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Smart Helmet Using GSM Module and Ardiuno

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Abstract: ***Accidents have become a serious problem in recent years. As the number of accidents continues to rise, efforts are made to prevent them and mitigate their effects. The rules of the road do not matter in our society, and they are routinely disregarded. India ranks first in terms of the number of two-wheeler accidents and deaths resulting from them. Using a smart helmet, we provide safety with magnificent and brilliant features by adopting a different perspective. The smart helmet is a GSM-based initiative. It is a helmet with advanced features that enhance the driving experience and make driving safer. The primary objectives of our product are to automate the existing non-automated road safety medical sector, to provide prompt medical assistance to victims of road accidents, and to require riders to wear helmets. To ensure that the biker is wearing a helmet, we are utilizing two modules, one on the helmet and one on the bike, which will operate in tandem. For this, a radio frequency module is used. We are utilizing a GSM800L module with an RS-32 interface that is both GSM and GRPS compatible. In addition, we use Arduino kit to store and operate the program. We are using an ultrasonic sensor that detects an accident and sends a signal to Arduino, which then sends commands to a GSM module that calls/SMS an ambulance and family members. Thus, instant assistance is provided. We aimed to make this intelligent, integrated helmet affordable.***
Keywords: Microcontroller, GSM module 800L, RF module, Arduino Uno kit, Ultrasonic sensor HC-SR04,

I. INTRODUCTION

It is a well-known fact that young people prefer motorcycles and bicycles to four-wheeled vehicles. According to a survey, approximately 70% of the global population did not wear helmets. A survey of road accidents in India in 2021 reveals that of the 69,635 riders killed, 47,000 were not wearing helmets. Accidents involving two-wheeled vehicles are on the rise, resulting in the loss of many lives, particularly among the younger generation. Due to inexperience or lack of concentration, drivers who disregard traffic regulations cause catastrophic collisions. Therefore, the concept of scaling up our project stems from our social responsibility to assist society in minimizing accidents as much as possible. There are numerous causes of accidents, such as disobeying traffic laws, reckless driving, driving under the influence, driving a two-wheeler without a license, etc., but the absence of a helmet is the leading cause of death due to brain damage. Consequently, it is essential that there be a facility to mitigate the aftermath of these accidents. However, the primary objective of our work is to make it mandatory for riders to wear helmets while simultaneously addressing other major causes of accidents. Consequently, our "Smart Helmet" project was founded on this sense of moral responsibility towards society. Smart helmet focuses on two major goals that are beneficial to our daily lives. First and foremost, the motorcycle will not start unless a helmet is worn. Accident detection is the second application. If a person is involved in an accident and no one is present to assist him, or if he is in a remote area, we can notify his family and hospital using technology embedded in this smart helmet. So we are using RF module, GSM module 800L, Ardiuno uno kit, ultrasonic sensor HC-SR04 for our project. Thus, a cost-effective and functional helmet will be considered.

II. LITERATURE SURVEY

A two-wheeler smart helmet incorporates sensors, connectivity, and software to provide the user with various features and benefits. Following is a literature review on smart helmet technology for two-wheeled vehicles.

1) "An internet of things towards a novel smart helmet for motorcycle" by Agung Pangestu and M. N Mohammad. It was published in 2021. This paper proposes a smart helmet which detects accidents for motorcyclists. Helmet is also equipped with a GSM system and Arduino for accident tracking and real-time alerts.

2) "Design of smart helmet for accident avoidance" by A. Jesudoss, R. Vybhavi, and B. Anusha. It was published in year 2019. This paper describes a smart helmet for riders of two-wheeled vehicles that includes features such as alcohol detection, accident detection, and real-time location tracking.

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3) "Smart Helmet: A Review Paper" by Megha Gupta and Prof. M. V. korade. It was published in year 2018. This paper proposes a smart helmet for two-wheeler riders with multiple features, including accident detection using a GSM module and Arduino and real-time location tracking. The paper also explains how to design inexpensive helmets.

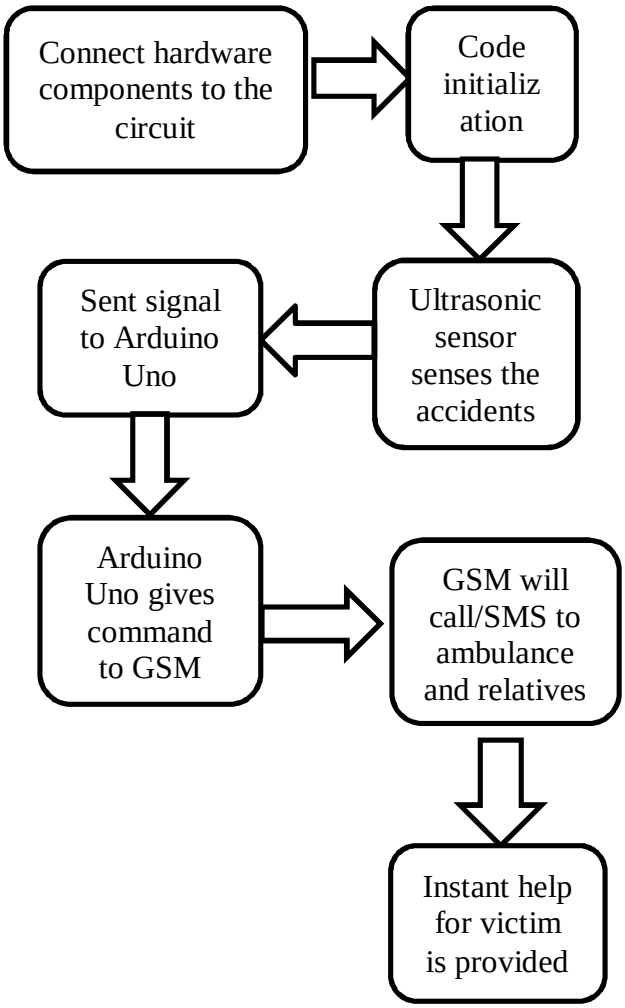
4) "Design and implementation of smart helmet using IOT " by P Koteswara, P Tarunsai N Vinay Kumar. It was published in year 2020. This paper describes a two-wheeler helmet equipped with a fall detection system and an emergency alert system. The paper describes the enhancements to the driver's safety.

5) "Trends in smart helmet with multimodal sensing" by Peter Lee, Uinchin Lee and Yong Jeong. It was published in year 2022. This paper proposes smart helmet trends and provides an overview of current and potential future deployments.

Smart helmets for two-wheelers have a vast array of potential applications for enhancing the safety and security of two-wheeler riders. They can incorporate a variety of functions, including alcohol detection, accident detection, fall detection, anti-theft systems, and GPS tracking. These features can help prevent accidents and provide riders with prompt assistance in the event of an emergency.

III. METHODOLOGY/EXPERIMENTAL

Flowchart



A. Materials

Materials requirement include GSM module, ultrasonic sensor, RF module , helmet, Arduino uno kit .

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IV. HELPFUL HINTS

A. Figures and Tables

1) GSM Module 800L

800L Module is a miniature cellular GSM/GPRS breakout board that permits GPRS transmission, the sending and receiving of messages, and the making and receiving of phone calls.A GSM module with an RS-232 interface that is compatible with both GSM and GRPS. Connects via serial cable to a computer. Access Arduino commands and convert them to SMS or phone cells.



2) Radio Frequency Module

It will force person to wear the helmet



3) Ardiuno UNO KIT



Arduino stores and executes the program. It uses serial pins for communication with GSM.

4) Ultrasonic Sensor



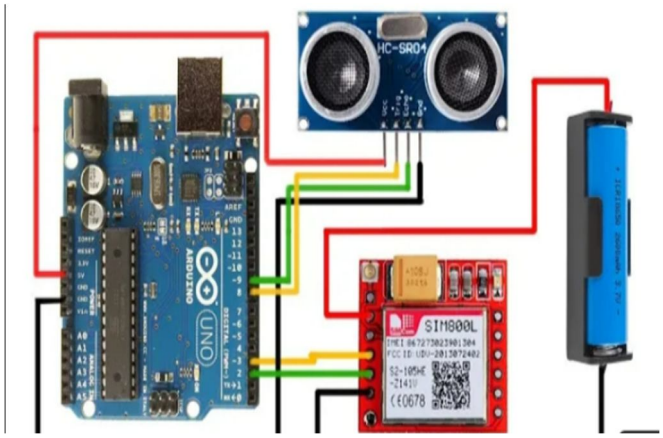
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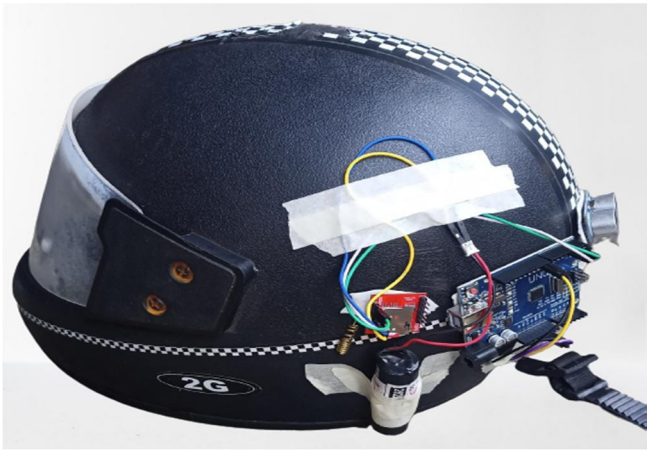
An ultrasonic sensor is a type of electronic device that determines the distance between itself and a target item by reflecting ultrasonic sound waves back to it and then turning that reflected sound into an electrical signal. Ultrasonic sound waves are emitted by the sensor. Sound waves that are audible travel at a slower speed than ultrasonic waves (i.e. the sound that humans can hear). Here, HC-SR04 is used an ultrasonic sensor. It detects an accident or damage to the helmet and sends an immediate signal to Arduino Uno.

5) Central Design Of Project

Inner interface



Outer interface



V. RESULTS AND DISCUSSIONS

The primary objective of the smart helmet project is to develop a system that can help detect accidents and provide immediate help to the victim. The system uses an Arduino board to detect sudden acceleration, which is indicative of an accident. Upon detecting an accident, the system sends an emergency alert message to a designated phone number using the GSM module. Additionally, the system also tracks the GPS location of the victim and sends it along with the alert message, which can help authorities locate the victim quickly.

The system was successfully implemented and tested, and it was found to work efficiently in detecting accidents and sending emergency alerts. However, it is important to note that the system is not fool proof and may not work in all scenarios. For example, the system may not be able to detect accidents in cases where the helmet is not worn correctly or if the impact is not severe enough.

One of the major advantages of the smart helmet system is its ability to send emergency alerts to a designated phone number. This feature can be particularly useful in cases where the victim is unable to call for help due to their condition. The GPS tracking feature can also be very beneficial in locating the victim quickly, which can be critical in emergency situations.

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VI. FUTURE SCOPE

Smart helmets using GSM module and Arduino have great potential in the future.

Some of the potential future applications of smart helmets using GSM module and Arduino are:

1) *Improved Rider Safety:* The smart helmets can monitor the rider's behavior and detect any risky driving patterns. The helmets can also detect and alert riders about potential hazards on the road, such as potholes, sharp turns, or speed breakers.
2) Real-time communication: The GSM module in the helmet can be used for real-time communication between the rider and other riders, as well as emergency services. This can be particularly useful for group rides or when the rider is in distress.
3) Enhanced navigation: The helmets can provide turn-by-turn navigation, allowing riders to easily navigate unfamiliar roads. They can also provide real-time traffic updates and suggest alternate routes to avoid congested areas.
4) Health monitoring: Smart helmets can also monitor the rider's health, including heart rate, blood pressure, and body temperature. This can help detect any potential health issues and provide timely medical assistance.
5) Improved rider experience: The smart helmets can be integrated with entertainment systems, allowing riders to listen to music, make calls, or even watch videos while riding.

Overall, smart helmets using GSM module and Arduino have the potential to revolutionize the way we ride motorcycles and improve rider safety and comfort. As technology advances, we can expect to see more advanced features and functionalities added to these helmets.

VII. CONCLUSION

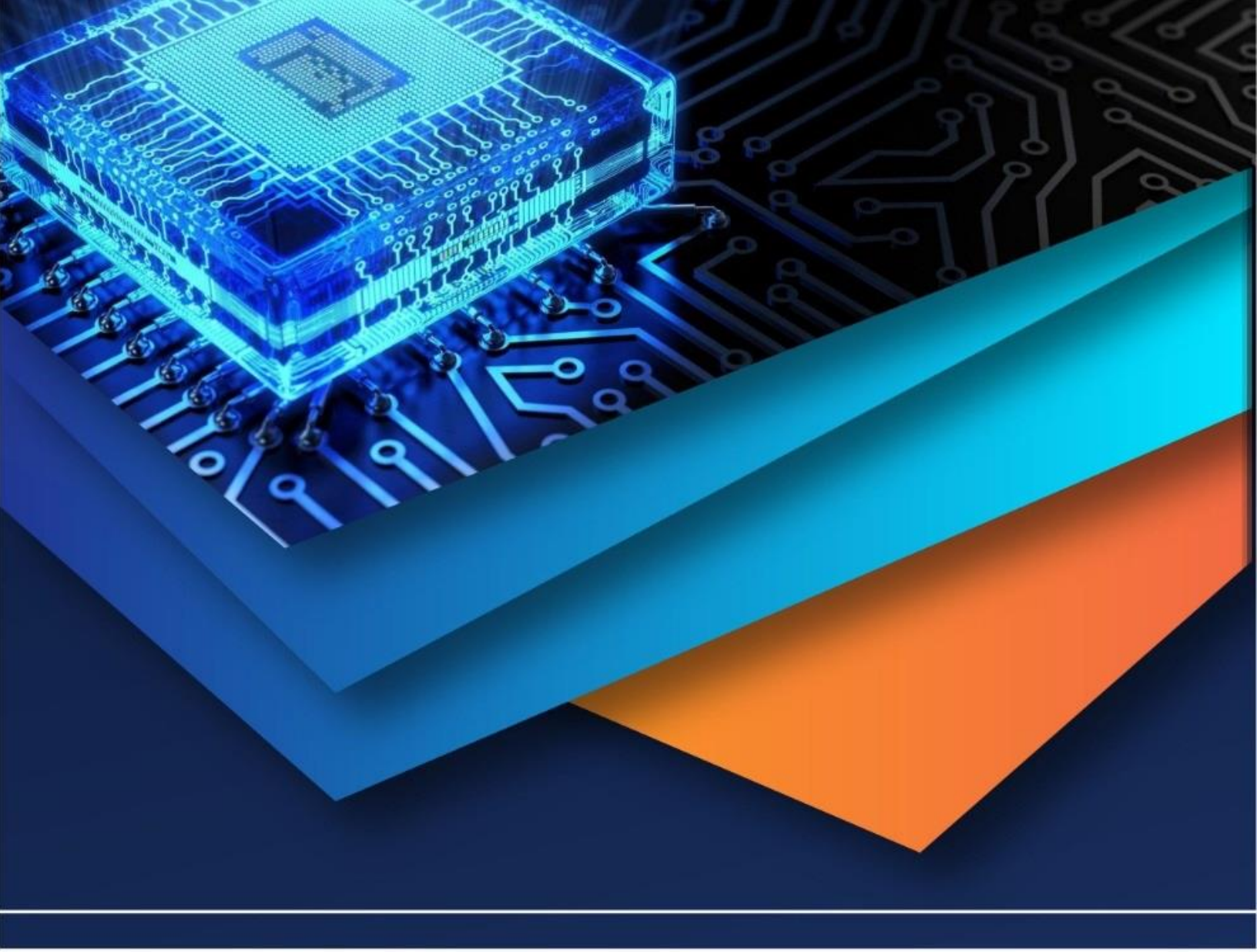
In conclusion, the smart helmet project using Arduino and GSM module technology is a significant step towards improving the safety of motorcycle riders. The system can detect accidents and send emergency alerts to a designated phone number, providing quick assistance to the victim in case of an emergency. Additionally, the system's GPS tracking feature can help authorities locate the victim quickly, which is crucial in emergency situations. Although the system is not foolproof and may not work in all scenarios, its potential to save lives cannot be ignored. Further development of the system, including incorporating more advanced sensors and machine learning algorithms, could significantly enhance its effectiveness. Overall, the smart helmet system is a promising development that can improve the safety of motorcycle riders and potentially save lives.

VIII. ACKNOWLEDGMENT

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