SMART HELMET FOR RIDER'S SAFETY

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Abstract— **In day to day life, helmet had made compulsory for all the riders of two wheeler, but many people who don't wear helmets are facing head injuries. At least 98 two-wheeler riders without helmets died daily in 2017, according to a Road Accident Report. So helmet is necessary to save our life. The objective of this project is to provide complete safety for bike riders. In this project there are two modules namely helmet and vehicle module, helmet will have control over the vehicle start and stop. In Helmet the sensor module is built using sensors like alcohol sensor and touch sensor. These sensors are connected to RF transmitter. Sensor module will be placed in the helmet to detect weather a person worn helmet are not, once the person wear the helmet the signals gets transmitted. The module in the bike allows the rider to start the vehicle once the module receives signals from helmet unit. GSM module, which is designed to automatically send message to one personal contact and traffic police in case of emergency. The GPS tracker used in our system forwards the co-ordinates that indicate the current location of the motorcycle in case of the emergency.**

Keywords—RF module, Renesas microcontroller, accelerometer, touch and alcohol sensor, Motor.

I. INTRODUCTION

It is a well-known fact that young generation prefers bikes over four wheelers. More than 70% of the riders don't wear helmet. Moreover speeding and drunk driving have become common issues. So with the help of technology problems mentioned above are avoided and their effects can be minimized.

In today's era, especially in the young generation, the craze of motorbikes is really remarkable. The middle-class families prefer motorbikes, because of low prices. As the bikes in our country are increasing, the road accidents are also increasing day by day, due to which many deaths occur, most of which are caused due to not wearing helmet. According to a survey of India, there are around 699 accidents occurs due to bike crashes per year. If accidents are one issue, lack of proper medication is another reason for death. In India out of the 699 deaths occurring annually, nearly half of the people die due to lack of proper treatment in time. Reasons for this are late arrival of an ambulance, no one at the place of accident to give information to the ambulance or parents, etc.

The Transport research wing of the Ministry of road transport and highways recently published its report in 2015 on the road accidents that occur in the country. Various facts of the accidents like trends, severity, injuries and fatalities was described in detail. During 2015, close to 5 lakh road accidents took place in which 1.46 lakh people were killed and approximately 5 lakh people were injured. Among these statistics 1.44 lakh accidents belonged to the two wheeler category in which thirty six thousand people were killed in thirty four thousand number of accidents. IoT comprises of smart machines and sensors interacting with other machines using an underlying network infrastructure. The IoT devices sense the data from the environment and send the data to each other or a central server. This leads to huge amount of data generated which can be further processed and analyzed to generate useful conclusions. This gives the advantage of remote monitoring the environment and insights into real time data reported from the environment.

A smart helmet is a very good idea which makes bike driving safer than before. The main objective of the smart

helmet for rider's safety is to prevent the person from starting his bike until and unless he actually wears the helmet. It uses the concepts of GSM and GPS to track a location of the accident.

II.   PROPOSED METHODOLOGY

A.   HELMET UNIT

The helmet unit comprises of an alcohol sensor, touch sensor, battery, RF Tx. The sensors installed in the helmet provide analog output. This output is fed to a comparator that acts as an ADC. The output signal from the comparator and the sensor lock is encoded in binary signals, which are transmitted via the RF transmitter.

- **Touch Sensor:** The touch sensor is used to check whether the delivery boy has worn helmet or not. It is in active state when the delivery boy wears helmet.

- **Alcohol Sensor:** The alcohol sensor will check whether the delivery boy has consumed alcohol or not. It is in the on mode when the delivery boy has consumed alcohol.

- **RF Transmitter:** The RF Transmitter will receive the signals from the touch sensor, alcohol sensor and send it to the RF Receiver in the vehicle unit.
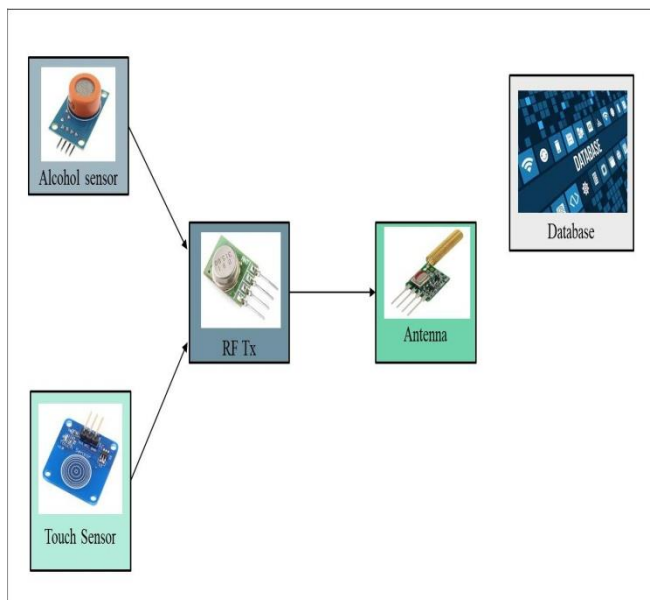
B.   VEHICLE UNIT

The vehicle unit contains following components:

- **RF Receiver:** The RF Receiver will receive the signals from the RF Transmitter and sends it to the Renesas microcontroller.

- **Global System for Mobile:** The GSM is used for the communication between the helmet and vehicle unit.

- **L293 Driver:** The DC motor's rotation is based on the input provided across the input pins of the driver

- **DC Motor:** The DC motor is used to perform the operations of the vehicle unit.

- **Accelerometer Sensor:** The Accelerometer Sensor is used to check the speed of the vehicle.

- **Accelerator:** The Accelerator is used to vary the speed of the vehicle.

- **Ignition Switch:** The Ignition Switch is used for on or off mode of the vehicle.

- **Renesas Microcontroller:** The Renesas Microcontroller is used to control the other components in the vehicle unit.
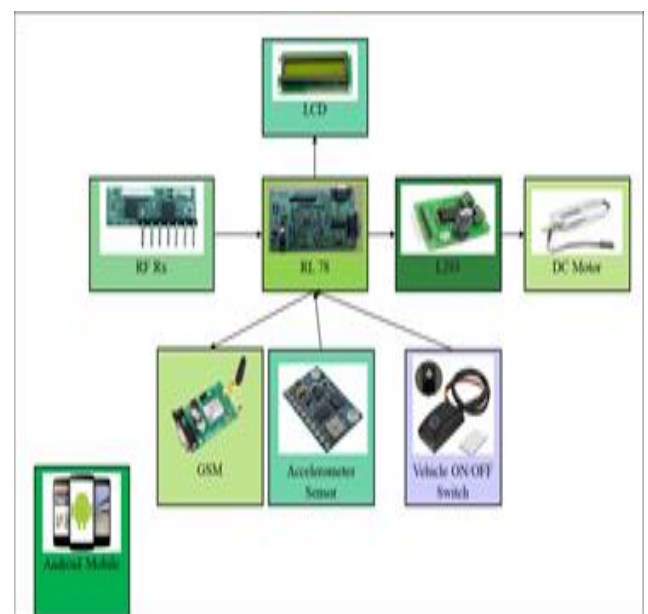

Fig. 1.Functional Diagram of Helmet Unit Block

Fig. 2.Functional Diagram of Vehicle Unit Block

III. SYSTEM DESIGN

A flowchart is a diagram that predict a process, system or computer algorithm. They are used in designing and documenting simple processes or programs. Like other types of diagrams, they help visualize what is going on and thereby help understand a process, and perhaps also find less-obvious features within the process, like flaws and bottlenecks. There are different types of flowcharts where each type has its own set of boxes and notations.

There are four major types of flowcharts called Document Flowcharts, Data Flowcharts, System Flowcharts and Program Flowcharts. Here in this project we are designing a System Flowchart. A System Flowchart shows the flow of data to and through the major components of a system such as data entry, programs, storage media, processors, and communication networks. The System Flowchart will also identify the devices to be used.
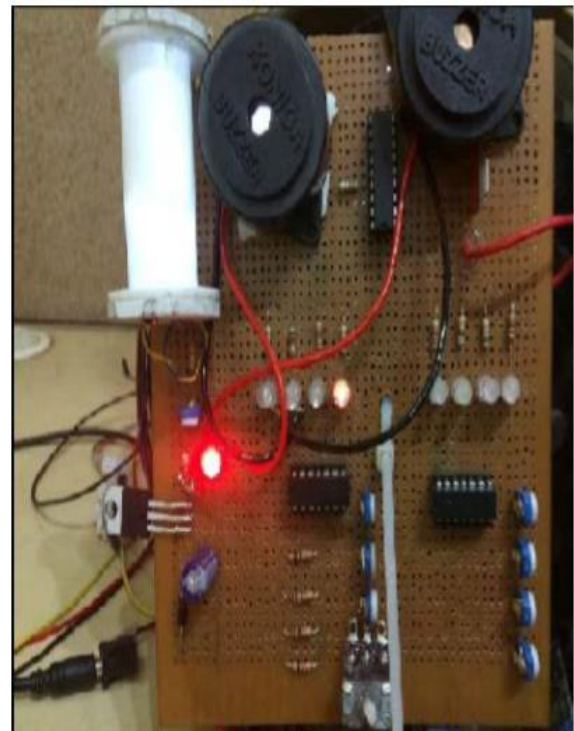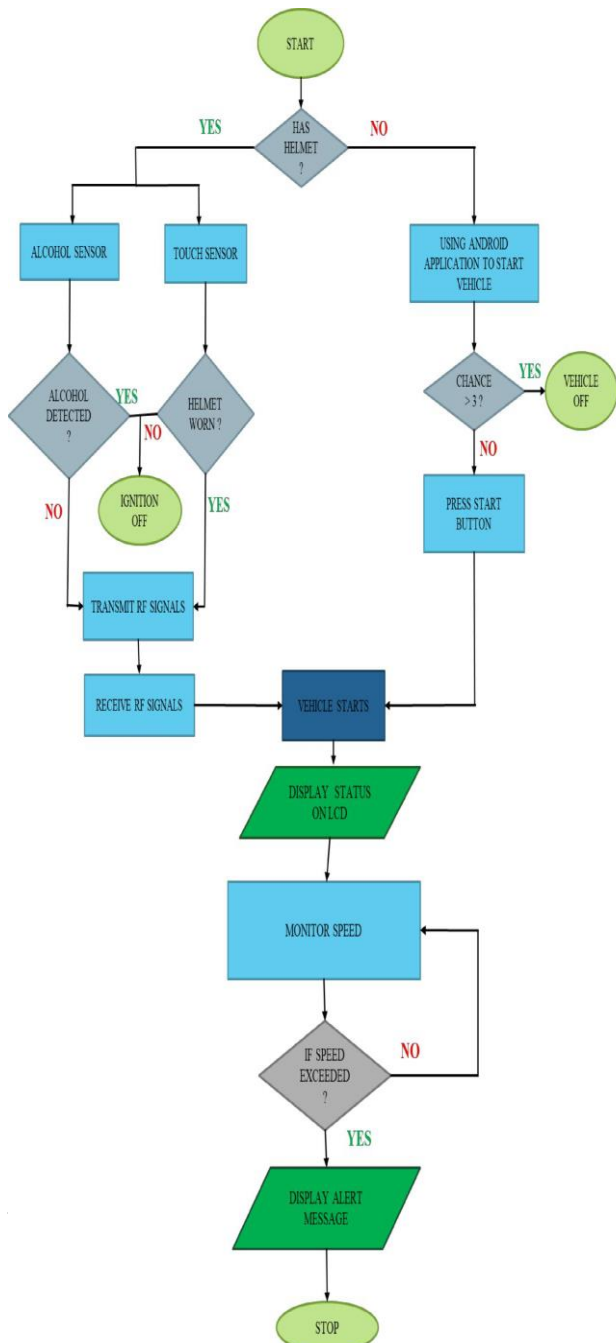
Fig. 3. Flowchart

IV. WORKING

Fig. 4 Helmet Unit Prototype

The proposed system works with simultaneous working of the transmitter and receiver section. A magnetic chip connected with the helmet detects if the rider is wearing the helmet or not. The chip sends out an analog signal, signaling the system that helmet is detected and the rider is wearing it. This is determined by a high output received from the chip. A low output is generated when the clip is not connected making the system to turn off the bike.

LCD   display is used to display various messages like: bike starts, alcohol consumed, speed exceed, wear helmet. Another scheme uses alcohol sensor (MQ-3), which can detect the presence of alcohol. The surface of the sensor is sensitive to various alcohol concentrations. It detects alcohol in the exhaled air of the rider. If a person consumed alcohol, the bike won't get started. In order to start bike the person must wear helmet and should not consume alcohol.

Accelerometer is employed to detect the speed when the speed limit is crossed. If so the coordinates of location are sent to traffic police in order to track where he has crossed speed limits.

If any accident occurs it can be detected by the vibration in bike module, then the exact location where accident occurred is sent to ambulance, traffic police and registered family member via GSM module and android application. GSM modem communicates with microcontroller through USART (Universal Synchronous Asynchronous Receiver Transmitter) and microcontroller gives command to GSM modem known as AT (Attention)

commands to send message to one personal contact and one concerned authority.
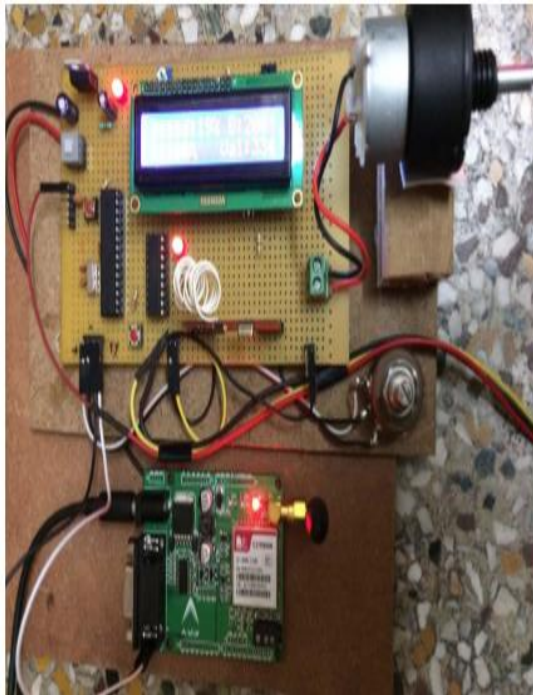

Fig 5. Bike Unit Prototype

V. RESULT

All the components are assembled and tested successfully. The circuit is designed in such a manner that bike does not start until and unless rider wears the helmet. Also the bike won't start if the rider is drunk, if rider crosses a certain speed limit then the intimation will be sent to traffic police.

GSM module and a GPS module can be applied to a system in which the sensor reports an emergency situation to relatives and nearby police personnel. This can be achieved by encoding GSM, GPS modules to transmit the exact GPS coordinates of the accident to responsible authorities making them aware of the dire situation for quick action.

Fig.6 Location Tracker

VI. CONCLUSION

Smart helmet is an effective solution to many problems. . Most of today's accident detection and prevention systems are built for four wheelers. The smart helmet could prove to be a life saver for the numerous two-wheeler riders in the country and the world by ensuring that help reaches them when they meet with an accident without any delay. It aims at reducing the threat to life, a person may face in case he meets an accident while riding his motorcycle. Also it strives to decrease the theft of motorcycle by integrating additional security features such as helmet-put-on. The GPS-GSM system that is integrated with the motorcycle enables the feature of tracking the motorcycle over the Internet.

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