

# Design of Smart Helmet for Accident Avoidance, Alcohol Detection and Smart Helmet Wiper Using Embedded System

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## Abstract:

The fastest growth of technology has made our lifestyle Comfort. The technology also increased the traffic risks and the road accidents take place frequently which causes huge loss of life because inadequate of emergency facility our project will help this displacement. 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. The IR sensor checks if the person is wearing the helmet or not. The Gas sensor recognizes the alcoholic substance in the rider's breath. If the person is not wearing the helmet and if he consumes alcohol, the bike will not start. If there is no sign of alcoholic substance present and helmet is used, then only the bike will start. At the point when the rider drive with bending alarm indication for warning by using mems sensor. If the person is met with an accident, then in such situation a message along with the location is sent to the ambulance or family member so that medical aid can be provided to that person as soon as possible. The project aims at intelligence security providing awareness for wearing helmet and also provides prevention for human life safety. An improvised helmet design which is integrated with a circuitry for automatic rain sensing mini wiper located on the eye shield. The presence of a smart helmet wiper will make two-wheeler riding easier and safer in rainy season since the driver won't be bothered by the continuous rain drops disturbing his/her vision. The wiper will automatically start as soon as it detects the presence of rain drops on the rain sensor mounted on the top of the helmet. In addition to this the wiper will be able to adjust its speed of wiping according to the intensity of rainfall automatically the rain sensor detects the rain the servo motor automatically ON. In school zone accident is prevent by using Rf transmitter and receiver.

**Keywords**—Smart Helmet Accident Detect System Alcohol Avoidance Smart Helmet Wiper Real-Time Accident Monitoring.

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## 1.INTRODUCTION

The bike accidents are increasing step by step and lead to the loss of numerous lives. By using helmet can decrease the probability of bike accidents. By estimating these days 1.2 million people are losing their valuable lives in road accidents. In day-to-day life, there are many accidents occurring for which some solution must be found as soon as the incident occurs. 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 this 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. 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. 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 suppress vision due to dizziness. Alcohol dampens fear and incite humans to take risks. All these factors while driving cause accident. Avoiding safety gears and helmet: Most of the motor cycle riders doesn't wear helmet while driving the motor cycle many studies have shown that helmets and other safety gears reduce the impact of the accident to a great extent but many did not wear even though it is made into law. An improvised helmet design which is integrated with a circuitry for automatic rain sensing mini wiper located on the eye shield. The presence of a smart helmet wiper will make two wheeler riding easier and safer in rainy season since the driver won't be bothered by the continuous rain drops disturbing his/her vision. The wiper will automatically start as soon as it detects the presence of rain drops on the rain sensor mounted on the top of the helmet. In addition to this the wiper will be able to adjust its speed of wiping according to the intensity of rainfall automatically.

### 1.1 EMBEDDED SYSTEM

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast a general-purpose computer, such as a personal computer (PC) is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today. Embedded system contains processing cores that are either microcontrollers, or digital signal processors (DSP).

A processor is an important unit in the embedded system hardware. It is the heart of the embedded system. The key characteristics, however, is being dedicated to handle a particular task. They are also used in automobiles, washing machines, microwave ovens, toys...etc, where automation is needed. The key features of microcontrollers include field programmability, flexibility.

## 2. LITERATURE SURVEY

[1] According to the recent Research paper in 2016 titled '2 Helmet using GSM and GPS technology for accident detection and Reporting system', The author specially developed this project to improve the safety of the bikers. The objective of this project is to Study and understand the concept of RF transmitter and RF receiver circuit. The project uses ARM7, GSM and GPS module. The Project also uses buzzer for indication purpose.

[2] The major disadvantage of this project is they are not using any Display device for showing the current status. Also, the cost of helmet is still high since helmet is designed for only one purpose. According to the Research paper in 2015 titled 'Microcontroller based smart wear for driver safety', In this paper author has Discussed on the speed of the vehicle. In this application the project will be monitoring the areas in which the vehicle will be passing. On entering any cautionary areas like schools, hospitals, etc the speed of the vehicle will be controlled to a predefined limit. LCD Is used for showing the various types of messages after wearing the helmet. The author has worked only on the phenomenon of Accident which is generally happens due to drunk and drive. According to the Research paper in 2016 titled 'Smart Helmet', In this paper the main objective of author is to force the rider to Wear the helmet.

## 3.EXISTING SYSTEM

Manual Monitoring: Currently, road safety relies heavily on manual monitoring by law enforcement officers, who conduct random breathalyzer tests to detect alcohol-impaired drivers. However, this method is limited by its reactive nature and inability to continuously monitor all drivers on the road, leading to missed opportunities for early intervention and accident prevention. Limited Environmental Monitoring: Existing safety measures often lack sophisticated environmental monitoring capabilities, such as real-time detection of adverse weather conditions like rain or slippery roads.

- ✓ Reliance on External Devices: Some safety systems require drivers to use

external devices, such as separate breathalyzer devices or weather sensors, which may not always be readily available or properly utilized.

- ✓ Cost and Accessibility: Implementing existing safety measures, such as widespread deployment of breathalyzer checkpoints or installation of weather monitoring infrastructure, can be cost-prohibitive and logistically challenging.

#### 4. PROPOSED SYSTEM

The bike accidents are increasing step by step and lead to the loss of numerous lives. By using helmet can decrease the probability of bike accidents. In our project are smart helmet, It can used to avoid accident hazards. In this Smart helmet are 4 types used to avoid bike accident First one is Wearing helmet it most important so we set limit switch in helmet locking if can't wear helmet automatically engine stop by using relay to motor. Second one is Alcohol detection sensor used to detect the person are drunken or not if drunker the sensor sensing and automatically bike stop Third one is Rain sensor using rain sensing mini wiper located on the eye shield. The wiper will automatically start as soon as it detects the presence of rain drops . Fourth one is Vibration sensor are used to detect accident, when the bike meet with accident automatically location will share rescue team by using GPS. Above all connected one helmet to overcome bike accident.

#### 5. BLOCK DIAGRAM

##### 5.1 Transmitter side:

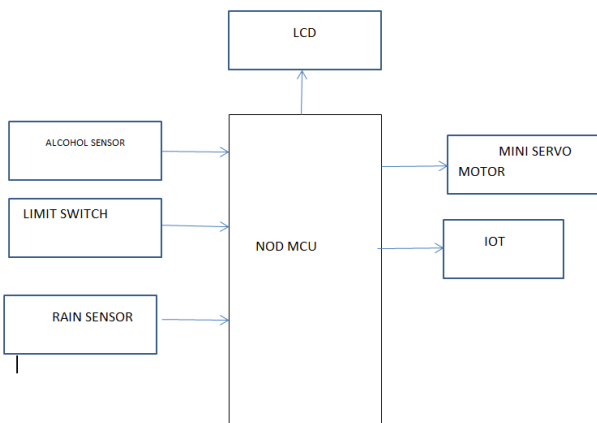


Fig 5.1: Block diagram for transmitter side

##### 5.2 Receiver side:

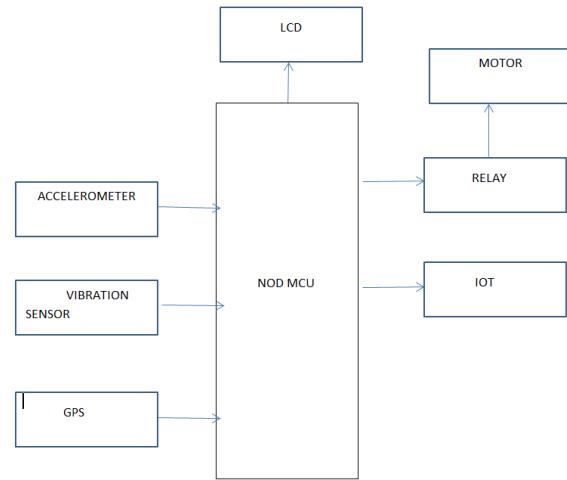


Fig 5.2: Block diagram for transmitter side

#### 6. HARDWARE REQUIREMENTS:

1. Node MCU
2. LCD
3. IOT
4. Alcohol Sensor
5. Vibration Sensor
6. Relay
7. Rain Sensor
8. Mini Servo Motor
9. Limit Switch

#### SOFTWARE REQUIREMENT:

1. Arduino Ide
2. Embedded C
3. Python

##### 6.1 Node MCU:

- ✓ The Node MCU is an open source LUA based firmware developed for ESP8266 wi-fi chip.
- ✓ It supports serial communication protocols i.e. UART, SPI, I2C etc.

##### 6.2 IOT:

- ✓ IOT The Internet of Things integrates everyday “things” with the internet.
- ✓ In the IOT are used to Artificial intelligence and machine learning
- ✓ Analyze this data and make informed decisions.

##### 6.3 Alcohol Sensor:

- ✓ Alcohol Sensor for use to detect the presence of alcohol vapors.
- ✓ The sensor we are used to LM741

#### 6.4 Vibration Sensor:

- ✓ A vibration sensor, and a LM393
- ✓ Vibration detecting
- ✓ Object Movement detecting
- ✓ It use Motorcycle alarm

#### 6.5 Rain Sensor:

- ✓ This sensor is used as a water preservation device and this is connected to the irrigation system to shut down the system in the event of rainfall.
- ✓ This sensor is used sensing the rain

#### 6.6 Relay:

- ✓ A relay is basically a switch which is operated by an electromagnet.
- ✓ The relay module we are going to use is the SRD-05VDC-SL-C.

#### 6.7 Mini Servo Motor:

- ✓ A small servo is a motor that converts electrical signals into mechanical motion.
- ✓ It is a rotary or a linear actuator capable of turning a predetermined position, exactly as commanded.

#### 6.8 LCD Display:

- ✓ Type: Liquid Crystal Display (LCD)
- ✓ Interface: Can use parallel or serial communication

#### 6.9 Limit Switch:

- ✓ Limit switch definition is an electromechanical switch that operates by any physical force or the movement of a machine.
- ✓ These switches are very helpful in detecting the absence or presence of an object

### 7.CONCLUSION

In conclusion, the future development of the Smart Helmet Accident Detection System represents a transformative leap forward in road safety technology, poised to revolutionize the way we prevent accidents and protect riders on the road. With enhanced sensor capabilities, personalized recommendations, and seamless communication between vehicles and infrastructure, the Smart Helmet System will not only make roads safer for riders but also contribute to the overall improvement of transportation ecosystems. As we look ahead, the

continued evolution of the Smart Helmet System holds the promise of creating a future where accidents are not just detected but prevented, making roads safer and more secure for everyone. The comparison of the parameters for accident detection shows the importance of the use of helmet.

### 8.FUTURE ENHANCEMENT

The future development of the Smart Helmet Accident Detection System holds immense potential for revolutionizing road safety through advancements in sensor technologies, artificial intelligence (AI) algorithms, and seamless integration with existing infrastructure. Future iterations of the system will focus on enhancing sensor capabilities by integrating advanced multi-gas sensors for detecting a broader range of intoxicants and more accurate environmental sensors for assessing road conditions. Additionally, AI-driven analytics will enable the system to analyze sensor data intelligently, predicting accident risks and taking proactive measures to prevent accidents before they occur. Biometric monitoring sensors will be incorporated to assess the rider's physical condition and alertness levels, while vehicle-to-infrastructure (V2I) integration will enable seamless communication between the helmet, vehicles, and roadside infrastructure for coordinated safety measures. Overall, the future development of the Smart Helmet System promises to redefine road safety by providing riders with an intelligent and proactive safety companion, ultimately making roads safer for all use

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