Design of Smart Helmet for Accident Avoiding

Dr.R.Kathirvel[1] (Professor), K.Logapriya[2], G.Jeniferdeepika[3],M.Parthiba[4]
Department of Electronics and Communication Engineering,
Mahendra Engineering College, Namakkal, Tamilnadu, India

ABSTRACT – When a motorcyclist is not wearing a helmet and is involved in a high- speed collision, the consequences can be fatal.A helmet can lessen impact shock and even save a life. Malaysia is one of the numerous nations that have laws requiring motorcycle riders to wear helmets when they are riding their vehicles.Motorcycling is now safer than ever thanks to a unique invention called the smart helmet.An embedded system and GPRS (Internet of Things) are used to do this.sensor data through its interfaced sensor module.This smart helmet operates in a fairly straightforward manner. The alcohol and ADXL sensors are located in separate areas of the helmet. The GPRS module instantly notifies the IoT when the data exceeds the minimal stress level. Additionally, it features an alcohol detecting sensor that, in the event that the sensor output is high, turns off the engine and determines whether the user is intoxicated.An investigation conducted in India found that two-wheelers are the cause of around 25% of traffic accidents. The main reasons for the deaths are driving while intoxicated, making reckless decisions, and exhaustion from extended travel. The goal is to create a fascinating smart helmet that both protects against collisions and warns of areas that are likely to have them. Here, we're building the smart helmet with a variety of sensors.We utilize alcohol sensors to determine whether the cyclist has consumed alcohol. An infrared sensor can be used to examine a rider's helmet. The helmet also has a vibration detector installed to let users know if it is being struck forcefully in an accident. When a two-wheeler slides down a road rash, the GPS locates the accident site and uses GSM to deliver location-based communications to neighboring police stations and hospitals in a timely manner. By wearing protective headgear, a rider can enhance the safety of their bike riding experience by utilizing a smart helmet. This helmet's main objective is to protect the rider. Advanced features like fall detection, alcohol detection, accident identification, location monitoring, and hands-free device use can be used to implement this. This turns it into a smart bike feature as well as a smart helmet. Helmet wear is required; the ignition switch cannot operate without it. A transmitter and receiver can communicate wirelessly by using an RF module as a connection.

I.INTRODUCTION

Currently, the majority of nations enforce that their residents wear helmets when riding bikes and that they should not ride when intoxicated, although regulations are still broken. This artwork is motivated by the actual difficulties we encounter on the roadways every day. Road accidents are increasing daily, and more people die in nations like India where motorcycles are more common due to negligence in wearing helmets.

Two-wheeler road accidents are a common cause of fatality in the current situation. Even though they are widely available, helmets are not being worn by the public. The emergency services are notified in the event of a traffic collision. s the number of motorcyclists in our nation rises, so do traffic accidents. These accidents result in numerous deaths, the majority of which are brought on by the common negligence of failing to wear a helmet. Many more deaths are also brought on by the failure to provide the injured party with the appropriate medical attention they require. The project's goal is to protect bikers from traffic accidents while also increasing their security.The goal of this project is to create a smart safety helmet for the whole rider and to construct a circuit that can increase motorcycle riders' safety. The word "technology" is used widely, particularly in the contexts of education, product manufacture.

Motorcycle safety is specifically tied to the rider's skill level with regard to motorbikes and is influenced by various aspects of the vehicle, including equipment type, vehicle design, and operator proficiency.However, they are the most dangerous drivers since, in the absence of a protective structure, even the slightest negligence could result in the rider's death or major injury. In addition to negligence, other factors that contribute to fatalities include speeding, reckless driving, excessive alcohol consumption, and breaking traffic laws. But the person's lack of a helmet was the primary cause of brain damage, which results in instant death.

There are 80% odds that a cyclist won't have a brain injury if they wear a helmet, and we can prevent accidents from taking lives.IoT and other emerging technologies will assist prevent hazardous traffic scenarios. In addition, the bikes should be designed with sensors, a system that sends messages to both the rider and the surrounding area to warn of danger, and legislation requiring helmet use for bike riders seventy percent of those who die in traffic accidents every hour do not wear helmets, according to a recent survey.

II.AREA OF INTEREST

Smart helmets are a growing area of interest due to their potential to improve safety and convenience for riders.

Smart helmets can incorporate a variety of sensors and technologies to provide riders with information about their surroundings, detect collisions, and send emergency alerts.Smart helmets can help to improve safety for riders in a number of ways. For example, they can detect collisions and send emergency alerts to first responders. They can also provide riders with information about their surroundings, such as the presence of other vehicles or pedestrians.Smart helmets can also make it more convenient for riders to get around. For example, they can integrate with navigation apps to provide turn-by-turn directions. They can also be used to control music or other devices. One of the most crucial functions of smart helmets is collision detection and emergency notifications, which might potentially save lives in the event of an accident. When a collision is detected, smart helmets with accelerometers and gyroscopes can broadcast emergency notifications to first responders along with the rider's location.

III.OBJECTIVES OF THE PROJECT

The primary goal is to significantly enhance the safety of motorcycle riders. By integrating advanced technology into the helmet, we aim to reduce the risk of accidents and mitigate their severity.Develop a system that can actively detect and alert riders to potential hazards, including collisions with vehicles or obstacles, thereby providing riders with crucial reaction time.Implement a solution that addresses one of the most common causes of motorcycle accidents – blind spots. The helmet should offer a comprehensive view of the rider's surroundings to reduce accidents related to lane changes and merges.

Create a mechanism within the helmet to automatically trigger the motorcycle's brakes or other safety measures in emergency situations, surpassing human reaction times.Design an intuitive user interface that includes voice commands for hands-free operation, GPS navigation, and seamless smartphone integration, ensuring ease of use while riding.Ensure that the smart helmet is compatible with various motorcycle models and integrates with standard safety gear, promoting widespread adoption.Ultimately, the project's objective is to contribute to the overall improvement of road safety,reducing motorcycle accidents and fatalities through innovation technology and proactive accident avoidance measures.

IV.PROPOSED SYSTEM

The accelerometer and alcohol sensors are positioned throughout the helmet in areas here there is a higher chance of impact, and they are coupled to a microcontroller board. This makes the operation of the smart helmet extremely straightforward. In other words, these sensors detect when the rider crashes and the helmet hits the ground, sending a signal to the microcontroller board. The controller then uses an IOT module that is interfaced to the sensor to collect sensor data. The IOT module automatically sends a message when the data exceeds the minimal stress limit. Additionally, it features an alcohol detecting sensor that determines if the user is intoxicated and turns off the engine if the output of the sensor is high.

In this way are project is helpful society to save human life to travel a vehicle with safety.A smart helmet is a helmet that is equipped with sensors and other electronic devices to provide additional safety and functionality to the rider. Smart helmets can be used to detect crashes, monitor the rider's vital signs, and even provide navigation and communication assistance.

1) Microcontroller:The helmet would also contain a microcontroller to process data from the sensors and control the helmet's other components.

2) Communication module: The helmet would have a built-in communication module to allow it to connect to other devices, such as a smartphone or a motorcycle's onboard computer.

3) Display: The helmet would have a small display to provide the rider with information, such as their speed, location, and battery level.

4) Sensors: The helmet would be equipped with a variety of sensors, including accelerometers, gyroscopes, and GPS. These sensors would be used to detect crashes, monitor the rider's movements, and track the rider's location.

The proposed system would work as follows:

- The sensors would continuously collect data about the rider's environment and movements.
- The microcontroller would process the data from the sensors and use it to detect crashes and monitor the rider's vital signs.
- If the microcontroller detects a crash, it would activate the helmet's communication module to send an alert to the rider's emergency contacts.

a)Block diagram of Proposed Method Hardware Requirements Arduino UNO

A microcontroller board based on the ATmega328P is called an Arduino or Genuino Uno. It contains a 16 MHz quartz crystal, 6 analog inputs, 14 digital input/output pins (six of which can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button. It comes with everything required to support the microcontroller; all you need to do is power it with a battery or an AC-to-DC adapter or connect it to a computer via a USB cable to get going. You can experiment with your UNO without too much fear of making a mistake; in the worst case, you can replace the chip and restart for a few bucks.

The name Arduino Software (IDE) 1.0 was chosen with the meaning of "uno," which is one in Italian. The reference versions of Arduino, which have now progressed to newer releases, were the Uno board and version 1.0 of the Arduino Software (IDE). The Arduino index of boards contains a comprehensive list of all previous and current Arduino boards, as well as the Uno board, which is the first in a series of USB Arduino boards and the platform's reference model.

LCD Display

Materials used in liquid crystal displays (LCDs) combine the characteristics of crystals and fluid. Instead of having a melting point, they have a range of temperatures where the molecules are nearly as mobile as they would be in a liquid yet are arranged in a crystal-like structure.An LCD is made up of two glass panels separated by a liquid crystal substance called sand. Transparent electrodes are coated on the inside of the glass plates to define the patterns, symbols, or characters that are to be displayed. Polymeric layers are sandwiched between the electrodes and the liquid crystal to keep the molecules of the liquid crystal at a specific orientation angle.

Outside the two glass panels are pasted one polariser per panel. The light beams traveling through these polarizers would be rotated to a specific angle and in a specific direction. The two polarisers and the liquid crystal twist light beams when the LCD is turned off, giving the impression that the LCD is transparent because the light rays exit the device without any orientation.The liquid crystal molecules would align themselves in a particular way when the electrodes were subjected to a enough voltage. The polarisers would spin the light beams going through the LCD, activating and emphasizing the desired characters as a result.The LCDs are thin, only a few millimeters thick, and lightweight.

The LCDs are compatible since they use less electricity.Reading in the dark is made feasible by backlighting. The LCDs have a broad working temperature range and a long lifespan.LCDs are more user-friendly because it is relatively easy to change the layout or display size.LCDs with a finite quantity of numerical data are the basic seven-segment displays seen only in watches, calculators, and measuring devices. Recent technological developments have improved legibility, increased information display capacity, and expanded temperature range. As a result, LCDs are widely utilized in electronics for entertainment and telecommunication. Even in modest TV applications, LCDs have begun to replace cathode ray tubes (CRTs), which were formerly utilized for text and graphic display.

Alcohol Sensor

An alcohol sensor is a device that detects the presence of alcohol in a gas sample. It is typically used in breathalyzers, car ignition interlock devices, and other applications where it is important to determine whether a person is intoxicated.There are two main types of alcohol sensors: semiconductors and electrochemical. Semiconductor sensors work by detecting changes in the electrical conductivity of a semiconductor material when alcohol is present. Electrochemical sensors work by detecting changes in the electrical current that flows through a solution when alcohol is present.Alcohol sensors are typically rated for a specific range of alcohol concentrations, such as 0.00% to 0.50% blood alcohol concentration (BAC). The sensor will output a signal that is proportional to the alcohol concentration in the gas sample. This signal can then be processed by a microcontroller to determine whether the person is intoxicated. In a smart helmet, the alcohol sensor is typically placed near the rider's mouth so that it can detect the alcohol in the rider's breath.The sensor's output signal is sent to the microcontroller, which processes it and determines whether the rider is intoxicated.If the rider is intoxicated, the microcontroller may prevent the helmet from starting the vehicle or send an alert to the rider or a third party.

Accelerometer Sensor

An accelerometer is a sensor used to determine how quickly an object accelerates. Usually used in smartphones, tablets, and other gadgets, it senses vibration, motion, and changes in orientation.To use an accelerometer in a smart helmet, the following hardware components are required:

Accelerometer sensor module: This is the physical accelerometer sensor, which includes the piezoelectric elements

or other components necessary to measure acceleration.

Accelerometer driver board: This board controls the accelerometer sensor module and allows it to be interfaced with the microcontroller unit (MCU) in the smart helmet.

Accelerometer sensor module: LSM303DLHC 3-axis accelerometer breakout board.

Accelerometer driver board: Adafruit LSM303 breakout board
Power supply: 9V battery
Mounting hardware: M2 screws and nuts
Enclosure: 3D-printed enclosure

RF,TX,TX
The term "radio frequency" (RF) refers to the rate of oscillation between approximately 3 kHz and 300 GHz, which is the frequency of radio waves and the alternating currents that onvey them. Though mechanical oscillations are not typically associated with radio frequency (RF) systems, they do occur.
Buzzer
Small electroacoustic devices, like the buzzer in a smart helmet, make noise when an electric current flows through them. An auditory alarm or notification is provided by buzzers in a number of technological devices, such as smart helmets.An obstacle's size and proximity are indicated by the buzzer's intensity or frequency. A closer, more substantial obstacle is indicated by a higher intensity or frequency. To notify the user, a buzzer sounds when an obstruction is identified within a predetermined distance. Users
and products can interact with one other in a variety of ways. The best method is to use a buzzer integrated circuit for audio communication. Comprehending certain technologies and their settings is therefore quite beneficial throughout the design phase.

Thus, an overview of an audio signaling device, such as a buzzer or beeper, and how it interacts with applications is covered in this article.A beeper, buzzer, or other auditory signaling device can be mechanical, piezoelectric, or electromechanical in nature.This is mostly used to convert the audio signal to sound. It is often powered by DC voltage and found in computers, printers, alarm clocks, timers, and other devices. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.The hardware requirements for a buzzer in a smart helmet are relatively simple. The buzzer must be small enough to fit inside the helmet and lightweight enough not to weigh down the rider's head. It must also be able to produce a sound that is loud enough to be heard over the noise of traffic and wind.
Smart helmets use buzzers for a variety of purposes, including:

- To alert the rider to incoming calls or messages.
- To warn the rider of obstacles or other hazards.
- To indicate the status of the helmet's various features (e.g., turn signals, low battery, etc.,)In addition to the buzzer itself, the following hardware components are typically required:
- A driver circuit to amplify the signal to the buzzer.
- A microcontroller to control the buzzer and other features of the helmet.
- A power source to supply power to the buzzer and other components.

4.1 Software Requirements Arduino IDE 1.8.0
The Arduino Integrated Development Environment (IDE) is acomprehensive software platform designed for programming and developing applications for Arduino microcontrollers.Arduino boards are open-source electronics platforms that allow hobbyists, tinkerers, and professionals to create a wide range of interactive and embedded projects. The Arduino IDE serves as the central hub for writing, compiling, and uploading code to these boards. The IDE also offers a set of helpful tools, including a text editor with syntax highlighting, a serial monitor for debugging, and a library manager for easy access to pre-written code snippets, known as libraries. Additionally, the IDEsupports various Arduino boardmodels, making it versatile and adaptable to different hardware configurations.
One of the key strengths of the Arduino IDE lies in its accessibility. It catersto both beginners and experienced developers, allowing them to quicklyget startedwith programming without the need for extensive knowledge in

electronics or computer science. The IDE abstracts away much of the complexity of embedded systems, enabling users to focus on the logic.Moreover, the Arduino IDE is compatible with multiple operating systems, including Windows, macOS, and Linux, ensuring a wide user base can take advantage of its capabilities. This cross-platform compatibility enhances its accessibility.The Arduino IDE promotes a collaborative and open-source development environment. It encourages the sharing of code, libraries, and projects through its vast online community and ecosystem.

Android Studio

Many testing tools and frameworks are available in Android Studio. It is NDK and C++ compatible. It offers Google Cloud Platform built-in support. It simplifies the process of integrating App Engine and Google Cloud Messaging.With its inline debugging and performance analysis capabilities, Android Studio aids in debugging and code performance optimization.Developed exclusively for Android development, Android Studio is the official integrated development environment (IDE) for Google's Android operating system. It is based on JetBrains' IntelliJ IDEA software.Linux, macOS, and Windows-based operating systems can all get it.It serves as the main IDE for developing native Android applications in place of the Eclipse Android Development Tools (E-ADT).

The most recent stable version comes with the following features:

- Support for builds built on gradle.
- Fast fixes and refactoring tailored to Android.Lint tools to detect issues with usability, performance, compatibility between versions, and other issues.
- The ability to integrate ProGuard and sign apps templates-based wizards to generate standard Android components and designs.
- A feature-rich layout designer that lets users examine layouts on different screen configurations and drag and drop UI components.
- Assistance in developing apps for Android Wear.
- Integrated support for Google Cloud Platform, allowing for Google App Engine and Firebase Cloud Messaging (formerly known as "Google Cloud Messaging") connection.
- Using the Android Studio, you may run and debug apps on an emulator.

With extensions like Go, Android Studio supports all the programming languages supported by IntelliJ (and CLion), including Java, C++, and more. Additionally, software versions

3.0 and higher support Kotlin in addition to "all Java 7 language features and a subset of Java 8 language features that vary by platform version."Certain aspects of Java 9 are backported by external projects.It's unclear to what extent Android Studio supports Java versions up to Java 12 (the documentation says incomplete Java 8 support), despite IntelliJ's claim that Android Studio supports all available Java versions, including Java 12. Android can utilize a minimum of a few new language features up to Java 12.After being compiled using Android Studio, an app can be released on the Google Play Store.The application must adhere to the developer content guideline set forth by the Google Play Store.

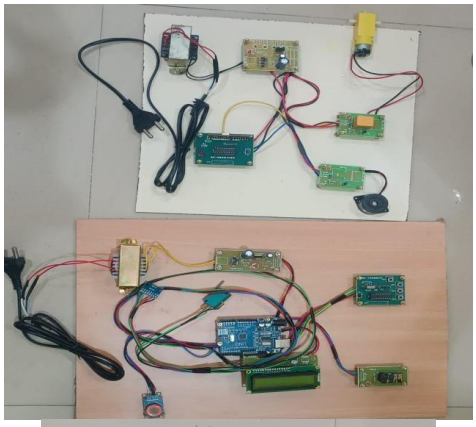
I.RESULT

The rider's protection is the main objective of this sophisticated helmet. Modern features like fall detection, accident recognition, position monitoring, and alcohol detection are used to achieve this.Prior to the message itself, each message is sent with a distinguishable character.Both devices will be able to determine the true subject of the communication in this way.The system is expected to function with the highest level of accuracy and dependability.The Bluetooth connectivity test resulted in a seamless connection with a maximum range of 50 m in only a few seconds.

As a result, the system was able to get a reliable and powerful wireless connection from the Bluetooth controller. Regarding the speaker test, the outcome showed that both music and phone calls could be heard clearly and loudly from the speakers at all volume settings. In a similar vein, the microphone test produced excellent sound quality and good depth for both audio recordings and voice calls.

Regarding the solar charger test, it was found that the power bank requires approximately three hours in bright sunlight and approximately eight hours in cloudy conditions to reach full charge. However, because of the additional load during heavy use, these charging timeframes may differ. As a result, the solar recharging method works better as a backup power source, with the batterybank being replenished externally as needed. Without the solar recharging device, the system could play music continuously for up to nine hours, according to the battery life test. Finally, it was determined that the Bluetooth controller's simple access buttons were practical, user- friendly, and intuitive.This

smart helmet's main objective is to keep the rider safe. Modern features like position monitoring, fall detection, accident recognition, and alcohol detection are used to achieve this.



II.CONCLUSION

Our smart helmet is designed to detect drunk drivers in an efficient manner. This project uses an effective method to save a human life. The primary function of this project is to locate the accident site and transmit that information via an IOT server to a nearby hospital. Drunk drivers are mostly at blame for accidents. When an accident happens to a regular individual, the number of fatalities rises because they were not wearing a helmet. Notwithstanding the fact that this intoxicated driver affects regular people. We created that project because of this. In this sense, the effort helps society to preserve human life by enabling safe vehicle travel.

The Smart helmet's design not only makes wearing a helmet mandatory, but it also makes ure that the rider hasn't consumed more alcohol than is permitted. The suggested solution will prohibit the rider from starting the bike if any of these primary safety regulations are broken.By mandating helmet wear, the smart helmet design not only protects the rider from injury but also verifies that they haven't exceeded the recommended alcohol consumption limit. The suggested solution will prohibit the rider from starting the bike if any of these primary safety regulations are broken. The system also helps in efficient handling of the aftermath of accidents by sending a sms with the location of the biker to the police station. this ensures that the victims get proper and prompt medical attention, if he/she met with an accident.

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