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SMART HELMET ALCOHOL DETECTION ENGINE LOCKING SYSTEM USING IOT

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ABSTRACT

In recent years, there has been a significant increase in road accidents caused by drunk driving, leading to loss of life and property. To address this issue, the integration of advanced technologies like the Internet of Things (IoT) into safety measures becomes imperative. This abstract presents a Smart Helmet Alcohol Detection Engine Locking System using IoT.

The proposed system consists of a smart helmet equipped with an alcohol detection sensor, a microcontroller unit, and IoT connectivity modules. The alcohol detection sensor continuously monitors the breath of the helmet wearer for alcohol content. Upon detecting alcohol beyond the permissible

limit, the sensor sends signals to the microcontroller unit.

Keywords: Smart helmet, Alcohol detection, Engine locking system, Microcontroller unit.

INTRODUCTION

The alarming prevalence of road accidents caused by drunk driving has spurred the need for innovative solutions to enhance road safety. Every year, countless lives are lost, and significant damage is inflicted due to the reckless behavior of intoxicated drivers. To mitigate this issue, technological advancements offer promising avenues for intervention. One such solution is the integration of the Internet of Things (IoT) into safety measures, providing real-time monitoring capabilities.

In this context, the Smart Helmet Alcohol Detection Engine Locking System emerges as a proactive approach to combat drunk driving. By leveraging IoT technology, this system aims to prevent intoxicated individuals from operating vehicles, thereby reducing the risk of accidents and saving lives. The smart helmet serves as the primary component of the system, equipped with an alcohol detection sensor, a microcontroller unit, and IoT connectivity modules.

LITERATURE SURVEY

[1] **"Smart Helmets: A Review of Technological Advancements"** by Zhang H. et al. offers a detailed examination of the technological evolution of smart helmets, emphasizing advancements such as integrated IoT capabilities and sensor technologies. The paper underscores the importance of these innovations in enhancing rider safety and reducing the risk of accidents on the road.

[2] **"IoT-enabled Smart Helmets for Motorcyclist Safety: A Survey"** by Li W. et al. provides a comprehensive survey of IoT-enabled smart helmets, highlighting their multifaceted functionalities, including real-time monitoring, GPS navigation, and collision avoidance systems. The study explores the underlying IoT technologies and their integration into helmet design to improve rider safety and overall riding experience.

[3] **"Recent Advances in Smart Helmet Technology: A Comprehensive Overview"** by Kim S. et al. offers an in-depth overview of recent advancements in smart helmet technology, covering developments in materials, sensors, and communication systems. The paper emphasizes the role of these advancements in mitigating risks associated with motorcycle riding and enhancing the overall safety and comfort of riders.

[4] **"Smart Helmets: Innovations and Applications"** by Chen L. et al. delves into the innovative features and applications of smart helmets, including built-in cameras, heads-up displays, and gesture recognition systems. The paper discusses how these technologies contribute to increased situational awareness and improved communication for motorcyclists, ultimately enhancing safety on the road.

[5] **"Next-generation Smart Helmets: Trends and Challenges"** by Wang Q. et al. identifies emerging trends and challenges in the development of next-generation smart helmets, such as miniaturization of components, energy efficiency, and seamless integration with other wearable devices. The study underscores the need for continued research and innovation to address these challenges and unlock the full potential of smart helmet technology.

[6] **"Safety-focused Smart Helmets: A Review of Design Strategies"** by Liu M. et al. examines design strategies employed in safety-focused smart helmets, including impact-resistant materials, advanced ventilation systems, and ergonomic designs. The paper discusses how these design features contribute to enhanced comfort and protection for riders, ultimately reducing the risk of head injuries in motorcycle accidents.

METHODOLOGY

The methodology for developing the smart helmet alcohol detection engine locking system using IoT encompasses several key steps. Initially, a thorough literature review is conducted to gather insights into existing technologies, sensor integration methods, and safety standards. Following this, a detailed requirement analysis is performed to identify user needs, regulatory requirements, and system functionalities. The selection and integration of appropriate sensors, IoT modules, microcontrollers, and communication protocols are crucial aspects of the methodology, ensuring accurate alcohol

detection and seamless communication with the vehicle's engine control unit (ECU). Hardware and software components are then developed, encompassing the design of the smart helmet prototype and algorithms for alcohol detection and data processing. Rigorous testing is conducted to validate the system's accuracy, reliability, and usability, with a focus on user interface design to ensure intuitive operation for riders. Evaluation and validation activities involve field testing, simulations, and gathering feedback from users and stakeholders to assess overall performance and effectiveness in preventing drunk driving incident.

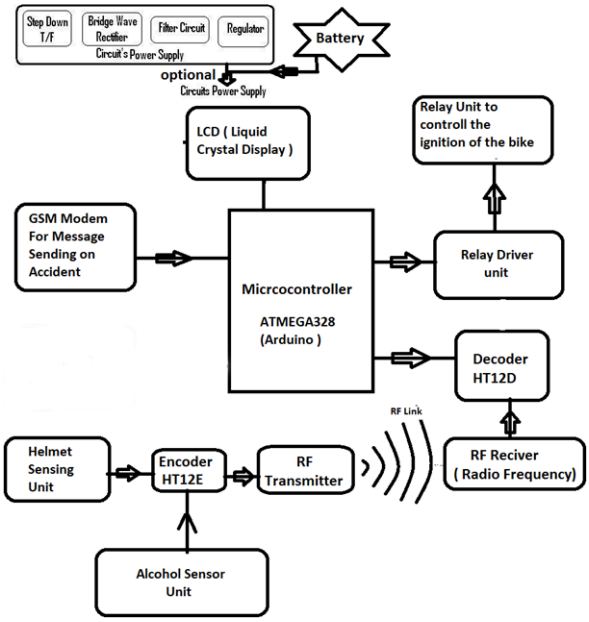

Fig 1 : Block diagram of smart helmet alcohol detection engine locking system using iot.

THE HARDWARE

ARDUINO UNO

The Arduino Uno is an open-source microcontroller board dependent on the Microchip ATmega328P microcontroller and created by Arduino.cc. It is programmable with the Arduino IDE through a kind B.

Fig 3 : Arduino Uno

RF Module

RF (Radio Frequency) modules are essential components used for wireless communication in a wide range of applications. These modules enable the transmission and reception of data over radio waves, making them ideal for remote control systems, telemetry, wireless sensor networks, and communication links. RF modules are available in various configurations, including transmitter, receiver, and transceiver modules, allowing for one-way or two-way communication. They operate across different frequency ranges, from megahertz to gigahertz, depending on the specific requirements of the application. With modulation techniques like Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Phase Shift Keying (PSK), RF modules encode and transmit data efficiently. The operating range of RF modules depends on factors such as transmit power, antenna design, and environmental conditions, determining the maximum distance over which they can effectively transmit or receive signals. Moreover, RF modules support different data

rates, enabling communication at varying speeds, and come with interfaces such as UART, SPI, or I2C for seamless integration with microcontrollers and other electronic devices. Regulatory compliance is essential, ensuring that RF modules adhere to standards and certifications governing radio frequency emissions, ensuring safe and legal operation

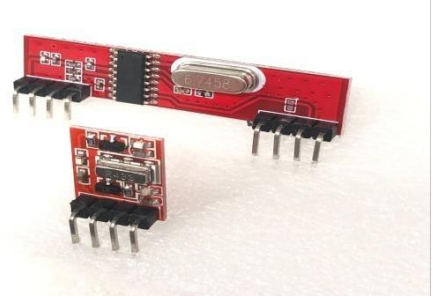

Fig 4 : RF Module

DC GEAR MOTOR

In this project work Four DC motors are used to operate the robot. By giving the command signals from the mobile through the bluetooth app i.e., forward, backward, right and left directions, the robot will be moved.

DC motors are widely used, inexpensive, small and poweful for their size. They are most easy to control. One DC motor requires only two singals for its operation. They are non-polarized, means you can reverse the voltage without any damage to motor. DC motors have +ve and –ve leads. Connecting them to a DC voltage source moves motor in one direction (clockwise) and by reversing the polarity, the DC motor will move in opposite direction (counter clockwise). The maximum speed of DC motor is specified in rpm (rotation per minute). It has two rpms: no load andloaded. The rpm is reduces when moving a load or decreases when load increases. Other specifications of DC motors are voltage and current ratings. Below table shows the specifications of the motor used in the project.

Fig 5 : Dc Gear Motor

L293D MOTOR DRIVER

L293d IC is known as a motor driver. It is a low voltage operating device like other ICs. The Other ICs could have the same functions like L293d but they cannot provide the high voltage to the motor. L293d provides the continuous bidirectional Direct Current to the Motor. The Polarity of current can change at any time without affectingthe whole IC or any other device in the circuit. L293d has an internal H-bridge installed for two motors.

Fig 6 : L293d MOTOR DRIVER

LIMIT SWITCH:

A limit switch is a type of electromechanical device commonly used in industrial applications to detect the presence or absence of an object, typically to control machinery and equipment. It consists of an actuator that comes into contact with the object being monitored, and when the object reaches a specific position or limit, Limit switches can be categorized based on their actuation mechanism, including lever-operated, roller-operated, plunger-operated, and proximity-based switches. Lever-operated switches use a lever arm to actuate the switch when the object comes into contact with it, while roller-operated switches utilize a rolling wheel for smoother operation. Plunger-operated switches feature a spring-loaded plunger that is depressed when the object reaches the designated limit, while proximity switches detect objects using electromagnetic

.

Fig 7: Limit Switch

MQ5 SENSOR:

The MQ-5 sensor is a gas sensor commonly used for detecting various gases, including alcohol vapor. Employing a tin dioxide (SnO2) sensing element, the MQ-5 sensor detects changes in conductivity when it comes into contact with alcohol vapors in the surrounding environment. This change in conductivity is proportional to the concentration of alcohol present, allowing the sensor to accurately measure alcohol levels..

Fig 8: MQ5 Sensor

SOFTWARE

ARDUINO IDE SOFTWARE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension

The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors.

RESULT AND DISCUSSION

DEVICE:

The pictures below are to represent the result of this work.

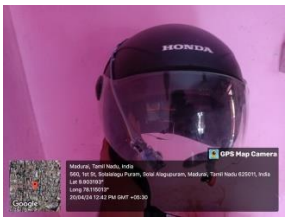

Fig 9: Helmet part

Fig 10: Bike part

CONCLUSION

In conclusion, the development of smart helmets represents a significant advancement in motorcycle safety technology. By integrating features such as IoT connectivity, sensor systems, and real-time monitoring capabilities, smart helmets offer riders enhanced protection and connectivity on the road. These helmets not only provide vital safety features like accident detection and emergency assistance but also offer additional functionalities such as GPS navigation, communication with other vehicles, and even alcohol detection systems. While further improvements and refinements are ongoing, smart helmets hold immense potential to mitigate risks, prevent accidents, and ultimately save lives, marking a promising evolution in motorcycle safety standards.

FUTURE SCOPE

The future scope of limit switches includes their integration with IoT platforms for remote monitoring and predictive maintenance, advancements in sensor technology to enhance accuracy and sensitivity, and the integration of AI algorithms for adaptive operation. Additionally, improvements in materials and miniaturization techniques may lead to more compact and durable limit switches.

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