



HELMET COMPLIANCE & ALCOHOL MONITORING SYSTEM

Patange Suraj Mohan ^I Bhagvat Awchar ^{II}

I. Final Year B. Pharm student at Saraswati Institute of Pharmacy, Kurtadi, Tq. Kalamnuri, Dist. Hingoli – 431701.

II. Professor Pharmacology Department of Saraswati Institute of Pharmacy, Kurtadi. Tq. Kalamnuri Dist. Hingoli – 431701

Abstract: -The helmet compliance and alcohol monitoring system is designed for better road safety, ensuring total road safety, including pedestrians and vehicles present on the road.

This system applies helmet enforcement to riders during their daily commutes, with the aim of saving the lives of millions of riders worldwide.

This system focuses on helmet compliance and ensures that no intoxicated rider is riding the bike and putting their lives and others on the road at risk. While dealing with this, we are also looking forward to ensuring that no rider on the road becomes the prey of drowsiness and road hallucination. We are introducing a double layer of authentication for helmet compliance to ensure no one can bypass the system.

Indian riders primarily belong to the labor class, commuting daily on their bikes while often neglecting safety; they are skilled individuals who form the backbone of our country. Losing valuable individuals due to negligence is unacceptable, so we are committed to protecting these assets of our country and promoting their safety and responsibility.

This project focuses on new technology and ensures that no public property is damaged and that the nation and society do not face any issues with losing such valuable personnel.

Keyword:- *helmet compliance, safety*

Introduction: - The helmet compliance and alcohol monitoring system is designed for better road safety, ensuring total road safety, including pedestrians and vehicles present on the road.

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Overview: -

The helmet compliance and alcohol monitoring system is a unique and effective project that includes several sensors that work together to provide a real-time database for monitoring the rider, ensuring the safety of both the rider and others on the road. This project uses the RF module, so it is more efficient than other technologies.

We designed the helmet compliance and alcohol monitoring system to safeguard riders and uphold road safety laws. Wireless systems and easy-to-install mechanisms make this one of the promptest systems to install on bikes. This project not only focuses on helmet compliance, alcohol monitoring, and sleep detection and warning but can also be added to with new sensors and mechanisms. This system guarantees adherence to the law, promotes rider safety, and maintains road safety.

if the rider is not wearing the helmet then the sensors send signals to the Arduino nano and then the signals from the Arduino proceed and send to the bike units via RF module. This seamless process only happens in a few nano-seconds and then the RF module in the bike receives the signals and performs the order given by the MCU with the help of the Relay module. It performs the action and the same process is being carried out if none of the requirements is being carried out like if the rider is intoxicated then the detection of alcohol led to not starting the bike unless and until the non-alcoholic person came and rides the bike which indicates the responsibility of the individual when the rider is having drowsiness or road hallucination at this time. Projects key feature that is sleep detection by using IR sensors come to an action and alerts the rider by the big beeping sound which makes the rider to awake.

Features at a glance:

- **HELMET COMPLIANCE:** This feature uses reed sensors, pressure sensors, or a switch to ensure compliance.
- **ALCOHOL MONITORING:** It works with the help of the MQ3 sensors.
- **SLEEP DETECTION:** With the help of the IR sensors, the system will perform its action.

The system also features the ability to operate the bike at a minimum speed when the rider loses their helmet, allowing them to reach someone in urgent need during critical situations. We are introducing a panic or emergency button that will allow the rider to operate the bike at a minimum speed of 40 km/h or less, which is considered safe. This speed ensures that the rider can handle the bike without being harmed and also alerts others on the road quickly to prevent major casualties, making this system highly effective and valuable to society.

Problem Statement:

In India, about **46,000+ accident deaths occurred in the year 2021 alone, and the data is from the Ministry of Road Transport**. The deaths are rising day by day, as most of the data remain offshore. As such, these numbers may be half of the original ones. Intoxicated riders and those not wearing helmets not only put their own lives at risk but also endanger others on the road, as uncontrolled vehicles can sometimes pass by, resulting in severe injuries to the rider, who may even die. Animals may run into the bike, causing accidents and injuries.

Intoxication is also one of the major problems among road safety and rider safety. Intoxication risks the rider's life and endangers the lives of others on the road. Intoxicated riders may create a lot of confusion on the road and risk their lives and others. Such riders risk the pedestrians' lives too and may risk the life of a person who is wearing a helmet, as the intoxication deaths on the road are **16000+** every year, and few of them are even accounted for by the government, as the number may rise as intoxicated riders cause many accidents on the road for themselves and others.

The situation is a problem for both bikers and society, as the labor class rides bikes to work daily as skilled workers in our country. They ride without helmets, and while coming back home from work with their daily payout, most of these people drink alcohol, which results in fatal injuries to them. We are losing both a person and a skilled worker, which significantly harms the family, country, and society, hindering our progress.

Highlighted Problem: -

- Riders are not wearing helmets on the roads.
- Deaths due to non-helmet compliance
- Intoxicated bike riding risks the rider's and others' lives on the road.
- Prevent the loss of the society's skilled and excellent personnel.
- Drowsiness is the major problem among riders.
- Road hallucination can kill the people.
- Two factors determine when a rider will not override the system.

Methodology: -

The **HELMET COMPLIANCE AND ALCOHOL MONITORING SYSTEM** is effective and yet noble to the world. This system employs one of the best techniques by integrating highly effective sensors that efficiently perform real-time monitoring of the rider.

- i. **Architecture of the system:** This system has the user-oriented safety architecture with the help of the **ARDUINO-NANO** and sensor integration. Here the helmet is the main monitoring system where the sensors are being mounted at specific locations with proper calibration and their integration.
- ii. **Safety by Enforcement:** The helmet is the only safety gear for the bike riders, and this system forces the rider to wear it by not letting the bike start. It will only start after authenticating from the **helmet-mounted monitoring unit**, which keeps track of the helmet's compliance and monitors alcohol intoxication, drowsiness, and sleep detection with the help of the **IR** sensors.

- iii. **Warning and alert system:** This system monitors the alcohol level and drowsiness and generates the alerts, which are being generated by the **PIEZO BUZZER**, which sounds in the helmet to let the rider awaken in between drowsy conditions, and the systemic alerts of the helmet not being worn and intoxication showing on the bikes. **LCD** display
- iv. **Conformation and ready to go:** When the **REED SENSORS** and **PRESSURE SWITCH/PRESSURE SENSORS** detect helmet wear, signals are sent to the bike unit via the **RF** module after being processed by the Arduino Nano, and this data is then used by the bike unit to activate the **RELAY**.
- v. **Safety over life: When** the rider is intoxicated (intoxication identified by **MQ3**) and riding the bike over a certain level of **BAC, namely 0.07%, the** system will not allow the rider to ride the bike and ensures complete safety until a safe rider uses the bike. In other cases of drowsiness where the rider may feel drowsy, the **IR** sensors play a crucial role in alerting the rider and stopping when the rider's response isn't calculated in the IR sensors.
- vi. **System testing and user efficacy:** This system has been tested and calibrated in the controlled environment where the road is kept clear and the rider is equipped with safety gear, where the system performs its action very effectively and shows that it's life-saving technology.

BENEFITS OF **HELMET COMPLIANCE AND ALCOHOL MONITORING SYSTEM**

1. **SAVE LIVES:** This system ensures that the rider must wear the helmet before he starts to ride the bike and avoid the fatal injuries.
2. **STOPS DRINK AND RIDE:** Here the system is equipped with the first-in-class sensors that detect the alcohol levels of the rider by analyzing the breath of the rider and prevent further casualties and accidents.
3. **REDUCE ROAD ACCIDENTS:** By properly calibrating the sensors and the helmet unit with the bike's fitted unit, it is possible to significantly reduce road accidents.
4. **MAKE THE RIDER RESPONSIBLE:** - By enforcing the helmet compliance and alcohol monitoring, the rider becomes aware and responsible for safe riding of the bike.
5. **REAL-TIME MONITORING:** The **real-time** monitoring of the rider and its safety measurements makes this system the leading safety mechanism for the bike and riders.
6. **SAVES LIVES BY OBEYING THE LAW:** A helmet is essential for the rider's safety, but many riders choose not to wear one; however, this system enforces helmet use and compliance with traffic laws, including the **Motor Vehicle (Amendment) Act 2019**, which addresses riding without a helmet (**sections 129 & 194D**) and the drunk driving act (**section 185**).
7. **A LOW-COST MECHANISM THAT SAVES PRICELESS LIVES:** This system saves lives at a very low cost that won't feel like any burden to the pockets but is efficient for saving the lives of millions.
8. **DESIGN THAT MAKES YOU COMFORTABLE:** The helmet-mounted unit is a small device with an effective mechanism that does not compromise the rider's comfort or style; it is currently at the prototype level and can be easily fitted to the helmet.
9. **FUTURE SCOPE FOR SAFETY:** The system can be installed with the **GPS** Module and **GSM** Module, accident alerts to the family, and emergency services drink alerts to the family to prevent the drink and ride.
10. **EMERGENCY OVERRIDE BUTTON:** This feature is currently at the prototype level and allows the rider to operate the bike without a helmet, but only at a maximum speed of 40 km/h. This ensures that the rider can ride the bike safely without risking serious injury, while also allowing intoxicated individuals to manage a bike at this low speed. Additionally, this feature enables quick alerts to others on the road, helping to prevent accidents. Once the button is pressed, it will function for a limited time.

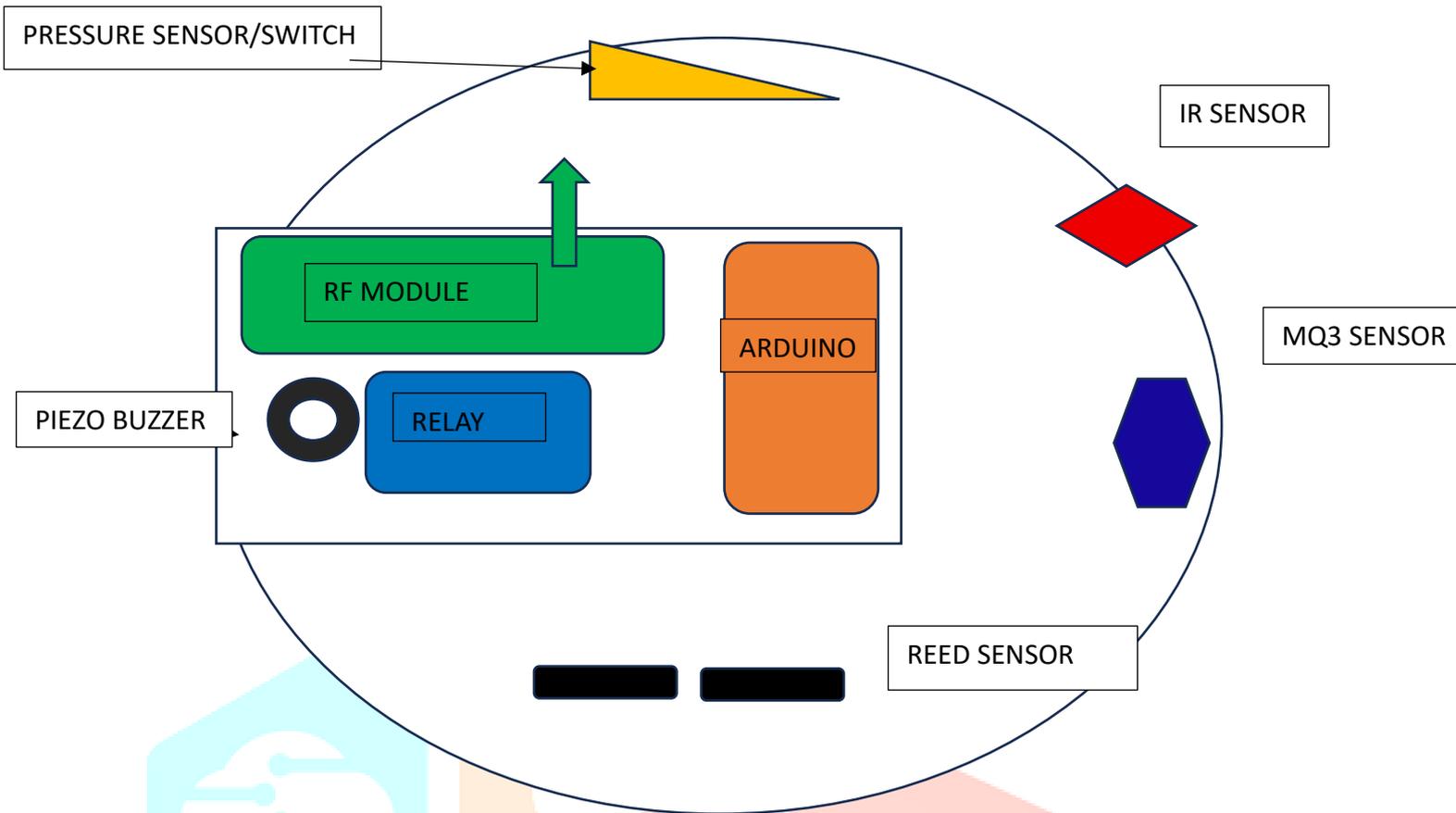
Implementation: -

This system uses hardware and codes to calibrate the sensors and the system's effectiveness.

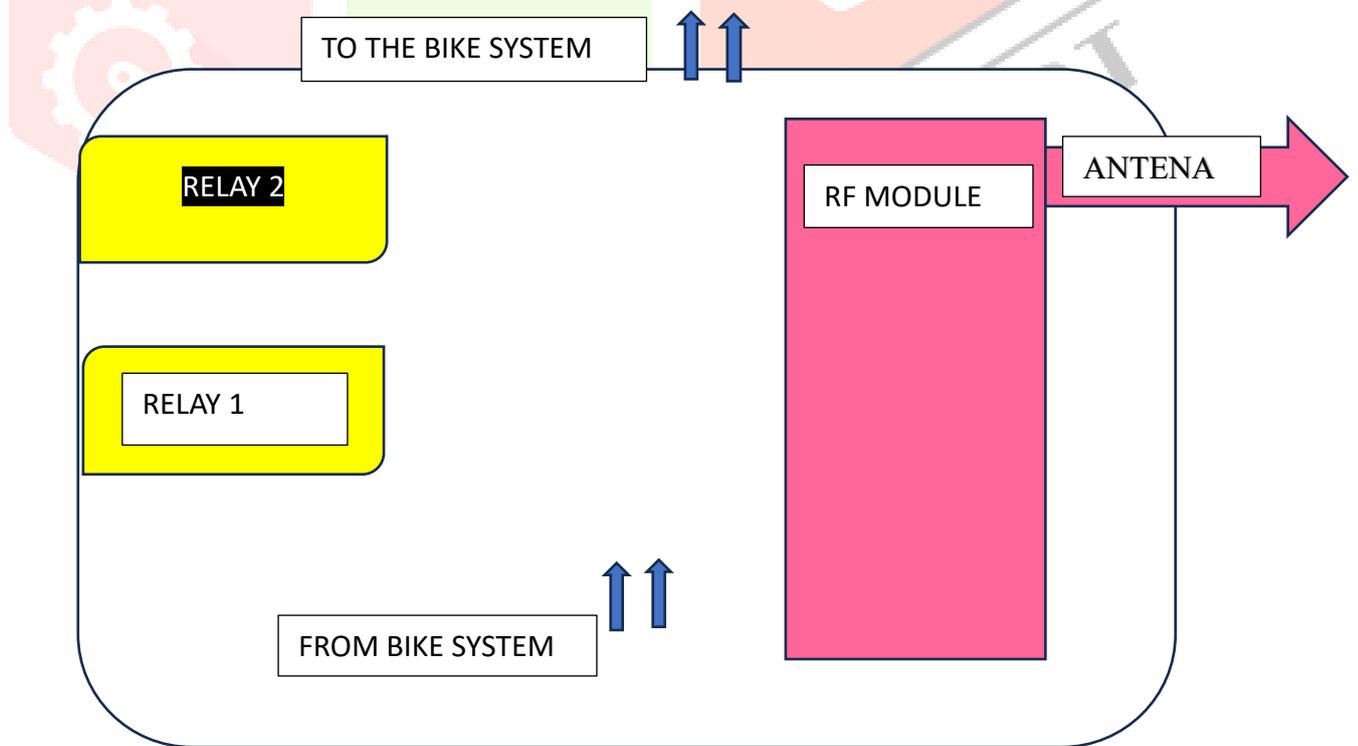
COMPONENTS USED, WHICH SAVE LIVES

1. **ARDUINO-NANO:** The MCU, which controls and calibrates the sensors for real-time monitoring of the rider.
2. **MQ3 SENSOR:** This sensor detects the alcohol in the rider's breath.
3. **REED SENSOR:** The first authenticator, it detects if the helmet is worn by buckling the strap.
4. **PRESSURE SWITCH/PRESSURE SENSOR:** It detects when the helmet is on the rider's head, activating the switch, and the same applies to the pressure sensor.
5. **IR SENSOR:** This sensor detects the drowsiness and sleeping condition of the rider.
6. **PIEZO BUZZER:** This component produces a beeping sound to alert the rider when they are sleeping or experiencing drowsiness while riding the bike.
7. **RF MODULE:** Used to send or transmit the signals between the helmet and the bike unit.
8. **RELAY:** They are a current-alternating unit to alter the current supply accordingly.

CIRCUITE DIGRAM OF HELMET UNITE: -



CIRCUITE DIGRAM OF BIKE UNITE: -



CONCLUSION: -

The system mainly focuses on the helmet compliance and alcohol monitoring system. This system also counters one of the major problems, which is sleep detection or drowsiness detection. There are about 46000+ accidents that occur per year and 16000+ per year due to the intoxication of the rider. This system is cost-effective as well as noble to society. By properly coordinating and integrating the sensors, this system provides an effective solution to the significant issue of motorcycle riding, utilizing pressure sensors, a pressure switch, MQ3 sensors, and IR sensors, along with the REED sensor, to achieve the desired outcomes for the most pressing problem currently faced on the road. And to get the desired result, we have added an MCU, which is an Arduino Nano. With the help of this MCU and relays, we are here to accomplish our target, and here we also identify the major emergency problem and add the emergency override button, which will allow the rider to ride the bike at the safe speed of 40 km/h, not exceeding more than this set speed, although this feature is only at the prototype level, and all the other features have been implemented and tested on the bike. Here we demonstrated the technology and set the benchmark of the lives that matter most.

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Mr. Patange Suraj Mohan is an undergraduate student at Saraswati Institute of Pharmacy, Kurtadi, currently studying in the final year of B. Pharm. He is currently working on research related to a Helmet Compliance and Alcohol Monitoring System.



Mr. Bhagavat Awchar is an Assistant Professor in the Department of Pharmacology at Saraswati Institute of Pharmacy, Kurtadi. He has completed his Master's degree in Pharmacology from Swami Ramanand Teerth Marathwada University, Nanded, at Nanded Pharmacy College.

