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SMART HELMET WITH ALCOHOL DETECTION

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ABSTRACT

The Smart Helmet with Alcohol and Sleep Detection is an IoT-based safety system that aims to cut down on road accidents and boost rider safety. It checks if the rider is wearing the helmet properly before allowing the vehicle to start using built-in sensors. An alcohol sensor examines the rider's breath for alcohol and prevents the engine from starting if the level is too high. The system also has drowsiness detection to keep track of the rider's alertness during travel. If it detects signs of sleep, it activates alerts like a buzzer or vibration to wake the rider. The vehicle will only operate when the rider is sober, alert, and wearing the helmet correctly. It employs sensors and microcontrollers for real-time monitoring and better performance. This system improves rider awareness and responsibility. It is cost-effective and simple to implement in everyday situations. It also reduces negligence among riders. Overall, it encourages safe driving habits and helps prevent accidents.

1. INTRODUCTION:

As more motorcycles come onto the roads, there is an increased risk of accidents caused by poor safety measures like failure to wear helmets, riding after taking alcohol, and tiredness among others. Despite strict implementation of traffic regulations, most people tend to disregard basic safety precautions, thus resulting in fatalities. This calls for the development of an automated system that will be able to check the safety of the rider before and during riding.

Smart Helmet System is developed using Internet of Things and Embedded Technology to increase the safety of the rider. Some of the safety precautions incorporated in this system include helmet detection, alcohol testing, and detecting any sign of tiredness among others. With this system, the rider will have his motorcycle start only if he is in good state i.e. sober, wearing a helmet and without any sign of sleeping, which would be indicated using a buzzer or vibration.

2.LITERATURE SURVEY:

However, many of the existing systems mostly consider basic protective measures such as wearing of helmets, observing traffic rules, among others, but it fails to make sure that the rider follows those safety measures. Many of the existing mechanisms depend upon manual verification by the traffic police, which may not be efficient all the time. Some of the existing systems offer detection of helmets but lack vehicle ignition control.

In previous studies, alcohol detectors were used to minimize the risk of intoxicated drivers on roads based on sensor usage for measuring alcohol content in the breath of the rider. They are effective and work fine but cannot be extended to incorporate other features because they are focused mainly on checking for alcohol. In addition to alcohol detectors, there are also drowsiness detection mechanisms that have been developed using sensors or camera systems for tracking rider status. But most of them have proved costly and complex for application in real time. Thanks to the advancement in technologies like Internet of Things (IoT), and embedded systems, there has been incorporation of various safety measures in one system. The Smart Helmet System is a combination of all the safety measures which includes detecting alcohol, helmet, and drowsiness among others.

Recent researches are also concentrating on incorporating smart technologies with wearable technologies to enhance road safety. Smart helmets have become significant because they incorporate safety aspects along with the continuous tracking system. This is done by using sensor and microcontroller technology to monitor the state of the rider and respond instantly. Incorporation of multiple aspects into one product makes the smart helmet more efficient than other ways, which are expensive.

3.PROBLEM STATEMENT

Two-wheeler riders are now witnessing more accidents because of their risky behaviour like not wearing helmets, being drunk, and riding without being alert. This will have a serious impact on the person's ability to drive. Despite having laws for safety and regulations, most riders don't abide by them because they have no system to continuously monitor the rider. Current solutions in place do not work because they cover one area, such as detecting a helmet and alcohol. Thus, there is a need to have a system that covers all the important factors in one place.

A Smart Helmet system will help in ensuring that the

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rider follows all the guidelines mentioned above. That is, the system will check whether the rider wears a helmet, is not drunk, and keeps his focus while riding.

4.PROPOSED SYSTEM

In order to eliminate the limitations of current safety systems, the Smart Helmet System is proposed, which is a combination of IoT and embedded systems. The system monitors the safety of the rider before and during the ride using sensors installed inside the helmet. These sensors include an alcohol detector, a helmet detector, and a drowsiness detector. The alcohol sensor measures the amount of alcohol present in the breath of the rider and inhibits the functioning of the engine in case the alcohol content is more than the safety limit. The helmet detector senses whether the rider has worn the helmet correctly and allows the engine to start only after ensuring that. The drowsiness detector is used to monitor the condition of the rider and alerts the rider about any signs of sleep through buzzer or vibrations.

2. METHODOLOGY:

Introduction of the Smart Helmet System is a safety-oriented automation system based on IoT that will help in monitoring the rider and ensuring safe riding.

a. Data Collection

This system utilizes various sensors installed in the helmet to gather data. The sensors used are a helmet detection sensor, alcohol detection sensor, and drowsiness detection sensor. The data is then relayed to the microcontroller for processing.

b. Data Monitoring

This microcontroller keeps checking the incoming sensor data. It verifies if the helmet is worn correctly, detects the presence of alcohol in the rider's breath, and monitors the signs of sleepiness while riding.

c. Data Processing and Analysis

The acquired data is analyzed and matched against pre-set safety criteria. This assists the system in determining whether the rider is capable of riding the bike or if there is any danger at all.

d. Decision Making (Automation)

From the analysis, it is evident that the system makes automatic decisions. In case alcohol exceeds the permissible limit or helmet is not used correctly, ignition of the vehicle is prevented. The system will trigger an alarm in case of drowsiness.

e. Control and Notification System

The microcontroller generates signals for controlling the ignition system of the vehicle and triggers the alarm systems such as the buzzer and vibrating sensor. This is performed continuously and repetitively in the form of a loop.

6. ALGORITHM:

1. **Start**
2. **Initialize the System**
3. **Set Threshold Values**
   - Define alcohol limit threshold
   - Define drowsiness detection condition
4. **Read Sensor Data**
   - Read helmet detection sensor status
   - Read alcohol sensor values
5. **Process Data**
   - Convert sensor readings into meaningful values
   - Store values in variables
6. **Decision Making**
   - Check if helmet is worn properly
   - If helmet not worn → Block ignition
   - Check alcohol level
   - If alcohol > threshold → Block ignition
   - Check drowsiness condition
   - If drowsiness detected → Activate alert
7. **Control Action**
   - Send signal to ignition control system
   - Activate buzzer or vibration for alerts
8. **Display/Monitor Data (Optional)**

Show system status (helmet, alcohol, alert)

Repeat Process

Continuously execute steps in a loop

10. End (Continuous Loop System)

7. RESULTS:

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Here is the picture showing the Smart Helmet prototype development that consists of various electrical components. The helmet contains a microcontroller (Arduino/ESP), sensors, buzzer, relay module, and battery connection through the wired circuit. The sensor placed at the front of the helmet is responsible for detection, which includes the rider's state, whereas, in total, the system will detect the presence of the helmet, alcohol, and drowsiness of the rider. Based on the information provided by the sensors, the system will have the ability to switch off the ignition system and alert the rider through a buzzer or vibration system.

This diagram explains a Smart Helmet which will help in enhancing safety measures of a rider using Internet of Things (IoT) and embedded systems. The Smart Helmet is programmed with the use of a microcontroller (for example, Arduino/ESP). There are various electronic devices which have been placed inside the helmet and connected via wiring. Battery pack is included in the system which provides power to the complete setup. There is a front-facing sensor installed within the helmet which acts as a detector and the blinking red light symbolizes that the system is operational. Components like buzzer and relay module are also available within the system. The entire system is able to detect the usage of helmet, consumption of alcohol, and the state of drowsiness of a rider.

8.CONCLUSION:

The Smart Helmet System proves to be an excellent tool for enhancing safety of riders by ensuring that the rider is wearing the helmet, that there is no alcohol present and that there is no sign of drowsiness. The Smart Helmet uses sensors and a microcontroller to make sure that the car cannot be started until all the conditions are met. If drowsiness is sensed, then the rider is immediately alerted using either a buzzer or vibrations. In this way, it minimizes the risk of accidents due to any negligence. The response times of the device are fast and accurate, which makes it an excellent choice for real-time implementations. The Smart Helmet system minimizes the risks of injury because it ensures that a helmet is worn while driving. It ensures road safety by preventing ignition if any alcohol is sensed in the breath.

9.FUTURE SCOPE:

The Smart Helmet System can be further enhanced by integrating advanced IoT technologies for improved connectivity and real-time monitoring through mobile applications. GPS and GSM modules can be added to enable location tracking and automatic emergency alerts in case of accidents. The system can be upgraded with AI-based algorithms for more accurate and reliable drowsiness detection. Cloud storage can be used to store rider data for analysis and safety improvements. Voice alert systems can be introduced to provide clear warnings to the rider. Mobile notifications can help in continuous monitoring by users or authorities. The system can be integrated with smart traffic management systems for better control and safety. Miniaturization of components can make the helmet more compact and comfortable to wear. Solar charging features can be added to improve power efficiency and reduce battery dependency. Biometric sensors can be used for rider identification and enhanced security. Wireless communication between the helmet and vehicle can improve system reliability. The system can be expanded to support accident detection and automatic emergency response. Advanced sensors can improve detection accuracy under different conditions. The overall design can be made more user-friendly and durable. With these improvements, the system can become a highly efficient and intelligent solution for modern road safety.

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