

Smart Helmet Vehicle

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Abstract

A smart helmet is considered as a anti-theft tracking system, accident spot identification, alcohol detection. Considering the increasing number of motor cycle riders in our country and the number of accidents happening each year, it is evident that in most cases the rider suffers injuries to the head and it leads to fatal casualties. This has thrown light on the importance of forcing the rider to wear a helmet to reduce the extent of the impact. The paper focuses on the methods that can be implemented to reduce the impact of road accidents. A system is proposed that can be implemented by installing it on a bike which works with the helmet that is being worn to make the rider to wear the helmet before riding the bike. An accident is an unexpected and external action which occurs in a period of time and any place, with no apparent and deliberate cause but with marked effects. Improper driving of the driver is the major factor of such accidents. The traffic administrator gives a lot of instructions to the vehicle operators. But many of them do not obey the rules.

Key Words: Helmet module, RF transmitter, sensors, microcontroller

INTRODUCTION

Number of two wheelers in total road accidents has raised continuously from 26.3 per cent in 2013 to 27.3 per cent in 2014 and 28.8 per cent in 2015 [1]. The thought of developing this project enhance to do some good things towards the society. Day by Day the two wheelers accidents are increasing and leads to loss of many lives According to survey of India there are around 698 accidents due to bike

crashes per year. Studies show that serious head injuries can happen even at low speeds (10-15 kmph). Drinking and driving of two wheeler riders often get into accidents. The people involved in the accidents need to be taken care of and immediately taken to the emergency room. Hence Road Safety becomes a major issue of concern. Therefore it becomes necessary to implement such a technique which is not easy to bypass the basic rule of wearing helmet and to avoid drunken driving [2]. Hence we have proposed such a system which will help to avoid above problems. Taking into account the inconvenience caused in the helmet we decided to implement many features in the helmet which will make the rider comfortable. Here we designed a system which checks the two conditions before turned ON the engine of the bike. Our system includes an alcohol sensor and a limit-switch. A switch is used to detect whether the rider is wearing helmet. Alcohol sensor is used to detect whether the bike rider is in drunken condition, the output is fed to the MCU. Both the switch and the alcohol sensor are fitted in the helmet. If any of the two conditions are violated the engine will not turned ON. To know that accident has occurred collision sensor is used. Microcontroller will send an SMS containing information about the accident and location of accident to family member. Another important feature is that this we are providing security against bike theft, fuel theft and if towing of van is detected also message alert is provided for the same.

Literature Survey

SudharsanaVijayan and Vineed T Govind et. al. have have a tendency to develop an electronic smart helmet system that efficiently checks the wearing of helmet and drunken driving. This system safes 2 wheeler vehicle which is possible which would deduce the head injuries throughout accidents caused from the absence of helmet and additionally reduce the accident rate due to drunken driving. Their system efficiently checks the wearing of helmet and drunken driving. This system a safe 2 wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate because of drunken driving.

According to the recent Research paper in 2016 titled '2 Helmet using GSM and GPS technology for accident detection and reporting system', The author specially developed this project to improve the safety of the bikers. The objective of this project is to study and understand the concept of RF transmitter and RF receiver circuit. The project uses ARM7, GSM and GPS module. The project also uses buzzer for indication purpose. Whenever the accident will occurs then accident spot will be note down and information will send out on the registered mobile number. The major demerits of this project are they are not using any display device for showing the current status. The cost of helmet is still increased since helmet is designed for only one purpose.

According to the Research paper in 2015 titled 'Microcontroller based smart wear for driver safety', In this paper author has discussed on the speed of the vehicle. In this application the project will be monitoring the areas in which the vehicle will be passing. On entering any cautionary areas like schools, hospitals, etc the speed of the vehicle will be controlled to a predefined limit. LCD displays the various types of messages after wearing the helmet. The author has worked only on the phenomenon of accident which is generally happens due to drunk and drive. But as we know that the accident in the area is not happens only due to consuming alcohol but also other parameters like speed are also responsible.

According to the Research paper in 2015 titled 'Smart Helmet', In this project the author has proposed the smart helmet because of growing bike

accident. People get injured or might be dead because of not wearing helmet. Continuously no one follows road rules .So to overcome these problem this helmet is been designed. The middle class families prefer to buy motor bike over four wheelers, because of the low prices, various variety available in the market. Author has also used encoder IC that receives parallel data in the form of address bits and control bits the other author has used smart system for helmet. But in this project author have not focused on the major issue that will occur in future regarding the alcohol and many others.

A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection by Ping Li, et al, This paper proposes an inexpensive, non-intrusive and non-invasive Smart Safety Helmet (SSH) system, which is non-vision-based. This includes mechanical components, electronic hardware for sensing human behaviours, an embedded real-time artificial intelligence module, a wireless transmission to communicate with the machine tool, and an electronic medical records (EMR). This is an essential step, the risk level estimation with electroencephalography (EEG) and the Inertial Measurement Unit (IMU) is presented in this paper. This paper includes Block diagram of the SSH system. [5]Smart-Tec Helmet by R. Prudhvi Raj, et al the prototype has three inputs and as many outputs routed to and fro the P89V51RD2Microcontroller respectively. The two sensors incorporated in the prototype i.e. LM35D temperature sensor and ADXL3 tilt sensor, along with the GSM and Global Positioning System (GPS) module comprise the input circuitry while the Peltier module, the Liquid Cristal Display (LCD) module and the Global System for Mobile communications(GSM) module forms the output circuitry.

PROPOSED SYSTEM

Our proposed system has following features: It consists of two sections:

- 1) Transmitter section (Helmet Unit)
- 2) Receiver section (Bike Unit)

Data through the helmet will be transmitted wirelessly to the bike various sensor input, the

microcontroller will decide the actions of other blocks.

This helmet is equipped security for bike theft and fuel theft. Limit switch is used for on and off purposes of vehicle. GPS is used to determine the location of accident in terms of longitude and latitude Cell phone charging feature is also provided. The system ensures the safety of the biker, by taking it necessary to wear the Helmet, as per the government guidelines.

Transmitter section

Block diagram:

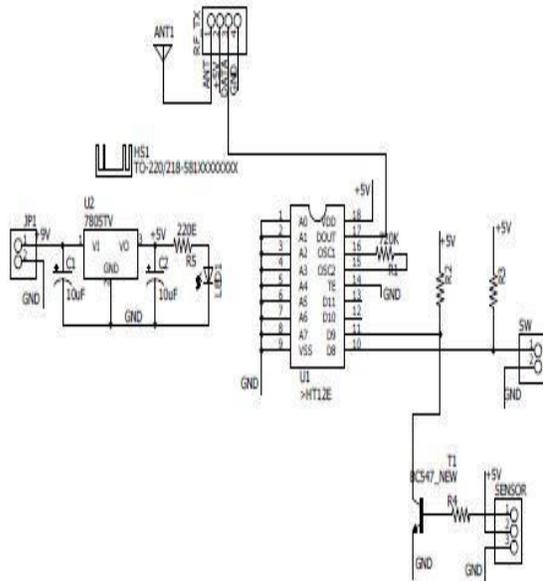


Figure 1 : Transmitter Unit

Transmitter section consists of a limit switch and an alcohol sensor. When the rider wears the helmet, the switch gets pressed and the indication of same is given on LCD. Also alcohol sensor which is fitted at the mouthpiece checks whether the alcohol content is present in rider's breath. If found alcoholic or non-alcoholic same will be indicated on the LCD. Only if rider is wearing the helmet and has non-alcoholic breath then only the bike will start. HT12E converts parallel data into serial data and this data is transmitted wirelessly using RF module to the receiver section.

Receiver section:

Block Diagram

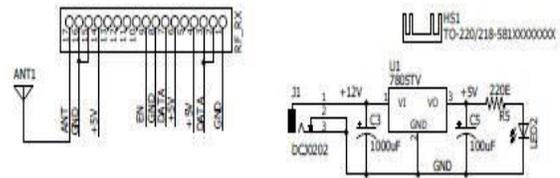


Figure 2 : Micro controller

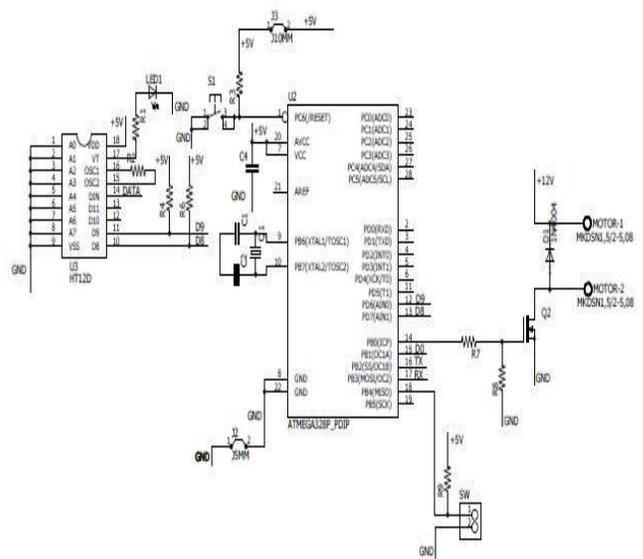


Figure 3 : Parts of receiver connections

Data transmitted by transmitter section is received by RF decoder which is then encoded by HT12D connected to microcontroller. Microcontroller will process the data which will be provided by different sensors and accordingly will perform necessary actions. Collision switch is placed on the bumper of the bike. When other vehicle hits the bike forcefully pressure will be built on switch and occurrence of accident will be detected. GPS will provide coordinates of location where accident took place and this data will be sent to relatives using GSM. If bike ignition is off and if fuel is flow is detected then it will indicate that fuel is being theft. Similarly if bike is off and it is towed due to tilting of bike it will indicate that bike is towed. Accordingly in both the

cases GPS will provide location and message will be sent to owner via GSM. Relay is used for interfacing this circuitry to the bike .It is used to control turning ON and OFF of ignition of bike.If rider is in danger and needs help ,so to alert relatives /friends a panic switch is provided which will send an alert message to the same.Additional feature of cell phone charging is provided.

COMPONENT DESCRIPTION

MQ3 sensor

Basically, it has 6pins, the cover and the body. Even though it has 6 pins, you can use only 4 of them. .Two of them are for the heating system,i.e.pin H, and the other 2 are for connecting power and ground, they are pins A and B.When rider start the bike then the systemcheck the alcohol level of rider, if it sensed then the bike engine is not started that time. If it sense nothing then the system allows them to start engine.

GSM module

GSM module requires a SIM card just like mobile phones to activate communication with the network. In our system we are using GSM SIM 900. We are using GSM to inform family members about the accident and various other parameters like fuel theft, towing of bike and in case of emergency.The MODEM needs AT commands, for interacting with processor or controller, these are then communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends the result back after it receives a command.

AT commands is being used our project are : –

AT+CMGS= Sends an SMS message to a GSM phone

AT+CMGF = Sets the GSM modem in SMS Text Mode or SMS PDU Mode.

GPS module

We are using GPS1268 module. In case of accident GPS will give co-ordinates of location of accident which will be then send to the family members with the help of GSM.

HT12E

HT12E consists of a transmission enable pin which is active low. When the triggered signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable[8].

HT12D

HT12D changes serial data to its input to 12 bit parallel data. These 12 bit parallel data is divided into 8 address bits and 4 data bits.

Microcontroller

In our project we are using microcontroller 89S51.The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In-System Programmable Flash memory. Features of 89S51 are: 128 bytes of RAM ,4K bytes of Flash, 32 I/O lines, two data pointers, a five-vector two-level interrupt architecture, two 16-bit timer/counters, a full duplex serial port, on-chip oscillator, and clock circuitry [10].In case of accident , microcontroller (89S51) receives the data from the GPS receiver through UART. GPS provides details such as latitude and longitude. This information is then sent to rider's relatives or friends with the help of GSM module.

Background Work

- **Helmer Module:**

1. The three sensor alcohol, accident and helmet sensor are assembled. Here it will run with a power supply QV battery.

The 7805 is liner voltage regular IC connected to the circuit which converts 0V to 5V

2. This circuit also consists of RF transmitter , HT12E encoder sensors and regulator output from each of the sensor is connected to data input pine of encoder (ADa, AD10, AD4). Encoding will continuously encode there sensors value are fed to RF transmitter to transmit data to the ECO (electronic control unit).

- Push sensor is used here as helmet sensor i.e. it will detect the wearing of helmet. It must be push off type i.e. in normal condition, it will be ON and pushed off.
- Alcohol sensor must be placed in front of mouth to check content in break.
- Vibration sensor is used to detect accident. So the sensor should be placed on the helmet where vibration occurs when the helmet hits the ground.
- **ECU module**
 1. This system includes GPS module, GSM module, PIC microcontroller , RF receiver and decoder.
 2. RF receivers receive signals from the helmet module and are decoded by decoder HT12D.
 3. Decoder is directly connected to PORTE, it is continuously scanned by PIC and does the required actions.
 4. Relay is used to short the spark plug to ground; normally vehicle body is connected to ground.
 5. In normal case spark is shorted to ground, it will disconnected from ground only after wearing helmet and when no alcohol is detected.
 6. Vibration sensor is fixed on the helmet , if accident occurs it will detect and send signals through RF, it will send SMS to the specified number with the accident location and vehicle speed just before accident bad occurred.

Conclusion

The present situation in our country we not using this type of two wheeler and this technology to reduce the manual effort and human error, we need to have some kind of automated systems. Monitoring all the parameters and functioning, this application can rescue people hazardous situations. This project here is undertaken keeping in view of traffic and traffic rules and also safety of people. Implementation of this type of project by government serves a lot of time and saves the precious life.

Future work

In future if there is a huge requirement this type of helmets we can manufacture the whole circuit in printed circuit board, so that circuit becomes smaller and can be easily fitted into helmet. The circuit can also be used by solar power energy so that it uses green energy and does no harm. This type of helmet technology can be implemented for the combat helmet used by the soldiers working under extreme temperature.

REFERENCES

- [1] SudharsanaVijayan, Vineed T Govind , Merin Mathews, SimnaSurendran , Muhammed Sabah, "Alcohol detection using smart helmet system", IJETCSE, Volume 8 Issue 1 –APRIL 2014.
- [2] Road accidents in India 2015 <http://pibphoto.nic.in/documents/rlink/2016/jun/p20166905.pdf>
- [3] International Journal of Science and Research (IJSR) ISSN (Online): 23197064 Volume 3 Issue 3, March 2014
- [4] J. International Journal Of Computer Science And Applications Vol. 6, No.2, Apr 2013 ISSN: 0974-1011 [3] Sayeed and A.Perrig, Secure Wireless Communications: Secret Keys through Multi-path, Proc.IEEE Intl Conf.Acoustics, Speech Signal Processing, pp. 3013-3016, Apr.2008
- [5] International Journal of Scientific Engineering Research Volume 2, Issue 12, December-2011 1 ISSN 2229-5518
- [6] Drunken driving protection system International Journal of Scientific Engineering Research Volume 2, Issue 12, December2011 1 ISSN 2229-5518
- [7] Vehicle accident alert and locator International Journal of Electrical Computer Sciences IJECS-IJENS Vol: 11 No: 02
- [8] Manjesh N,Prof. Sudarshan Raj , "SMART HELMET USING GSM & GPS TECHNOLOGY FOR ACCIDENT DETECTION AND REPORTING SYSTEM" International Journal of Electrical and Electronics Research ISSN 2348-6988 Vol. 2, Issue 4, pp: (122-127), Month: October - December 2014, Research Publish Journals.

[9] A. Srikrishnan, K. Senthil Kumar and S. Ravi
CLOUD INCORPORATED SMART HELMET
INTEGRATED WITH TWO-WHEELER
COMMUNICATION SETUP,I J C T A, 2016, pp.
251-261

[10] Sivakumar, DHIVYA,“SMART HELMET
SYSTEM USING ALCOHOL DETECTION FOR
VEHICLE PROTECTION” ,international journal of
advanced science and engineering research
www.Ijaser.In volume: 1, issue: 1, june 2016 ISSN:
2455-928.

[11] Saravana Kumar K, Anjana.B.S, Litto.Thomas,
Rahul.K.V, “SMART HELMET”, International
Journal of Scientific & Engineering Research,
Volume 7, Issue 3, March-2016