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# SMART HELMET (SHELMET)

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**ABSTRACT**

*Over speeding, intoxicated driving, and negligent driving are the three primary causes of fatality for two-wheeler drivers. If emergency medical services had been able to learn about the tragedy and arrive on the scene in time, many lives might have been saved. We are working on building a helmet that provides the best solution to these present problems. The primary goal of this intelligent helmet is to protect the rider. This is accomplished with the aid of IR sensors, which identify the approaching vehicle's speed, and vibration sensors, which aid with fall detection. The Bluetooth module has been added to make an emergency call in case the rider is involved in any accident.*

**KEYWORDS:** *Smart Helmet, IR sensor, Vibration sensor, Tilt Sensor, Arduino Uno, Bluetooth module, Shelmet app.*

## I. INTRODUCTION

India has seen an annual increase in traffic accidents. Every individual riding a two-wheeler is required to wear protective headgear that complies with BIS (Bureau of Indian norms), per Section 129 of the Motor Vehicles Act of 1988. The Motor Vehicle Act of 1939 declares that drunken driving under the influence (DUI) is a crime and carries a prison sentence for the bike rider. Bikers can currently easily avoid the law. These are the three key problems that drive us to create this project. This project aims to provide a helmet protection system for the safety of bike riders. The manufactured smart helmet is equipped with various sensors that oversee detection. Three main goals of the smart helmet are beneficial to us in our daily lives. Accident detection is the first application. With the aid of this smart helmet, which uses a Bluetooth module and is connected to the phone via an app, we may notify his family and hospital in cases where there is no one around to assist him or when he is in a remote location. The second application alerts the bike rider when nearby vehicles are travelling at excessive speeds, because over speeding is one of the major causes for accident

## II. METHODOLOGY

Smart Helmet is an innovative technology made to provide greater mobility. This module has a transmitter circuitry and various sensors. The microcontroller has IR sensors, Tilt sensors, and Vibration sensors (SW-420, SW-520D). With the help of a Bluetooth Module (HC-05), wireless connection is made possible.

### A. BLOCK DIAGRAM

Figure: 01 shows the block diagram of our proposed system. In this case, sensors have been included into the device's design to accurately measure a few parameters. Three sensors, i.e., IR, Tilt and Vibration are incorporated into the Arduino uno board which receives power from an external battery source. The whole model is then, connected with a Bluetooth model for wireless communication, which is explained further.

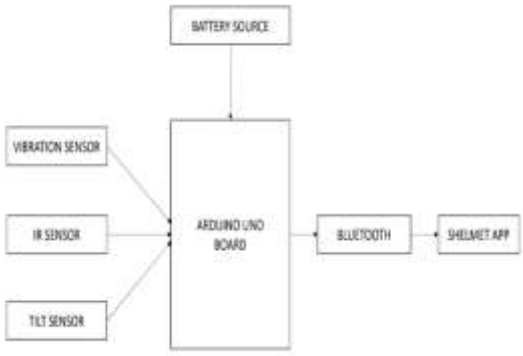



Figure: 01

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**Infrared Sensor**: A sensor that measures and recognises infrared radiation in its environment. One of the electromagnetic radiations with a wave length longer than visible light but shorter than microwaves is infrared radiation. IR radiation has wavelengths that range by five orders of magnitude from 750 nanometres to one millimetre.



**Figure: 02 – Visual representation of a typical IR sensor.**

**Vibration Sensor:** The circuit for fall detection is coupled to the vibration sensor SW-420. When an accident occurs, it detects the pressure and transmits it to the Arduino, which then uses Bluetooth to deliver the notification to the added emergency contact.



**Figure: 03 – Visual representation of a typical vibration sensor.**

**Bluetooth Module:** The circuit utilised for wireless communication has a Bluetooth module attached to it, model HC-05. When an accident happens, it detects the pressure and communicates the information to the Arduino, which then sends the message through Bluetooth connection to notify the emergency contact listed for the rider.



**Figure: 04 – Incorporated Bluetooth module.**

**Arduino:** Utilising the Arduino IDE software and a micro-USB cable, this board is typically programmed. With its built-in boot loader already pre-programmed, the ATmega328 makes it simple to upload code without the use of additional hardware.
In creating electronics projects or products, it has a wide range of applications. The programming of the board is done in the simple-to-learn and use C and C++ language. Programming is greatly simplified with the Arduino IDE.




**Figure: 05 – A typical Arduino uno board**

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### B. WORKING AND ANALYSIS

The circuitry uses 4 IR sensors (2 on each side of the helmet) to gauge the speed of vehicles coming up behind the rider. The other cyclists' infrared emissions are detected by the IR sensor. In order to detect any vibrations or pressure on the helmet, the vibration sensor is attached to the Arduino board. This is used to determine whether the rider has experienced an accident by detecting any vibrations on the helmet of the rider. The HC-05 module, a Bluetooth sensor, is linked to the app for wireless communication.

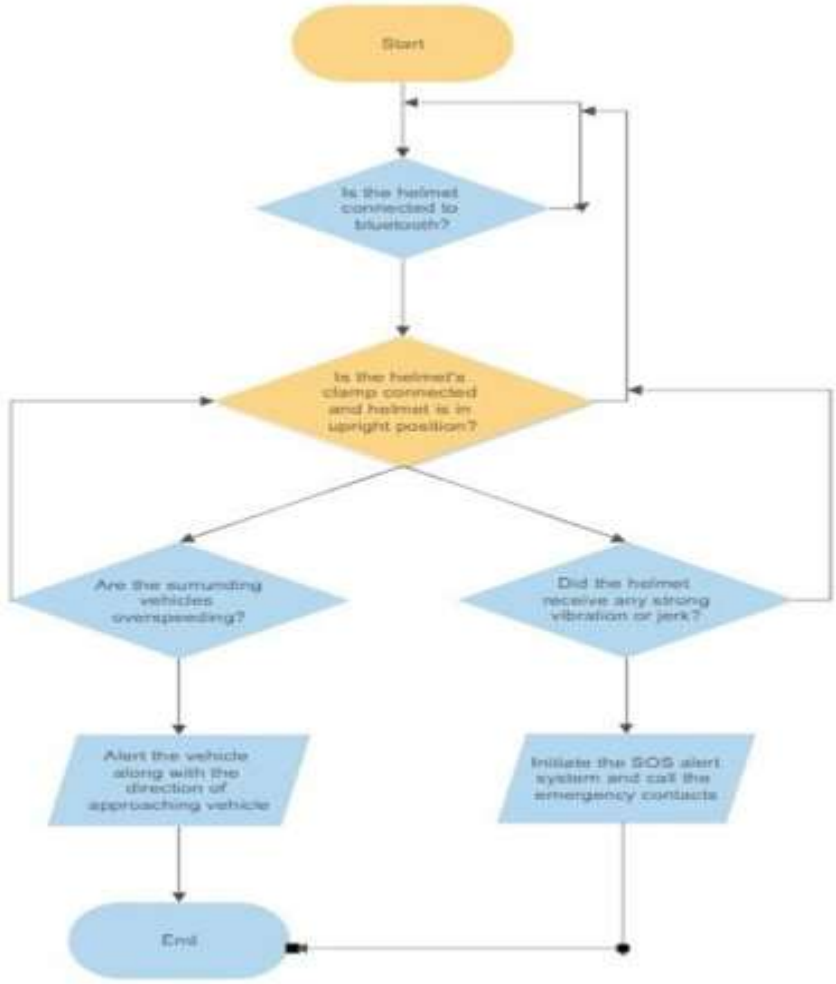



**Figure: 06 – Flowchart of the proposed project**

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### C. CIRCUIT DIAGRAM

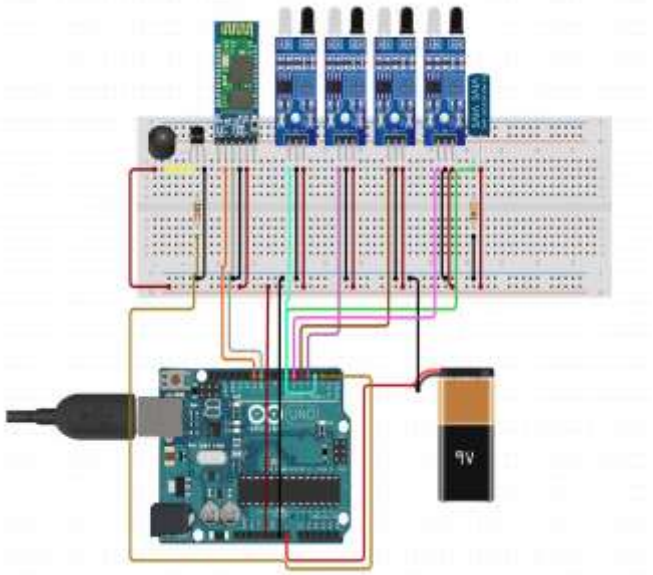


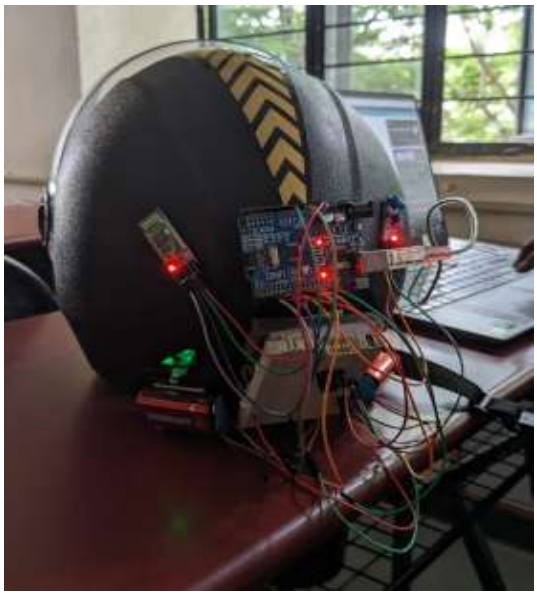
**Figure: 07**

### D. TECHNICAL SPECIFICATION OF THE SENSORS

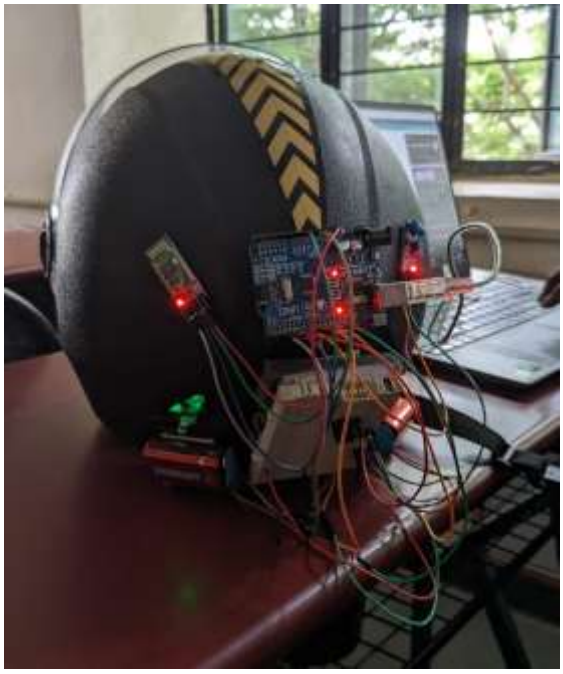
| Sensor | IR | Vibration | Bluetooth Module |
|---|---|---|---|
| Range | 2cm – 30 cm | 1–8000 Hertz | <100m |
| Dimension | 16mm x 12 mm | 15cm x 10cm x 8cm | 30mm x 14mm x 2.2 mm |
| Weight | 5.06 grams | 70 grams | 5 grams |

## III. RESULT

As a result, this technique is quite successful for user safety. Since a helmet is required to ride a bike, the rider will abide by all traffic laws. This technology is controlled by your pocket, so you can ride a two-wheeler while keeping your expenses and safety in mind. This system has simple controls. The intelligent helmet was created with the rider's security, safety, and comfort in mind. The smart helmet's design has achieved good results and functions properly. With redial functionality, emergency and accident alarm systems are effective in preventing the worst scenarios.



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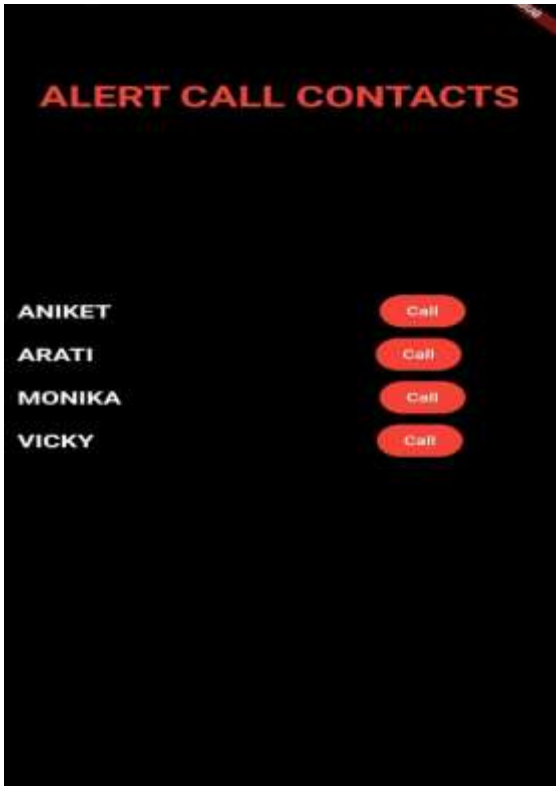



**Figure: 08 - Snapshots of the outcome**

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