

Design and Fabrication of “Smart Helmet”

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Abstract— The smart helmet is made to provide means and apparatus for detecting and reporting accidents. Sensors, Wi-Fi enabled processor and cloud computing infrastructures are utilized for building this system. It is designed for the safety and welfare of the society. The bike will not start if the rider is not wearing the helmet or has consumed alcohol. If any accident occurs the alert message will be sent to respective emergency number. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a cloud-based service. The vehicle location is obtained by making use of the global positioning system.

Keywords: Ubiquitous sensing, Accident location, Cloud Based Service, Smart Helmet, Alcohol sensor, Accident detection, Internet of Things

I. INTRODUCTION

The road accident is one of the major problems all over the world. The recent report says that the annual average road accident is estimated to be about 7,00,000 of which 10% occur in India. The annual statistics revealed by the World Health Organization (WHO) in its Global status report on road safety says that around 80,000 people are killed on Indian roads due to rush driving, drunken driving and less usage of helmets. The idea of developing this work comes from our social responsibility towards society. Considering three major factors for avoiding the accident causes such as I. Make wearing the helmet compulsory. II. Avoid drunk and drive. III. If person met with an accident, no one is there to help him. Simply leaving or ignoring the person he may die. In such situation, informing to ambulance or family members through mobile to rescue him for an extent. In this system we proposed a system which is based on concept of Internet of Things. IOT is comprised of smart machines interacting and communicate with other machines, object and environment.



Fig. 1:

II. LITERATURE SURVEY

[1] When the system is switched on, LED will be ON indicating that power is supplied to the circuit. The RF is used for start the two-wheeler firstly it checks whether the driver is drunken or not if drunken it will not allow to start two-wheeler. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information will be sent to a mobile number through a message.

[2] IOT has enabled us to connect our day to day devices in a network for a sole purpose to exchange data. Today a number of countries has made it mandatory to wear helmet while riding. In this paper, I describe a helmet which is made smart using latest IOT technologies. This helmet for the comfort of riders provide various functions such as Listening to the music on the go, sending SOS messages in case of emergency, use navigation services. Bluetooth Module is a wireless technology standard for exchanging data over short distances from fixed and mobile devices. Range is approximately 10 Meters (30 feet).

[3] In this paper we proposed a system that can detect an accident, detect the person is wearing helmet or not and rider is over-consumed alcohol. For this purpose, we use Arduino Uno as a Microcontroller and some onboard sensors- infrared sensor, breath analyzer, Accelerometer Sensor, and location tracking GPS. If Accident is occurred then the location of accident is tracked by GPS and sends the alert message to the nearest hospital with the location of accident. If person is not wearing a helmet or over-consumed alcohol then bike will not be start by stopping the ignition engine of bike.

[4] The prime objective of this paper is to force the rider to wear the helmet throughout the ride. So, this sense of moral responsibility towards the society, laid the foundation of this project “Smart Helmet based on IOT”. By implementing this system, a safe two-wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to driving bike after Consuming alcohol. a helmet may not be a 100% proof but is definitely the first line of defense for the rider in case of an accident to prevent fatal brain injuries.

[5] The Bluetooth transmitter will be placed in the helmet and the Bluetooth receiver at the vehicle. The main function is only if the person wears the helmet the bike will start the ignition system will enable. It can be detected by ultrasonic or infrared sensors. Alcohol sensor placed in the mouth region of the helmet interfaced, detects whether the rider is alcoholic or not, only when the rider is nonalcoholic the bike will start the ignition system, if (BAC>0.3) alcoholic level then it will disable. If anyone of the test condition fails that is helmet should be not worn, alcoholic then the bike will not start.

[6] It is an integrated circuit which is used to measure the acceleration with respect to the object where this accelerometer is attached. Here we use this accelerometer for accident detection by placing it to helmet and can be detected by tilting of helmet with respect to ground. When the rider has worn the helmet, the push button is pressed. Alcohol sensor measures the presence of alcohol in rider's breath. Accelerometer measures tilting of the helmet. The push button installed at the top of the helmet will provide signal to the microcontroller that the helmet is worn by the rider, if the signal from the push button is not received by the bike section the ignition of engine of the bike will not turn on. If the rider removes the helmet during the ride ignition of the bike will turn off.

[7] Sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilized for building the system. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. The vehicle location is obtained by making use of the GPS. The system promises a reliable and quick delivery of information relating to the accident in real time. Thus, it ensures greater safety for the motorists.

A. Conclusion Drawn from Literature Review

It is designed for the safety and welfare of the society. The bike will not start if the rider is not wearing the helmet or has consumed alcohol. If any accident occurs the alert message will be sent to respective emergency number.

III. GAP OBSERVED

In the earlier model of SMART Helmet there were individual helmets with these imbedded function like as alcohol detector and all but in our project we added all of those systems with some extra features which will be very much beneficial for the rider while riding and which will be in a great favor of MORTH (Ministry Of Road Transport and Highways) also the cost of helmet is compensated with the help of this technology as we have to buy a single helmet instead of 3-4 different helmets.

After going through the various research papers, we found that in future research we can also bring some modifications in our smart helmet like we can add up with the air filter which can allow fresh air to pass in through the helmet and we also add up with an assistant technology like of google assistant which will guide us on giving the command.

IV. COMPONENTS USED & SPECIFICATIONS

A. Accelerometer

This is a very low cost break out module for the ADXL335 triple axis accelerometer. This module includes optional header pins and provides easy access to the X, Y and Z axis analogue outputs from the accelerometer. It is capable of sensing forces up to 3g in all axis. A 3.3V onboard regulator is also provided allowing the module to be powered from a 3.3 to 5V power supply source.

B. Alcohol Sensor

MQ-4 sensor composed by micro AL₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-4 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current.

C. Global Positioning System

GPS receivers are used for positioning, locating, navigating, surveying and determining the time and are employed both by private individuals (e.g. for leisure activities, such as trekking, balloon flights and cross-country skiing etc.) and companies (surveying, determining the time, navigation, vehicle monitoring etc.). GPS (the full description is: navigation System with Timing and Ranging Global Positioning System, NAVSTARGPS) was developed by the U.S. Department of Defense (DoD) and can be used both by civilians and military personnel. The civil signal SPS (Standard Positioning Service) can be used freely by the general public, whilst the military signal PPS (Precise Positioning Service) can only be used by authorised government agencies. The first satellite was placed in orbit on 22nd February 1978, and there are currently 28 operational satellites orbiting the earth at a height of 20,180 km on 6 different orbital planes. Their orbits are inclined at 55° to the equator, ensuring that a least 4 satellites are in radio communication with any point on the planet. Each satellite orbits the Earth in approximately 12 hours and has four atomic clocks on board.

D. Relay

A relay is an electrical switch that uses an electromagnet to move the switch from the off to on position instead of a person moving the switch. It takes a relatively small amount of power to turn on a relay but the relay can control something that draws much more power. Ex: A relay is used to control the air conditioner in your home. The AC unit probably runs off of 220VAC at around 30A. That's 6600 Watts! The coil that controls the relay may only need a few watts to pull the contacts together.

E. Bluetooth

Bluetooth serial module is used for converting serial port to Bluetooth. These modules have two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands. HC-04 specifically includes: Master device: HC-04-M, M=master Slave device: HC-04-S, S=slaver.

The main function of Bluetooth serial module is replacing the serial port line, such as:

- 1) There are two MCUs want to communicate with each other. One connects to Bluetooth master device while the other one connects to slave device. Their connection can be built once the pair is made. This Bluetooth connection is equivalently liked to a serial port line connection including RXD, TXD serverio www.serverio.com

signals. And they can use the Bluetooth serial module to communicate with each other.

- 2) When MCU has Bluetooth slave module, it can communicate with Bluetooth adapter of computers and smart phones. Then there is a virtual communicable serial port line between MCU and computer or smart phone.
- 3) The Bluetooth devices in the market mostly are slave devices, such as Bluetooth printer, Bluetooth GPS. So, we can use master module to make pair and communicate with them.

V. PROPOSED METHODOLOGY

The time taken in making of this smart helmet is approximately equal to the normal making of an helmet and the approximate cost of this helmet is Rs. 3000. We have used IOT panel for sending the alert message on the embedded emergency number which fast in comparison with the GSM technology .

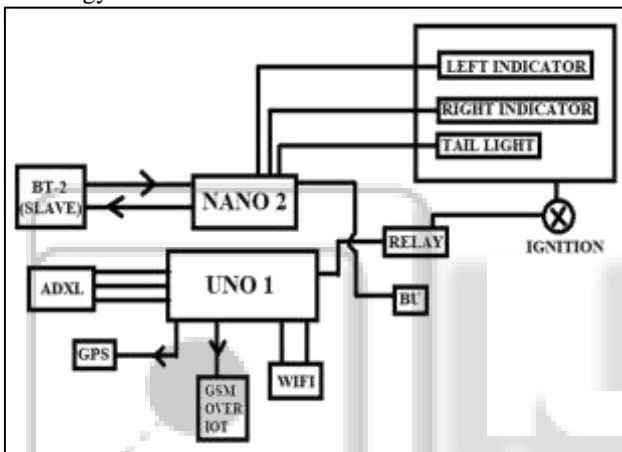


Fig. 2: Block Diagram bike

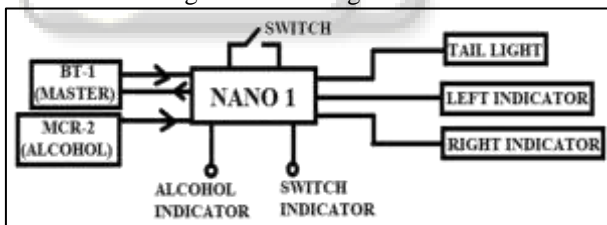


Fig. 3: Block Diagram of Helmet

VI. CONCLUSION

So finally through our project work we have concluded with following features-

- It is designed for the safety and welfare of the society. The bike will not start if the rider is not wearing the helmet or has consumed alcohol. If any accident occurs the alert message will be sent to respective emergency number.

REFERENCES

[1] Rutuja R. Maske, Krutika B. Shinde, Aamir A. Khan and Prof. J.R. Kamble, "Survey on Smart Helmet for Accident Detection Using IOT", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 6, Issue 9, September 2018.

[2] Manjesh N and Prof. Sudarshan Raj, "Smart Helmet Using GSM &GPS Technology for Accident Detection and Reporting System", International Journal of Electrical and Electronics Research, Vol. 2, Issue 4, pp: (122-127), Month: October - December 2014.

[3] C. Lekha, Divyanshu Bhardwaj, Ravi Ranjan Kumar and Sanjeev Kumar Yadav, "Development of Smart Helmet based on IoT Technology", IJSRD - International Journal for Scientific Research & Development, Vol. 6, Issue 08, 2018.

[4] Mr.Sethuram rao, Vishnupriya.S.M , Mirnalini.Y and Padmapriya.R.S, "THE HIGH SECURITY SMART HELMET USING INTERNET OF THINGS", International Journal of Pure and Applied Mathematics, Volume 119 No. 12 2018, 14439-14450.

[5] Mohammed Khaja Areebuddin Aatif and Ainapurapu Manoj, "Smart Helmet Based On IoT Technology", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 5 Issue VII, July 2017.

[6] Akshatha, Anitha, Anusha, Prema and Rumana Anjum, "Smart Helmet for Safety and Accident Detection using IOT", International Research Journal of Engineering and Technology (IRJET), Volume: 06 Issue: 03 | Mar 2019.