HELME-FI AND MOTORBIKE PROTECTION UNIT (HAMPU)

BE- IV ELECTRICAL (2022-2023)

Submitted by:

GAUTAM HITESH ASHOK (2019033800130204)
PANCHAL SHUBHAMKUMAR JIGNESHKUMAR (2019033800130297)
PALLATH ATHEESHLAL LALSAN (2019033800128565)

UNDER THE GUIDANCE OF

Dr Hiren Shah

Faculty of Technology & Engineering The Maharaja Sayajirao University of Baroda

DEPARTMENT OF ELECTRICAL ENGINEERING

THE FACULTY OF TECHNOLOGY AND ENGINEERING

MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

GUJARAT, INDIA MAY 2023

CERTIFICATE

This is to certify that the project report entitled "HELME-FI AND MOTORBIKE PROTECTION UNIT (HAMPU)" is submitted by Shubham Panchal , Atheeshlal Pallath and Hitesh Gautam towards the partial fulfillment of the requirements for the degree of Bachelors in Engineering (Electrical). It is the record of work carried out by them under my supervision and guidance. In our opinion, the submitted work has reached a level for being accepted for examination. The results embodied in this project work, to the best of my knowledge, have not been submitted to any other university or institution for award of any degree or diploma.

GUIDE

DR. HIREN SHAH

ELECTRICAL ENGINEERING DEPARTMENT

FACULTY OF TECHNOLOGY & ENGGINERING

THE MAHARAJA SAYAJIRAO UNIVERSITY

OF BARODA

HEAD OF THE DEPARTMENT

DR. SORUM KOTIA

ELECTRICAL ENGINEERING DEPARTMENT

FACULTY OF TECHNOLOGY & ENGGINERING

THE MAHARAJA SAYAJIRAO UNIVERSITY

OF BARODA

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I am very thankful to the professors of Faculty of Technology and Engineering ,The Maharaja Sayajirao University Of Baroda to give opportunity of making the project and for providing me all possible information and for guiding me during my project period.

I would take this opportunity and thank the entire staff of Electrical Enggineering Department. I am particularly thankful to—

DR. SORUM KOTIA (HEAD OF DEPARTMENT) & DR. HIREN SHAH (GUIDE).

I am also grateful to all the professors, lab assistant, lab technician and helpers for providing guidance and sparing their precious time with me to explaining the fair points of the project . And last but not the least my family, who supported and guided me.

Here, I realized how simple principles that we study do have a great importance in practical world.

CONTENTS

ABSTRACT:-

Accidents are increasing with the rate of 4-5% annually as per WHO report. Helmet is used for reducing the consequence of an accident. Still it is not enough but what if a helmet indicates the probability of danger and makes the rider aware about it. Parents are particularly concerned when it comes to safety of their child while riding a 2 wheeler. Also they want to know whether their child is driving properly or not. We are planning to make project which senses accident, rash driving (very high speed detections) & alcohol consumption of driver. Our project aims to solve the above mentioned problems – This project have 2 units Helmet Unit (HU) & Motor Unit (MU). Both the units communicate via two HC-05 Bluetooth module in master and slave mode for wireless serial communication. The HU contains sensors like alcohol, pulse rate, impact sensor & buzzer. The alcohol detects whether the rider has consumed alcohol or not, pulse rate sensor ensures whether rider has worn the helmet or not and lastly impact sensor will sense the intensity of impact caused due to accident. And all this sensed give rise to buzzing of buzzer. Now this data of HU will be send to MU by wireless communication through Receiver and Transmitter. Now the MU contains Hall Effect Sensor, LCD to display messages and GSM module to send message to emergency contacts. Hall effect sensor detects the speed of the vehicle and display the message if overspeed detected as a warning to the rider and also a message will be sent. And in case of any mishap the MU will send message with location to emergency contacts. From there the dear ones can monitor the situation effectively and could take necessary action against the cause.

LIST OF FIGURES:-

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CHAPTER 1

INTRODUCTION

India is a densely populated nation with a huge amount of traffic on the road so a two-wheeler proves to be one of the most effective modes of road transport. But, two-wheelers are also one of the most unsafe means of road transport. A helmet is a must for any rider on the road but still many people avoid it. This leads to fatal injuries in case of accidents. Over speeding and rash driving are not only dangerous for the rider but also for other people in the vicinity. Many drivers are unaware of vehicles approaching from behind due to several reasons and this leads to accidents. Also, many young riders drive carelessly jeopardizing their as well as others life.

According to the Ministry of Road Transport And Highways, a total number of 4,12,432 road accidents have been reported by States and Union Territories (UTs) during the calendar year 2021, claiming 1,53,972 lives and causing injuries to 3,84,448 persons. The number of road accidents in 2021 increased by 12.6 percent on an average compared to previous year 2020. Similarly, the number of deaths and injuries on account of road accidents increased by 16.9 percent and 10.39 percent respectively (refer to Table 1.1). These figures translate, on an average, into 1130 accidents and 422 deaths every day or 47 accidents and 18 deaths every hour in the country of death in the age group of 15 to 49 years. During the calendar year 2021, road crashes in India claimed about 1.5 lakh lives and caused injuries to more than 3.8 lakh people. Road accidents being the result of inter-play of multiple factors, multi-prong measures are needed to reduce the number of accidents and fatalities. Therefore, the Ministry of Road Transport and Highways has initiated a proactive policy approach towards road safety by incorporate a ting active participation of all stakeholders across the country.

1.1 OVERVIEW

This project have 2 units Helmet Unit (HU) & Motor Unit (MU). Both the units communicate via IR receiver and transmitter (IR LED & IR Phototransistor). The HU contains sensors like alcohol, pulse rate, impact sensor & buzzer. The alcohol detects whether the rider has consume alcohol or not and if he/she had consume it then the ignition of motor bike will not occur , pulse rate sensor ensures whether rider has worn the helmet or not and & if he has not worn then there will be no any pulse so eventually no ignition ,lastly impact sensor will sense the intensity of vibration caused due to accident. And if any sensor detects abnormality then buzzer will start beeping.

Now this abnormality of HU will be send to MU by wireless communication through IR Receiver and IR Transmitter. Now the MU contains Hall Effect Sensor, LCD to display messages , GPS and GSM modules . Hall effect sensor detects the speed of the vehicle and display the message if overspeed detected as a warning to the rider. And in case of any mishap the MU will send message with location to emergency contacts with help of GPS & GSM Module. Also there is a feature of push button provided on motorbike unit which rider can press if the accident is normal or not so fatal by which another message of rider is safe normal accident will be sent to his/her emergency contacts.

In this report – Chapter 2 contains the details of WORKING PRINCIPLE AND FUNCTIONAL DESCRIPTION OF THE PROJECT. It contains the detail description of helmet unit components like microcontroller, pulse rate, alcohol, impact sensors, buzzer, adc, power supply, IR LED transmitter etc. And then contains information of motorunit components like hall effect sensor, GPS & GSM modules, LCD, IR phototransistor receiver in detail.

Chapter 3 desribes the IMPLEMENTAION DETAILS of our project in which SCHEMATIC diagram of the complete project on proteus is shown then the schematic of HU and MU separately is also shown. Then software decription is available wich we have used in this project extensively. After that the flowchart of our protection system with complete description is available.

Chapter 4 describes the complete TESTING AND SIMULATION which we have performed one by one during the entire project. It contains the step by step testing of our units. First the individual testing of all the components like all the alcohol sensing, pulse rate sensing and it's measuring, impact sensing, speed sensing and measuring is shown. Then, the combine testing of HU is described. Also the testing methods and debugging procedures at each stage is described in details with suitable proteus simulation schematics as well as hardware methodology which we have adopted before PCB is made is shown in detail. Then the optimization is also shown in which General Purpose Circuit Board (GPCB) is prepared by us for the complete HU is added. And then the testing of GPCB is also mentioned.

Chapter 5 describes the RESULTS which we get out of the project on partial fulfillment of the project, and then the conclusion is made out of the work which we have done. Also limitations of this project and some future scope is mentioned in it which will help to the reader to understand better.

CHAPTER 2

WORKING PRINCIPLE AND FUNCTIONAL DESCRIPTION

2.1 BLOCK DIAGRAM:

BLOCK DIAGRAM

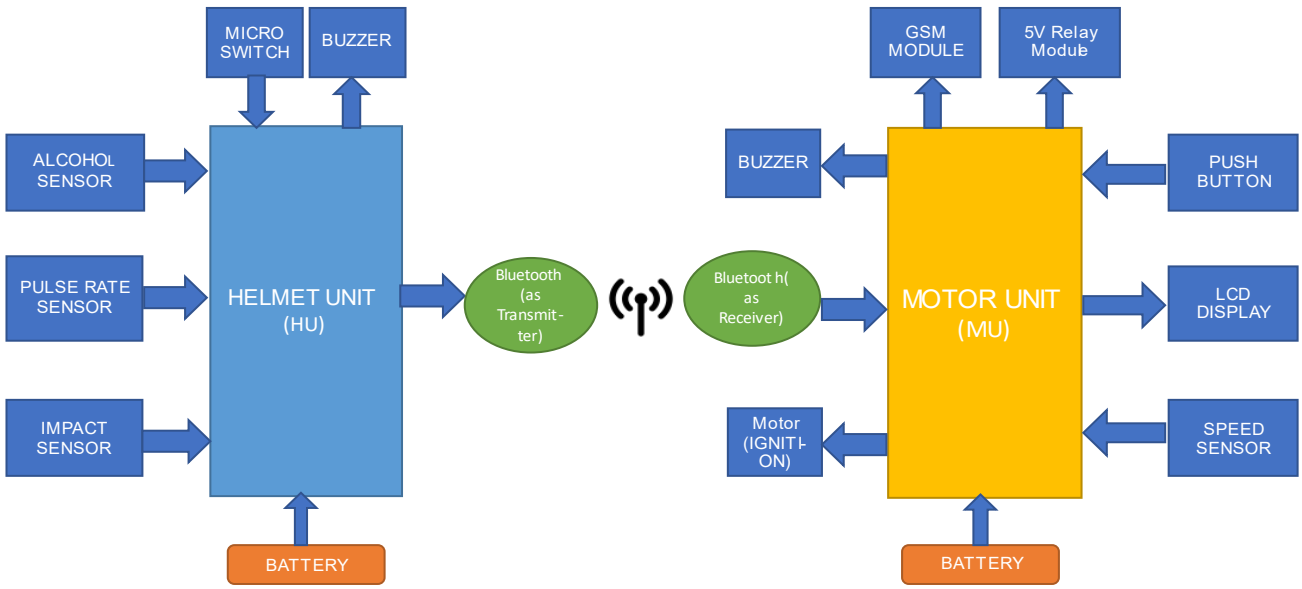


FIG 2.1

DESCRIPTION OF BLOCK DIAGRAM:

HELMET UNIT(HU)	MOTOR UNIT (MU)
8051 MICROCONTROLLER(AT89C51)	8051 MICROCONTROLLER(AT89C51)
ALCOHOL SENSOR (MQ-3)	HALL EFFECT SENSOR
PULSE RATE SENSOR	L.C.D
IMPACT SENSOR (FSR)	G.S.M MODULE, G.P.S MODULE
BUZZER	BUZZER
SUPPLY (5V)	SUPPLY(5V)
ADCO8O8-N, CD4049 U3	

TABLE 2.1

2.2DESCRIPTION OF HELMET UNIT COMPONENTS:

1. 8051 MICROCONTROLLER(AT89C51) : It is 8 bit microcontroller . It is built with 40pin DIP, 4KB ROM storage and 128 Bytes of RAM storage, two 16 bit timers, four 8 bit parallel ports. And on chip crystal oscillator is integrated in the microcontroller having crystal frequency of 12MHZ.
2. ALCOHOL SENSOR : We are using MQ-3 gas sensor for alcohol detection purpose, It gives analog and digital output as it has on chip comparator. We have interfaced this by giving it's digital output as an input to microcontroller port pin P2.1

Features:-

- 5V operation
- Simple to use
- LEDs for output and power
- Output sensitivity adjustable
- Analog output 0V to 5V
- Digital output 0V or 5V
- Low Cost
- Fast Response
- Stable and Long Life
- Good Sensitivity to Alcohol Gas
- Both Digital and Analog Outputs
- On-board LED Indicator

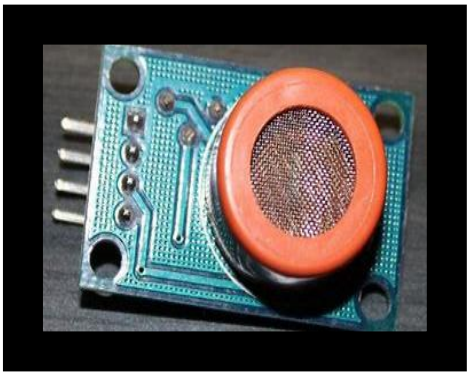


FIG 2.2

3. PULSE RATE SENSOR :It measures BPM of a rider mounted on neck belt of helmet. It gives pulses as an output and we have interface with microcontroller by giving this pulses to port pin P3.5.

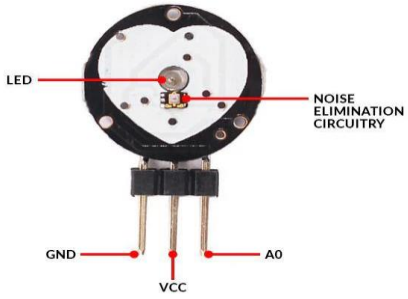


FIG 2.3

FEATURES

- This sensor measures the heart rate and biometric pulse rate.
- This sensor in a plug-and-play model.
- This sensor operates at a voltage of +5V/+3.3V.
- Integral amplification circuit for noise cancellation.
  Low power consumption

4. **IMPACT SENSOR**: We are using Force Sensitive Resistor (FSR) as an impact sensor because we had studied various different types of pressure sensors in which most of them are for industrial purpose, expensive and also not easily mounted on helmet. Collision sensor was also one option but it is simply giving digital output and we were in search of a sensor which gives different levels of impact so then FSR was the best option .

   As you can see from figure that it is very thin so it will be easily mounted on helmet, also it is a kind of variable resistor so it will give different analog voltages which will be send to ADC and ADC is interfaced with microcontroller (P1, P2.7, P2.6, P2.5, P2.4).

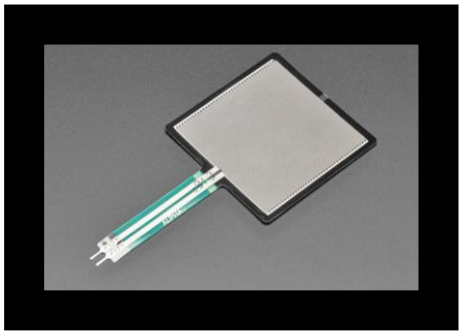


FIG 2.4

FEATURES:

- Actuation force a slow as 0.1N.
- Easily customizable to a wide range of sizes.
- Highly repeatable force reading as low as 2% of initial reading with repeatable actuation system.
- Cost effective.
- Ultra thin; 0.45mm
- Robust; up to 10M actuations.
- Simple and easy to integrate.

5. **BUZZER**

   A piezoelectric audio signalling device as a beeper is use in this project on helmet unit. It will beeps as a warning to the rider in case rider is drunk or it also beeps when the accident happened as alert in it's surrounding. Also in motor bike unit if very high speed of the bike detected, then also it will beep as a warning to the rider.

FEATURES:

- Simply Compatible
- Frequency Response is Good
- Size is small
- Energy Consumption is less
- The Range of Voltage usage is Large
- Sound Pressure is high

FIG 2.5

6. **ADC(0808-N)** :

- In this project we have used adc0808lcn analog to digital converter. The need of adc arises because the output of FSR is a analog voltage whose magnitude depends on the intensity of the impact, And the output of this ADC will be digital output having range 0-255 in decimal. So, by this we better judge the how danger is the accident, and accordingly the messages and other work will happen.
- The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog

- FEATURES:
    - Easy Interface to All Microprocessors.
    - Operates Ratiometrically or with 5 VDC or Analog Span Adjusted Voltage Reference.
    - No Zero or Full-Scale Adjust Required.
    - 8-Channel Multiplexer with Address Logic.
    - 0V to VCC Input Range
    - Outputs meet TTL Voltage Level Specifications
    - ADC0808 Equivalent to MM74C949
    - ADC0809 Equivalent to MM74C949-1
- KEY SPECIFICATIONS
    - Resolution: 8 Bits
    - Total Unadjusted Error: ±½ LSB and ±1 LSB.
    - Single Supply: 5 VDC.
    - Low Power: 15 mW.
    - Conversion Time: 100 μs.
- The design of the ADC0808, ADC0809 has been • Low Power: 15 mW optimized by incorporating the most desirable aspects of several A/D conversion techniques. The ADC0808, • Conversion Time: 100 μs ADC0809 offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability, and consumes minimal power. These features make this device ideally suited to applications from process and machine control to consumer and automotive applications. For 16- channel multiplexer with common output.

7. MICROSWITCH & SUPPLY:

- Here we are using microswitch which will be ON when the rider worns the helmet.After this only the supply to the helmet unit will be given so that the sensors mounted on the helmet unit will check the conditions of rider and take necessary decision whether the vehicle should start or not . Here we are providing 5V DC supply to the helmet via Lithium Ion battery.

FIG2.6

8. BLUETOOTH MODULE(HC-05):

- We are using this module as a transmitter, so it is in **master mode**, transfer data of HU to MU.
- Operating Voltage: 4V to 6V (Typically +5V)
- Operating Current: 30mA
- Range: <100m
- Works with Serial communication (USART) and TTL compatible
- Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.

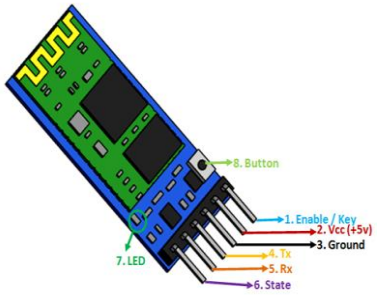


FIG2.7

9. CD4049 U3

- The CD4049 is a hex inverting buffer/converter which basically means that it has 6 NOT gates (inverters) and that it can provide a higher sink current than most logic gates. It has 16 pins, two of which are not in use. This chip is often used for level shifting as it can accept a higher input voltage than its supplied VDD voltage.
- In this project we have used CD4049 IC to generate 640KHz clock signal which we have given to ADC0808lcn. As adc uses this and takes 100microsec time for conversion.

2.3 DESCRIPTION OF MOTOR UNIT COMPONENTS

1) HALL EFFECT SENSOR:

- In this project we have used hall effect sensor mounted on the wheel of the vehicle which will help to the measure speed of the vehicle**.** The main motive to use this is to check whether the rider is overspeeding or not. If the measured speed is found to be violating the certain threshold value (

70kmph) then the buzzer will start beeping and the message showing overspeed detected will be shown on the lcd display as a warning to the rider. Im case the rider continuously violating the speed limit then the meassage showing overspeed detected will also be sent to the emeregency contacts of the rider.

- About the sensor used-
  Hall Effect Sensor Module is **used to detect the proximity of a magnet.** It is very much smaller in size. When the magnetic field rises above a threshold level, the open-collector output transistor switches on, which pulls the logic-compatible output low and illuminates the onboard LED indicator.

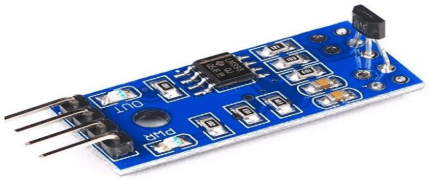


FIG2.8

- The hall effect sensor is a type of magnetic sensor which can be used for detecting the strength and direction of a magnetic field produced from a permanent magnet or an electromagnet with its output varying in proportion to the strength of the magnetic field being detected.
- **FEATURES:**
  - wide operating voltage range 4.5V-24V.
  - Wide ambient temperature range: –40°~150°C
  - Bipolar technology
  - Open-collector 25mA output
  - Open-collector 25mA output
  - Reverse battery protection
  - Resistant to physical stress
  - Solid-state reliability
  - Activate with small, commercially available permanent

2) SINGLE CHANNEL 5V DC RELAY:

- We are using 5V DC relay in motor unit to turn on or off the ignition of the bike as per the conditions details given by the helmet unit.
- Relay is one kind of electro-mechanical component that functions as a switch. The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts like normally open (NO) and normally closed (NC).

FIG2.9

3) GSM MODULE:

FIG 2.10.

- A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here.
- SIM900 GSM Module

  These modules consist of a GSM module or GPRS modem powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computers. A GSM modem can be a dedicated modem device with a serial, USB, or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

4) LCD(LM016L):-

- In this project we have used 16x2 LCD module to constantly show the update of each sensor data both on HU and MU. In case of accident it will also show the emergency contact number so that the people around the victim can even dial that number to inform to his/her emergency contacts.
- 16x2 lcd is a very common type of lcd module to be used in 8051 based applications so we opt for it for project purpose. It is available in 16 pin packages with features like contrast adjustment function, backlight and each dot matrix has 5x8 dot resolution. The pin configuration is shown in appendix.

10.BLUETOOTH MODULE(HC-05):

- We are using this module as a receiver, so it is in **slave mode**, receives data from HU to MU.
- Operating Voltage: 4V to 6V (Typically +5V)
- Operating Current: 30mA
- Range: <100m
- Works with Serial communication (USART) and TTL compatible
- Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.

CHAPTER3

(IMPLEMENTATION DETAILS)

3.1 Schematic Diagram

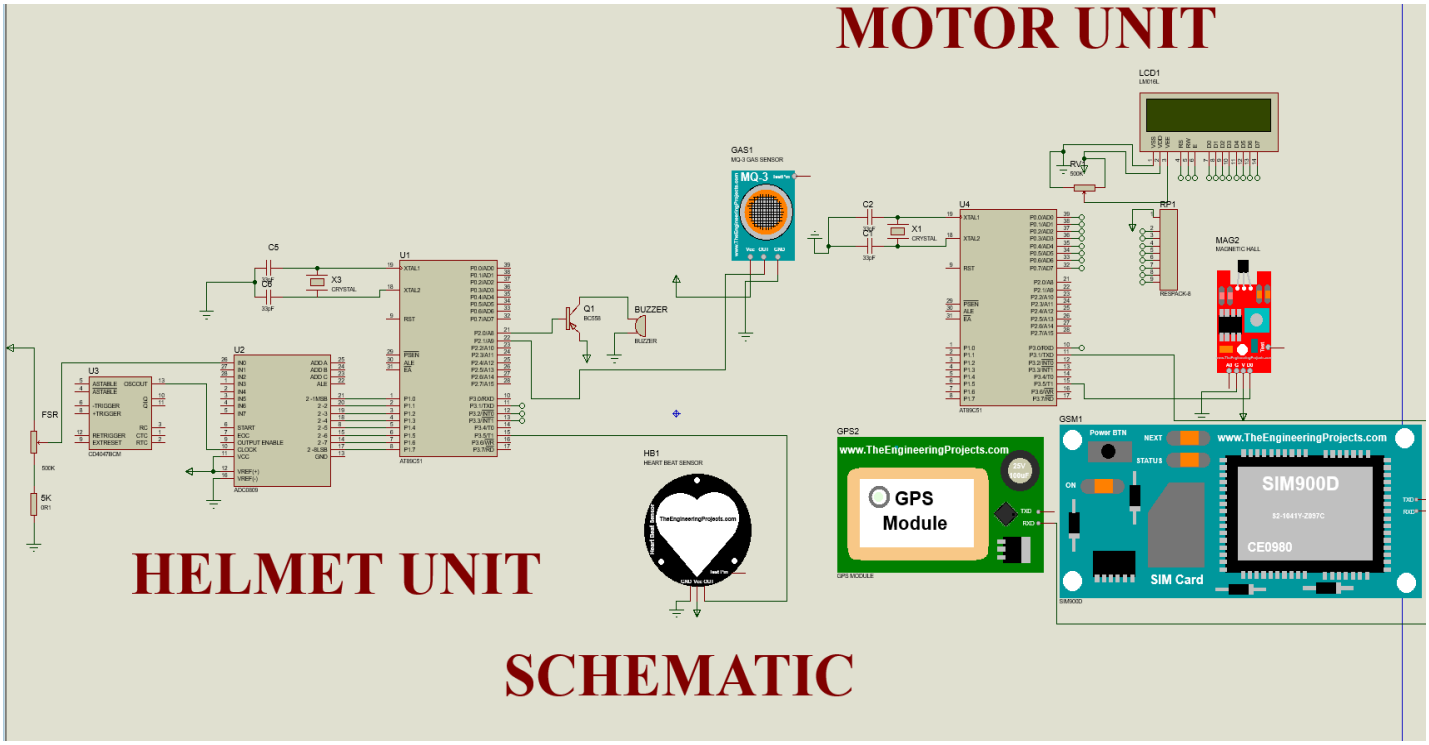


FIG 3.1

DESCRIPTION: The Schematic consist of two units

1)Helmet Unit(Left) 2)Motor Unit(Right)

1. **Helmet Unit**:-

It consist of three sensors

- MQ-3 GAS SENSOR
- PULSE RATE SENSOR
- IMPACT SENSOR

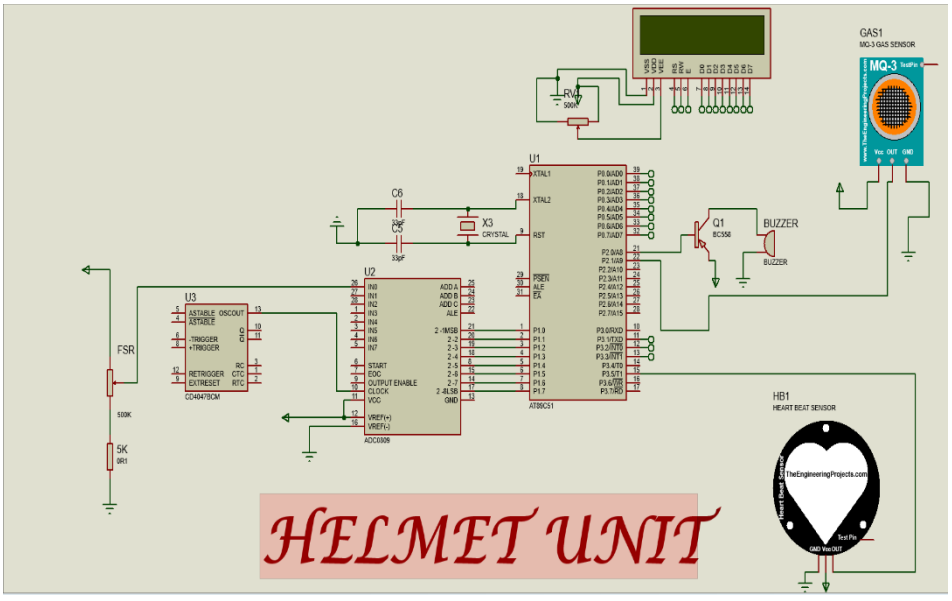


FIG 3.2

- Pulse Rate Sensor generates pulses as per the Heart Rate. Its signal pin is connected with PIN3.5 to count the number of pulses. It counts the number of pulses within one second.MQ-3 sensor detects alcohol with some change in resistance value(chemiresistor).Third the FSR will lower its resistance as some force is applied on it. The data through these sensors will be transmitted through Serial Communication RXD and TXD pin of 8051 using IR LED and Phototransistor wirelessly. The data is transmitted through TTL Logic with the functioning of UART block inside 8051 Controller.

2. MOTOR UNIT :

It consist of the following

- GSM Module
- GPS Module
- Hall Sensor
- LCD(16X2)

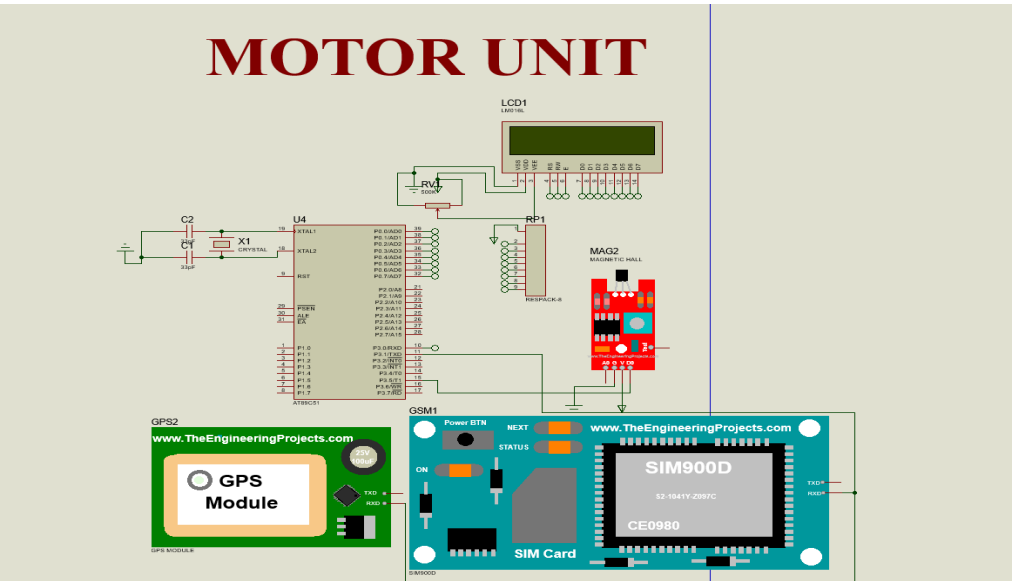


FIG 3.3

- As per the data received serially decision making will be done by this motor unit.All the data will be displayed on LCD i.e(Pulse Rate, Impact value &Gas Sensor) as well as ignition to remain on or off will be decided based on that. The message and location will be send using GSM(Global System Mobile Communication)and GPS(Global Position System) modules respectively.

3.2 SOFTWARE DESCRIPTION :

1. PROTEUS 8

- The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it.

2. KEIL MICROVISION3

- Keil Software development tools for the 8051 family supports every level of developer from the professional application of engineer to student just learning about embedded software development. The microvision IDE is a windows based software development platform that combines a robust editor, project manager and make facility. The microvision3 Integrates all tools including the C compiler,

macro assembler, linker/locator and hex file generator. µVision3 helps expedite the development process of your embedded applications by providing the following features:

3.2POWER SUPPLY:-

- The voltage needed for both the units as well as all the sensors are 5V DC. The power supply for testing phase was made by using a stepdown transformer 220/9V then passing through a bridge rectifier and LM2950 voltage regulator to get 5V DC. For the final prototype power supply is given to motor unit as by using 2 Lithium Ion batteries in series.

3.3 FLOWCHART

- In this project we have made the flow of tasks of our HU system as per the flowchart shown below. In this flowchart start denotes the closing of buckle of the helmet by which the supply to the unit will be provided and sensors will start the work & the connection between the HU and MU gets established.
- After this Alcohol detection and PULSE RATE detection will start and if we found the count of pulses above the threshold value and if NO ALCOHOL detects then only the IGNITION will start.
- Once the IGNITIION of bike will start IMPACT SENSOR will check the impact work continuously. As there can be different intensities of impact possible, So as per the range of output of ADC we have segregated the intensities of impact as shown in the flowchart below.

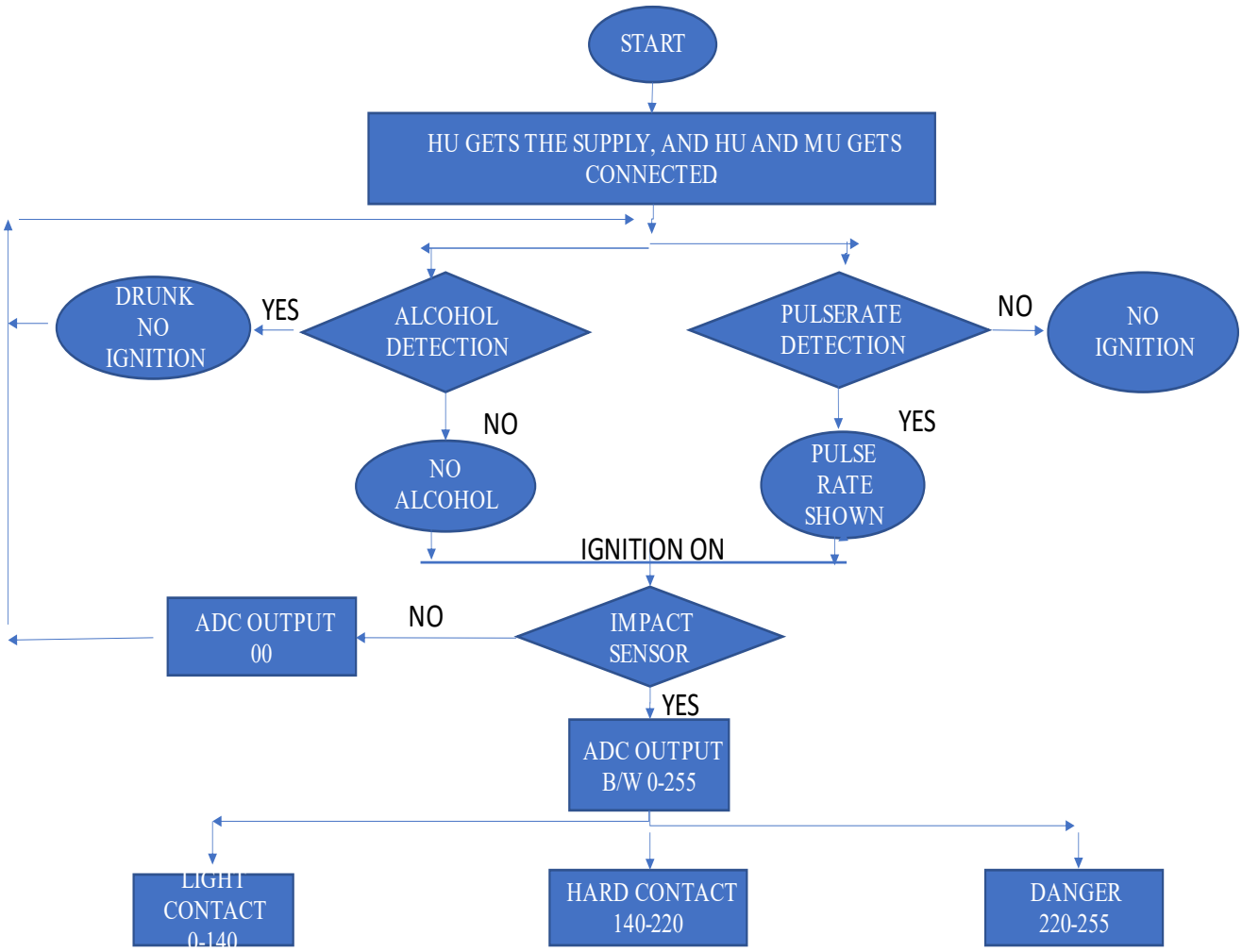


FIG 3.4

- **FLOWCHART FOR MOTOR UNIT**

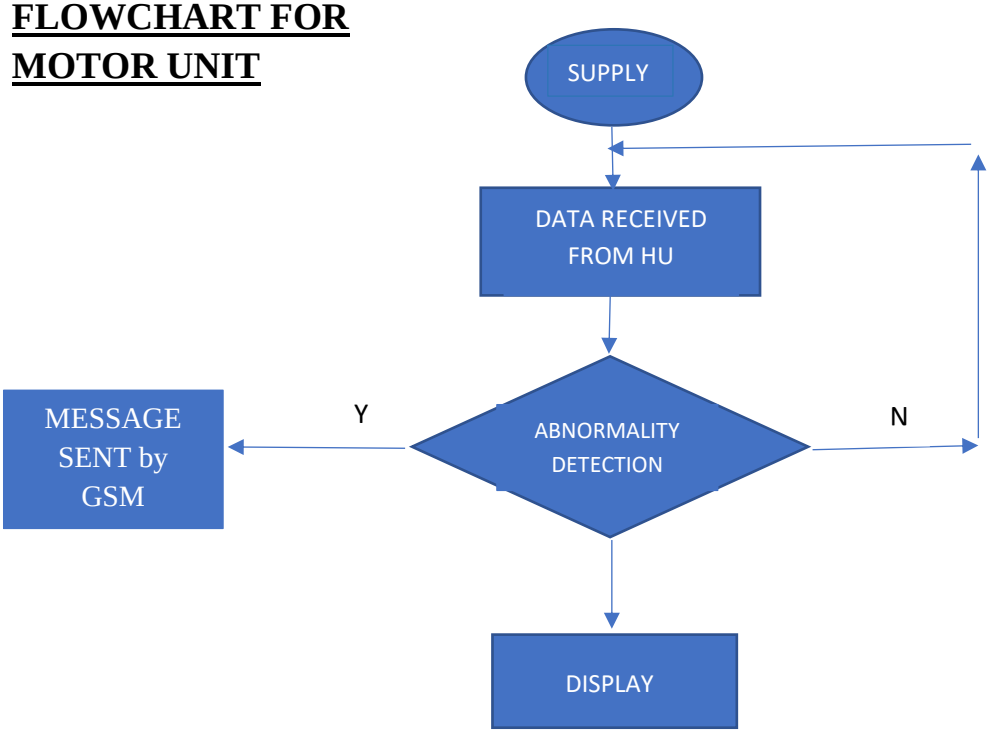


FIG 3.5

CHAPTER-4

SIMULATION AND TESTING

In this project we have done testing of all the sensors mounted on the helmet unit And motor unit individually as described below.

4.1testing of helmet unit components:

1. MQ-3 GAS SENSOR:

- Here this is testing of the alcohol sensor, basically we have given the digital output to the port pin P2.1 and if the alchol gets sensed by the MQ-3 sensor it gives low output i.e. 0 and if no alcohol content then digital output is 1 only. So, as per our logic if P2.1 bit gets 0 means the alchol is above the threshold amount then the buzzer will beep and the message showing **DRUNK** will be shown on the LCD of MU. The testing we had done firstly on proteus and then on the Hardware as well, which verifies the MQ-3 sensor interfacing with 8051 uc successfully. The program to do so is made on **assembly language** and is compiled on **KEIL MICRO VISION3.** For hardware we have use PCB, Breadboard, Jumper wires, 5V supply as shown below:-
  The testing photo on the proteus as well as on the Hardware is attached below:

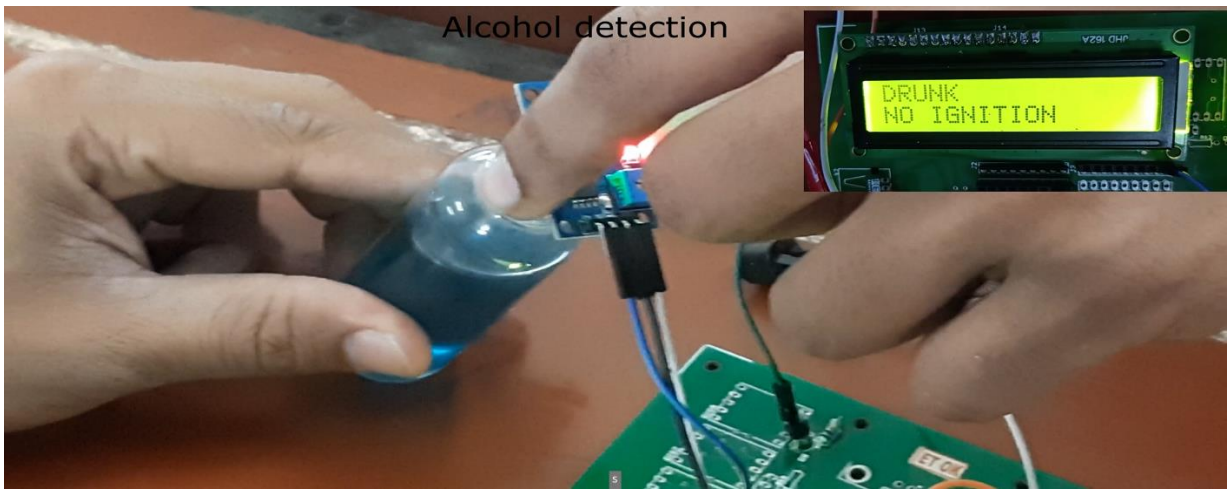
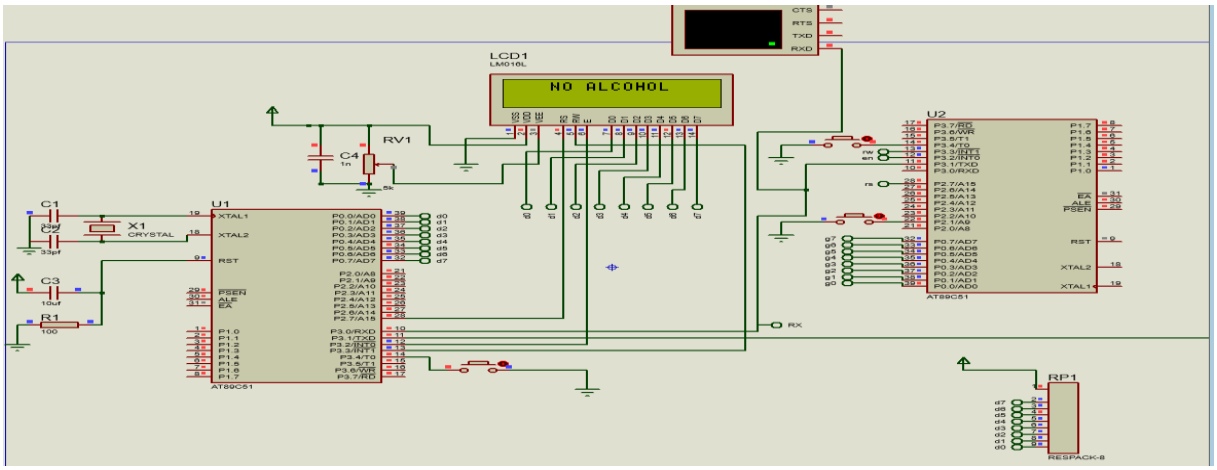


FIG 4.1, FIG 4.2



- Here this is testing of the pulse rate sensor, basically we have given the pulse output to the port pin P3.5 and have made the program to measure the pulse is BPM. The pulses sensed by the pulse rate sensor it gives square pulse as an output. The pulses measured will be send as a data to the MU and if it is above certain threshold value in BPM then only the rider will be able to start the vehicle.
  The testing we had done firstly on proteus and then on the Hardware as well, which verifies the pulse rate sensor interfacing with 8051 uc successfully. The program to do so is made on **assembly language** and is compiled on **KEIL MICRO VISION3.** For hardware we have use PCB, Breadboard, Jumper wires, 5V supply as shown below:-
  The testing photo on the proteus as well as on the Hardware is attached below:

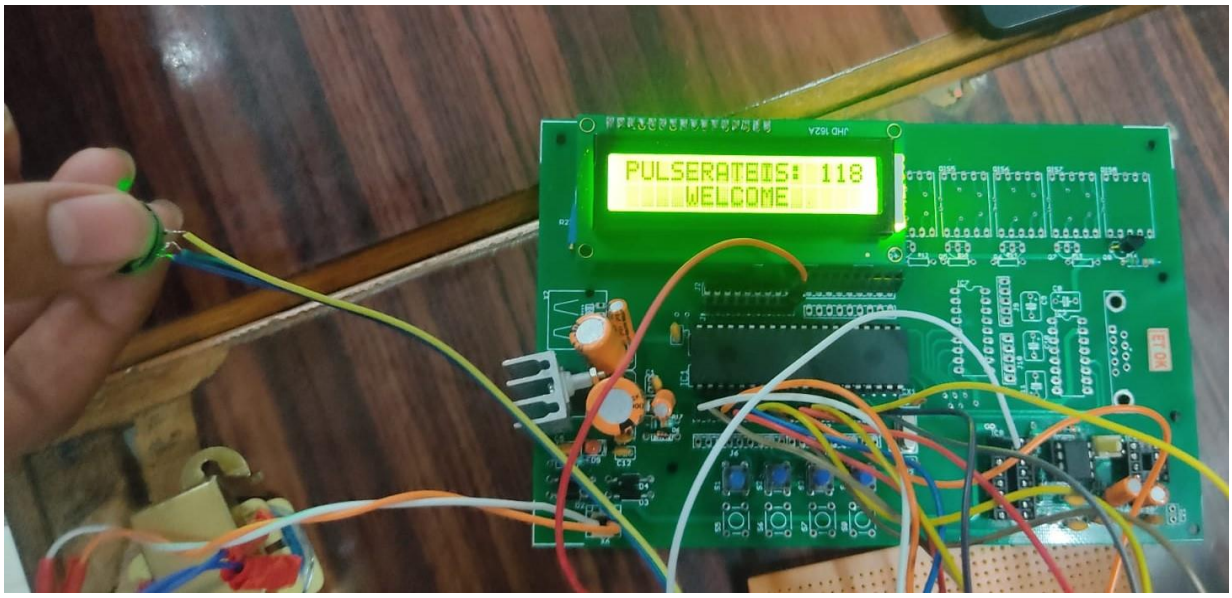


FIG 4.3

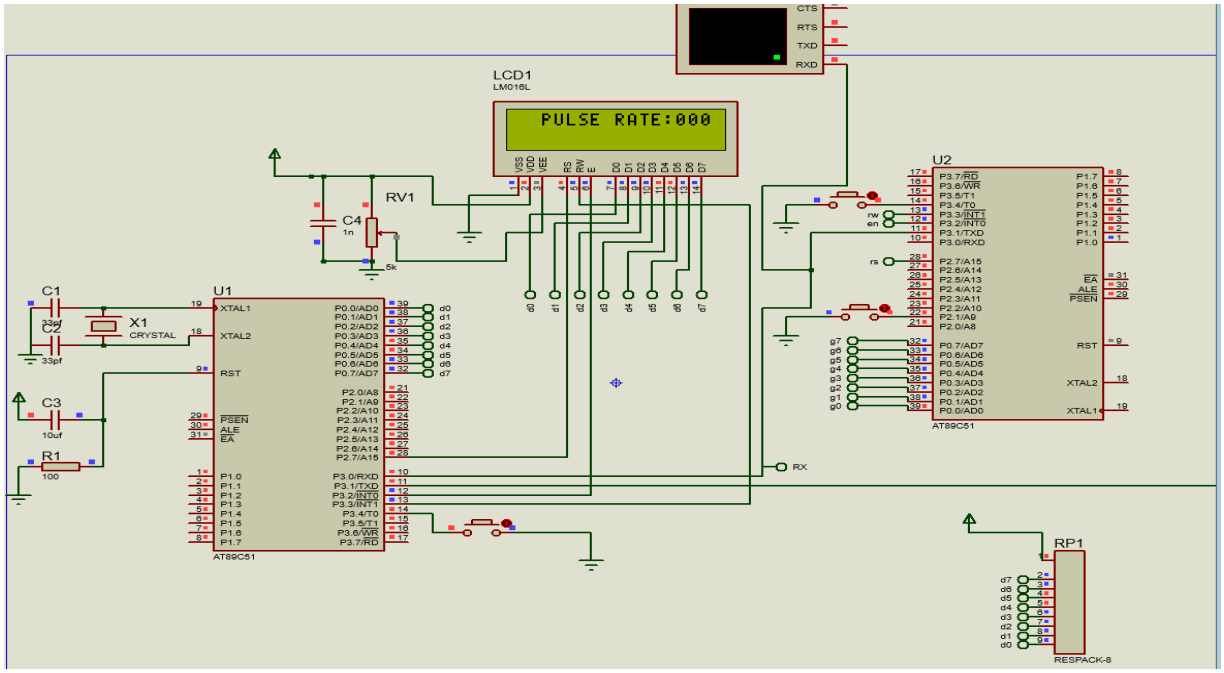
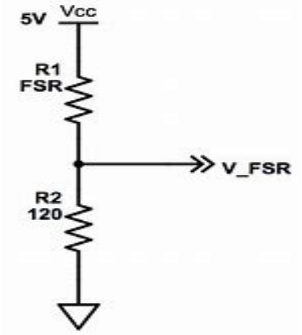
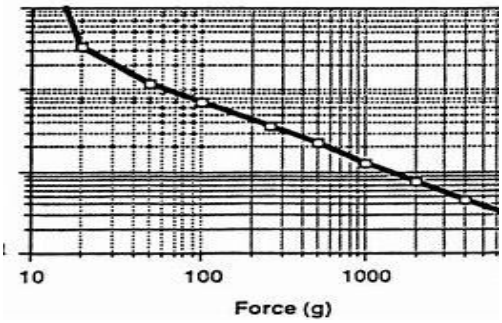


FIG 4.4

2. **FORCE SENSITIVE RESISTORS**:

- Here this is testing of the impact sensor, basically we have given the analog output to the adc0808lcn and have made the program to convert analog data to the digital. The impact sensed by the Force Sensitive Resistor. FSR has two pins and if their no impact or force on the FSR then it has infinite resistance and if some pressure is applied on the FSR then its resistance value changes inversely as follows:





- This voltage from the voltage divider circuit is our analog output which we have given to the adc0808lcn as an input and it's output has range 0-255 decimal. Now as for different impacts there will be different voltages as an input to ADC and then ADC gives its digital output to port P1 which will be different for different impacts. So for this we had placed various thresholds of impacts .
    2) From 10 – 140 it will be **LIGHT CONTACT** (FIG 4.4)
    3) From 140 – 220 it will be **HARD CONTACT** (FIG 4.5)
    4) FROM 220 – 255 it will be **DANGER** (FIG 4.6)

The testing we had done firstly on proteus and then on the Hardware as well, which verifies the pulse rate sensor interfacing with 8051 uc successfully. The program to do so is made on **assembly language** and is compiled on **KEIL MICRO VISION3.** For hardware we have use PCB, Breadboard, Jumper wires, 5V supply as shown below

The testing photo on the proteus as well as on the Hardware is attached below:

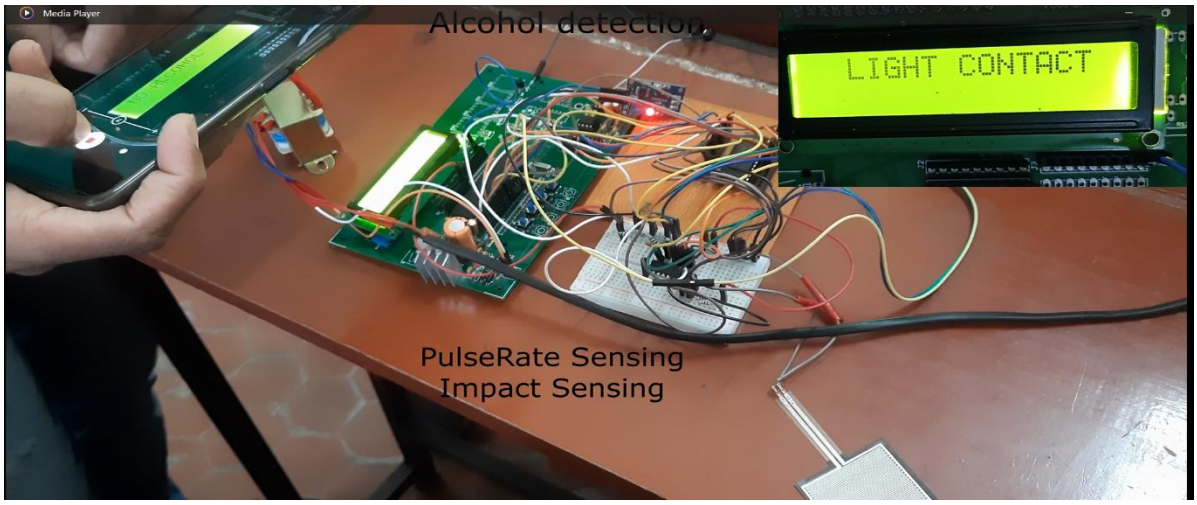


FIG 4.5

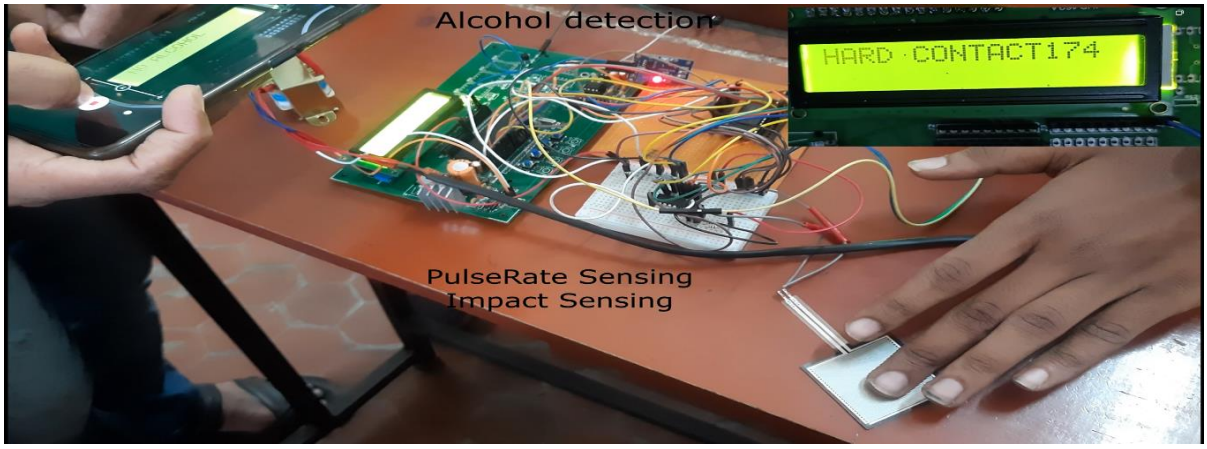


FIG 4.6

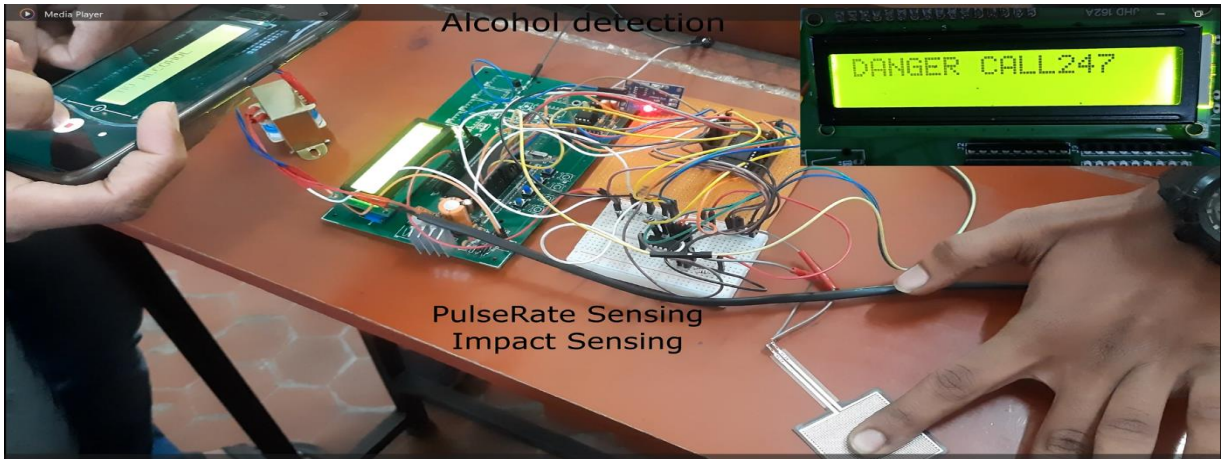


FIG 4.7

4. SERIAL COMMUNICATION(WIRELESS):-

- As mentioned earlier in this project the data from HU has to be sent to the MU, so it requires wireless communication between the microcontrollers. This we have done using serial communication feature provided on the **AT89C51** CHIP. Basically the AT89C51 chip has two pins **RxD** and **TxD** pins which are used to receive and transmit data serially. In our project we have used 2 Bluetooth modules for wireless communication.

- **Bluetooth Module(2)** as transmitter(master) and receiver(slave) respectively. For the testing purpose we had made the transmitter program which we have added on the HU programming and the MU for the receiving purpose. The testing has been done on the proteus firstly then on the Hardware. The testing photo for both the purpose are attached

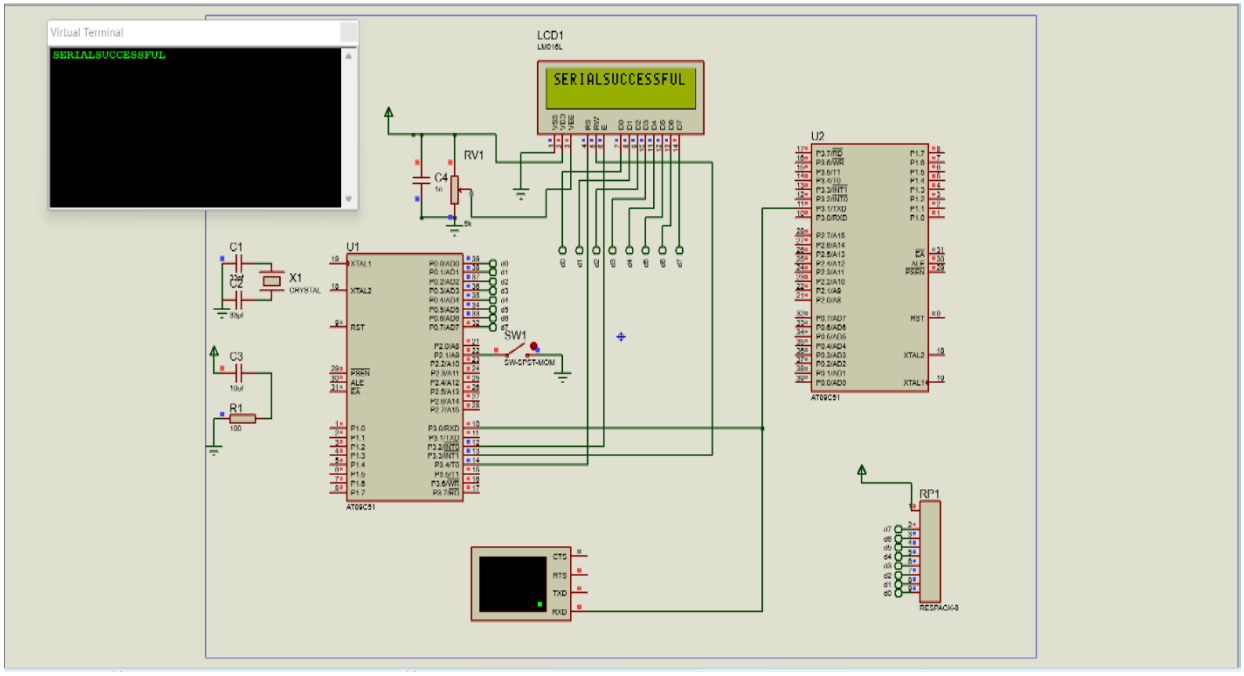


FIG 4.8

4.2HELMET UNIT COMBINE TESTING:

- After testing each of the components of the HU we have done the testing of HU combinely by merging the programs. The testing has done on the proteus firstly and then on the Hardware. The program to do so is made on **assembly language** and is compiled on **KEIL MICRO VISION3** For hardware we have use PCB, Breadboard, Jumper wires, 5V supply as shown below:-
  The testing photo on the proteus as well as on the Hardware is attached below:

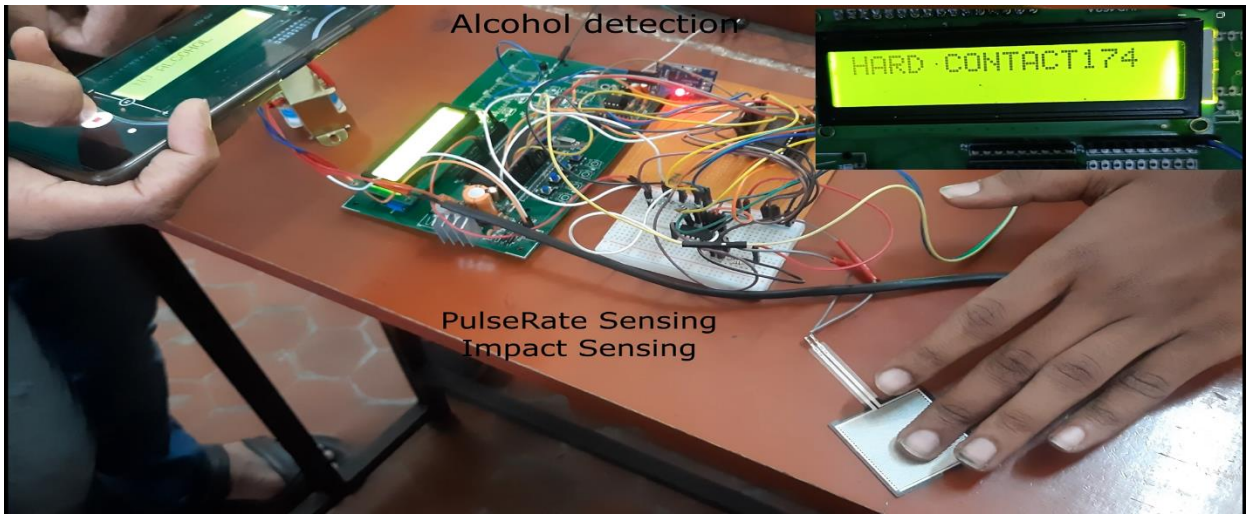


FIG 4.9

1st OPTIMISATION :

- After successful testing of HU on testing board we had made compact circuit of HU on General Purpose Circuit Board(GPCB) as shown in FIG 4.9. So now our HU hardware is ready to be mount on helmet along with necessary placements of sensors on Helmet.

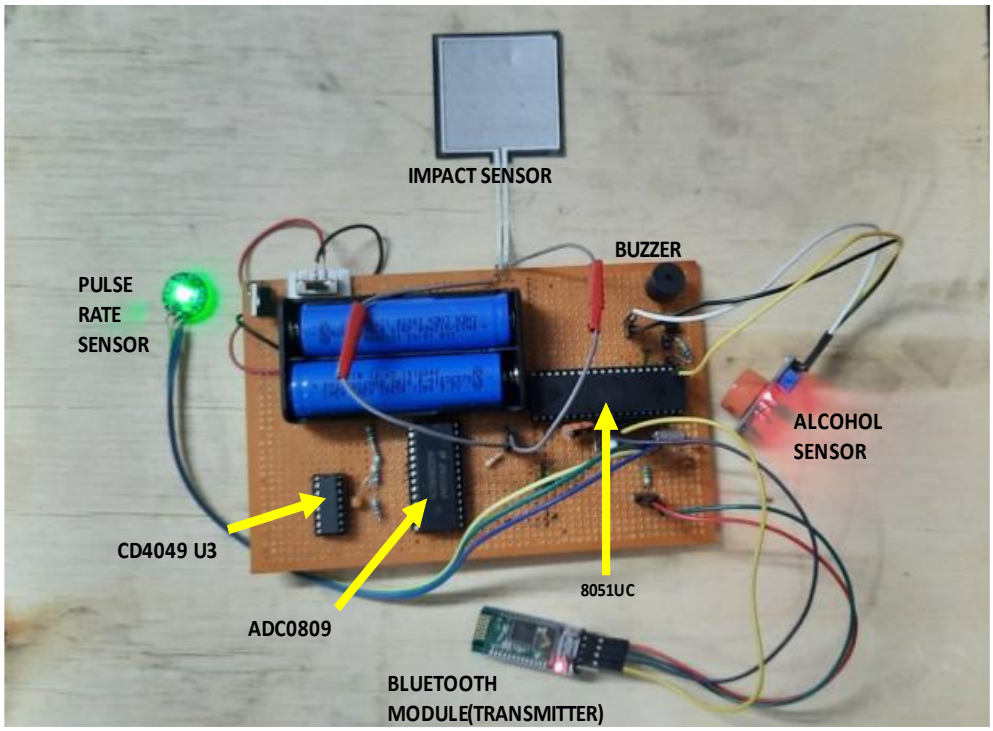


FIG 4.10

4.3TESTING OF MOTOR UNIT COMPONENTS

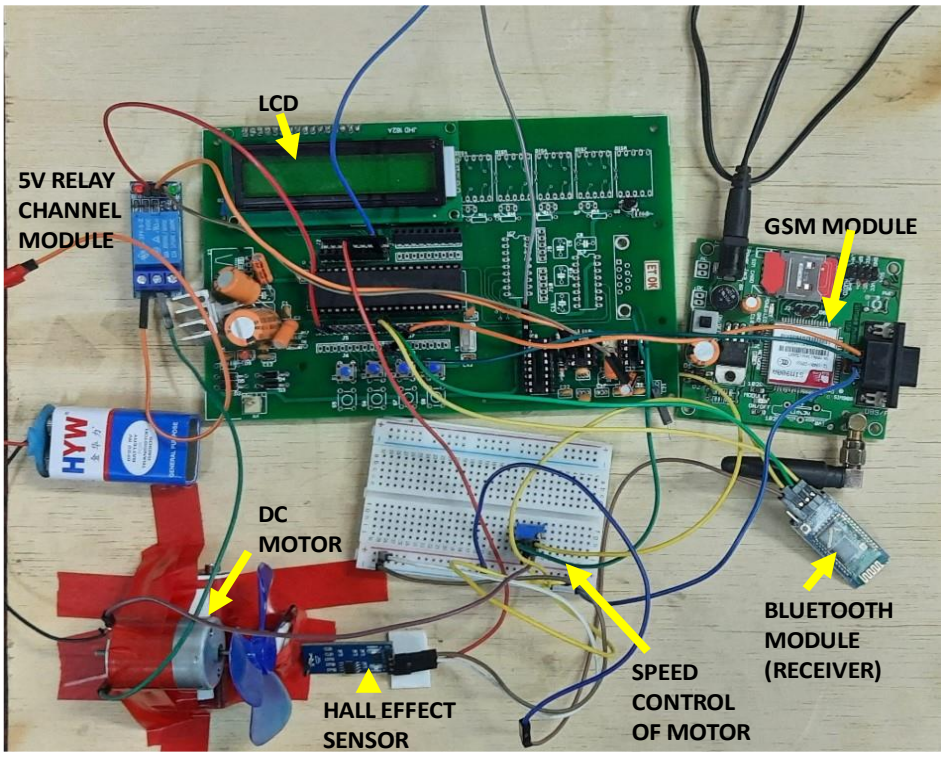
1.HALL EFFECT SENSOR TESTING :

- Here this is testing of the hall effect sensor, basically we have given the output to the port pin P3.5 of MU controller and have made the program to measure the speed in RPM. The magnetic field sensed by the hall effect sensor it gives low output . At time of sensing simultaneously glowing it's LEDas an output and the output is high at other time so in every one revolution 1 sensing is done, If speed measured is above certain threshold value in RPM then only the overspeed detected meassage will be shown on LCD display.
- The testing we had done firstly on proteus and then on the Hardware as well, which verifies the pulse rate sensor interfacing with 8051 uc successfully. For hardware we have use PCB, Breadboard, Jumper wires, 5V supply as shown below The program to do so is made on **assembly language** and is compiled on **KEIL MICRO VISION3**
  The testing photo on the proteus as well as on the Hardware is attached below:

FIG 4.11

FIG 4.12

MOTOR UNIT: **FIG 4.13**



CHAPTER-5

RESULTS AND CONCLUSION

RESULTS:

When the rider wears the helmet and locks the buckle the microswitch in the buckle switches on. This activates the module of HU which then starts sending the data from all the sensors of the HU to MU. The values sensed by the pulse rate sensor, alcohol sensor, and FSR is sent by the HU to MU which can be seen on the LCD Display as shown above figures. When the user wears the helmet and the pulse rate detected exceeds 40 bpm a welcome message is displayed on the LCD as seen in FIG4.3. As soon as the alcohol content in the breath of the rider exceeds the preset value the bike is deactivated by disconnecting the ignition, the buzzer on both the units goes off and an SMS along with the location of the motorbike is sent to the emergency contact number as shown in Fig___. Also, a message is displayed on the LCD screen showing the name and number of emergency contact is displayed so that someone in the vicinity of the rider can help the rider. When the rider meets with an accident the buzzers on both the units go off which alerts people in the surrounding that an accident has occurred and an SMS with the location of the rider is sent to emergency contacts as seen in Figure ___. Also, the name and phone number of the emergency contact is displayed on the LCD display so that someone in the vicinity can help the rider. The location sent by the MU is accurate and can be seen in Fig____. The real-time values of speed of bike can be seen in Fig4.10.

CONCLUSION

A pulse rate sensor effectively recognizes whether the rider has worn a helmet or not. False triggering of the Pulse rate sensors is not as easy as in the case of an infrared sensor or microswitch. This makes it compulsory for the rider to wear a helmet. This leads to a reduction in deaths and fatal injuries due to accidents. The LCD display is more effective in displaying large messages and is also more compact. The force-sensitive resistors on the HU detects the accident accurately & inform about the mishap on time. Concerned authorities are instantly informed in case of accidents, drinking & driving, or in case of reckless driving. The rider-safe push button works efficiently in informing that the rider is safe in case of minor accidents. Preventing a drunk rider from driving reduces drinking and driving accidents. Locating an accident as soon as it occurs can help the medical team reach the location faster and save a life. Warning the rider in case of over speeding of the bike prevents accidents. The project ensures the safety of young riders & warns in case of risk hence reduces accidents.

FUTURESCOPE AND ANALYSIS

- As we can also use IOT so that itt will Allow the Parents to track their child in a smart way .
- With development in technology we can also introduce features like Voice interfacing, google connectivity etc
- With Government support we can even introduce a subsidy. So that it will be cheaper for a customer and more and more users can take advantage of this system
- We can also approach big companies who are making motor bikes so that they can install this new exotic feature to their bike.
- Also we can send the overspeed message to the nearest police station so that strict penalty(in form of Challan) can be applied against reckless driving.

LIMITATIONS

- As we are using 8051 microcontroller which is working on 5 volt DC supply, and as many interfacings are there so it will consume more power because it doesn’t contain low power mode which makes battery to die early.
- Right now we are not using IOT, so there is no alternative way to start vehicle incase of failure or damage of system.

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