

Smart Helmet

Introduction

A smart helmet is a type of protective headgear used by the rider which makes bike driving safer than before. The main purpose of this helmet is to provide safety for the rider. This can be implemented by using advanced features like alcohol detection, accident identification, location tracking, use as a hands-free device, fall detection. This makes it not only a smart helmet but also a feature of a smart bike. It is compulsory to wear the helmet, without which the ignition switch cannot turn ON.

An RF Module can be used as wireless link for communication between transmitter and receiver. If the rider is drunk the ignition gets automatically locked, and sends a message to the registered number with his current location.

In case of an accident, it will send a message through GSM along with location with the help of GPS module. The distinctive utility of project is fall detection; if the rider falls down from the bike it sends a message.

Problem Definition

ROAD traffic crashes take the lives of nearly 1.3 million every year and injure 20-50 million more in the world. According to Global status report on road safety 2013 total number of road traffic deaths remains unacceptably high at 1.24 million per year. Only 28 countries, covering 7% of the world's population, have comprehensive road safety laws on five key risk factors: drinking and driving, speeding, and failing to use motorcycle helmets, seat-belts and child restraints. So, to overcome from this problem this smart helmet is being introduced which help so to reduce number of accidents that takes every day and also helps to reduce death ratio.

In countries like India where bikes are more prevalent many people die due to carelessness caused in wearing motorcycle helmets. Even though there has been continuous awareness from the government authorities regarding helmets and seatbelts a majority of the drivers do not heed them.

Most of the people use traditional helmets just to prevent from challan done by traffic control police not for the safety purposes. So, these helmets do not ensure the safety of the driver. For two -wheeler rider, Helmet act as a basic protection device. But it does not ensure whether the rider strictly follows the traffic rules or not. So , to overcome from this problem the smart helmet can be used.

Components Used (Hardware)

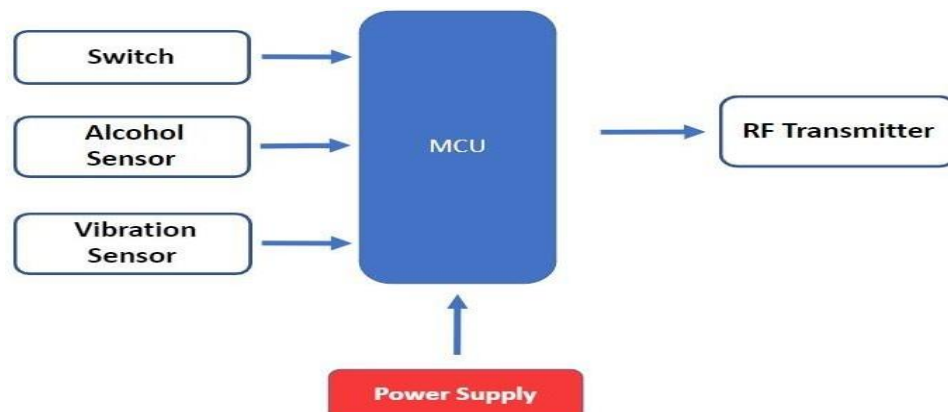
- Motorcycle Helmet
- Arduino Nano ATmega328p (x2)
- MQ-3 Alcohol And Benzene Analog Sensor
- Vibration Sensor Module
- Push Button Switch
- Jumper Wires
- RF Transmitter and Receiver
- Active Piezo Buzzer
- Bi-Colour LED's
- Sim900 GSM Module
- 12V Lipo battery
- Veroboard
- Soldering Iron
- LCD 16x2

Components Used (Software)

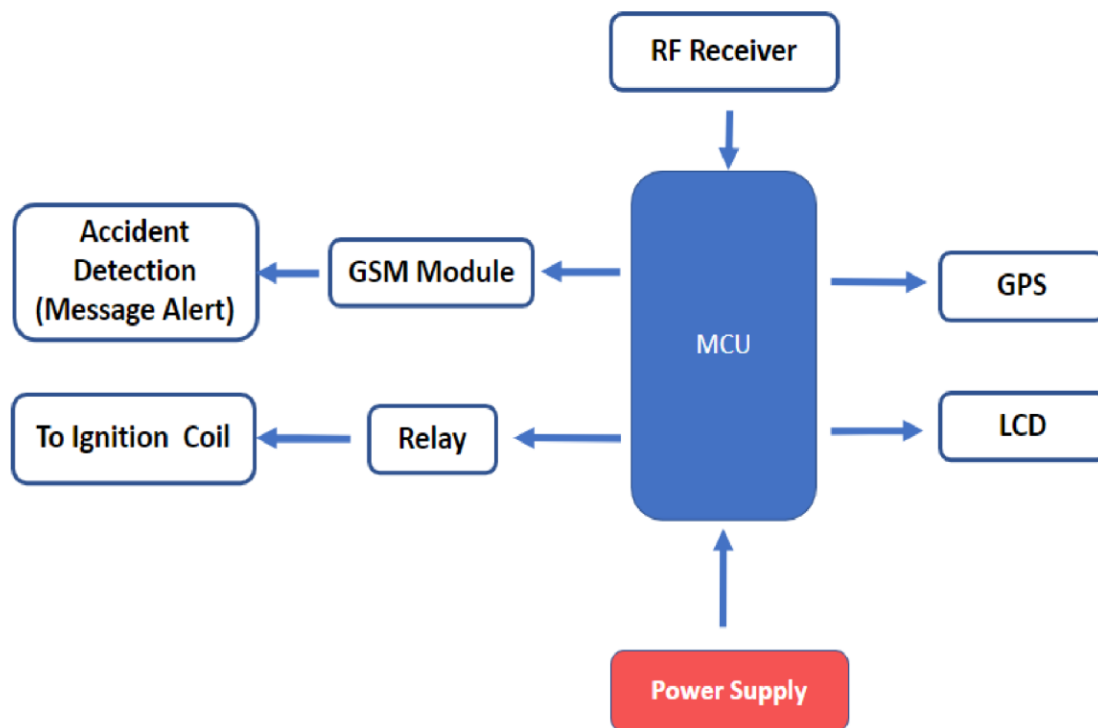
- Proteus 8 Professional

Block Diagram

Transmitter Section:-



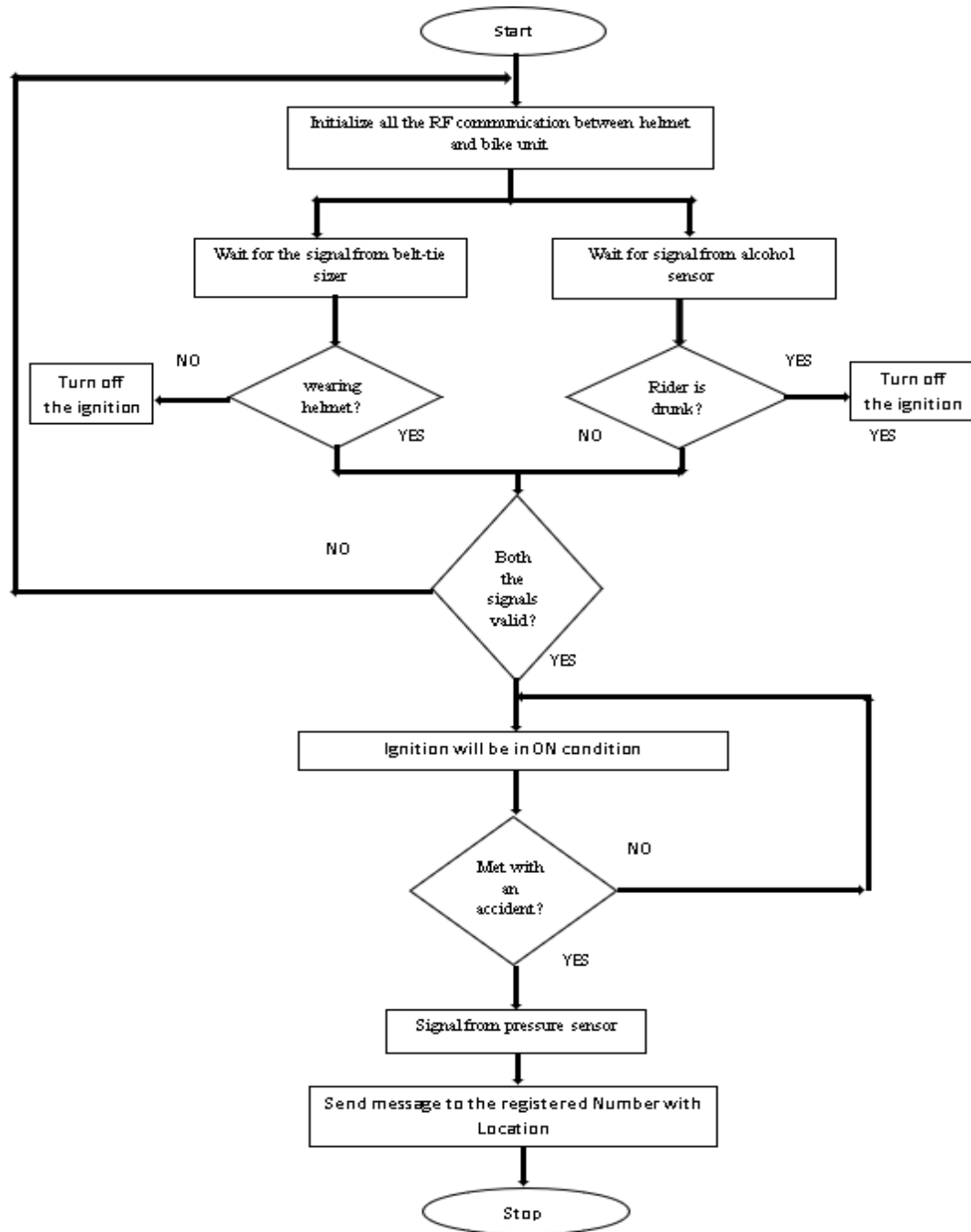
Receiver Section:-



Working Principle

We have used Alcohol sensor MQ-3 to determine whether the driver has consumed alcohol or not. And if the driver is drunk a message will be displayed on LCD that “You’re drunk” and SMS notification is sent to the number mentioned in the code through a GPS. We have also used one switch which is connected inside the helmet to check whether the driver has worn the helmet or not. And if not then the ignition will not start and the driver will not be able to start the bike. Here, we are using RF transmitter and receiver for transmitting and receiving data wirelessly. For detecting the accident, the vibration sensor is included in the circuit that can be tuned to a specific level of vibration and immediately tells the GSM module to send a notification to certain numbers as a call for help.

Flowchart:



Component Description:

Arduino-Uno:

The Arduino-uno is microcontroller which is based on the atmega328. The board are equipped with set of digital and analog input/output pins that may be interfaced to 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.



LCD 16x2:

The LCD screen 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.



MQ3 sensor:

MQ3 sensor Basically, it has 6 pins, the cover and the body. Even though it has 6 pins, you can use only 4 of them. Two of them are for the heating system, i.e. pin H, and the other 2 are for connecting power and ground, they are pins A and B. When rider start the bike then the system check the alcohol level of rider, if it sensed then the bike engine is not started that time. If it sense nothing then the system allows them to start engine.



Vibration sensor:

Vibration sensor is otherwise called piezoelectric sensors which are adaptable gadgets and it is utilized for estimating purposes. These sensors measure the progressions with speeding up, temperature, force, weight or strain by changes to electrical charge. This sensor estimates amount and capacitance for choosing aromas of air.



GSM module:

GSM module requires a SIM card just like mobile phones to activate communication with the network. We are using GSM to inform family members about the accident. 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



GPS 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.

**RF Module:**

This radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter/receiver (Tx/Rx) pair operating at 434 MHz. The transmitter module takes serial input and transmits these signals through RF. The transmitted signals are received by the receiver module placed away from the source of transmission.



Advantages:

1. Detection of accident in remote area can be easily detected and medical services provided in short time.
2. It will reduce the probability of accidents by simply avoiding drunken drive by using alcohol detector
3. Decrease in death rates due to head injuries.
4. Security system for motorcycles.
5. Less power consuming safety system.
6. Provide wireless connection security

Applications :

1. It can be used in real time safety system.
2. We can implement the whole circuit into small VLSI chip that can be embedded into the helmet and bike unit.
3. It can be designed for less power consuming safety system.
4. This safety system technology can further be enhanced in car or other vehicle by replacing the helmet with seat belt.