Intellisafe Rideguard

Research Scholar Riya Lohiya, Research Scholar Rishika Jain,
Research Scholar Rohit Choudhary,
Research Scholar Raghvendra S. Evaney, Professor Dr. Monika Kapoor
Department of Electronics & Communication Engineering
Lakshmi Narain College of Technology, Bhopal, Madhya Pradesh, India

Abstract- Everyday around the world a large percentage of people die from road accident, especially in case of two wheelers. This may be avoided by emergency treatment of victim, wearing helmets and riding vehicles without consuming alcohol. An effective approach is made to solve the problem by using Smart Helmet. Here, Smart Helmet is acting as a key. If the driver has consumed alcohol, the sensor will sense it and immediately lock the engine. Smart helmet provides help in case of accident by using GSM and GPS technology. If the person is met with an accident, then in such situation a message along with the location is sent to the ambulance or family member so that medical aid can be provided to that person as soon as possible. The project aims at intelligence security providing awareness for wearing helmet and provides prevention for human life safety.

Keywords- GSM, GPS, Accident.

I. INTRODUCTION

Bike riding is a lot of fun, but accidents happen. People choose motor bikes over car as it is much cheaper to run, easier to repair, easier to park and flexible in traffic. In India more than 37 million people are using two wheelers. Since usage is high accident percentage of two wheelers are also high compared to four wheelers. Motorcycles have high rate of fatal accidents than cars or trucks and buses. This project aims for accident avoidance, safety and security of bike rider. The main purpose of the project is to encourage wearing helmet. The system will ensure that the motorbike will not start unless the rider is wearing a helmet and has not consumed alcohol. Thus, alcohol detection is also an important part in this project. Alcohol detections done by MQ-3 sensor and helmet detections done by IR and PIR sensors. The system will also alert the bike rider if any obstacle comes too close while riding the bike. This is found to be useful at night or when the riders drowsy or tired. By these accidents can be prevented. Also, GSM technology is used to inform the family members in case of an accident. Accident detection is done using accelerometer. Wireless communication through. short. In recent times helmets have been made compulsory in Telangana State. Traffic accidents in India have been increased every year. As per Section 129 of Motor Vehicles Act, 1988, every single person riding a two-wheeler is required to wear protective headgear following the standards of BIS (Bureau of Indian Standards). Also, drunken driving under the influence (DUI) is a criminal offence according to the Motor Vehicle act 1939, which states that the bike rider will get punishment. Currently bike riders easily escape from the law [1]. These are the three main issues which motivates us for developing this project. The first step is to identify whether the helmet is worn or not. If helmet is worn then ignition will start otherwise it remains off. For this, Infrared Sensor (IR) sensor is used. The second step is alcohol detection [2]. Alcohol sensor is used as breath analyzer which detects the presence of alcohol in rider's breath and if it exceeds permissible limit ignition cannot start. It will send message to the number saying that "Rider is drunk and is trying to ride the bike". MQ-3 sensor is used for this purpose.

When these two conditions are satisfied then only ignition starts. The third main issue is accident and late medical help. In fall detection, we place accelerometer in the bike unit. By this mechanism accidents can be detected. The aim of this project is to make à protection system in a helmet for the safety of bike rider. The smart helmet that is made is fitted with different sensors responsible for detection [3]. There are two main units in this project. Each unit uses a microcontroller.

II. LITRATURE REVIEW

According to the recent Research paper in 2016 titled '2 Helmet using GSM and GPS technology for accident detection and Reporting system', The author specially developed this project to improve the safety of the bikers. The objective of this project is to Study and understand the concept of RF transmitter and RF receiver circuit. The project uses ARM7, GSM and GPS module. The Project also uses buzzer for indication purpose. will send out on the registered mobile number. [2] The major disadvantage of this project is they are not using any Display device for showing the status. Also, the cost of helmet is still high since helmet is designed for only one purpose. According to the Research paper in 2015 titled 'Microcontroller based smart wear for driver safety', In this paper author has Discussed on the speed of the vehicle. In this application the project will be monitoring the areas in which the vehicle will be passing. On entering any cautionary areas like schools, hospitals, etc. the speed of the vehicle will be controlled to a predefined limit. LCD Is used for showing the various types of messages after wearing the helmet. The author has worked only on the phenomenon of Accident which is generally happens due to drunk and drive. But as we know that the accident in the area is not happens only due to consuming alcohol but also other parameters like speed are also responsible. According to the Research paper in 2016 titled 'Smart Helmet', In this paper the main objective of author is to force the rider to Wear the helmet. In this competitive world one of the surveys says that the death trolls due to motor bike accidents are increasing Day by day out of which most of these casualties occurs because of the absence of helmet. Traffic police cannot cover remote roads of city. That is why over primary objective is to make the usage of the helmet for two wheelers" compulsory ". Thus, no one other than the owner himself, who doesn't have "password" which would have been created by the owner, can use the bike. In this author has proposed the feature that the bike will not start unless the bike rider does not wear the helmet. The other this module basically deals with the checksum of rider if he is wearing the helmet or not on first place to achieve this ultrasonic sensor is been used. based on this the signal are been sent to the next module voice recognition module use for authentication purpose. Arduino is also used in this project which is an open-source tool for making computer that can sense.

III. PROPOSED METHODLOGY

The project consists of 5 parts:

- **Helmet Authentication**- to ensure that the bike rider is wearing a helmet or not.
- **Alcohol Detection**- to ensure that the bike rider has not consumed alcohol (using MQ3 Gas Sensor).
- **Response System-** in the helmet in case of accident, to inform bike rider's family about the accident using GPS & GSM module Helmet.
- **Safety Zone Indication**- to alert the bike rider if any vehicle comes too close using Ultra sonic Sensor.
- **Fall Detection**- in case of accident, to inform bike rider's family about the accident and the vibrations due to static obstacles will be detected by using accelerometer.

IV. WORKING MODEL

- To sense the helmet, a switch is used.
- To sense the alcohol content, an alcohol sensor-MQ3 Gas sensor is used.
- To sense the speed of upcoming vehicle an ultrasonic sensor is used.
- An accelerometer is used to detect the fall of vehicle.
- Arduino Nano is used as controlling unit, it reads the values from accelerometer, when

Arduino observe any abnormal values, it reads the current location from GPS module, and send it to given mobile through SMS by using GSM module.

- Before sending the SMS, Arduino activate the buzzer, after 30 seconds of beeping SMS will be sent, but if someone press the "I AMOKAY" button, message will not send, which helps to prevent unnecessary SMS.

1. Transmitter section

If the switch is pressed after starting the bike, it feeds a logic level 1 to the input of the transmitter through an encoder ht12e. If alcohol is detected in the mq3 alcohol sensor, it feeds a logic level 0 and that 0 logic level is received by the receiver.

Flow Chart
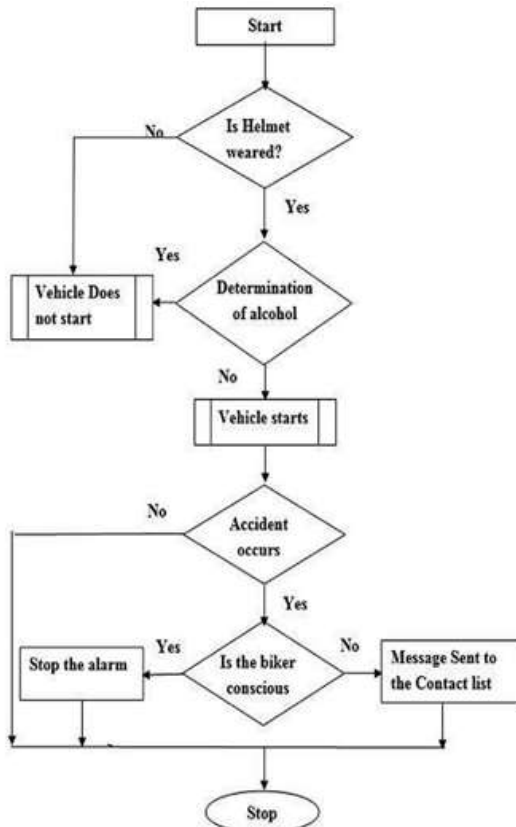
Figure 1: Flow Chart

2. Receiver Section

When the biker ON the switch, logic level 1 is received by the receiver which gets decoded by the ht12d decoder and triggers the microcontroller and the motor gets on. When alcohol is detected the logic level 0 ta received and the motor goes off. When the vibration sensor gets triggered for an accident, GPS and GSM both get ON and SMS is sent along with the biker's location.

3. Micro controller

In the microcontroller, when logic signal 1 is triggered the motor driver turns the motor on. When the vibration sensor is triggered, the microcontroller is executed as well as GPS and GSM.

System Requiremet

Fig 1. BLOCK DIAGRAM FOR HELMET

Figure 2: System Requiremet

Arduino UNO

Figure 3: Arduino UNO

Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.
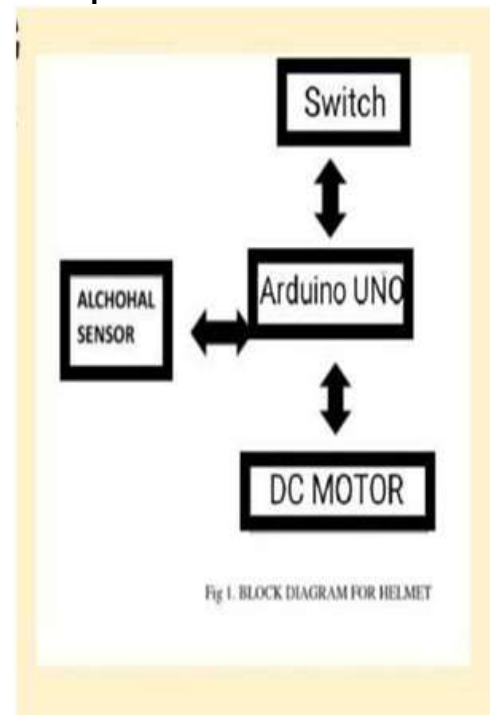
Arduino UNO features AVR microcontrollerAtmega328, 6 analogue input pins, and 14 digital I/O pins out of which 6 are used as PWM output.
This board contains a USB interface i.e. USB cable is used to connect the board with the computer and Arduino IDE (Integrated Development Environment) software is used to program the board.

The unit comes with 32KB flash memory that is used to store the number of instructions while the SRAM is 2KB and EEPROM is 1KB.

The operating voltage of the unit is 5V which projects the microcontroller on the board and its associated circuitry operates at 5V while the input voltage ranges between 6V to 20V and the recommended input voltage ranges from 7V to 12V.

Arduino UNO Components
The Arduino UNO board contains the following components and specifications:

ATmega328
This is the brain of the board in which the program is stored.

Ground Pin
There are several ground pins incorporated on the board.

PWM
The board contains 6 PWM pins. PWM stands for Pulse Width Modulation, using this process we can control the speed of the servo motor, DC motor, and brightness of the LED.
Digitall/O Pins: there are 14 digital (0-13) I/O pins available on the board that can be connected with external electronic components.

Analogue Pins
There are 6 analogue pins integrated on the board. These pins can read the analogue sensor and can convert it into a digital signal.

AREF
It is an Analog Reference Pin used to set an external reference voltage.

Reset Button
This button will reset the code loaded into the board. This button is useful when the board hangs up, pressing this button will take the entire board into an initial state.

USB Interface
This interface is used to connect the board with the computer and to upload the Arduino sketches (Arduino Program is called a Sketch)

DC Power Jack
This is used to power up the board with a power supply.

Power LED
This is a power LED that lights up when the board relates to the power source.

Micro SD Card
The UNO board supports a micro-SD card that allows the board to store more information.

3.3V
This pin is used to supply 3.3V power to your projects.

5V
This pin is used to supply 5V power to your projects.

VIN
It is the input voltage applied to the UNO board.
Voltage Regulator: The voltage regulator controls the voltage that goes into the board.

SPI
The SPI stands for Serial Peripheral Interface. Four Pins 10(SS), 11(MOSI), 12(MISO), 13(SCK) are used for this communication.

TX/RX
Pins TX and RX are used for serial communication. The TX is a transmit pin used to transmit the serial data while RX is a receive pin used to receive serial data.

Vibration Sensor Sw-420
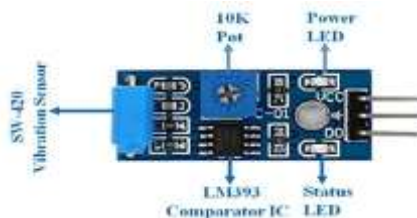
Figure 4: Vibration Sensor Sw-420

This vibration sensor will be used to trigger the GSM module. vibration sensor continuously sends the signal to the Arduino. Arduino is our microcontroller in this smart helmet project. if any rise in the signal the Arduino will take action according to the signal. If the sensor senses a vibration in the vehicle which is nearly to the accident. The Arduino triggers the GSM module to send the message and call.
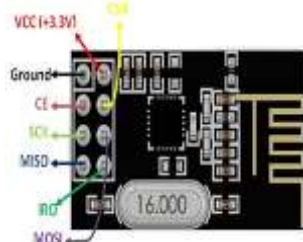
NRF Module NRF24l0

Figure 5: NRF Module NRF24l0

NRF module is a small-size low-cost ultrapower module that works 2.4 GHz wireless transceiver. that can be used in wireless communication projects. you can also connect many NRF modules together and communicate between all the NRF modules.

NRF modules use the SPI (serial peripheral interface) protocol to make communication between all the devices we have two NRF modules one will be connected to the transmitter and the other will be connected to the receiver module.

LCD 16×2
An electronic device that is used to display data and the message is known as LCD 16×2. As the name suggests, it includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) in total & every character will be made with 5×8 (40) Pixel Dots. So the total pixels within this LCD can be calculated as 32 x 40 otherwise1280 pixels.

Figure 6: LCD 16×2

LCD 16X2 Pin Configuration
The pin configuration of LCD 16 X 2 is discussed below so that LCD 16×2 connection can be done easily with external devices.

Pin1 (Ground)
This pin connects the ground terminal. Pin2 (+5 Volt): This pin provides a +5V supply to the LCD

Pin3 (VE)
This pin selects the contrast of the LCD. Pin4 (Register Select): This pin is used to connect a data pin of an MCU & gets either 1 or 0. Here, data mode = 0 and command mode =1.

Pin5 (Read & Write)
This pin is used to read/write data. Pin6 (Enable): This enables the pin must be high to perform the Read/Write procedure. This pin is connected to the

data pin of the microcontroller to be held high constantly.

Pin7 (Data Pin)

The data pins are from 0-7 which are connected through the microcontroller for data transmission. The LCD module can also work on the 4-bit mode through working on pins 1, 2, 3 & other pins are free.

Pin8 – Data Pin 1 Pin9 – Data Pin 2 Pin10 – Data Pin 3 Pin11 – Data Pin 4 Pin12 – Data Pin 5 Pin13 – Data Pin 6 Pin14 – Data Pin 7

Pin15 (LED Positive)

This is a +Ve terminal of the backlight LED of the display & it is connected to +5V to activate the LED backlight. Pin16 (LED Negative): This is a -Ve terminal of a backlight LED of the display & it is connected to the GND terminal to activate the LED backlight.

Figure 7: Pin15 (LED Positive)

NEO 6m Module

At the heart of the module is a NEO-6M GPS chip from u- box. The chip measures less than the size of a postage stamp but packs a surprising number of features into its little frame.NEO-6M GPS Module. It can track up to 22 satellites on 50 channels and achieves the industry's highest level of sensitivity i.e. -161 dB tracking, while consuming only 45mA supply current.

Unlike other GPS modules, it can do up to 5 location updates a second with 2.5m Horizontal position accuracy. The u-blox 6 positioning engine also boasts a Time-To- First-Fix (TTFF) of under 1 second. One of the best features the chip provides is Power Save Mode (PSM). It allows a reduction in system power.

Single Channel Relay Module

Figure 8: Single Channel Relay Module

Here in the receiver, we are using a relay that will trigger the motor which is to be pretend the bike engine.

When it receives the data from the transmitter and starts the motor it needs to be triggered by the relay module. relay module will be used to operate the 12v DC motor.

DC Motor 12V

Figure 9: DC Motor 12V

We are using here a 12v DC motor with gears. If the driver is drunk the motor will be turned off. it means the bike engine will be turned off. 12v DC motor connected via 12v external power supply. which is connected through the relay which always will be triggered from the relay. Arduino can't run a DC motor due to back EMF and low current at the pins.

MQ3 Sensor

Figure 10: MQ3 Sensor

The Grove – Gas Sensor (MQ3) module is useful for gas leakage detection (in home and industry). It is suitable for detecting Alcohol, Benzine, CH4, Hexane, LPG, CO. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible.

Specifications of MQ-3 Gas Sensor
Power requirements: 5 VDC @ ~165 mA (heater on) /~60 mA (heater off)
Current Consumption: 150mA
DO output: TTL digital 0 and 1 (0.1 and 5V)
AO output: 0.1- 0.3 V (relative to pollution), the maximum concentration of a voltage of about 4V Detecting Concentration: 0.05-10mg/L Alcohol Interface:

1 TTL compatible input (HSW), 1 TTL compatible output (ALR)

Heater consumption: less than 750mW
Operating temperature: 14 to 122 °F (-10 to 50°C)
Load resistance: 200kΩ

Sensitivity S: Rs (in air)/Rs (0.4mg/L Alcohol)≥5 Sensing Resistance Rs: 2KΩ-20KΩ(in 0.4mg/l alcohol) Dimensions: 32 x 22 x 16 mm

SIM 800L

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls. Low cost and small footprint and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting power module boots up, searches for cellular network and login automatically.

Figure 11: SIM 800L

Specifications
Supply voltage: 3.8V – 4.2V Recommended supply voltage: 4V Power consumption:
Sleep mode < 2.0mA Idle mode < 7.0mA GSM transmission (avg): 350 mA GSM transmission (peek): 2000mA Module size: 25 x 23 mm

Interface: UART (max. 2.8V) and AT commands SIM card socket: micro SIM (bottom side) Supported frequencies: Quad Band (850 / 950 / 1800 /1900 MHz)

Antenna Connector: IPX Status signaling: LED Working temperature range: -40 do + 85 ° C of how the LCD will be connected to the UNO.

Applications
• It can be used in real time safety system.
• The system will ensure that the motorbike will not start unless the rider is wearing a helmet and has not consumed alcohol. Hence safety of person is ensured.
• Detection of accident in remote area can be easily detected and medical services provided in short time.
• The developed system senses the obstacles in front of the vehicle and so that the accidents due to static obstacles could be avoided.
• In future if all the bike manufacturing companies include this system on each bike before the sell, accident rates will drastically fall.

Advantages
• All the components required are easily available.
• No manual attention is required.
• Circuit is flexible, without much change in the circuit it can be used with any four-wheeler.
• Automatically controlled and easy to use.
• It will help to reduce the number of road accidents which are very frequent in a country like India.
• It will help to create awareness about the need to wear helmet during bike riding.

V. CONCLUSION

In smart helmet system, the life of the rider on two-wheeler can be saved from the road accident with standard protection with safety features i.e. helmet detection, alcohol detection and object detection. The system also helps efficient handling of the aftermath of accidents by sending a SMS with the location of the biker to the police station, nearby hospital and his family. This ensures that the victims get proper and prompt medical attention, if he/she met with an accident.

REFERENCES

1. International Journal of Scientific & Engineering Research Volume 2, Issue 12. December-2011 ISSN 2229-5518 IJSER
2. International Journal of Science and Research (ISR)ISSN (Online): 2319-7064 3) "Vehicle Accident Alert & Locator" UJECS-IENS Volume 11, Issue 02
3. www.academia.edu/6541133/Smart_Helmet.php
4. IUSR ISSN(Online):2319-7064 Vijay J. Saritha B. Priyadharshini B. Deepika S and Laxmi R (2011), "Drunken Drive Protection System", International Journal of Scientific & Engineering Research.Vol.2. No. 12. ISSN:2229-5518