



# Development and Implementation of IOT Based Smart KIT for Helmet Detection and Accident Prevention

**Mr. V. J. Patil<sup>1</sup>, Shweta Y. Divate<sup>2</sup>, Shravani R. Havale<sup>3</sup>, Sanjana R. Chougule<sup>4</sup>, Tanuja M. Powadi<sup>5</sup>**

**Shweta S. Magdum<sup>6</sup>**

Lecturer, Department of Mechanical Engineering, DKTE Society Yashwantrao Chavan polytechnic Ichalkaranji, Maharashtra, India<sup>1</sup>

Students, Department of Mechanical Engineering, DKTE Society Yashwantrao Chavan polytechnic Ichalkaranji, Maharashtra, India<sup>2,3,4,5,6</sup>

**Abstract:** Accidents are increasing day by day, also there is many laws and regulations are posed by government in order to avoid this road accidents. Accidents can be the unplanned event or the mistake that may occur resulting in injury and sometimes it also leads to death. The accidents occur in two wheelers are more compared to other vehicles. Although enough road rules and regulations are made by the government to avoid accidents, but the accident rate is increasing day by day. Road accidents are responsible for the deaths of thousands of individuals every year. Using the Internet of Things, smart helmets will be able to identify accidents and send alerts to nearby emergency services as well as medical facilities. From the method proposed using Arduino UNO, MEGA and other cost-effective sensors like an IR sensor. The bike engine will start only when the rider will have worn the helmet. It detects the head of the bike rider within the range. We designed a system that is capable of detecting the rider is whether wearing the helmet or not.

**Key Word:** Rider's safety, Alcohol detection, Accident detection, Quick alerting system, GSM GPS location, Sensors.

## I INTRODUCTION

India is the one of the densely most populated country. This exponential raise in the population and due to the recent pandemic, many people did not prefer to use public transport to go to their work and to travel these increased sales of the motor cycles rapidly compared to 2019, the sales has been doubled in 2022 this increase the traffic among the Indian roads and increase in the number of road accidents according to the 2019 report 42% of accidents occur in India are because of motorcycles. The Smart Helmet system represents a paradigm shift in the approach to mitigating two-wheeler accidents by integrating cutting-edge technology with proactive safety measures. This system aims not only to detect accidents promptly but also to provide real-time assistance and support to riders, thereby minimizing the likelihood of severe injuries and fatalities. By leveraging advanced sensors, communication technologies, and intelligent algorithms, the Smart Helmet system empowers riders with a robust layer of protection, enhancing their safety on the roads. There are several causes for road accidents in India the major cause for road accidents is given below.

- **Over speeding:** Most of the accidents are occur due to the over speeding it is the natural psychology of humans to excel and to win, if there is a chance human will go to infinity in speed. But as the speed thrills it also kills, faster vehicles riders are more prone to accident.
- **Drunken Driving:** Consumption of alcohol to celebrate any instance is very common. But when it is mixed with driving it turns enjoyment to misery. Alcohol can reduce concentration of riding. It decreases reaction time of a rider body. Hands and legs take more time to react. It suppresses vision due to dizziness. Alcohols dampen fear and incite humans to take risks.

## II OBJECTIVES

The objective of the smart helmet project is to enhance the safety of motorcycle riders by introducing advanced features and technologies into the traditional helmet design.

- **Accident Detection and Reporting:** Implement sensors and communication modules in the helmet to detect accidents and promptly relay the information to relevant parties, such as emergency services or registered contacts.



- **Alcohol Detection:**

Integrate alcohol detection sensors into the helmet to detect whether the rider is under the influence of alcohol.

- **Speed Control and Warning:**

By promoting speed control, this objective seeks to reduce the likelihood of accidents and ensure compliance with speed regulations.

- **Compulsory Helmet Usage:**

Implement mechanisms that enforce the mandatory use of helmets.

### III LITERATURE REVIEW

#### Smith:

This study assessed the efficacy of intelligent safety helmets equipped with advanced sensor technology in reducing head injuries among two-wheeler riders. The authors conducted a comprehensive review of existing literature on helmet safety and analysed data from real-world accidents to evaluate the impact of intelligent helmet usage.

#### Divyasudha N:

Proposed a system consists of position sensor, Alcohol sensor, IOT Modem, GPS receiver, Power supply to avoid the accidents and check the alcohol consumption. In this system two condition is checked that is whether the rider is wearing the helmet or not and to check whether he had consumed alcohol or not if this is not followed by the rider the bike will not start and it is indicated by beep sound.

#### K. M. Mehata:

Proposed a technique which provide safety to the workers or to identify any fall of the workers in working area. The proposed system has two components. One is the wearable device built using sensors and electronic elements. The communication between the two components is provided by gsm module. These devices also monitor the health and safety of the worker is continuously. This system ensures good fall detection and alert the register person to give medical attention.

#### Jesudoos A:

Proposed a mechanism, where sensors such as IR sensor, The gas sensor will detect if a user consumed alcohol and display on the LED display. If an accident occurs the vibration sensor, sense the accident and send information through GPS to the hospital. In this system exactness and accuracy are high and ambulance is booked automatically based on ten locations.

#### Prem Kumar M, Rajesh Bagrecha:

The objective of this project is to develop a smart helmet is to provide a means and apparatus for detecting and reporting accidents. Sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilized for building the system.

### IV SCOPE OF PROJECT

1. In future in actions, the system could be further enhanced by integrating advanced technologies such as artificial intelligence and machine learning algorithms to improve accident detection and response mechanisms.

2. Additionally, exploring the integration of additional sensors, such as proximity sensors and GPS modules, could enhance the system's ability to detect potential hazards and provide real time navigation assistance to riders.

3. Furthermore, the development of a comprehensive database to store and analyse accident data could enable the system to identify patterns and trends, allowing for targeted interventions and policy recommendations aimed at further reducing two-wheeler accidents and improving overall road safety.

### V METHODOLOGY

#### 1. IR Sensor:

Which is placed inside the helmet to detect the head of the motorcyclist and ensures that the wearer is wearing the helmet. It detects the head of the motorcyclist between 10 cm and 80 cm away. So, it's a sensor which can measure distance with integrated signal processing and analogue voltage output.

#### 2. MQ-3 Alcohol Sensor:

This gas sensor module is very useful for leakage of alcohol. Because of its very high sensitivity and quick response time, measurements can be taken in as soon as possible. This sensor gives an output which is analogue resistive based on alcohol concentration.



### 3. SIM800L:

SIM800L is a small and inexpensive GSM breakout board. It is set it up with Arduino to send simple text messages. The basic structure of this module is shown in Figure No 4.

Pin D8 of Arduino is connected with pin 1(TX) and Pin D9 of Arduino is connected with pin 0(RX) of the SIM800L. One 3.6 Volts Battery is connected between GND of the Arduino and VCC of the SIM800L.

### 4. GSM sensor:

A GSM sensor is a module or chip, allowing a device to connect to GSM cellular networks. This enables the device to exchange data wirelessly over the GSM cellular network, typically to a server or a monitoring system. (Global System for Mobile communication) is a digital mobile network.

### 5. ESP32-S2:

The ESP32-S2 has a built-in sensor used to measure the chip's internal temperature. The temperature sensor module contains an 8-bit Sigma-Delta analog-to-digital converter (ADC) and a digital-to-analog converter (DAC) to compensate for the temperature measurement.

### 6. Arduino UNO

Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, and Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output

## BLOCK DIAGRAM

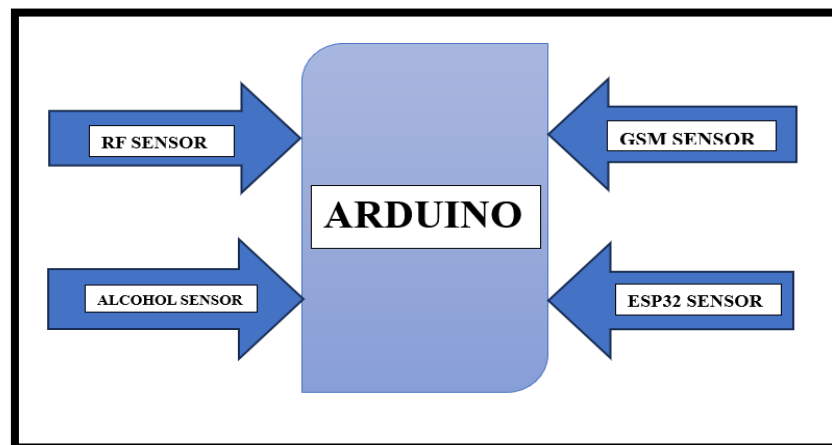


FIG No. 1 Block Diagram Of Project

## EXPERIMENTAL SETUP

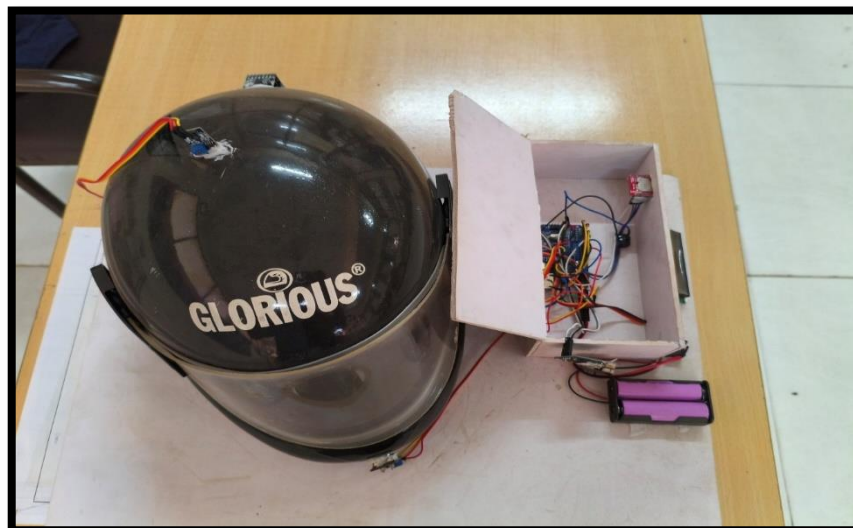


FIG. No. 2 Experimental setup

**VI. CONCLUSION**

1. In conclusion, the development and implementation of the proposed system represent a significant step towards enhancing two-wheeler rider safety and mitigating the risk of accidents on the road.
2. By integrating innovative technologies such as IR sensors, alcohol detectors, and GSM communication, the system effectively addresses key factors contributing to road accidents, including non-compliance with safety regulations and impaired driving.
3. The successful outcomes obtained demonstrate the potential of proactive safety measures and real-time monitoring in preventing accidents and minimizing their severity.
4. Moving forward, continued research and development in this area hold promise for further advancements in road safety technology, ultimately saving lives and creating safer environments for all road users.
5. The smart helmet is designed and tested for real time application. All three modes of operations designed in the prototype namely Start ON mode, Running Mode and Accident modes are tested and found to work satisfactorily. Wearing a helmet, taking off side stand and negative in alcohol detection is mandatory during Start ON mode; without which the bike will not start.
6. While riding the bike, gyro sensors will be continuously active and monitor the rider, and bike as well. In case if the gyroscope encounters an angle greater than 90 degrees, the engine will be off and will not be ignited and a message will be sent to the emergency number.

**REFERENCES**

- [1] 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.
- [2] Sudharsana Vijayan, Vineed Govind, Merin Mathews, Simna Surendran, Muhammed Sabah, "ALCOHOL DETECTION USING SMART HELMET SYSTEM", International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE) ISSN:0976-1353 volume 8 issue 1 – APRIL 2014.
- [3] Dominik Dorr<sup>1</sup>, David Grabengieser<sup>2</sup> and Frank Gauterin<sup>1</sup> 2014, Online Driving Style Recognition using Fuzzy Logic"- IEEE 17th International Conference on Intelligent Transportation Systems (ITSC) October 8-11, 2014. Qingdao, China.
- [4] "Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem", Vol. 3, Issue 7, July 2014 Hoang Dat Pham, Micheal Drieberg, Chi Cuong Nguyen
- [5] "Development of vehicle tracking system using GPS and GSM modem ", Conference: 2013 IEEE Conference on Open Systems (ICOS) Lih-Jen Kau, Member, IEEE, and Chih-Sheng Chen.
- [6] "A Smart Phone-Based Pocket Fall Accident Detection, Positioning and Rescue System", Dec 2013.
- [7] Jennifer William, Kaustubh Padwal, Nexon Samuel, Akshay Bawkar, Smrita Rukhande intelligent Helmet International Journals of Scientific & Engineering Research, volume 7, issue 3, March-2016.
- [8] Shoeb Ahmed Shabbeer, Merin Melleet Smart helmet for accident detection and notification 2nd IEEE international conference on computational systems and information technology 2017.
- [9] Khairul M, Rasli A.M, Madzhi N.K, Johari. J, 2013, Smart Helmet with Sensors for Accident Prevention , International Conference on Electrical, Electronics and system Engineering (ICEESE) University Teknologi Mara, Malaysia.
- [10] Jianyun Ni; Jing Luo, 2010 , "Microcontroller-based engineering education innovation, " Educational and Information Technologies (ICEIT), International Conference on , vol.3, no 5., pp.109-112.
- [11] Gimbel, G. M., & Hoshizaki, T. B. 2008. Compressive Properties of Helmet Materials Subjected to Dynamic Impact Loading of Various Energies. European Journal of Sport Science, 341-349.