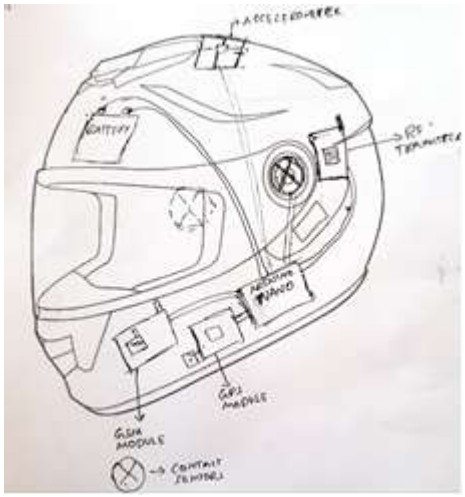

Figure 7: internal structure

4.4 Flow Charts

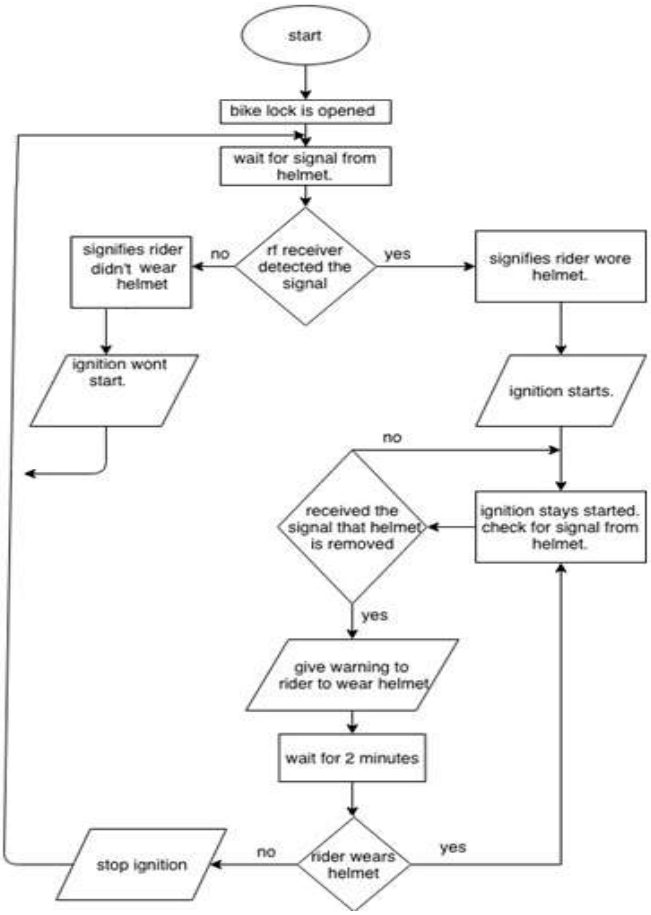

Figure 8: Flowchart of helmet detection

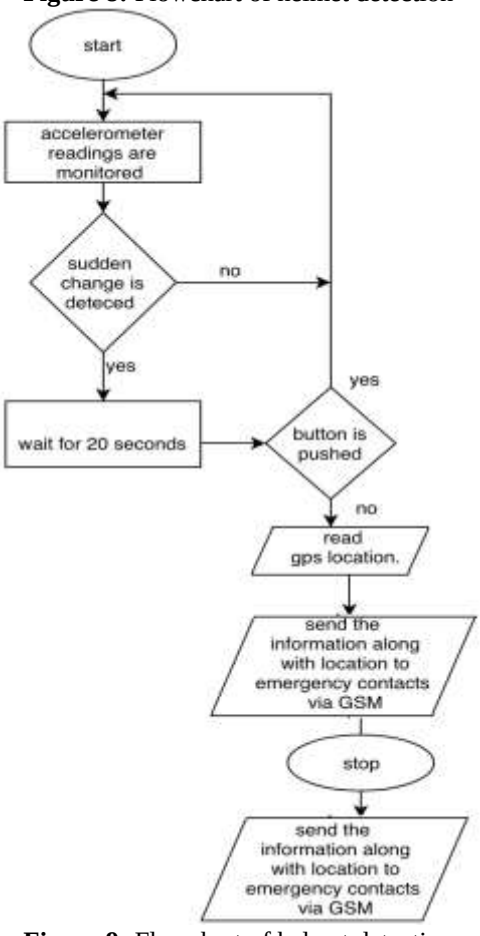

Figure 9: Flowchart of helmet detection

5. Results & Discussion

When the rider doesn't wear the helmet the ignition system won't start. It will start only when the rider wears the helmet. If the rider removes the helmet the system will give a warning and stops after a particular time.

If the driver met with an accident and the rider won't push the button on the helmet in 20 seconds, the information and location will be sent to emergency contacts.

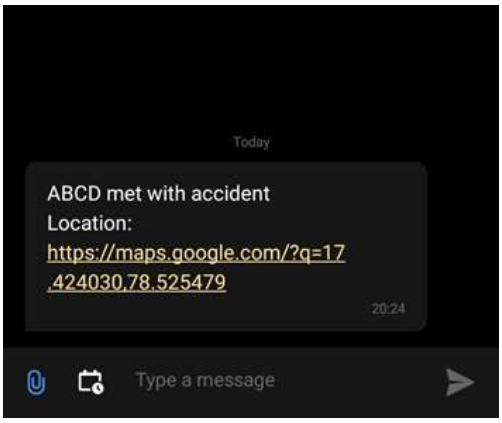

Figure 10: received SMS

6. Future Scope

We can make further modifications to this project for more use cases like

1) By adding microphone and speaker for seeking directions or sending messages without using mobile
2) Biometrics for authentication. Thefts can be avoided.
3) Speed regulation or Speed alerts can be generated if speed exceeds the required limit.
4) Alcohol detection can be obtained.
5) Solar panels can be used as power supply for self-charging

7. Conclusion

This system can be used for any bike by simple modifications. This is a cheap and efficient way to make riders wear the helmet. By this system, we can quickly notify the emergency service in case of an accident and save the final precious second. We can use this system for tracking the rider when required. This project can help in reducing the number of deaths due to accidents.

References

[1] Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS ModemNimisha Chaturvedi1, Pallika Srivastava 2 International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03 | Mar-2018 www.irjet.net
[2] SMART HELMET Prof. K. Y. Rajput1, Gunprabh Chadha2, Brij Kanodia 3 and Vishal Lakhani. International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 02 | Feb-2016
[3] Smart Helmet Using GSM &GPS Technology for Accident Detection and Reporting System Manjesh N1 , Prof. Sudarshan Raj 2 International Journal of Electrical and Electronics Research Vol. 2, Issue 4, pp: (122-127)
[4] SMART HELMET: FOR DRIVER SAFETY 1 SHRUTIKA S. GHOSALKAR, 2 S. L. NALBALWAR, 3N.S.JADHAV Proceedings of 74 th IRF International Conference
[5] ARDUNIO nano http://www.farnell.com/datasheets/1682238.pdf
[6] GPS module https://www.epa.gov/sites/production/files/2015-10/documents/global_positioning_system110_af.r4.pdf
[7] GSM module http://www.uky.edu/~jclark/mas355/GSM.PDF
[8] RF module http://forum.researchdesignlab.com/datasheet/RF%20module.pdf
[9] accelerometer http://www.mantech.co.za/Datasheets/Products/433Mhz_RF-TX&RX.pdf

Author Profile

Kathi Navya Sri, DOB:15/10/1997, Sreenidhi Institute of Science and Technology, Hyderabad, 501301

Mogili Pavan Reddy, DOB:28/10/1997, Sreenidhi Institute of Science And Technology, Hyderabad, 501301

Gummadavelli Lavan Kumar, DOB:28/07/1997, Sreenidhi Institute of Science And Technology, Hyderabad, 501301