# SMART HELMET USING IOT

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in Computer Science and Engineering

By

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**SCHOOL OF COMPUTING**

# SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY**
**(DEEMED TO BE UNIVERSITY)**
**CATEGORY - 1 UNIVERSITY BY UGC**
**Accredited with Grade "A++" by NAAC I Approved by AICTE**
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## BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Aakash S(40110004) and Akshara C V(40110045)** who have done the Project work as a team who carried out the project entitled "**SMART HELMET USING IOT**" under our supervision from November 2024 to April 2025.

**Internal Guide**

**Dr. P. ASHA, M.E., Ph.D.**

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**Submitted for Viva voce Examination held on_____**

**Internal Examiner** **External Examiner**

## DECLARATION

We, **Aakash S (Reg. No- 40110004), Akshara C V (Reg. No-40110045)** hereby declare that the Project Report entitled **"SMART HELMET USING IOT"** done by me under the guidance of **Dr. P. Asha, M.E., Ph.D.** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering**.

**DATE:**

**PLACE: Chennai** **SIGNATURE OF THE CANDIDATE**

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## ABSTRACT

Motorbikes serve as a means of easy transportation compared to other vehicles. At the same time, safety while riding a motorbike is also an important issue to take care of. The usage of a smart helmet, a sort of protective headgear, increases the rider's level of safety when operating a motorcycle. This helmet's primary function is to keep the rider safe. Advanced features like fall detection, accident identification, location monitoring, and alcohol detection can be used to accomplish this. As a result, it doubles as a smart bike feature and a smart helmet. When a rider is intoxicated, the ignition locks itself and sends a message with his location to the registered phone number. A vibration sensor is also added to the helmet to indicate the harsh hitting of the helmet during an accident.

One main reason the fatality rate in mishaps is rising is due to the delay and lack of proper treatment in time and no immediate response from society to inform the police and the hospital. Many have lost their life in this case. Saving life in golden hours matters a lot here. So, we must not let time take any life. The Smart helmet also helps the traffic police and follows government regulations. The device is completely safe for use by two-wheeler riders. In case of unexpected interruptions during running mode, the proposed system enters into accident mode and enables GSM to report the accident to the pre-registered phone number. A noteworthy addition to this proposed model is the inclusion of a temperature sensor. Recognizing that prolonged helmet wear can elevate internal temperature above 40 degrees, the system monitors the internal helmet temperature. When the temperature surpasses the threshold, the driver receives an alert, prompting them to take a rest. These are features that will be included in the prototype.

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# CHAPTER 1

# INTRODUCTION

The Internet of Things also known as IOT is a system of interrelated computing devices, machines, objects, animals, or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Nowadays IOT is being used in many fields such as home automation, wearable smart appliances, smart agriculture, etc. Since it helps mutual communication between the devices and the people over the network.

The basic concept of All IOT devices is explained as follows, at first the device senses or generates the data, and the data is sent over to the server, since it can generate a huge amount of data by data, we can draw the conclusion and processing by analyzing it through the Big Data. Following that, it gives the advantage in real-time data reporting from the environment, although it has changed people‘s lifestyles and improved the convenience of conducting daily activities, it is also associated with numerous negative side effects, such as road mishaps and traffic due to distraction, fatigue, and exhaustion. These are significant and latent dangers responsible for much loss of lives. In recent years, scientists have been trying to prevent any further loss by pre-emptively spotting such symptoms well in advance. These recognizing methods are characterized as subjective and objective detection. In the subjective detection method, a driver must participate in the evaluation, which is associated with the driver ‘s subjective perceptions through steps such as self-questioning. Then, these data are used to estimate the danger of the vehicles being driven by exhausted drivers, assisting them to plan their schedules accordingly.

The first step is alcohol detection. An alcohol sensor is used as breath analyzer which detects the presence of alcohol in the rider's breath and if it exceeds the permissible limit ignition cannot start. It will send a message to the number saying that the "Rider is drunk and is trying to ride the bike". MQ-3 sensor is used for this purpose. The next main issue is accidents and late medical help. If the rider has met with an accident, he may not receive medical help instantly, which is one of the main reasons for death. Every second people die due to delays in medical help, or in the case where the place of accident is unmanned. In fall detection, we place an accelerometer in the bike unit.

Driver tiredness discovery may be a car security innovation that avoids accidents when the driver is getting lazy. Different considerations have been proposed that around 20% of all street mishaps are fatigue-related, up to 50% on certain streets. Driver weakness could be a critical reason for the large number of vehicle mishaps. Later measurements assess that yearly 1,200 passing and 76,000 wounds can be credited to weariness-related crashes.

The improvement of technologies for recognizing or avoiding laziness at the wheel could be a major challenge within the field of accident evasion frameworks. Due to the risk that laziness or fatigue presents on the street, strategies have to be shaped to neutralize its influences. Both driver tiredness and diversion, in any case, might have the same impacts, i.e., diminished driving execution, longer response time, and an expanded hazard of crash inclusion. Based on the Procurement of video from the camera that's before the driver, it performs real-time preparation of an approaching video stream to together the driver‘s level of weariness on the off chance that the laziness is estimated at that point it will deliver the caution by detecting the eye movements.

# CHAPTER 2

# LITERATURE SURVEY

This problem statement has been extensively studied over the past 5 years by researchers and automotive companies in a bid to create a solution, and all their solutions vary from analyzing various patterns and models of smart helmets.

The authors in their research work titled, "SMART HELMET-A Review" aimed at creating an inexpensive, intelligent helmet that can detect alcohol intake and stop car accidents. The primary goal of this intelligent helmet is to protect the rider. This is accomplished by utilizing cutting-edge features including fall detection, accident recognition, position monitoring, and alcohol detection. Helmet use is required for this project, the ignition switch cannot turn on without one. When a rider is intoxicated or an accident occurs, the ignition switch is automatically locked, and a message containing the rider's current location is sent to their registered phone number. It offers the ability to accept calls over Bluetooth while driving.

The authors in their research work titled, “Novel Covid-19 Detection and Diagnosis system using IOT based Smart Helmet", aimed at a design for a smart helmet-mounted thermal imaging system is proposed that can automatically identify the coronavirus from a thermal image with minimal human input. In order to monitor the screening process and obtain real-time data, the thermal camera technology is integrated into the smart helmet and linked with IoT technology. The suggested system also has facial recognition technology, which enables it to show the pedestrian's personal information and automatically take their temperature. The healthcare system will be put under a lot of strain by the suggested design, which may also help stop the coronavirus from spreading further

The authors in their research work titled, "Smart-Helmet development for Ecological Field Research Applications" offered a novel method to improve environmental perception in this paper. The suggested device is an embedded wearable system built into a helmet that is intended to collect environmental data. Additionally, it enables the creation of fresh applications to broaden the researcher's vision of reality. Additionally, the process of creating a unique wearable device to improve environmental awareness

in field studies of forests. The architecture proposal is where this process begins, using sensing nodes based on the Internet of Things idea. Then, we demonstrate a finished prototype. Finally, we created a programme that enables a wider perception of the surroundings.

The authors in their research work titled, "IOT BASED SMART HELMET SYSTEM USING RASPBERRY Pi-3" developed a Shrewd System for Helmet Detection utilizing Raspberry Pi guarantees cap ownership by a motorcyclist consistently by catching a depiction of the rider's head protector utilizing Pi Camera and affirming object location by cascading technique. The primary thought behind the venture is to diminish street fatalities among motorcyclists. An intelligent LED will caution the rider if the protective cap is not recognized after which the rider needs to guarantee the ownership of a cap or else the System will show a notice message which will win the rider a strike in the event that it is overlooked. An automated e-mail alert generation system is also developed in a reporting module of proposed system.Their proposed system is employed to point the user about the vacancy of the parking slots. A user can choose the parking squeeze advance, rather than waiting in area of the parking, where the parking availability are shown through user's smart phones.

IR Sensors are going to be attached in each slot for detecting the vacancy. The signal from the sensors captured by Arduino and this signal is then converted from electrical signal into another form to detect presence of car in terms of the number of sunshine reflected back from the obstacle like wall of the car parking zone. The output from Arduino depends on the measurement of amount of sunshine and supported that, slot's allocation is finished. On the opposite hand, the output from Arduino is modified into text format and is sent.

## 2.1 INFERENCES FROM LITERATURE SURVEY

The inferences from the above mentioned literature survey provides us information about various technologies and features included in the smart helmet and how it is upgraded from the year to year, most of the required factors like starting conditions, safety while riding, informing accidents and preventing robbery are individually discussed by several authors. In the first literature survey, authors and his group proposed a system where they employ IR sensors are attached to each and every slot for detecting the vacancy, the user can choose the parking area in advance rather than waiting in the parking area, the slot can be viewed through smart phone using Arduino. In the second literature survey, author discusses that can detect alcohol intake and stop car accidents also provides various features. Following that, another paper discusses about detection of covid-19 virus using an IOT-based Smart Helmet using thermal images with minimal human input and facial recognition technology. Then "IOT BASED SMART HELMET SYSTEM USING RASPBERRY Pi-3" was developed by Vinith.G and Thangarajan, guarantees cap ownership by a motorcyclist consistently by catching a depiction of the rider's head protector utilizing Pi Camera and affirming object location by cascading technique. The primary thought behind the venture is to diminish street fatalities among motorcyclists. An intelligent LED will caution the rider if the protective cap is not recognized after which the rider needs to guarantee the ownership of a cap or else the System will show a notice message which will win the rider a strike in the event that it is overlooked.

## 2.2 OPEN PROBLEMS IN EXISTING SYSTEM

Individual solutions cannot solve this issue, since this subject is an interconnected matter of several factors. Eliminating one factor of accident while the others remain the same will not help to solve this problem. Therefore, the current research work is interested in solving all the available factors of accident in a single shot. The novelty of this research work resides in combining all the necessary factors for the smooth and safe riding of a motorbike in a single small device, without making the existing system complex and implementing it in real-time. Because most of the research works failed to connect the solutions with the real-time implementation for a developing country.

# CHAPTER 3

# REQUIREMENT ANALYSIS

## 3.1 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT

Smart helmets are becoming more popular with bike riders and sports events. They have many features, including:

1) Engine control system
2) Built-in cooling fan
3) Built-in Bluetooth system
4) Accidental alert system

### 3.1.1 *Risk factors of smart helmets include:*

High cost, Technology adoption, Sensor performance, Wireless communication, Data security and privacy, Battery life, and Coverage area.

### 3.1.2. *Feasibility factors of smart helmets include:*

1) Voice command
2) Controlling basic bike functionalities
3) Increasing visibility in case of fog or smog
4) Smart helmets can help reduce the number of accidents and death ratio.

They can ensure that the rider is wearing a helmet and hasn't consumed alcohol more than the permissible limit. If these safety rules are violated, the system will prevent the biker from starting the bike

## 3.2 HARDWARE AND SOFTWARE REQUIREMENTS

### *3.2.1 MQ3 Alcohol Sensor*

MQ-3 is one type of gas sensor. It works on a voltage flexibly of 2-3.3V. It is used to check whether the rider is consuming alcohol or not before driving the bike. It can be placed in front of the mouth. As indicated by the government act the Illegal utilization of liquor is 0.08mg/L at the hour of driving. The sensor faculties different atoms in liquor

and recognizes if the rider is devouring liquor. The sensor comprises of potentiometer to modify the conc. of gases. The sensor comprises of four pins in particular GND, VCC, Analog output, and Digital output. But here we use the digital output of this sensor.


***Fig. 3.1 MQ3 alcohol sensor***

**********etc…**********

# CHAPTER 4

# DESCRIPTION OF PROPOSED SYSTEM

In this proposed framework if the rider isn't wearing a helmet the bike will not start. Similarly, if a person is consuming any alcohol the bike will not start by using the MQ-3 sensor. At whatever point the condition is fulfilled the bike will start otherwise the bike never starts. Additionally include another smart feature in the proposed framework. This smart feature is used to identify the specific location of mishaps that happened area by sending a message to ambulances and relatives. So immediately give a medical service to the riders. In this proposed system if any accident is met by a rider easily identify the exact location of the accident occurred area and send a message to registered mobile numbers. The eye blink sensor detects movement of the eyeball. The sensor output is linked to an Arduino. If the sensor detects no output from the sensor due to no movement in the eyeball, it sends a signal to the Arduino. The Arduino quickly buzzes the buzzer and emits a warning signal. SIM card used for GSM modules also helps to maintain the log- details and message transmission details. We can utilize SIM storage and Network providers help to generate the message log details. This can be used in case of the Denial of Service in case of any issues.

## 4.1 SELECTED METHODOLOGY OR PROCESS MODEL

The smart helmet system mainly consists of 2 modules; the helmet module and the bike module. The helmet contains switches that are connected to a microcontroller unit.

### 4.2 ARCHITECTURE / OVERALL DESIGN OF PROPOSED SYSTEM

*******Draw the architecture diagram/ Data Flow Diagram & Explain**********

### 4.3 FINANCIAL REPORT ON ESTIMATED COSTING

***TABLE 4.1 Financial report on estimated costing***

| S.no | Product | Cost |
|---|---|---|
| 1 | Vibration Sensor | 755 |
| 2 | GPS module | 500 |

# CHAPTER 5

# RESULTS AND DISCUSSION

## 5.1. RESULTS

The project was well done, designed and responded to the request. This IoT helmet makes it safer and reduces the number of passengers. If all safety measures are violated, the system will not allow the driver to start the motorcycle.

***Fig.5.1.Temperature sensor gives both visual and audio alert***

The accelerometer is designed to identify tilting and tilting conditions (y-axis < 90 degrees and z-axis > 50 degrees or x-axis > 200 degrees). If the accelerometer records these values, it predicts that the helmet has collided with the ground, signifying an accident. Subsequently, the accelerometer triggers the GSM module. As the GSM module sends messages, it concurrently activates the GPS. The GPS is then responsible for relaying the passenger's precise latitude and longitude coordinates.

***Table 5.1 Vibration sensor detection reading***

| | VIBRATION | SMS ALERT |
|---|---|---|
| SI | Range >=5000 | |
| 1. | 8000 | YES |
| 2. | 3000 | NO |

## 5.2. FUTURE ENCHANCEMENTS

# CHAPTER 6

# CONCLUSION

***1/2 paragraphs***

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# APPENDIX

## A. SOURCE CODE

```
#include <SPI.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
```

## B. SCREENSHOTS


***Fig. B.1. Temperature sensor gives both visual and audio alert***

## C. PAPER PUBLICATION

2024 International Conference on Circuit Power and Computing Technologies (ICCPCT)

# SMART HELMET USING IOT

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# Acceptance – Intimation

On behalf of the Technical Program Committee of the **"International Conference on Circuit Power and Computing Technologies", ICCPCT-2024,** we are pleased to inform you that your paper has been accepted for oral presentation. **Camera ready submission, copyright form submission and view review options were enabled for the selected paper in your CMT author console**. All the papers selected and presented will be published in IEEE Digital Xplore , indexed by Scopus. You can complete the registration process within **a week from the date of acceptance**.The conference will be conducted on **8th & 9th August 2024**. The detailed conference schedule will be send to you later. All review comments and suggestions should be incorporated while preparing camera ready paper. Review comments are available in **CMT account>author console>view reviews**.

# PAYMENT PROOF SCREENSHOT