Smart Helmet With Message Alert System

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Abstract— **Smart Helmet is designed to prevent most of the fatal accidents as it acts as the protective head gear for the rider. This smart helmet provides safety for the rider and also finds out the location where vehicle is located by sending the location through message in case of vehicle theft and fall detection. The Smart Helmet through belt-tie sensor detects whether the rider is wearing the helmet or not and switches the ignition ON only if the helmet is worn, otherwise it remains in OFF condition. It also contains a special feature which detects the alcohol content if the rider is drunk using Alcohol/Gas sensor(MQ5). This also follows the same condition as that of the belt-tie sensor where the ignition will not turn ON if the rider is drunk. RF module is used as a wireless link which communicates between the transmitter and the receiver in the Helmet module and the Engine Control Unit(ECU). One interesting feature here is in case if vehicle theft the vehicle can be tracked by sending the message to the number present in the GSM sim slot, and if the vehicle has met with an accident then the Pressure sensor in the ECU senses the pressure and message by the GSM is sent to the registered number with their current location using GPS module.**

Keywords-: Smart helmet, rider's safety, accident detection, fall detection, alcohol detection, vehicle tracking, location.

I. INTRODUCTION

In recent times helmets have been made compulsory for both persons in bike. Traffic accidents in India have increased year by year. As per Section129 of Motor Vehicles Act, 1988 it is compulsory that the rider should wear helmet which is of ISI standard. In India drunken drive case is a criminal offence according to Motor Vehicle act 1939. Which states that the bike rider will get punish. In spite of this bike rider easily get escaped from law.

These are the key issues which motivates us to develop this smart helmet. The first step is to identify whether rider is wearing helmet or not. The ignition gets on if he is wearing helmet otherwise it remains off until he wears it. For detecting this we use pressure sensor (force sensor flexible type). The second step is alcohol detection. Alcohol sensor is placed in front of the mouth which detect the presence of alcohol in rider breathe if it is exceeds permissible range ignition cannot start. MQ-5 sensor is used as alcohol sensor.

When these two conditions are satisfied then ignition will start. The third main issue is accident and late medical help. If the rider met accident with him he cannot receive medical help instantly, its big reason for deaths. Around every second people die due to late medical help or the accident place is not known. Pressure sensor is used to detect accident occurred.

The aim of this project is to make a protection system in a helmet for a good safety of bike rider. The smart helmet that we made is fixed with sensors which act as to detect wear helmet or not. The arduino microcontroller is used. Smart helmet consists of two modules, one on the bike and another on helmet. Signal transmission between the helmet unit and bike unit is using a RF concept.

II. PROBLEM DEFINITION AND MOTIVATION

There has been a sharp rise in total number of deaths due to road accidents in past few years. A survey performed in India confirmed that around 1,34,513 deaths occurred in year 2014 ,these number increased to 1,42,485 in year 2015. The main reason for these road accident deaths are due to violation of traffic rules, rider not wearing helmet, drunken drive. More than one third who died in road accidents could have survived if they had worn a helmet. Studies shows that usage of helmet can save accident death by 30 to 40%. The rate at which number of two wheelers in India is rising is 20 times the rate at which human population is growing. The risk of death is 2.5 times more among riders not wearing a helmet compared with those wearing a helmet.

III. BLOCK DIAGRAM

It has two modules they are Helmet Module and the Engine Control Unit (ECU), on the helmet and another inside the bike.
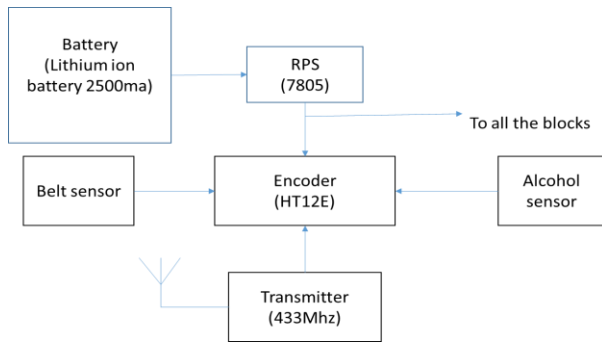
A. Helmet Module

Fig. 1. Block Diagram of Helmet module

The sensors – Belt-tie sensors-conductance and Alcohol/Gas sensor(MQ5) sensors are present in the helmet module. It runs with 9v battery. The 7805 linear regulator IC connected to the modules convert 9v to 5v.

This circuit contains RF transmitter, encoder, sensors and regulator. Output from each of the sensors is connected to the data input pins if the encoder. (AD9, AD10 and AD11). Encoder will continuously encode and these sensors values are fed to RF transmitter to transmit data to the ECU unit where further fuction will take place. All the sensors we have used here is digital (TTL output) to makes our system easier. Conductance is used here as helmet sensor i.e. it will detect the wearing of helmet.MQ5 Alcohol sensor is used and it must be placed in front of the mouth to check alcohol content in the breath.
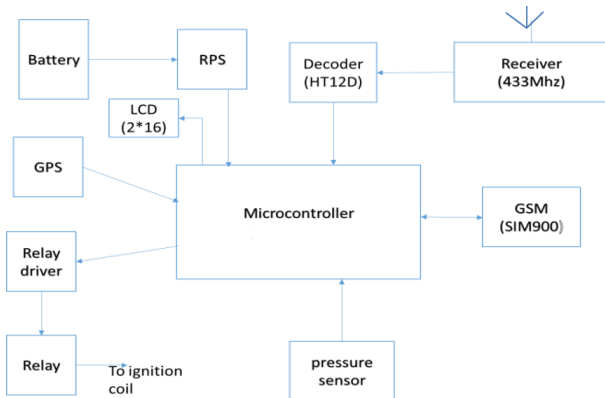
B. Engine Control Unit

Fig. 2. Engine control Unit (ECU)

ECU includes GPS module, GSM module, PIC microcontroller, RF receiver and decoder. RF receiver receives signals from the helmet module and are decoded by decoder IC HT12D. Decoder is directly connected to the microcontroller, it is continuously scanned by Arduino microcontroller and does the required actions. Relay is used to short the spark plug to ground; normally vehicle body is connected to ground. it will get disconnected from ground only after wearing helmet and when no alcohol is detected.

Vibration sensor is fixed in the vehicle which is connected to the ECU module, if accident occurs it will detect and send signals through RF, it will send SMS to the specified number with the accident location. LCD display shows the status of the system and detection of alcohol.

C. Arduino-uno

The Arduino-uno is microcontroller which is shown in Figure 1 based board on the atmega328.The board are equipped with set of digital and analog input/output pins that may be interfaced o various expansion boards or breadboard and other circuits. The boards feature serial communications interfaces including USB (universal serial bus) on some models which are also used for loading programs from PCs. The microcontroller is typically programmed using a dialect of features from the programming languages c and c++ in addition to using traditional compiler tool chains, the Arduino project.

Fig. 3. Block Diagram

D. MQ-5 Alcohol Sensor

MQ-5 gas sensor is right for identifying the alcohol content from breath. It can be positioned just front of the face. The sensor is responds to various gases. It determines by helmet unit that weather the rider is drunk or not. MQ-5 sensor has potentiometer to adjusting different concentration of gasses. We calibrate the detector for 0.4mg/L of Alcohol concentration in air and use value of resistance is 200 KΩ. MQ-5 has supports for both analog and digital. MQ-5 has a 4 pin namely GND, VCC, Aout, Dout. Here we use digital output of this sensor which is gives output in terms of high or low. It decided by our helmet unit weather rider is drunk.

Fig. 4. Block Diagram

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E. GSM and GPS Module

GSM (Global System for Mobile Communications) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. SIM300 module is a Dual band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz.It supports features like Voice, Data, SMS, GPRS and integrated TCP /IP stack. It identifies the phone number when the call is made to it and if it is correct.The GPS fixes the GPS satellites. The GSM obtains longitude and latitude from GPS and send SMS to the registered number with the location.
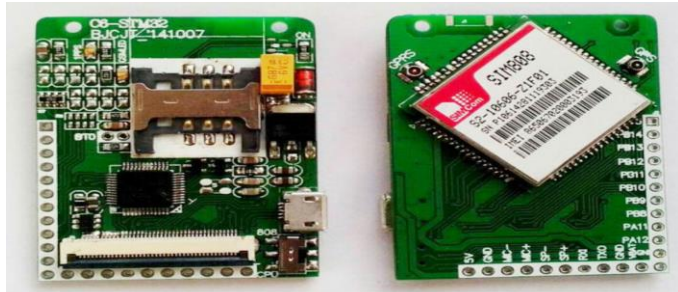
Fig. 5. Block Diagram

F. LCD 16x2:

The LCD screen which is shown in Figure 3 is more energy efficient and can be disposed of more safely than a CRT can. Its low electrical power consumption enables it to be used in battery powered electronic equipment more efficiently than CRTs can be a 16x2 LCD display is used in the project which displays the count or number of rotation.
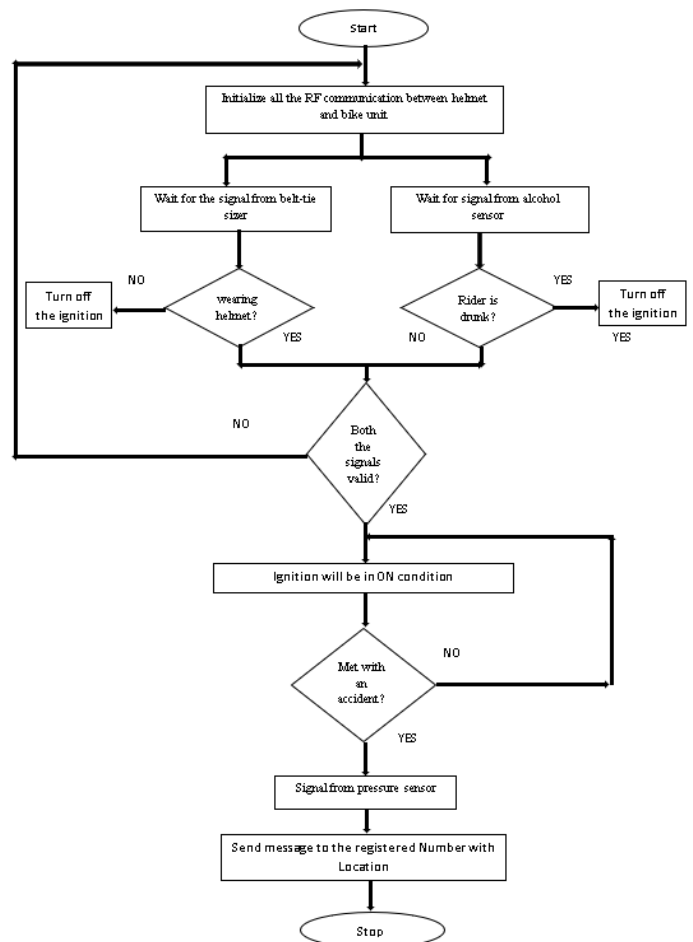
Fig. 6. Block Diagram

IV. FLOW CHART

Fig. 7. Flow chart

A. Applications

- Used in motor vehicles to ensure safety of the rider.
- Alcohol detector can also be implemented in cars.
- It can be used in real time safety system.
- This safety system technology can further be enhanced in car and also by replacing the helmet with seat belt.
- Vehicle monitoring.
- Can be applied to the persons who are working in the underground.
- Mining helmets.

B. Advantages

- Detection of accident in remote are can be easily detected and medical services provided in short time.
- Simply avoiding drunken drive by using alcohol detector. It will reduces the probability of accidents.
- Decrease in death rates due to head injuries.
- Reduces the work load of traffic police.
- Security system for motorcycles.
- Less power consuming safety system.
- Provide wireless connection security.

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V. EXPERIMENTAL RESULTS

If the rider is not wearing helmet, then it displays the message of " No helmet pls wear it".

Fig. 8. Status of the Rider
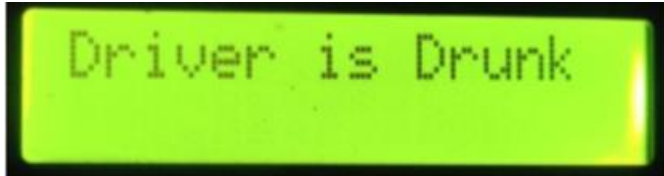
If the rider is drunk, then it displays the message on LCD

Fig. 9. Alcohol Detection

If the accident has occurred, then it sends the SMS to the registered number with their current geographical location.
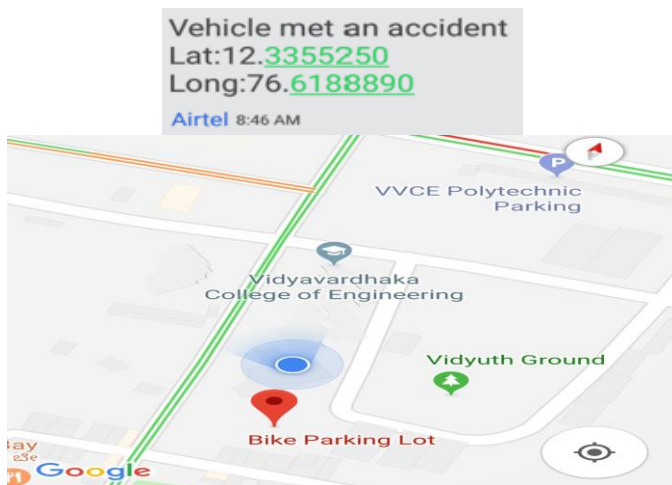

Fig. 10. Accident Location

VI. CONCLUSION AND FUTURE SCOPE

The developed system efficiently ensures that the rider is wearing helmet through out the ride. Rider will not be under the influence of alcohol while riding. Accident location can be detected,which is helpful to provide immediate medical help.Vehical theft can be detected and by sending lock message the ignition can be turned off. In this project belt tie sensor is used instead pressure sensors can be used to detect if the helmet is worn, IR sensors and temperature sensors can also be used for a better detection. we can make use of small camera for the recording the drivers activity. If there is a large demand of this type of helmets we can manufacture whole circuit in printed circuit board, so that circuit becomes smaller and can be easily fitted into helmet. In this project RF transmitter and receiver are used to provide a proper communication. In future we can enhance our project through placing high efficiency RF transmitter.

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