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SMART HELMET USING IOT

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Abstract:
A smart armor helmet has been developed that is able to detect hazardous event while driving. In the development of helmet we have consider the two main types of hazardous such as alcohol detection, accident detection. The first is the concentration level of alcohol. The second accident detection was preferred when the driver met with any accident. As a result, the existing proposals very few have been implemented and tested in the real-world, identifying the existence of a gap between theory and real world application at scientifically accepted level. In order to execute the entire system, the system is divided into units. mems sensor is used for accident detection and send the notification to the parents or emergency care. MQ3 is nothing but a alcohol sensor which is used to detect the consumption of alcohol . It is mainly used due to generate Challan when ever alcohol is detected. Data processing unit, the ESP32 micro controller which is used to get all the data from the above all sensors and concludes whether needs any intimation or alert unit from user wearing it and a 24x7 GPS tracker for security and intimation. Wifi unit is used to transfer the data from the processing unit and sends as a notification to the authority via blynk app. It is achieved through The transmission over IOT and it was successful at distances more than double than were specified.
Keywords: Helmet, IOT, smart, micro controller, blynk app.

I. INTRODUCTION

As pert the global report of WHO (World Health Organisation's) on road safety, India has the highest number of road accidents in the world and has overtaken China in the process. Out of all these accidents 98.6% of bikers died due to major injuries to brain. If we look on accidents statics in India for last 5 year, we realised that there were one death in every 4 minutes due to road accident and drunken driving is also major cause of accident. To reduce the deaths due to accident government comes with 'no helmet no petrol' act but public goes against with this act and after sometimes this act was vanished. Traffic police are also unable to cover all the roads. So, we proposed smart helmet as a solution of this problem. The system includes helmet which is mandatory to start the ignition of bike. The drunken driving is another main cause of accident. This system also has a solution for this. This provides locking of ignition of bike when drunken driver try to start the bike. There is some existing safety system for cars like airbags this project is all about the riders' safety. WHO revealed that drunk driving, speeding, and low use of helmets, seat belts are the main contributing factors of accident [3]. Basic idea for developing this system came from 'Alcohol Detection using Smart Helmet System'. This system developed to detect drunken driver. It uses microcontroller for controlling purpose and RF communication to communicate between bike and helmet. ESP32 board is tool that is easy to interface with sensor.

II. LITERATURE SURVEY

1. Smart Helmet: For Driver Safety 1 Shrutika S. Ghosalkar, 2 S. L. Nalbalwar, 3n.S.Jadhav.
In India, common man uses motor cycles as affordable vehicle for travelling. As per the Indian Population the ratio of middle class people is more. The ratio of accidents occurs due to motor cycle are more as compared to other vehicles. These accidents happens due to many reasons like high speed of the bike, drunk and drive cases and last because of not wearing helmets during driving.

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The solution to these problems is smart helmet. The main objective of this work is to develop smart helmet to provide safety of these people. The helmet is mandatory to wear to start ignition of bike. Smart helmet is protective headgear use by biker to make driving safe. This System has two modules, bike module and helmet module. Helmet module which will help to detect helmet is wear or not and drunken biker. The bike will start only when helmet is wear by non drunken rider. The novel of this smart helmet includes GSM, GPS and vibrations to detect accident. As GPS is connected to helmet the location of rider is send to relatives via GSM when rider caught in accident.

2. World report on road traffic injury prevention Edited by Margie Peden, Richard Scurfield, David Sleet, Dinesh Mohan, Adnan A. Hyder, Eva Jarawan and Colin Mathers

In 2004, World Health Day, organized by the World Health Organization, will for the first time be devoted to Road Safety. Every year, according to the statistics, 1.2 million people are known to die in road accidents worldwide. Millions of others sustain injuries, with some suffering permanent disabilities. No country is spared this toll in lives and suffering, which strikes the young particularly. Enormous human potential is being destroyed, with also grave social and economic consequences. Road safety is thus a major public health issue throughout the world. World Health Day will be officially launched in Paris on 7 April 2004. France is honoured. It sees this as recognition of the major efforts made by the French population as a whole, which mobilized to reduce the death and destruction it faces on the roads. These efforts will only achieve results if they are supported by a genuine refusal to accept road accidents fatalistically and a determination to overcome all-too-frequent indifference and resignation. The mobilization of the French Government and the relevant institutions, particularly civic organizations, together with a strong accident prevention and monitoring policy, reduced traffic fatalities in France by 20%, from 7242 in 2002 to 5732 in 2003. Much remains to be done, but one thing is already clear : it is by changing mentalities that we will, together, manage to win this collective and individual struggle for life.

3. Smart helmet for safe driving Keesari Shravya(1) , Yamini Mandapati(2) , Donuru Keerthi(3) , Kothapu Harika(4) , and Ranjan K. Senapati(5)

A smart helmet is a type of protective headgear used by the rider which makes bike driving safer than before. The main purpose of this helmet is to provide safety for the rider. This can be implemented by using advanced features like alcohol detection, accident identification, location tracking, use as a hands free device, fall detection. This makes it not only a smart helmet but also a feature of a smart bike. It is compulsory to wear the helmet, without which the ignition switch cannot turn ON. An RF Module can be used as wireless link for communication between transmitter and receiver. If the rider is drunk the ignition gets automatically locked, and sends a message to the registered number with his current location. In case of an accident it will send a message through GSM along with location with the help of GPS module. The distinctive utility of project is fall detection; if the rider falls down from the bike it sends a message.

*4. Development of Smart Helmet Using Iot Technology for Safety and Accident Detection Sterlin Minish *1, K Eshwar*2, Karthik M*3, K Ravivarma*4, K Venugopal*5 , K Lohith*5*

The aim of this paper is to determine Road accidents are increasing day by day because the riders are not using the helmet and due to consumption of alcohol. In today's world, huge numbers of people are dying on road accidents. By using smart helmet, the accidents can be detected. The main target of the project is designing a smart helmet for accident avoidance and alcohol detection. 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 have made it mandatory to wear helmet while riding. In this project we describe a helmet which is made smart using latest IOT technologies. This helmet for the comfort of riders provide various functions such sending messages in case of emergency like accidents in blynk , sending current location through GPS (latitude and longitude) and it also

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checks riders body temperature which most essential in this covid19 situation .In case the rider has consumed alcohol means our proposed system will turn of the vehicle (like DC motor will not turn on) and if the accident occurred means also the vehicle will not turn on. Here we are representing vehicle through DC motor. The whole proposed system will work only when the rider wear the helmet otherwise none of the functionalities will work and the vehicle also will not turn on if the rider is not wore the helmet. All these parameters will be send to the blynk server through wifi by the microcontroller and we can monitor them in the blynk app in any android phone.

5. *Smart Helmet using IoT Guntupalli Sireesha*

As we know India is second most populated country and has a large youth population, nowadays youth are fond of bikes and because of fashion, they neglect wearing helmet. Because of these, bike accidents are increasing day by day which causes deaths. Major deaths are due to head injuries which can be prevented by wearing a helmet. Drunk and drive cases are becoming more, which causes accidents and due to lack of negligence where an accident occurs and people are dying. These incidents made us develop a smart helmet using internet of things which reduce the accidents and risk of deaths, which has following features, the bike starts only if the rider wears a helmet if the rider is over drunken then the ignition will be automatically offed and if any accident occurs then through GSM modem it will send the message to the registered contact number by using a sim card.

III. EXISTING SYSTEM

Wearing a helmet puts a pressure on the helmet, and a data signal is sent to the transmitter, which causes the bike ignition control to switch on.

However, there are certain disadvantages to the technology: By putting any artificial substance inside the helmet, pressure can be created. Instead of wearing a helmet, the rider can provide the appropriate pressure by inserting any dummy material into the helmet. As a result, the primary goal of starting the bike while wearing a helmet might be easily overlooked.

IV. PROPOSED METHODOLOGY

The system is divided into units. mems sensor is used for accident detection and send the notification to the parents or emergency care. MQ3 is nothing but a alcohol sensor which is used to detect the consumption of alcohol . It is mainly used due to generate Challan when ever alcohol is detected. Data processing unit, the ESP32 micro controller which is used to get all the data from the above all sensors and concludes whether needs any intimation or alert unit from user wearing it and a 24x7 GPS tracker for security and intimation. Wifi unit is used to transfer the data from the processing unit and sends as a notification to the authority via blynk app.

V. HARDWARE COMPONENTS

Block Diagram:

Block illustration correspond of two units Helmet unit and Vehicle unit. Helmet unit correspond of RF encoder, RF transmitter, pressure sensor, Alcohol sensor. Vehicle unit correspond of RF receiver, Tilt sensor, GSM, GPS, Rain drop detector, Motor

motorists, LCD display, Servo motor, Power force. The whole system is controlled by Arduino Uno unit. Different functions are controlled by using detectors. The Arduino UNO is placed in the Vehicle unit. The inputs from different detectors are givento Arduino unit and which is analyzed by the Arduino andgiven to the Vehicle unit by RF transmission. The power force is given to the Vehicle unit.

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Receiver Module (Bike)

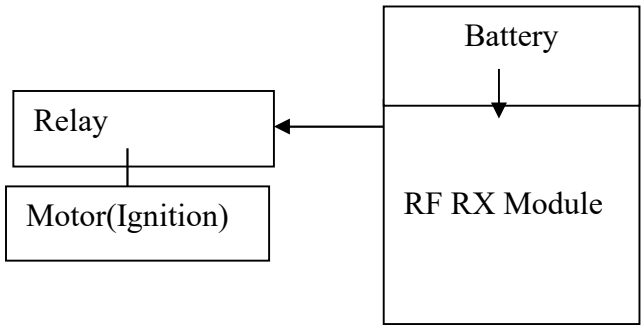

Fig 1 Block Diagram of Receiver Module (Bike)

Transmitter Module

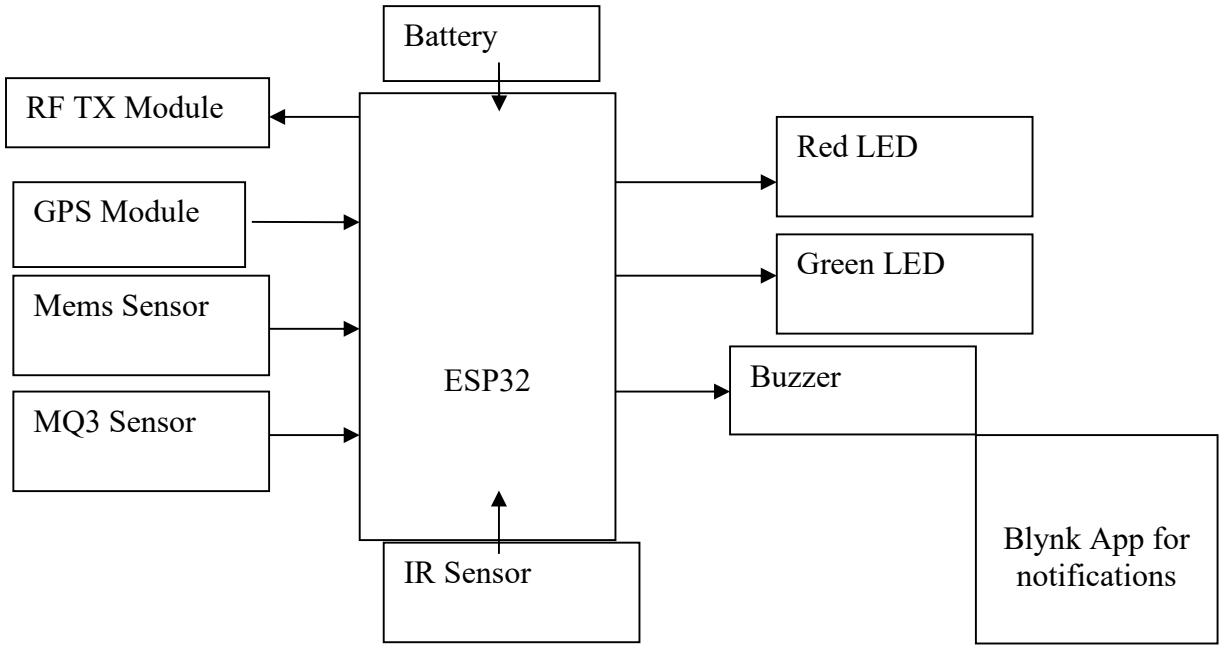

Fig 2 Block Diagram of Transmitter Module

ESP32

When we think about using a microcontroller for a project we usually consider an Arduino. It's inexpensive, easy to use and has a generous number of digital I/O ports, and a few analog inputs as well. But the Arduino, for all of its wonderful benefits, is lacking in a number of areas. The first one is speed, the popular Arduino AVR series of boards run at 16 MHz. That's certainly fast enough to build thousands of applications, but it's a bottleneck for others.

The Arduino certainly has enough digital outputs and inputs to satisfy most requirements, and its analog inputs are also useful. But adding features like WiFi and Bluetooth requires external components. Let's face it, the Arduino has been around since 2005. That's fifteen years, which in terms of technology is one.

The ESP32 is actually a series of microcontroller chips produced by Espressif Systems in Shanghai. It is available in a number of low-cost modules.

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Fig 3 ESP-WROOM-32 Module

Piezo-Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarms, timers and confirmation of user input such as a mouse click or keystroke. A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to “driver” circuits which varied the pitch of the sound or pulsed the sound on and off.

Fig 4 Piezo-Buzzer

Gps (Global Positioning System)

The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth.

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Fig 5 GPS

GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on Earth, and the GPS receivers owned by users. GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time.

DC Motor

A DC motor is an electric motor that runs on direct current (DC) electricity. In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

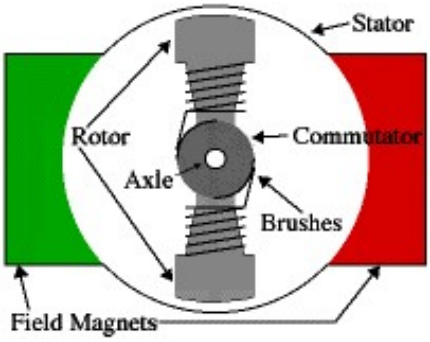

Fig 6 DC motor

Mq3 Alcohol Sensor

The Grove - Gas Sensor(MQ3) module is useful for gas leakage detection (in home and industry). It is suitable for detecting Alcohol, Benzine, CH4, Hexane, LPG, CO. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer. This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air. It's conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. This module provides both digital and analog outputs. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc.

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Fig 7 Mq3 Alcohol Sensor

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

Rf Module

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). In generally, the wireless systems designer has two overriding constraints: it must operate over a certain distance and transfer a certain amount of information within a data rate. The RF modules are very small in dimension and have a wide operating voltage range i.e. 3V to 12V.

Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

This RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

The RF module is often used alongwith a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.

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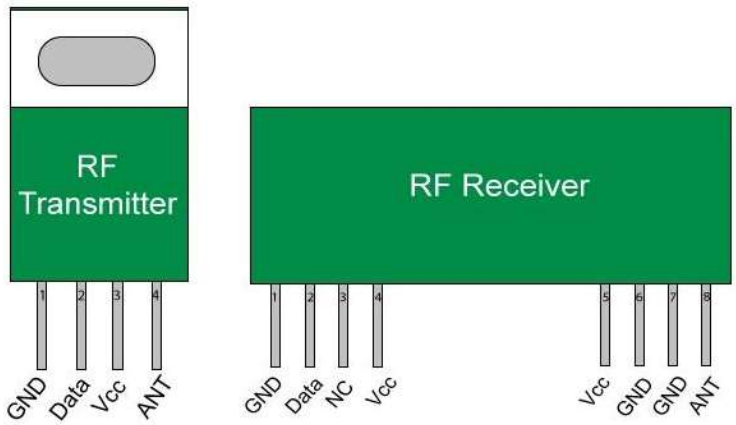

Fig 8 Pin Diagram of Rf Module

MEMS

MEMS (micro electro-mechanical systems) technology has gone from an interesting academic exercise to an integral part of many common products. But as with most new technologies, the practical implementation of MEMS technology has taken a while to happen. The design challenges involved in designing a successful MEMS product (the ADXL2O2E) are described in this article by Harvey Weinberg from Analog Devices.

In early MEMS systems a multi-chip approach with the sensing element (MEMS structure) on one chip, and the signal conditioning electronics on another chip was used. While this approach is simpler from a process standpoint, it has many disadvantages.

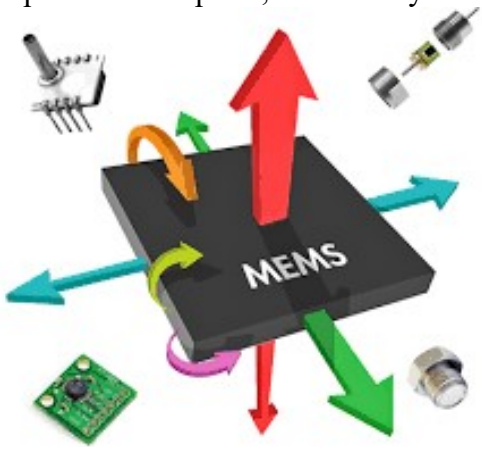

Fig 9 MEMS

VI. RESULTS

The smart helmet guarantees motorcycle rider security and also takes the vital steps to decrease mischance causality. in case any security highlights are abused, the framework can't allow the rider for beginning the motorcycle. The alcohol sensor's accuracy depends on the separate bet ween the mouth and sensor. When the separate over 15 cm, the sensor examined < 150 mg/L implies rider has moo blood liquor substance (BAC). The alcohol level reaches >350 mg/L implies rider has higher BAC, as the remove reduce s to less than 6 cm. On the other hand, the accident detect on sensor, the 3 pivot accelerometer sensor encompasses a tall exactness rate. After calibration, the accelerometer's esteem changes about 1.280 g from the initial esteem. It has 100Hz transmission capacity for detection.

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Fig 10 Notifications received in Mobile


Fig 11 Smart Helmet

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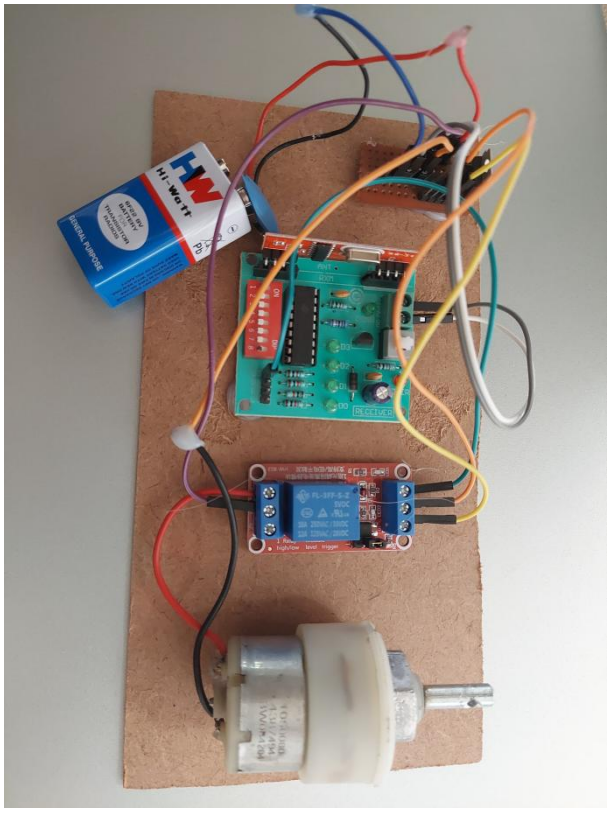

Fig 12 Kit Used in Smart Helmet

VII. CONCLUSION

The proposed system aims to prevent motorcycle accidents and also reduce the fatality of accidents. Family members, law enforcement agencies, and the nearest hospital are informed about accidents and also accidents location. Accidents detection algorithm has high accuracy and automatically record, detect, and report the accidents immediately. The driving data helps the rider to improve driving. This system makes a habit to wear a helmet among motorcycle riders. The smart helmet would make a motorcycle journey more protected and safer.

References

[1] Bindu Sebastian Priyanka Kp, Hridhya Kuttikrishanan, “Smart Helmet” International Journal of Technology & Advanced Engineering, Volume5, Issue:12, December 2015.

[2] Professor Chitte P.P., Salunke Akshay S., Thorat Aniruddha, N Bhosale, “Smart Helmet & Intelligent Bike System”, International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 05,May 2016.

[3] Jianyun Ni; Jing Luo; "Microcontroller-based engineering education innovation, " Educational and Information Technology (ICEIT), 2010 International Conference on, vol.3, no., pp. V3-109-V3-112, 17-19 Sept. 2010.

[4] S. Chandran, S. Chandrashekhar, E. Elizabeth N, “Konnect: An Internet of Things (IoT) based Smart Helmet for Accident Detection and Notification”, India Conference (INDICON), 2016 IEEE Annual.

[5] Jennifer William, Kaustubh Padwal, Nexon Samuel, Akshay Bawkar, Smita Rukhande “intelligent Helmet” International Journals of Scientific& Engineering Research, volume 7, issue 3, March-2016.

[6] Shoeb Ahmed Shabbeer, Merin Melleet “Smart helmet for accident detection and notification “2nd IEEE international conference on computational systems and information technology 2017.

DOI:10.46647/ijetms.2024.v08i03.57 ISSN: 2581-4621

[7] Syan Tapadar, Arnab Kumar Saha, Dr Himadri Nath Saha, Shinjini Ray, Robin Karlose "Accident and Alcohol detection in Bluetooth enabled Smart Helmets for motorbikes".
[8] Nitin Agarwal, Anshul Kumar Singh, Pushpender Pratap Singh, Rajesh Sahani, "SMART HELMET", International Research Journal of Engineering and Technology, Volume 2, issue 2, May 2015.
[9] N. Fathima, A. Ahammed, R. Banu, B.D. Parameshachari, and N.M. Naik, "Optimized neighbor discovery in Internet of Things (IoT)," In Proc. of International Conference on Electrical, Electronics, Communication, Computer, and Optimization Techniques (ICEECCOT), pp. 1-5, 2017.
[10]. S. A. Shabbeer and M. Meleet, "Smart Helmet for Accident Detection and Notification," 2017 2nd International Conference on Computational Systems and Information Technology for Sustainable Solution (CSITSS), Bangalore, 2017, pp. 1-5, doi: 10.1109/CSITSS.2017.8447702.
[11]. N. Nataraja, K. S. Mamatha, Keshavamurthy and Shivashankar, "SMART HELMET," 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, India, 2018, pp. 2338-2341, doi: 10.1109/RTEICT42901.2018.9012338.
[12]. N. V. Joshi, S. P. Joshi, M. S. Jojare, N. S. Joshi and A. R. Askhedkar, "Design and Finite Element Analysis of IoT based Smart Helmet," 2020 IEEE International IOT, Electronics and Mechatronics Conference (IEMTRONICS), Vancouver,BC,Canada,2020,pp.1-8,doi:10.1109/IEMTRONICS51293.2020.9216393. [13]. M. Jeong, H. Lee, M. Bae, D. Shin, S. Lim and K. B. Lee, "Development and Application of the Smart Helmet for Disaster and Safety," 2018 International Conference on Information and Communication Technology Convergence (ICTC), Jeju, 2018, pp. 1084-1089, doi: 10.1109/ICTC.2018.8539625.
[14]. "IoT Based Smart Helmet and Accident Identification System," 2020 IEEE Region 10 Symposium (TENSYMP), Dhaka, Bangladesh, 2020, pp. 14-17, doi: 10.1109/TENSYMP50017.2020.9230823.
[15]. R. Budiman, D. W. Sudiharto and T. Brotoharsono, "The Prototype of SmartHelmet with Safety Riding Sends Notification for Motorcycle Rider," 2018 3rd International Conference on Information Technology, Information System and Electrical Engineering, Computer Engineering(ICITISEE), Yogyakarta, Indonesia, 2018, pp. 362-367, doi: 10.1109/ICITISEE.2018.8721027.