Section A-Research paper
ISSN 2063-5346

SMART HELMET

Dr. Ramaswamy.T
Associate Professor, ECE Dept, Sreenidhi Institute of Science and Technology,Hyderabad ,India,
Email: ramaswamyt@sreenidhi.edu.in
Dr. SPV. Subba Rao
HOD ECE Dept, Sreenidhi Institute of Science and Technology,Hyderabad ,India,
Email: spvsubbarao@sreenidhi.edu.in
M.Lavanya
DSCE, Sreenidhi Institute Of Science and Technology,Hyderabad ,India,
Email: lavanyamatoori23@gmail.com

Abstract:
Now days, there are many accidents and brutal assault activities being happen and are normally at an inclination point. The project aims in designing a smart helmet to provide safety and security using PIC microcontroller. The controlling device of the whole system is a Microcontroller. Switch, alcohol sensor, MEMS sensor, GPS, RF Transmitter, RF receiver, DC motor, ESP8266 Wi-Fi module are interfaced to the Microcontroller. Whenever the user wears the helmet, the switch detects that and then only the helmet section circuit works properly. When the alcohol sensor detects the alcohol, then the system will stop the vehicle ignition automatically. MEMS sensor is uses to detect the accident of the bike and send the blynk notification to the parents/police along with location. This system sends the accident notification to the user mobile using blynk mobile application. This system uses GPS technology to track the location of the person. To stop the vehicle automatically, the wireless communication is implemented between the helmet and the ignition part of the vehicle by using RF technology.

Keywords:
Helmet side: Battery Power, PIC16F877A controllers, GPS, ESP8266 WI-FI, RF transmitter, Alcohol sensor, MEMS (accident)sensor, switch .
Vehicle side: DC motor, RF RX.

1. Introduction

Nowadays, corruption is rising more quickly than ever before. Kidnapping, rape cases, drunk driving, robbery, getting off the path, fatal accidents, and tracking (tracking in this project does not note an automatic update of geographical coordinates, but when the person feels the need to be tracked, then he or she can press the button on helmet for sending the location to the respective mobile number, then the coordinates of the location would be sent to the required number. And if this situation

keeps happening, it means that the rider or the person wearing the helmet could be followed as they move around.

People not only harming other fellow beings but also harming the environment, by the hazardous gases being emitted from the vehicle. At times, accidents do happen by an intake of alcohol and still driving i.e., "Drunk and Drive" due to this not only their lives are a danger even the others life may be stalked at risk.

Not even that the major accidents when happen, the person's life would be at danger level to the maximum case when they do not wear their helmets. As every part of the body is controlled by brain and shall be protected well, wearing a helmet even in the at most cases, riders do ignore and put their lives at risk .

RF Communication ranges in between 30 KHz to 300 GHz. RF communication works by creating electromagnetic waves at a source and being able to pick up those electromagnetic waves at a particular destination. These electromagnetic waves travel through the air at near the speed of light. The wavelength of an electromagnetic signal is inversely proportional to the frequency; the higher the frequency, the shorter the wavelength.

The action of these instructions is already loaded into the Microcontroller using Embedded C programming. The intelligent control software, which has been developed Embedded C programming language.

2. LITERATURE SURVEY:

In the past, the helmet is worn only for protection for the head as a head gear. As, controller/processor is the important part of an embedded system, the brain is important to the body of a human being. However, in the past few years due to the increase in the technology as everything is changing into smart applications and people getting accustomed to the smart or in other ways lazy or handy way of things being done within few fractions of time,even the helmet and vehicles are also coming with smart technology embedded along with them.

At starting the helmet is made smart by implementing the gas sensors to detect the harmful gases emission in coal mines and save the lives of the coal mine workers.In the coal mines the gases which are colorless and harmful to the human body, sometimes due to brake in the walls, these harmful gases do leak from those broken areas.As, the passage in the coal mines is far,the time till the person reaches out from inhaling those leaked harmful gases are unseen by naked eye, the chances are higher that the person may die immediately.Hence, in this way the smart helmet is used to save the lives of coal mine workers.

Later it was made even smarter with adding an automatic lightning system.i.e, at the times of darkness the helmet starts lightening due to the bulb attached along with sensor's. In olden days switching on and off of the helmet lights used to be a bit displeasure, in other words inconvenience to the helmet worn people.By this technology they were able to wear with all along with pleasure and comfort, as it automatically switches on and off saving some physical activity and time for the mine workers.

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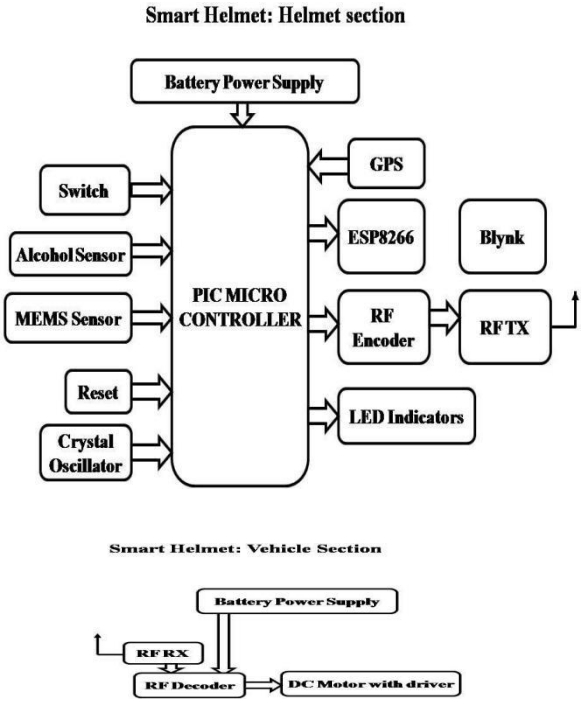
3. Implementation:



3.1 Block diagram of Smart Helmet

Helmet side component configuration is for the protection of the rider, to check the alcohol level and whether the helmet is worn or not?. If the conditions are met, then the sensors don't raise any signals and with the help of RF technology communication the vehicles runs without any problem. However, if the alcohol or not wearing a helmet is detected, then using RF technology the vehicle stops and doesn't start no matter how many times the start button is used. In case of accident detection may use, then a blynk notification along with location sent to the particular person.

Vehicle side component configuration is mainly for either to start or stop the ignition system of a vehicle. Here, in this project the vehicle's on and off movement is known by the DC motor module being attached to the RF receiver.

4. Related Work:

The brief introduction of different modules used in this project is discussed below:

4.1. PIC16F877A Microcontroller:

4.1.1 PIC16F877A Microcontroller

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The PIC1640, which was initially created by General Instrument's Microelectronics Division, is the basis for the PIC family of Harvard architecture microcontrollers, which are developed by Microchip Technology. "Peripheral Interface Controller" was the initial meaning of the word PIC.

PIC instructions range from roughly 35 for low-end PICs to over 80 for high-end PICs. The instruction set comprises instructions for conditional execution, programme branching, the accumulator and a literal constant or a register, as well as for performing a number of operations on registers directly.

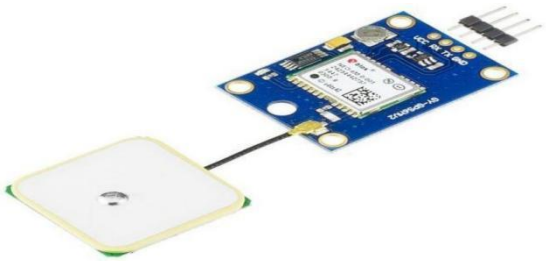
4.2 Alcohol sensor:

Fig :MQ-3 Alcohol sensor

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air.

4.3. GPS(NEO 6M):

GPS(NEO 6M) has four pins:VCC and GND for power supply of 3v-5v and grounding of the module.TX and RX for transmission and reception of data with respective to GPS NEO 6M and other end connected device.And it’s default baud rate is 9600 bps(bits per second).



4.6.1 GPS module

It is mainly used for finding the location using ht latitude and longitude values we obtain from GPS.Not only the latitude and longitude values would be found using GPS, we could also find location, tracking, timing, mapping, tilt, altitude and navigation.

The $GPGGA which is the basic “GPS National Marine Electronic Association” message, that provides 3D location and an accurate data.

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4.4. MEMS(ADXL345):

Fig: MEMS module

It is a 3- axis accelerometer which measures values ranging from -16g to + 16g (where 'g' stands for "Gravitational Force").It measures in all x-axis , y-axis , z-axis gravitational forces in units 'g'.

It is used to find the tilt of any object, acceleration of any object at any movement, to measure and sense acceleration forces.It could be used even to sense the vibration or movement.

4.5 ESP8266 Wi-Fi module:

Fig: ESP8266 WI-FI module

The ESP8266 WiFi Module is a self-contained SOC with an included TCP/IP protocol stack that can grant access to your WiFi network to any microcontroller. Either an application can be run on the ESP8266 or all Wi-Fi networking tasks can be transferred to another application processor. A pre-installed AT command set software is included with each ESP8266 module.

4.6. DC Motor:

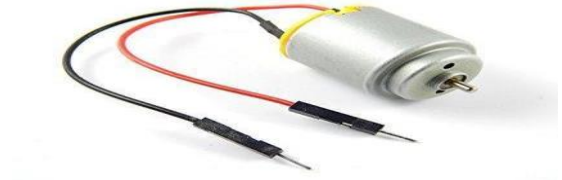

Fig: DC Motor Module

A DC Motor converts the electrical energy directly into mechanical energy.

The motor has conductivity materialist carbon particles brushes. These brushes are attached to the wires, through which current would be passed. Along the sides of these brushes magnets of opposite polls would be placed.

Whenever, the brush would be given a momentum it starts moving in the magnetic field. In the magnetic field due to the movement of electrified or conducted brush materials an electromagnetic field would be produced and this gives rise to the relays produced by the magnets.

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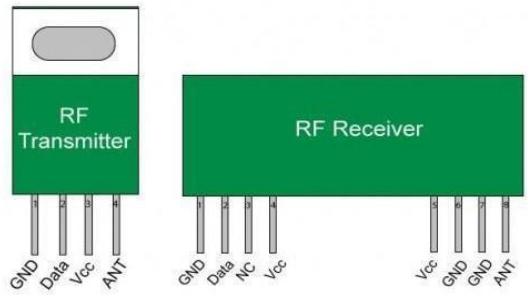
4.7 RF Technology:



4.9.1 RF Transmitter,RF Receiver

Radio frequency transmitter and radio frequency receiver together give the scope for a radio frequency communication to happen.

Both RF receiver and RF transmitter do work with the frequency range of 434 Megahertz(MHz).It works under the voltage provided of 3v-5v.It is simple in installation and very easy to use.It could even work in harsh environments.

The transmitter does the transmitting job and the receiver does the reception job as known generally. The baud rate by default for this transmission is 9600 bps(bits per second).

5. CONCLUSION:

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with PIC micro controller. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for "SMART HELMET" has been designed perfectly. The project is concerned to save the life of the rider wearing this helmet. This system able to detects the alcohol and cutoff the vehicle ignition automatically. This system able to detect the accident and sent the blynk notifications along with location to the particular person. This system able to track the location of the person used GPS technology. This system able to communicate between vehicle and helmet used wireless RF technology. Thus, the project has been successfully designed and tested.

6. ACKNOWLEDGEMENT

We would like to express our thanks to all the writers of the research publications we used as references for this paper. It was incredibly educational and useful for future research.

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7. RESULTS:

If the limit switch is pressed it means that the helmet is worn by the rider if not, the condition of must wear a helmet fails, then the controller stops the ignition system of the vehicle.

If the rider intakes alcohol, then using the RF technology between the helmet and ignition system of the vehicle, the vehicle automatically stops and no matter how much the rider tries to start his/her vehicle it doesn't start, until all the above listed condition's becomes false.

If the MEMS reads the value which makes the coding condition become true, then an accident message will be sent to a predefined phone number.

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5. Sunitha.K,PG Student, Department of Electronics and Communication Engineering , Geetanjali College of Engineering and Technology(UGC Autonomous), Cheeryal, Keesara Mandal, Hyderabad, Telangana-501301, India.

6. NAGALAKSHMI,Assistant Professor , Department of Electronics and Communication Engineering,Geetanjali College of Engineering and Technology(UGC Autonomous), Cheeryal, Keesara Mandal, Hyderabad, Telangana-501301, India.