Implementation of High-Tech Hard Hat & Intelligent Ideal of Motorbike

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Abstract: The principle brunk when a motorbike includes in a fast mishap without wearing a cap is exceedingly unsafe and may cause casualty. By wearing the protective cap, it decreases the stun from the brunk and recoveries the life. There are numerous nations arraigning administration that requires the motorbikes rider to wear their protective cap while riding on their motorbike. The best case for this standard is the Malaysia. With this judgment, this proposed work is particularly created as to update the security of the motorbikes rider. Additionally, this shrewd cap which is a defensive head gear utilizes propelled highlights like liquor identification, area following, and use as a sans hands gadget, and with fall recognition which makes it as a keen cap as well as with an element of brilliant bicycle. The rider should necessarily wear his or her very own cap, on the grounds that without this head protector start framework can't be ON. A Radio Frequency module is utilized as an open remote connection between the transmitter and recipient. On the off chance that the rider lushes the start switch in the protective cap is consequently bolted and naturally sends message to their enlisted portable numbers with their present area. At the point when a mishap happens message will be sent to their enlisted versatile numbers through Global System for Mobile module (GSM) and to locate their present area by utilizing the Global Positioning System module (GPS). The unmistakable administration of this undertaking is of a fall recognition which essentially recognizes the fall of the driver from the motorbike; it will consequently send the message to their enrolled portable numbers.

Key Words: Alcohol sensor, Global Positioning System module, Global System for Mobile module, Peripheral Interface Controller 16F877A, Push button, Radio Frequency transmitter and receiver, Vibration sensor.

1. INTRODUCTION:

In this modern day, the road accidents are becoming the sizable complications in all over the world due to the absence of the hard hat. The modern review conveys the annual average road accident is predicted to about 7, 00,000 of which 10% crop up in India which has overwhelmed by China [1]. But in the unsubstantial countries, road traffic accidents are the ultimate serious cause of scars, ranking 11th among the ultimate important cause of lost years of healthy life. These accidents implicate crash between vehicles and animals, vehicles and pedestrians or vehicles and fixed obstacles. In Indian road systems, extension of roads is not at all a surrogate to elude traffic in such a cities. The difficulty with the state drunk driving control systems can clears up in peculiar ways [2].

Due to this contention, we put a prong to this misery. We have developed the hard hat for the motor cycle, a way to chunk starting of vehicles without draining hard hat or even if the driver is boozed. In accession, it has a great highlighted of detecting accidents and instructs specific kin via SMS with spot and agility of the bike before the accident occurs with the help of GPS and GSM based on scout system, thus aiding ambulance to reach the precise spot [3]. We have implemented all the sensors within the hard hat, which will dispatch the instruction to the module connected with the bike engine wirelessly. A parade is provided to monitor the status.

By using this hard hat, we can curtail the drunk and drive accidents. When an accident occurs memo will be sent to their cataloged numbers by using the GPS, GSM based tracking system. If the driver is not draining the hard hat the motor bike will not get started, by this scheme we can curtail the accidents. If the person had consumed the alcohol, then the sensor will detect the consumption of alcohol so that the motor bike won't get started. This motor bike hard hat system has two modules, one on the hard hat and other on the bike. Vibration sensor, push button sensor and alcohol sensor are fixed with the hard hat module. GPS and GSM are associated with the module on the bike that has parade to monitor status. These two modules communicate wirelessly using RF transmitter and receiver with encoder and decoder, PIC 16F877A is used as CPU.

2. RELATED WORKS:

Mr.Bhosale Nilesh T. proposed system in which the intelligent helmet ensures the safety of the biker by making it necessary to wear the helmet and assure that rider hasn't consume any alcohol and detection of accident and late medical help. This system is implemented by using Arduino [11]. The main drawback in this

system is, when the alcohol exceeds permissible range ignition cannot start, it won't detect the less consumption of alcohol.

Mr.Parul Nagarkar introduced the system which can detect accident and helmet. When the vehicle meets with an accident immediately the accelerometer detects the signal and a short message along with the location with of the rider will be sent to the predefined number using GSM modem and Bluetooth [12]. Limit switch is placed in the helmet which will detect whether the rider has worn the helmet are not, if not then the bike won't start, but the author didn't focus on the alcohol detection.

Mr.Tushar Raut demonstrated the smart helmet working, which makes the motorcycle driving safer than before; this is implemented using GSM and GPS technology [13]. In this system the author had discussed about the alcohol level of the drunken people who is riding the bike and about the accident detector in which the sensor will active the GPS and find the location and further SMS will send to ambulance or family members, but he didn't discuss about helmet detection.

Deekshita N M research was carried out to avoid the accidents and to improve the safety of the motorcycles rider. This project only concentrated on only one specific purpose that is an accident [14]. Whenever the accident will occur then accident spot will be note down and information will send out on the noted mobile number and it also uses buzzer for indication purpose, but they didn't focus on other features.

Mr.Kushal Kumar in this the author introduced about accident and speed of the vehicle. The project will be monitoring the areas in which vehicle will be passing. On entering any cautionary areas like schools, temples, the speed of the vehicle will be controlled to a pre-defined limit you also discussed about accidents which is generally happens due to drink and drive but he didn't focus on helmet and alcohol detection [15].

S. Vijay Murugan, K.G. Lavanya has done "An Intelligent Environmental Novelty System Using Mobile Technology for WarFields". In this, the proposed robot is self-fueled and controlled through remote innovation. The usage of this robot is powerful to use in protection. Since this multipurpose controller is planned with a few capacities by utilizing the GSM module, AT89S52 and so on, on a solitary stage [18].

3. PROPOSED WORK

The research works made by Prof. Shelke have implemented the smart helmet at Feb 2018 in which the motor cycle will not start without wearing the helmet. The main con of this idea is it includes accident and alcohol detectors separately and also the ultrasonic sensor used is very costly.

The originator Mr.S.Sachin, Mr.Sahasranaman Unni have published Smart helmet with sensors at May 2017 which uses an alcohol detection sensor and ultrasonic sensor is used for detection of the riders head and alcohol content[8]. But the main con is that the originator didn't focus on accident detection though it is a main issue.

The thesis, Helmet using GSM and GPS technology for accident detection and reporting system by Lakshmi Devi.P and Jeevan.M implemented on May 2016 is only concentrated on accident detection[16]. The major cons of this project are they are not using any display device and cost of the helmet is very high since helmet is used for only one purpose.

In this theory, the Author Nitin Agarwal, Anshul Kumarsingh has figured only on governing the vehicle speed but not on the major issues like alcohol and accident detection in Smart Helmet on May 2015[9].

The originator, Sudharsana Vijayan and Vineed T Govindh uses alcohol sensor for detecting alcohol concentration present in drivers breathe in Alcohol detection using smart helmet system on April 2014 and no testing methodology has been adopted to the drunken drive accidents that occur outside the cities [7].

To overcome these cons, the concept of this design "Implementation of High-Tech Hard Hat and Intelligent Ideal of Motorbike" is to first inquiry if the rider wears the hard hat or not, in the surrogate wrangle the fling of the riders head inside the hard hat [5]. Conjointly this design has two units, one is the Helmet Unit which acts as the Transmitter Section and the other is the Engine Control Unit which acts as the Receiver Section.

Dossier from hard hat will be transmitted wirelessly to the motorbike [6]. Bestow to the assorted sensor input the microcontroller will determine the operation of the other blocks.

3.1 HELMET UNIT:

Helmet unit which is shown in the figure 3.1.1 acts as the transmitter unit in which it is set-up on the hard hat. This circuit contains RF transmitter, Encoder, sensors and regulator. The sensors like vibration, alcohol and the helmet sensor or push button are implemented in this unit. Alcohol sensor which is also known as a gas sensor that is stowed beside the mouth in which it acts as the breath analyzer to detect the alcohol sensation. Accident sensor is the vibration sensor and it is stowed on the upper end of the hard hats head. This vibration module based on the vibration sensor SW-420 and Comparator LM393 to recognise if there is any vibration that ahead the threshold if there is no vibration this module output logic low [4]. Helmet sensor is also known as push button, in which it is positioned interior to the helmet which touches the upper end of the skull which is responsible for regulating some aspect of a machine or a process.
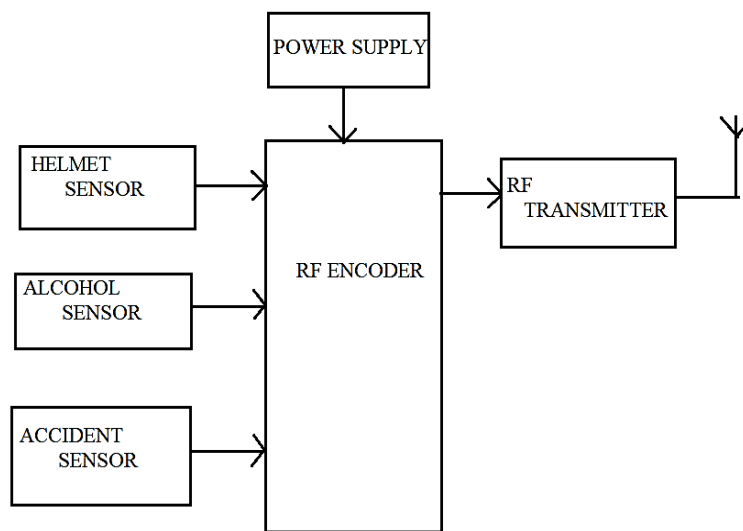

Figure. 3.1.1 Block Diagram of Helmet Unit

Encoder HT640 is an integrated circuit of 2^{12} series of encoder. It is mainly used in interfacing RF and infrared. RF module functions at radio frequency. Transmission through RF is finer than infrared. The 7805 linear regulator IC connected to the circuit will convert 9V to 5V.

In this circuit the input signal to be encoded is given to AD7-AD0 input pins of encoder. Here the input signal may be from key board, parallel port, microcontroller or any interfacing device. The encoder output address pins are shorted so the output encoded signal is the combination of (A0-A9) address signal and (D0-D7) data signal. The output encoded signal is taken from 8th pin which is connected to RF transmitter section.

All the sensors we have used here is digital to makes our system easier. Push button is used here as helmet sensor i.e. it will perceive the wearing of helmet. It must be push off type i.e. in median condition it will be ON and when pushed it will be OFF. Gas sensor must be implanted in front of the mouth to inspect alcohol content in the breath. Vibration sensor is used to perceive accident at the range of 4GHz, so it should be implanted on the helmet where vibration crops up when the hard hat bangs the landscape.

3.2 ECU UNIT:

Engine control unit shown in the figure 3.1.2 acts as a receiver unit, which is set-up on the motorbike. Peripheral Interface Controller 16F877A is used in this unit. Technology that is used here is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other main features of PIC 16F877A. RF receiver and decoder are used to receive the signals from helmet unit [17]. Visual indication and relay are implemented in this module. The LCD display used in this project consists of 2 rows. Each row consists of maximum 16 characters. By using this display only maximum of 32 characters can be displayed. The relay common pin is connected to supply voltage. The normally open (NO) pin connected to

load. When high pulse signal is given to base of the Q1 transistors, it conducts and shorts the collector and emitter terminal and zero signals is given to base of the Q2 transistor. So the relay is in turned OFF state. In normal case spark plug is shorted to landscape, it will dissociate from landscape only after wearing hardhat and when no alcohol is detected.
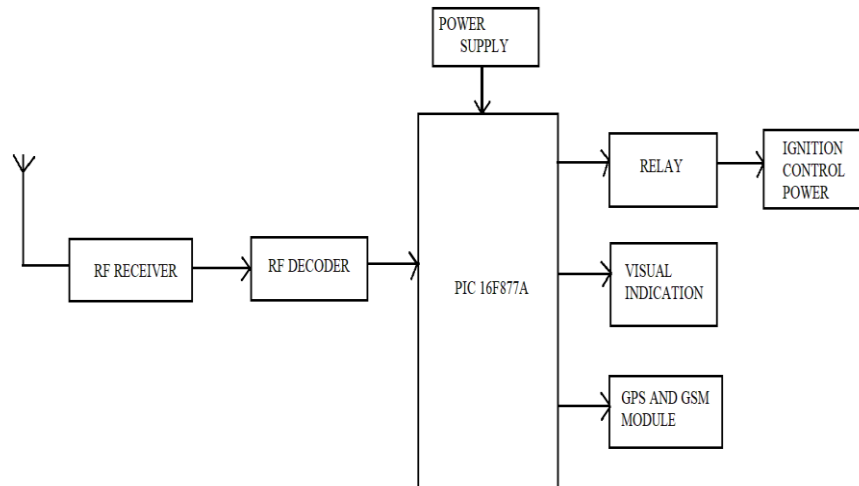

Figure. 3.2.2 Block Diagram of Engine Control Unit

This unit will receive the RF signals from the helmet unit. This RF signal, received by the RF receiver which have the frequency range of 434 MHz and sends the signals to the decoder HT12D which converts the signal from analog to digital and passes the signal to the controller. Based on the signal received by the PIC 16F877A this unit starts its work if the rider doesn't wear the helmet then the PIC will display a command by using the visual indication as no helmet, please wear it. If the bike has fallen down then the helmet receives the signal and displays as accident detected in the visual indication. If the rider is drunken then the signal receives and displays as alcohol detected.

This system comprises GPS module, GSM module, PIC microcontroller, RF receiver and decoder. The controller consists of 5 ports. The directions of the ports are controlled by using TRIS(X) registers. Setting a TRIS(X) bit '1' will set the corresponding PORT(X) bit as input. Clearing a TRIS(X) bit '0' will set the corresponding PORT(X) bit as output. PORT A is a 6 bit bidirectional port. PORT B is 8-bit wide bidirectional port; it is connected to LCD display. PORT C is a 8-bit wide bidirectional port which is connected to GPS and GSM modules. PORT D is also a 8-bit bidirectional port and is connected to spark plug. RF receivers receives signals from the helmet module and are decoded by decoder IC HT12D.Decoder is unswervingly connected to PORTE, it is incessantly scanned by PIC and does the obligatory actions. Vibration sensor is immotile on the hard hat, if accident ensues it will detect and post signals through RF, it will send SMS to the specified number with the accident location and vehicle speed just before accident had occurred. LCD display expos the status of the system- detection of alcohol, accident detection, speed of the vehicle and accident location. This are main two modules in this circuit, PIC16F84A is a microcontroller to control the entire component in the system. Only when the rider buckled the hard hat then only the motorcycles engine will start.

4. RESULTS & DISSCUSIONS:

This project is developed using embedded systems and all the modules were designed and all the components were assembled as shown below. The testing of each module was carried out successfully. The serial data from all the sensors was successfully recorded and analyzed. Thus the testing phase was completed and this study was performed in a controlled manner.

Figure. 4.3 Helmet Unit

The above figure 4.3 shows the transmitter section viz. the helmet unit in which this transmits the memo to the receiver part for the further task to accomplish.
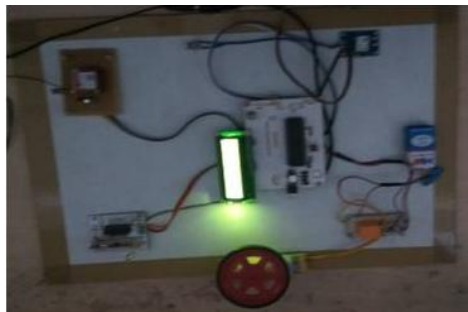

Figure. 4.4 Engine Control Unit

The above figure 4.4 is the receiver section viz. the Engine Control Unit . By receiving the memos if any blunder eventuates, then the engine will cease and a message will displayed on LCD display and ravines to the registered mobile number.If the rider doesn't wear the helmet, then the LCD display displays the message as shown in the figure 4.5

Figure. 4.5 Lcd Display of Helmet Detection

After the rider wears the helmet the vehicle gets on and the LCD will display as shown in the figure 4.6 (a). If the rider meets with a brunk the LCD will display as shown in figure 4.6 (b) below and the vehicle will not start.After detecting, the above message will sent to the registered mobile number's which is displayed in the LCD as shown in figure 4.6(c).

(a)   (b)   (c)

Figure. 4.6 (a) Lcd Display of Vehicle On, (b) Accident Detection (c) Sms Sending

The vehicle alert message will be received by the registered mobile number such that the information regarding the rider's accident will be known to them. Thus the will alike figure 4.7.
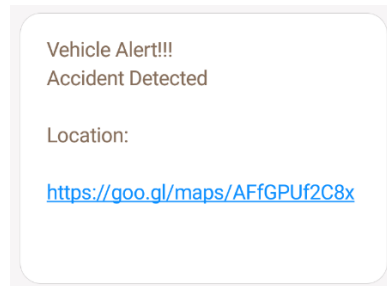
Vehicle Alert!!!
Accident Detected

Location:

https://goo.gl/maps/AFfGPUf2C8x

Figure. 4.7 Screenshot of Message

If the rider has consumed the alcohol the vehicle will not get started and LCD will displays as shown in the figure 4.8. After detecting the above message will sent to the registered mobile number's which is displayed in the LCD as shown in figure 4.6(c).

ALCOHOL DETECTED

Figure. 4.8 Lcd Display of Alcohol Detection

The vehicle alert message will be received by the registered mobile number such that the information regarding the rider's consumption of alcohol will be known to them alike figure 4.7.

5. FUTURE ENCHANCEMENTS

In future, if there is an enormous appeal for this persuasion of hard-hats we can fabricate the whole circuit in printed circuit boards, so that circuit becomes and can be easily fitted into hardhat. The circuit can also powered by solar energy so that it uses green energy and doesn't harm to environment. The flexible solar panels can fixed all along surface of hard hat for power supply. By using power supply we can charge our mobile. This persuasion of hardhat technology can be implemented for the combat hardhats used by the soldiers working under extreme temperatures.

Moreover we can contrivance peculiar biometric sensors on the helmet to measure various activities. We can capitalize live camera at right corner of the glass of hard hat for seeing the blind curves in the hilly areas. It can also be used for passing message from one vehicle to another vehicle by using wireless transmitter. Calls are also depleted through wireless transmitter such that the rider's concentration will not be diverted.

In this project a smart hard hat using GSM and GPS technology is designed successfully. The project made compulsory of wear helmet to start the ignition of vehicle and while riding if there is any sudden change like accident occurred or if the rider consumes alcohol while driving or if the rider didn't wear helmet a short message with the location of rider will be send to the predefined number using GSM module. This is a situation where we found some solution to the problem of increased death ratio.

6. CONCLUSIONS:

We have conducted a proof-of-concept inquiry to demonstrate that electrodes mounted to the inside of a motorcycle hardhat can reliably detect the accident, consumption of alcohol and the first and foremost is to detect the presence of hardhat in riders head. This project has a marvelous real-life outlook[10]. It aids in downsizing the lot of road brunks of two wheelers as it is the dominant cause of the fatality in this exclusive cosmos. It additionally helps to avert the bruise ensues in vehicle by the brunks. So this helps in curbing the road brunks by implementing mandatory hardhat protection and detection of alcohol smug during the starting on the bike. This project here is tackled observance in glimpse of traffic, traffic rules and safety of people. Implementation of this persuasion of project by the government vaults a lot of time for traffic police and most importantly emancipates the precious life of a person as one candor run the vehicle without wearing the hardhat or if he consumed alcohol. Family members will be informed as well through SMS.

REFERENCES:

[1]. Prof.Shelke have published "Smart helmet" in International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 02 Feb 2018.

[2]. Mr.S.Sachin, Mr.Sahasranaman Unni have published "Smart helmet with sensors" in International Research Journal of Engineering and Technology (IRJET) Volume: 04, Issue: 05 May 2017.

[3]. Lakshmi Devi.P, Jeevan.Mhave published"Helmet using GSM and GPS technology for accident detection and reporting system" inInternational Journal on Recent and Innovation Trends in Computing and Communication Volume: 04, Issue: 05 May 2016.

[4]. Nitin Agarwal, Anshul Kumarsingh have published "Smart Helmet" inInternational Research Journal of Engineering and Technology Volume: 02, Issue: 02 May 2015.

[5]. Mr.Sudharsana Vijayan, Mr.Vineed T Govindh have published "Alcohol detection using smart helmet system" in International Journal of Engineering Technology in Computer Science and Electronics (IJETCSE) Volume: 08, Issue: 01 April 2014.

[6]. Manjesh N, Prof. Sudarshan raju C H M have published "Safety measures for two wheelers by Smart Helmet and Four wheelers by Vehicular Communication" in TechNATIONAL CONFERENCE on Developments, Volume: 03 Issue: 05 January 2015.

[7]. Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari have published "Smart Helmet with Sensors for Accident Prevention" in Faculty of Electrical Engineering University Technology MARA40450 Shah Alam Selangor, Volume: 04 Issue:03 February 2014.

[8]. Mr.P.Dileep Kumar, Dr.G.N.Kodanda Ramaiah Mr.A.Subramanyan, Mrs.M.Dharani have published "A Solar Powered Smart Helmet with Multifeatures" in International Journal of Engineering Inventions e-ISSN: 2278-7461, p-ISSN: 2319-6491 Volume 4, Issue 10 [June 2015] PP: 06-11).

[9]. Ping Li, Ramy Meziane, Martin have published "A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection" in J.-D. ISSN 2319 – 2518 www.ijeetc.comVolume. 4, Issue 02, April 2015© 2015 IJEETC.

[10]. Sudarshan K and Kumara guru Diderot P have researched "Helmet for Road Hazard Warning with Wireless Bike Authentication and Traffic Adaptive Mp3 Playback", in International Journal of Science and Research (IJSR), Vol.3, No. 3, ISSN (Online): 2319-7064.

[11]. Vijay J, Saritha B, Priyadharshini B,Deepeka S and Laxmi R 2011 have did, "Drunken Drive Protection System", in International Journal of Scientific & Engineering Research, Vol. 2, No. 12, ISSN: 2229-5518.

[12]. Harish Chandra Mohanta, Rajat Kumar Mahapatra and Jyotirmayee Mudulihave published "Anti-Theft Mechanism System with Accidental Avoidance and Cabin Safety System for Automobiles", in International Refereed journal of Engineering and Science IRJES, Vol. 3, No. 4, pp. 56-62.

[13]. Tushar Raut, Indrani Nikose ,Reena Bisen,Varsha Deshmukh, Ashwini Damahe , Pranoti Ghotekar have published "Smart Helmet Using GSM and GPS Technology"in International Journal of Advanced Research In Computer & Communication (IJESR/FEB 2017/ Vol-6/Issue-2/3297:2007) e-ISSN 2278-1021, p-ISSN 2319-5940.

[14]. Lakshmi Devi P, Bindushree R, Deekshita N M, Jeevan M,Likhith have published "Helmet using GSM and GPS technology for accident detection and reporting system." in International Journal On Recent And Inovation Trends In Computing And Communication, (Volume-4, Issue-5, May-2016) E-ISSN:2321-8169.

[15]. Abhinav Anand, Kumar Harsh, Kushal Kumar, and Sourav Gouthi have published "Microcontroller based smart wear for driver safety" in International Journal Of Research In Engineering And Technology,   E-ISSN: 2319-1163, p-ISSN: 2321-7308.

[16]. Saravana Kumar K, Anjana.B.S, Litto Thomas, Rahul.K.V have published "Smart Helmet" in International Journal Of Science, Engineering And Technology Research, Volume-5, Issue-3, March-2016.

[17]. Nitin Agrawal, Anshul Kumar Singh, Pushpendra Pratap Singh, and Rajesh Sahanihave published "Smart Helmet" in International Research Journal Of Engineering And Technology, Volume-2, Issue-2, May-2015, and E-ISSN: 2395-0056. P-ISSN: 2395-0072.

[18]. S. Vijay Murugan, K.G. Lavanya has done "An Intelligent Environmental Novelty System Using Mobile Technology for WarFields". In international journal of engineering research and technology (IJERT) ISSN:2278-0181 vol.2 Issue 10, Oct-2013.