Vehicle Protection System with Close Loop (Smart Helmet)

Shivam Agrahari[1] Vivek Mishra[2] Anil Kumar[3] Aman Gautam[4]
B.Tech Student
[1,2,3,4]Department of Electronics & Communication Engineering
[1,2,3,4]Rajarshi Rananjay Singh Institute of Management & Technology Munshiganj, Amethi, Utter Pradesh, India

Abstract— Wearing a helmet is important and required by the law in every country of the world. This paper discusses a simple system that makes it possible for a motorcycle accident victim to get the timely medical attention. In this system we use the vibration sensors, pressure sensors, GPS and GSM to achieve this. . One of the important problem with bike riders is that most of the time they don't bother to wear helmet which could be fatal when accidents happen. Also reckless drivers are in the habit of drinking. Under the influence of liquor they indulge in rash driving. A smart helmet is a unique idea which automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving. GSM & GPS technology and also different sensors like alcohol sensor, flow, sensor, tilt sensor, bumper switch, and limit switch are used. Provision for cell phone charging is provided.

Key words: Arduino Nano, Radio Transceiver - NRF24L01, Microcontroller, Ultrasonic Sensor - HCSR04, Arduino IDE Software, Alcohol Sensor, GSM & GPS

I. INTRODUCTION

In this competitive world one of the surveys says that the death tolls due to motor-bike accidents are increasing day-by-day out of which most of these casualties occur because of the absence of helmet. Traffic police cannot cover remote roads of the city. That‟s why our primary target is to make the usage of the helmet for two-wheelers "compulsory". Thus, no one other than the owner himself, who doesn‟t have the „Password‟ which would have been created by the owner, can use the bike. This would, in other sense, also ensure the safety of the bike when we have to abandon the mercy of parking lots for several hours. Thus to make the riding of a bike "Helmet Centric" the project has been proposed. The helmet would be used to communicate with the motor bike all the time during the initiation of the ride to detect if the person is wearing the helmet or not and then the rider is asked for a password in the form of speech to unlock and ignite the bike by matching a user-independent password just like any other personal computers, and to stop the engine as well.

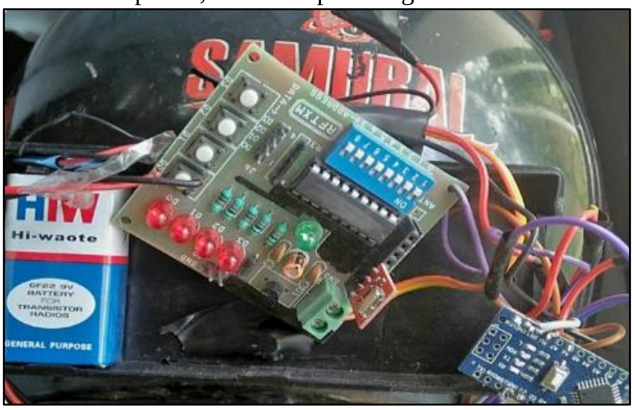

Fig. 1:

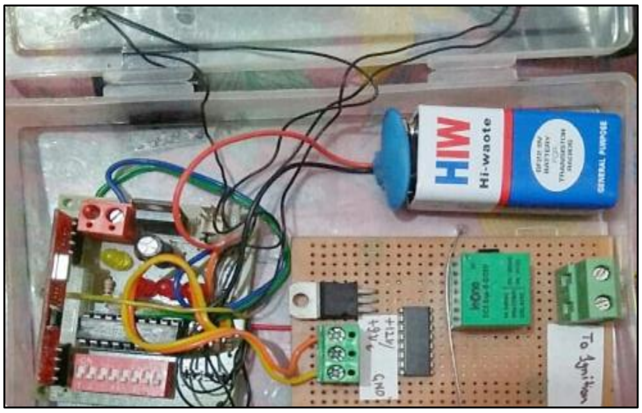

Fig. 2:

Our proposed system has following features
1) Transmitter section (Helmet Unit)
2) Receiver section (Bike Unit)

Data from the helmet will be transmitted wirelessly to the bike. According to the various sensor input the micro-controller will decide the actions of other blocks.

- Collision sensor is used for accident detection which will be placed on the bumper.
- This helmet is equipped security for bike theft and fuel theft. Also indication will be provided if bike is taken away by towing van.
- Panic switch is provided to alert relatives if rider is in danger.
- GPS is used to determine the location of accident in terms of longitude and latitude. This data is forwarded using GSM to relatives/friends
- Cell phone charging feature is also provided [4].

The system ensures the safety of the biker, by taking it necessary to wear the Helmet, as per the government guidelines.

II. RF TRANSMITTER SECTION

Encoder IC (HT12E) receives parallel data in the form of address bits and control bits. The control signals from remote switches along with 8 address bits constitute a set of 12 parallel signals. The encoder HT12E encodes these parallel signals into serial bits. Transmission is enabled by providing ground to pin14 which is active low. The control signals are given at pins 10-13 of HT12E. The serial data is fed to the RF transmitter through pin17 of HT12E.

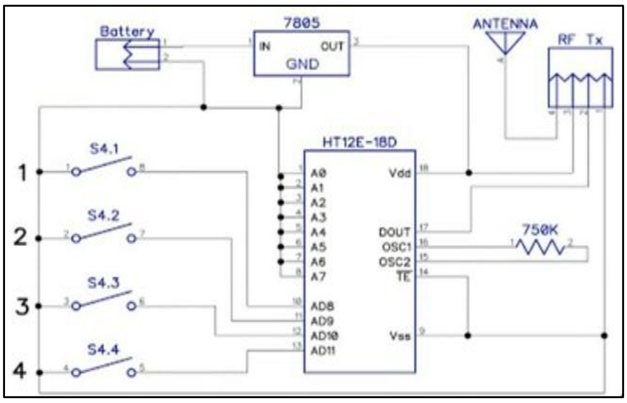

Fig. 3:

A. *Microcontroller - Arduino Nano*

Arduino is an open source tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board

III. ULTRASONIC SENSOR - HCSR04

Ultrasonic sensors (also known as transceivers when they both send and receive, but more generally called transducers) work on a principle similar to radar or sonar which evaluates attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

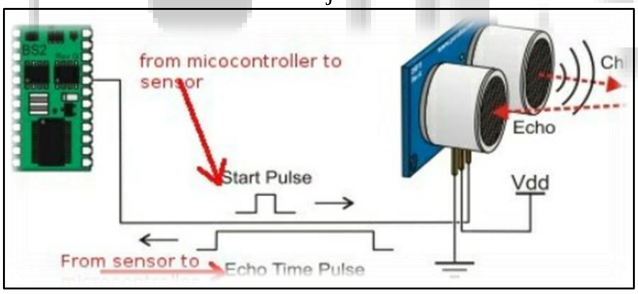

Fig. 4:

IV. ALCOHOL DETECTION USING SMART HELMET SYSTEM

The project aim of the security and safety of the bikers interfaces to alcohol sensor. Alcohol Sensor is a sensor against road accidents. A Smart Helmet is special idea that measures the amount of alcohol that is present in which make motor cycle driving safer than before, this is surrounding environment. If any drunken person came,

Fig. 5:

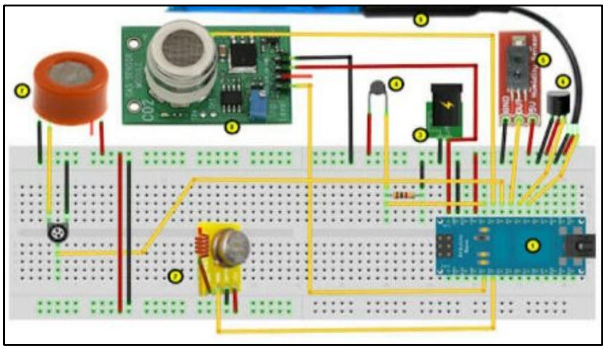

Fig. 6:

A. *Receiver Section (Bike Unit)*

Data transmitted by transmitter section is received by RF decoder which is then encoded by HT12D connected to microcontroller. Microcontroller will process the data which will be provided by different sensors and accordingly will perform necessary actions. Collision switch is placed on the bumper of the bike. When other vehicle hits the bike forcefully pressure will be built on switch and occurrence of accident will be detected. GPS will provide coordinates of location where accident took place and this data will be sent to relatives using GSM. If bike ignition is off and if fuel is flow is detected then it will indicate that fuel is being theft. Similarly if bike is off and it is towed due to tilting of bike it will indicate that bike is

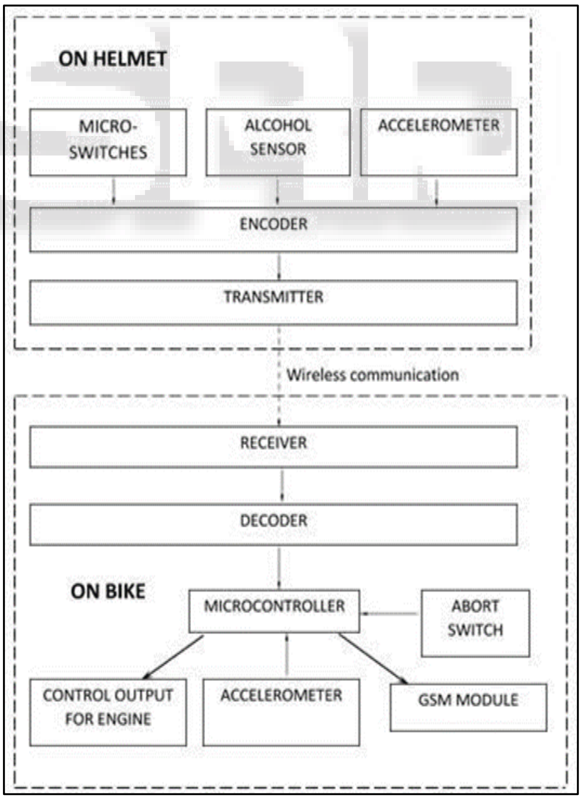

Fig. 7:

B. *Vibration Sensor*

This sensor buffers a piezoelectric transducer. As the transducer is displaced from the mechanical neutral axis, bending creates strain within the piezoelectric element and generates voltages. The Vibration Sensor Detector is designed for the Security practice When Vibration Sensor

Alarm recognizes movement or Vibration, it sends a signal to either control panel Developed a new type of Omni-directional high sensitivity Security Vibration Detector with Omni-directional detection.

Fig. 8:

C. GSM Module

GSM module requires a SIM card just like mobile phones to activate communication with the network. In our system we are using GSM SIM 900. We are using GSM to inform family members about the accident and various other parameters like fuel theft, towing of bike and in case of emergency. The MODEM needs AT commands, for interacting with processor or controller, these are then communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command [6].AT commands used in our project are

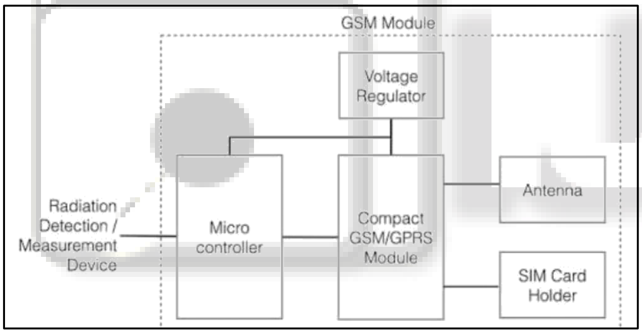

Fig. 9:

AT+CMGS= Sends an SMS message to a GSM phone
AT+CMGF = Sets the GSM modem in SMS Text Mode or SMS PDU Model[7].

D. GPS Module

We are using GPS1268 module. In case of accident GPS will give co-ordinates of location of accident which will be then send to the family members with the help of GSM.

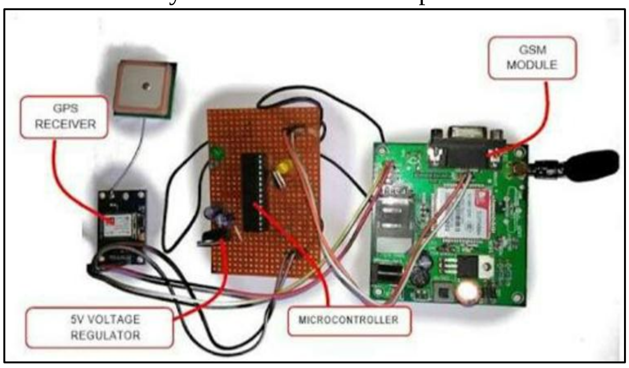

Fig. 10:

Accelerometer sensor measures level of acceleration which is the rate of change of velocity of an object Accelerometer check the speed of motor it connect to arduino nano if moter speed running 60km/h above then By arduino nano simple programming it on the every indicater & buzzer.

V. APPLICATION

- Useful for school students.
- Useful for bike and scooters.
- Help to protect life in accident case.
- Number of cases of voilated traffic rules can be reduced.

VI. FUTURE SCOPE

We can design an intelligent system to notify No parking and No entry area. Indication of the same will reduce crowd of vehicles. No entry area is mainly allocated during the development or repairing of the road, in case if the rider enters in such area this system would immediately give indication as No entry area and vehicle can stop automatically.

VII. CONCLUSION

The main aim of our project which is to encourage people to obey rules and regulations of traffic authorities can be achieved. Thus fatal road accidents can be prevented to some extent. By implementing this system owner of the bike will be kept informed if some wrong practices are done with the bike.

VIII. RESULT

Smart helmet for safe rider is designed with radio frequency link. , as user wear helmet a rf signal radiate from transmitter and these RF signal get sensed and synchronized with the help of address matching by the receiver section placed in the ignition switch of the bike and bike get started and bike stopped working as helmet keep out from head. This means bike work properly till helmet keep on head.

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