Intelligent Safety Helmet System

Mansi Patil[1], Roshni Mudradi[2], Komal Kadam[3], Vineet Sharma[4], Ameya Jadhav[5]

(Department Of Electronics, Atharva College Of Engineering, Mumbai University)

Abstract: *This project is designed as the bikers in our country are increasing, the road mishaps are also increasing day by day, due to which many casualties, most of them are caused due to most common negligence of not wearing the helmets, and also many deaths occur due to lack of prompt medical attention needed by the injured person. This increase trend in accident motivated us to think about making a system which ensures the safety of biker, by making it necessary to wear helmet, as per government guidelines, also to get proper and prompt medical attention, after meeting with an accident. The proposed system is an intelligent helmet. A module affixed in the helmet is such that, the module will synchronize with the module affixed on bike and will also ensure and check that biker has not consumed alcohol. The accident detection module is an additional feature which will be installed on the bike, which will be able to detect accident and will be able to notify quickly the accident to police control room and in case if the accident is minor, rider can abort message sending by pressing the abort switch .The main objective of the smart helmet is to provide safety for rider . This implement by using advance feature due to late medical help or the accident place is unmanned.[1]*

Keywords: *Alcohol,Casualities,Helmet,Module,Police.*

I.   Introduction

In today's world where automobiles plays a crucial role in human life worldwide there is also need for road safety.Accidents avoidance techniques which are innovated till now, are not enough to save the lives of people.Drafting of bikers has become a menace on public roads. Also drunk and drive being an criminal offence is giving a freeway to road mishaps. The bitter truth is the carelessness carried by the people which gives the breakthrough to the road accidents. In spite of the safety rules implemented by the government there is lack of support from the public which fails to follow the rules. To improve the safety system for bikers there should be a reliable communication system between the bikers and hospitals as well as the police. The proposed system is a wireless helmet system that follows GPS and GSM modules. The quick communication between the hospitals and the GSM and GPS modules proves to be beneficial for the user by the means of medical facilities. The additional benefit provided by the helmet is the theft detection which works in synchronization with GPS and GSM modules. The most important advantage of this helmet is alcohol detection which proves to be very helpful in public interest. As most of the road accidents happen due to the alcohol consumption this helmet proves to be a boon for bikers.[2]

II.   Working

The proposed system is made to ensure the safety of the biker by making it necessary to wear the Helmet as per the government guidelines also to get proper and prompt medical facilities after meeting with an accident. A module is affixed in the helmet, such that, the rider can trigger voluntary messages as well as monitors the motion of the rider and the rate at which the motion takes place. The system will bear following functionalities:

It will ensure that biker has not consumed alcohol. It will automatically trigger an alert message that will notify the pre-programmed contact. An accident detection module will be installed on the bike, which will be able to detect accident and will be able to notify quickly the accident to police control room and in case if the accident is minor, rider can abort message sending by pressing the abort switch. Data from the helmet will be transmitted wirelessly. According to the various sensor input the micro-controller will decide the actions of other blocks. A smart helmet is an innovative concept which makes motorcycle driving safer than before. It uses the GPS and GSM as its core technologies. The mechanism of this smart helmet is very simple, vibration sensors are placed in different sections of helmet where the chances of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and provide it to the microcontroller board, then controller extract GPS data using the GPS module that is integrated to it. When the data goes below the minimum stress limit then GSM module automatically sends alerting message to ambulance or family members. The hardware used in this system is alcohol sensor, GSM, GPS, microcontroller, pressure sensor and vibration sensor. The system has a detecting feature that it will automatically check whether the person is wearing the helmet and has non- alcoholic breath while driving. The data to be transferred is coded

with RF encoder and transmitted through radio frequency transmitter. The receiver at the bike collects the data and decodes it through RF decoder. MCU controls the function of relay and thus the ignition; it controls the engine through a relay

2.1 Block Diagram

In this chapter we shall discuss the details of the functioning of the helmet with the help of a block diagram as shown in figure 1 below that takes into inclination, alcohol detection levels and also tracks and transmits the location of the device. The LC Here we see that the device involves the use of multiple sensors which monitor the motion account all the important components of the technology that will constitute the end product. Screen helps provide valuable information to the user wearing the helmet and is used as a very valuable information center for the device if multiple utility functions need to be added later.
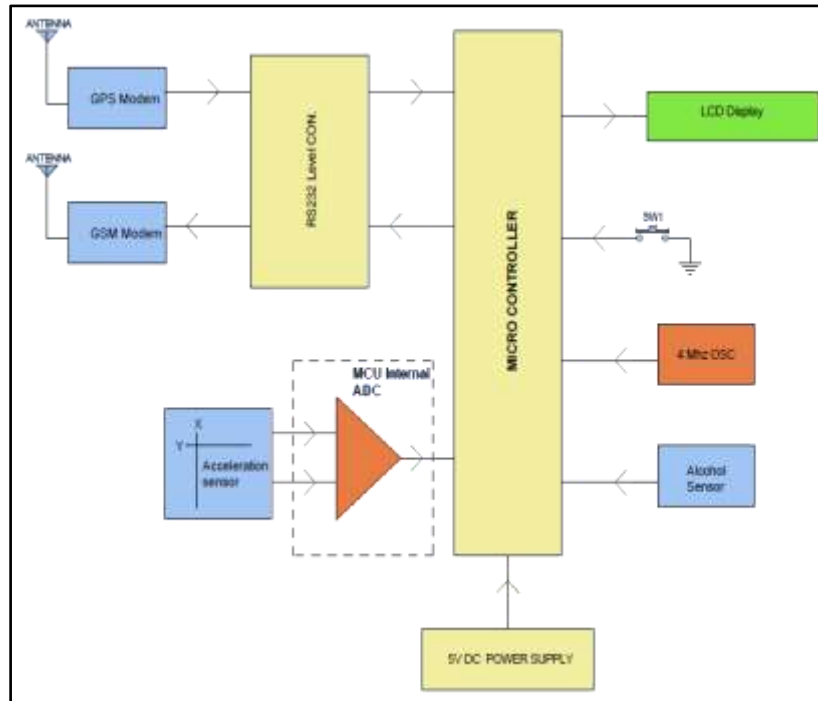

Figure 1. Block Diagram

III. Hardware

The main hardware components used are discussed here:

3.1 GPS and GSM Module Interface (RS232)

The communication between the micro controller and the GPS receiver and GSM Module requires an RS-232 interface as shown above in figure 6.1 which serves to convert the CMOS TTL output voltage of the micro controller (0-5 volt) into a voltage of+/- 12 volt. The converter uses the MAX232 (U3) converter IC. The connection of MAX232 to the GPS and GSM uses the RS232 data cable.The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) and the serial communication in PC works on RS232 standards (- 25 V to + 25V).
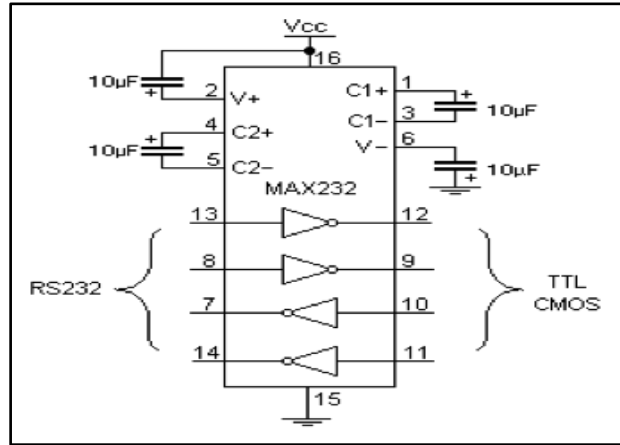
Figure 2. GPS and GSM Module interface (RS232)
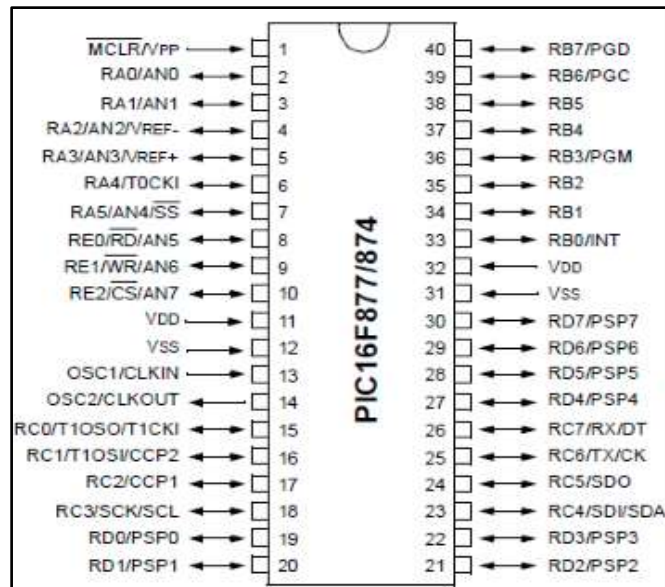
3.2 Micro controller PIC16Fxxx

Figure 3.Microcontroller PIC16Fxxx

To control the peripheral device and dispersing the function of the main CPU the (PIC) that is peripheral interface controller was developed. PIC has the calculation function and the memory like the CPU and is controlled by the software. However the throughput, the memory capacity isn't big. However it depends on kind of PIC but normally the maximum operation clock frequency is about 20MHZ and the memory capacity to write the program is about 1K to 4K words. The clock frequency is related with the speed to read the program and to execute the instruction. Only at the clock frequency, the throughput cannot be judged. It changes with the architecture in the processing parts for same architecture; the one with the higher clock frequency is higher about the throughput. The point, which the PIC convenient for is that the calculation part, the memory, the input/output part and so on, are incorporated into one piece of the IC. The efficiency is limited but can compose the control unit only by the PIC even if it doesn't combine the various IC's so, the circuit can be compactly made.
.

3.3 GSM Modem

This act just like a mobile phone with its own unique phone number and this GSM modem is capable of accepting any GSM network operator SIM card. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily.[4]

3.4 GPS Modem

The broadcast signals from space that are received by the global positioning system are processed by the GPS which is used to provide three dimensions they are longitude, altitude, longitude and also precise time.They provide   reliable positioning.navigation, and timing services   are also included in feature list provided where worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. The standard NMEA 0183 v3.0 protocol is output of serial data of 9600 baud rate offering industry standard data messages and a command set for easy interface to mapping software and embedded devices.

3.5 LM7805

This is used to make the stable voltage of +5V for circuits. The LM7805 is three terminal positive regulators are available in the TO-220 - package and with several fixed output voltages, making them useful in a wide range of applications.LM7805 has internal current limiting. Also it provides thermal shut down. Safe operating area protection make this e unable to destroy. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators.

3.6MAX232

Thesignals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits needed to converted which are done by using MAX232 which is an integrated circuit. The MAX232 is a dual driver/receiver and typically converts the receive data, Transmitt data, Clear to send and request to send signals.

3.7 16 x 2 LCD Modules

A 16 x 2 LCD controllers is one of the most common dot matrix liquid crystal display (LCD) display controllers available. The device can display ASCII characters, and some symbols in two 16 character lines.

3.8 Alcohol Sensor Module

Alcohol Gas Sensor MQ3 is used to make this module. It is a low cost semiconductor sensor. SnO2 is a sensitive material which is used for this sensor whose conductivity is lower in clean air. As the concentration of alcohol gases increases its conductivity also increases.High sensitivity to alcohol is what this module provides.It also has a good resistance to disturbances due to smoke, vapor and gasoline. easy interfacing with Microcontrollers, Arduino Boards, Raspberry Pican be done For detecting alcohol concentration on your breath this alchohol sensor is used. It has a high sensitivity. The circuit is very simple all it needs is one resistor. A simple interface could be a 0-3.3V ADC .some features of alcohol sensor are output sensitivity is adjustable.Good sensitivity to alcohol gas. It provides both digital and analog output.

3.9 Sensor Interface

A maximum of 4 sensors can be connected to the system, these can be found in the circuit diagram. These sensors need to have their contacts open when in the inactive state (i.e. normally open) or active low signal @ 5V DC. A power supply voltage of +5 VDC is available for each sensor at the corresponding wiring terminals (CN2). There are many type of sensor available you can connect with the projects. External detection Sensor's interface to micro controller via Port, RA0 to RA3, (pin no 2 to 5). Port RA Used as a digital Input Port and is pulled up via 10K resistors network (R-pack – RN2)**.**

3.10 Power supply

The power supply circuit. It's based on 3 terminal voltage regulators, which provide the required regulated +5V and unregulated +12V. Power is deliver initially from standard 12V AC/DC adapter or 12V_500ma Transformer. This is fed to bridge rectifier (D3, 4, 5, 7) the output of which is then filtered using 1000uf electrolytic capacitor and fed to U5 (voltage regulator). U5 +5V output powers the micro controller and other logic circuitry. LED L2 and its associate 1K current limiting resistors provide power indication. The unregulated voltage of approximately 12V is required for GPS and GSM Modem and relay, buzzer driving circuit.

IV. Advantages

The design is very cost effective for mass production purposes.It has a potential of being a modular device which implies there can be multiple features added to it for safety and recreational purposes.Improves the probability of the user surviving a potentially fatal accident.Helps the user be more alert of their surroundings while in motion.Makes communication easy and sending distress alerts is convenient.Parts are easy to acquire and technology is widely available with mobile networks and high speed internet is available at fairly affordable prices for the general population.Proposed network can be further made wireless to improve

mobility and reduce weight.Number of cases of violated traffic rules can be reduced.Similarly various upgrades can be carried out taccommodate multiple features.[5]

V. Disadvantages

In order to keep the cost low and affordable to the masses, the device misses out on a few more safety features that can be added to it. Camera support, proximity alert, sleep detection, etc.From a maintainence aspect, the user might not invest in repair or renew costs after the device has undergone damage on a couple of occasions.The increase in the weight of the device might need reforms inorder to make sure the device does not cause stress on the user's spine and neck when the device is used for long durations.Transport regulations in the country currently do not support the branching out of the smart helmet into something that is used as a source of information while commuting.

VI. Conclusion

With the help of the helmet itself we could reduce road mishaps to great extent. Thus the components are selected in order to make safety helmet system based on embedded. Various data regarding to components is studied. The components are fixed according to application. By minimization of all the components the size and weight of the system can be reduced to a much comfortable level. The alcohol detection plays the vital role in accident reduction as many of cases happen due to consumption of alcohol. Not only detecting alcohol but also instant message system of sending user location to the police and hospitals will contribute a lot to save life as the medical facility will be provided as earliest as possible.

Acknowledgement

Reference

[1]   Jennifer William, Kaustubh Padwal, Nexon Samuel, Akshay Bawkar, SmitaRukhande,IntelligentHelmet,International Journal of Scientific & Engineering Research,Volume 7, Issue 3, March-2016.

[2]   Aviral Vijay, Ajay Singh, Bhanwar Veer Singh, Abhimanyu Yadav, Blessy Varghese and Ankit Vijay,Hi-tech Helmet and Accidental Free Transportation System,International Journal of Advanced Technology and Engineering Exploration,Volume-2 Issue-6 May-2015.

[3]   Nayan Ramteke,Shilpa Patil,, Mayur Deshmukh, Roshani Yelekar,IMPLEMENTATION OF SMART HELMET SYSTEM FOR BIKE WITH SPEED INDICATION TO GOVERNMENT,International Journal of Research In Science & Engineering,Special Issue 6-ICRTEST January 2017.

[4]   Ms.Anuradha.A.Nirmal, Ms.Vijayalaxmi B.Patil , Ms.Amruta S.Digraje , Ms.Supriya S.Gondkar,Smart Automation in Textile for Fault Detection & Salary Calculation,International Journal of Engineering Research in Electronics and Communication Engineering,Volume 4 ,February 2017.

[5]   Nitin Agarwal, Anshul Kumar Singh, Pushpendra Pratap Singh, Rajesh Sahani,SMART HELMET,International Research Journal of Engineering and Technology (IRJET),Volume: 02Issue: 02 May-2015.