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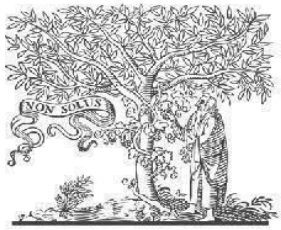

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SAFETY HELMET FOR BIKE AUTHENTICATION & ALCHOHOL SENSING FOR RIDERS

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ABSTRACT

A safety helmet is a form of vigilant and more secure head piece apt by a driver which makes motorbike driving safer. The predominant reason of this helmet is to provide protection and safety for riders. A twist of fate is an uncommon, accidental, surprising outer movement which happens in a certain time and location, with no evident and intentional purpose but with considerable effects and offers an embittered experience for some families. Careless of the motorist is the foremost issue of such mishaps. The government of traffic authorities consign few enlightens to the automobile operators. Although lot of people do no longer carry out the rules and instructions. In order to overcome these problems an intelligent system is introduced. The system which inexorably checks if the person is draining the helmet and retain non-alcoholic exhalation moment

In this paper we are developing a product called Smart helmet, which comprises of to units, motor unit and helmet unit, Helmet unit consists of the alcohol sensor, Alcohol Sensor will not allow rider to take on bike after drinking alcohol. Motor unit is able to communicate with the care takers with messages and, also this system act as accident prevention and detection system.

Keywords: Sensor, Safety, MEMs, Detection

1. INTRODUCTION

Cycling stands as a mode of transportation cherished by millions globally for its sense of liberation and eco-friendliness. Nonetheless, the accompanying risks, compounded by factors like negligence and alcohol consumption, emphasize the pressing need for inventive safety measures. This introduction lays the groundwork for investigating a pioneering solution aimed at bolstering rider safety through the fusion of helmet authentication and alcohol sensing technologies. Enthusiasts of biking often revel in the freedom and thrill of navigating roads and trails on two wheels. However, this exhilaration can swiftly turn hazardous when safety protocols are ignored.

Fig 1 representation of the Safety features of wearing a Helmet.

Incidents and fatalities resulting from bike accidents are regrettably prevalent, with data underscoring the profound impact of neglect and impaired riding on road safety. One of the foremost concerns revolves around the unauthorized operation of bikes by individuals lacking requisite skills, training, or legal authorization. Such unauthorized use not only endangers the rider's safety but also poses a hazard to pedestrians and other road users. Moreover, alcohol consumption prior to or during biking diminishes judgment, coordination, and reaction times, significantly heightening accident risks. Acknowledging these challenges, researchers and innovators have strived to devise proactive safety solutions addressing the fundamental causes of bike accidents.

This paper introduces an innovative approach amalgamating two state-of-the-art technologies: helmet authentication and alcohol sensing. By seamlessly integrating these technologies into biking equipment and control mechanisms, our aim is to transform rider safety and mitigate risks associated with unauthorized operation and alcohol impairment. Subsequent sections will delve into the nuances of helmet authentication and alcohol sensing technologies, scrutinizing their functionalities, implementation hurdles, and potential impact on biker safety. Through a thorough exploration of these inventive solutions, we aspire to pave the way for a safer and more conscientious biking experience for riders across age groups and skill levels.

2. LITERATURE REVIEW

With the growing number of 2-wheel motor vehicles, frequency of accidents is on the rise [1]. A major portion of the fatalities occur because the person was either not wearing a helmet, or his accident was not reported in time, and he could not be saved because of the delayed admittance to a hospital, or because he was riding while drunk [2]. We propose mechanisms that can detect if one is wearing the helmet, detect accidents, and detect whether the person has over-consumed alcohol. For this purpose, we use on board sensors – touch sensor, alcohol sensor (MQ-135), MEMS sensor and breath-analyser (MQ6). The MEMS sensor measures the change in tilt, in X Y and Z axes respectively, and sends the alert message to the pre-set contacts [8].

The breath analyser senses the breath of a person wearing the helmet and confirms the presence of a human in the helmet. The moisture sensor clears the windscreen during fog and rain making riding comfortable. This can help optimize accident detection in the future when enough data is gathered to provide reliable accuracy [7]. The helmet can connect to any smartphone via Bluetooth, to communicate with the online API, using the internet connection of the smartphone. This will ensure the holistic safety of the rider at all times. Motorcycles and bikes form an integral part of personalized transportation in India [6].

However, unfortunately, it also involves innumerable accidents and subsequent loss of lives [5]. Every year, about 300,000 teenagers go to the emergency department because of bike injuries, and at least 10,000 teenagers have injuries that require a few days in the hospital. Statistics say, motorcycle deaths accounted for 15 % of all motor vehicle crash deaths in 2015 and were more than double the number of

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motorcyclist deaths in 1997 [4]. Through an ONEISS survey conducted by the Department of Health, it was found that 90% of the motorcycle's rider killed in accidents were not wearing a helmet at the time of impact. This, along with drunken driving are a major reason of accidents. We aim to mitigate these problems and hence the associated casualties by ensuring that the rider will wear the helmet all the time during his/her ride, thus ensuring safety [3].

The helmet can understand if the person is wearing the helmet, using the pressure sensors, fitted inside the padding foam. The helmet can detect a possible accident, using the on-board accelerometer and pressure sensor. If the values detected exceed a threshold, it is reported as an accident [10]. Emergency contacts, specified by the rider during app setup, are informed about the possible accident, via a system generated email and text message, containing the address and GPS coordinates where the accident had been detected.

An on-board alcohol sensor also analyses the breath of the rider to detect if the current intoxication level is above the legal threshold. If he rides it anyway, his emergency contacts are informed, so that they may handle the situation [9]. The helmet can connect to any smartphone via Bluetooth so that it can communicate with the server using the smartphone's internet access.

3. BLOCK DIAGRAM

The Block Diagram of our prototype is as shown below

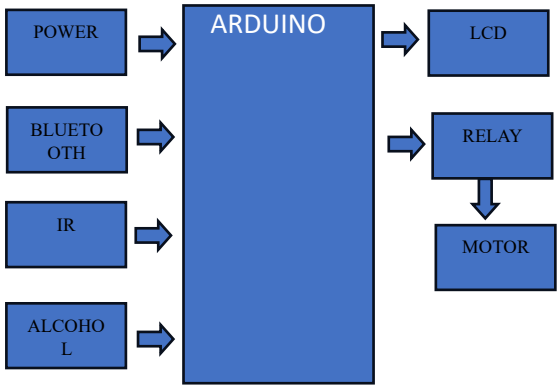

Fig 2 Block Diagram

Power supply unit

Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU.

Arduino

Arduino is a company which creates open-source, programmable microcontroller and software. Although the Arduino was originally designed as a prototyping platform, it can be used in various electronics projects whether temporary or embedded.

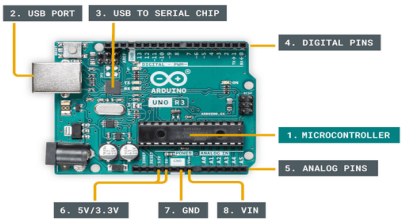

Fig 3 representation of Arduino layout

LCD

Liquid Crystal Display or LCD is a flat, electronic device generally used as a screen in televisions, computers,

smartphones and display signs for producing still and movable images.

Fig 4 representation of lcd display

IR Sensor

An Infrared sensor is an electronic component that is worn to sensation of the specified characteristics of its surroundings. It performs these functions by either emitting or detecting. This is also able of scaling the heat being emitted by a body and sensing the motion. In electromagnetic spectrum, infrared radiation bottle between the visible and microwave region. The principals involved in working planks radiation law, Stephen Boltzmann law, Wien displacement law. The infrared rays are invisible to human eye.

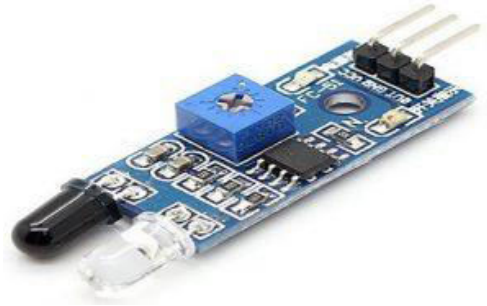

Fig 5 representation of an IR sensor

MQ3 Alcohol Sensor

The MQ3 alcohol gas sensor is a module used for detecting alcohol, CH4, benzene, gasoline, hexane, CO, and LPG. It has a sensitive material SnO2 for alcohol gas detection, with lower electrical conductivity in the fresh air. It is a semiconductor alcohol gas sensor that detects or monitors the presence or absence of alcohol. It is also known as Chemi resistors because sensing of the sensitive material depends on the resistance change when the sensor is

exposed to alcohol gas.

Fig 6 representation of an MQ3 Alcohol sensor

DC Motor

DC Motor is an electrical machine which, when provided with direct current electrical energy, converts it into mechanical energy. It is based on electromagnetic induction, where a conductor carrying current (normally a coil of wire) placed in a magnetic field experiences force to rotate. This rotation is used to perform mechanical work.

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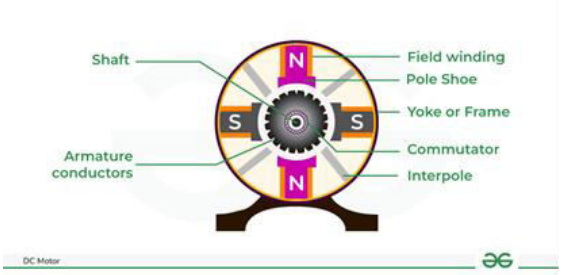
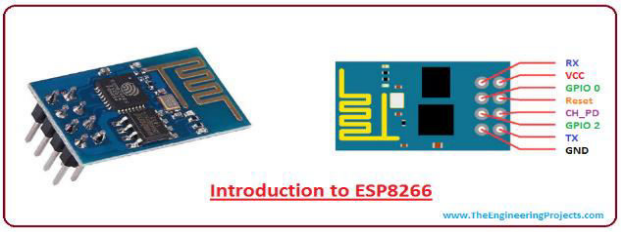


Fig 7 representation of the internal of DC Motor

ESP8266 Wi-Fi module

ESP8266 is a very low-cost & user-friendly Wi-Fi module, which develops a simple TCP/IP connection and can easily be interfaced with microcontrollers via Serial Port. The first chip in this series was ESP-01 which gained sheer attention in the market. In this tutorial, we will discuss the ESP8266 Wi-Fi module along with its pinout, features, specifications, applications and datasheet. The below figure 1.9 shows the pins of an ESP8266



module.

Fig 8 representation of the parts of ESP8266

4. DESIGN FLOW

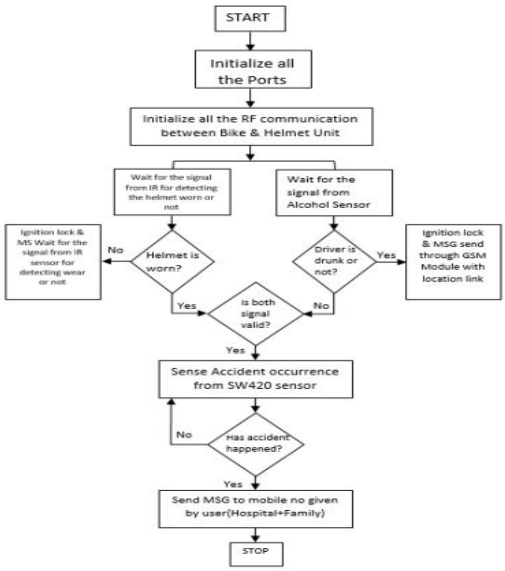


Fig 9 design flow of the project

The first step of project is it initializes all the port and next step is Accident Detection using accelerometer if No accident then it will go to third step. Third step is listening to RF Module Continuously for Data and Interprets Data using if conditions. Fourth step is checking weather helmet is ware or not. If Helmet not wore then display Message “Please wear the helmet”. Next step is checking the condition of drunk if rider is drunk display message "You are Drunk" and then send the message to stored no. with Location. And ask for the password if password is correct then start bike. The sixth step, if accident detected, stop everything and send message with location.

5. WORKING

The microcontroller is the central processing unit of the smart helmet system that processes the data from the sensors and analyses it using algorithms to provide an accurate measurement of the alcohol concentration.

The display and alert system provide real-time feedback to the wearer, displaying the alcohol concentration on an LED or LCD screen and providing a visual or auditory signal if the alcohol level is above the legal limit. The rechargeable battery provides power to the sensors, microcontroller, and display, ensuring that the system is always operational. The data collected from the sensors is stored in a database for further analysis, and the system includes wireless communication capabilities that allow it to communicate with other devices such as smartphones and tablets.

The proposed system has numerous potential applications, particularly in the prevention of drunk driving and improving road safety. The system can alert the wearer if the alcohol level is above the legal limit, preventing them from driving while under the influence. Additionally, the system can be used in various settings, such as workplaces, schools, and public

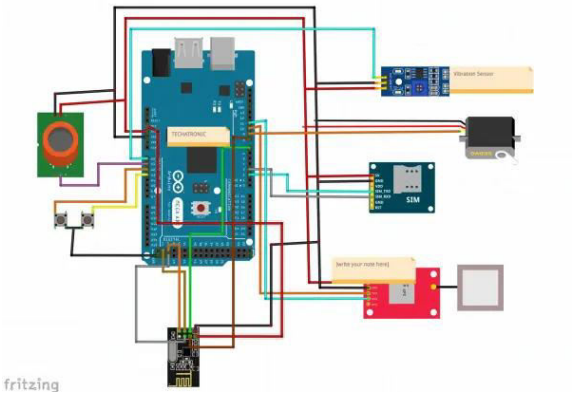


Fig 10 representation of wired connections of the project

events, to ensure that individuals are not under the influence of alcohol while performing their duties or engaging in activities. In conclusion, the proposed system of alcohol detection using a smart helmet system provides a non-invasive and convenient way to detect and monitor alcohol levels in the wearer's body. The system has significant potential in preventing drunk driving, improving road safety, and ensuring the safety and well-being of individuals in various settings.

6. RESULTS

The project resulted in the development of a smart helmet system that can detect whether the rider is wearing the helmet and if the rider has consumed alcohol. If either of these conditions is not met, the bike's engine will not start, and a message will be sent to the rider's family members via IoT.

Fig 11 wired connections of the project

Both the IR sensor (to detect the helmet) and the alcohol sensor operate on negative logic, meaning they will be in a high state before they sense and will be low when they sense. When the sensors detect the absence of a helmet or the presence of alcohol, the engine will automatically turn off, and a message is sent to the rider's well-wishers.

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6.1. Displayed Results

If RF module not in range or helmet RF module is not switch on.

Fig 12 message displayed on LCD Screen

If rider is not warning helmet, then it displays the message of "No Helmet Pls Wear it".

Fig 13 message displayed on LCD Screen

If alcohol concentration present in human breath, then it displays the message on LCD

Fig 14 message displayed on LCD Screen

If accident occurred, then bike is fallen. It displays the message on LCD. And it sends the SMS to register no. with their current geographical location.

Fig 15 message displayed on LCD Screen

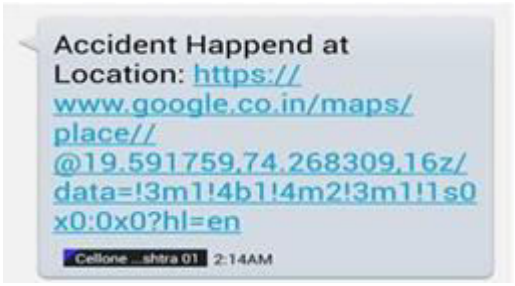

Fig.16 Alert message on mobile for accident

The outcomes of the project have showed that the bike ignition will start if the helmet is worn. So, it will automatically decrease the effect from accident and it can avoid bike from being stolen. Arduino Lilypad is good in controlling all the system and the sensors. Executing the wireless system which Radio Frequency Module to send signal from helmet unit to the bike unit. Due to this wireless connection is better than wired link.

7. CONCLUSION

Combining helmet authentication with alcohol sensing technologies marks a significant stride in enhancing the safety of biking environments, catering to riders across all proficiency levels. Through the utilization of advanced technology, we aim to reduce risks, avert accidents, and fundamentally enhance the biking experience, ensuring a safer and more enjoyable journey for all individuals involved. Formulating references for a hypothetical situation like this one, which introduces a novel technological concept, may not adhere to conventional academic or scholarly sources.

In the future, the smart helmet alcohol detection system can be improved by incorporating advanced sensors and machine learning algorithms for more accurate and reliable results. Additionally,

the system can be integrated with other smart features such as voice assistants and augmented reality displays to enhance the overall riding experience. Furthermore, the system can be expanded to include other forms of transportation such as cars, trucks, and buses, making it a comprehensive solution for preventingdrunk driving and promoting safe transportation. With further development and implementation, the alcohol detection system based on a smart helmet has the potential to significantly reduce the number of accidents caused by drunk driving and save many lives.

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