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SMART HELMATE ALCOHOL DETECTOR ACCIDENT ALERT USHING GSM & GPS BIKE CONTROL RIDER

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Abstract: *Everyday around the world a large percentage of people die from road accident. An effective approach is made to solve the problem by using smart helmet band. Smart helmet band is an idea which make motorcycle driving safer than before. The working of this smart helmet band is very simple, Limit switch is placed inside the helmet, which will detect whether the rider has worn the helmet or not, if not then the bike will not start. Smart helmet band provides help in case of accident by using GSM and GPS technology.*

Key Words: Automation System, Smart Helmet, Accident Detection, Helmet Detection, SMS Alert.

1. INTRODUCTION

Everyday around the world a large percentage of people dies from road accident. An effective approach is made to solve the problem by using smart helmet. A smart helmet is a special idea which makes motorcycle driving safer than before. This is implemented using Adriano. The main objective of this project is to build a safety system which is integrated with the smart helmet and intelligent bike to reduce the probability of two-wheeler accidents and drunk driver cases.

This smart helmet consists of vibrator sensor for detection of accidents. And alcohol sensor detects the alcoholic content in riders' breath. For the detection of helmet, we are put one switch if that switch was pressed then it will detect as helmet detected. If the rider is not wearing the helmet or if there is any alcohol content found in rider's breath, the bike remains off. So when the rider crashes and the helmet hits the ground, then it will sense by the vibrator sensor. And the SMS and GPS location was send to the rider's family member. This SMS alert was send through the GSM module and the Adriano extract GPS data using the GPS module that is interfaced with Adriano. Through GPS module we can get the exact location of the rider. Smart helmet provides help in case of accident by using GSM and GPS technology.

2. SPECIFICATIONS

2.1 GPS unit

1. Ultra-high sensitivity: -165dBm
2. Extremely fast TTFF at low signal level
3. Built-in 12 multi-tone active interference canceller
4. Low power consumption: Typical 18mA@3.3V
5. ±10ns high accuracy time pulse (1PPS)
6. Advanced Features: Always Locate; AIC; EPO;EASY
7. QZSS, SBAS(WAAS,EGNOS,MSAS,GAGAN)
8. Indoor and outdoor multi-path detection and compensation
9. Small form factor: 15x13x2.2mm
10. RoHS compliant (Lead-free)

2.2 GSM Module

1. Dual band GSM/GPRS 900/1800MHz.
2. Configurable baud rate.
3. SIM card holder.
4. Built in network status LED.
5. Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS.

2.3 RF RX Module

6. Easy to use. TX
7. Power supply and/or modulation input voltage : 2.2 to 5.5v.
8. Operating temperature: -40 to +80C. RX:
9. Power supply and/or modulation input voltage :.5v.
10. Operating temperature: -20 to +80C.

2.4 Arduino Uno 328p

1. Microcontroller ATmega328
2. Operating Voltage 5V
3. Input Voltage (recommended) 7-12V
4. Input Voltage (limits) 6-20V
5. Digital I/O Pins 14 (of which 6 provide PWM output)
6. Analog Input Pins 6
7. DC Current per I/O Pin 40 mA
8. DC Current for 3.3V Pin 50 mA
9. Flash Memory 32 KB (ATmega328) of which 0.5 KB used by bootloader SRAM 2 KB (ATmega328) EEPROM 1 KB (ATmega328)
10. Clock Speed 16 MHz

2.516*2LCD

1. E-blocks compatible
2. Low cost
3. Compatible with most I/O ports in the E-Block range (requires 5 I/O lines via 9 way D-type connector)
4. Ease to develop programming code using Flow code icons.

2.6 Vibratory sensor

1. The default state of the switch is close
2. Digital output Supply voltage:3.3V-5V
3. On-board indicator LED to show the results
4. On-board LM393 chip
5. SW-420 based sensor, normally closed type vibration sensor
6. Dimension of the board: 3.2cm x 1.4cm

2.7 Alcohol sensor

1. Concentration - 0.05 mg/L ~ 10 mg/L Alcohol
2. Operating Voltage - 5V ±0.1
3. Current Consumption - 150mA
4. Operation Temperature : -10°C ~ 70°C

3. LITERATURE SURVEY

Sr.No	Author	Year	Invention
1.	Saravana Kumar K at.al.	2016	The prime objective of this paper is to force the rider to wear the helmet throughout. Considering the increasing number of motor cycle riders in our country and the number of accidents happening each year, it is evident that in most cases the rider suffers injuries to the head and it leads to fatal causalities. This has thrown light on the importance of forcing the rider to wear helmet to reduce the extent of impact. The paper focuses on the methods that can be implemented to reduce the impact of road accidents. In this paper, we propose building a system that can be implemented by installing it on a bike which works with the helmet that is being worn to make the rider to wear the helmet before riding the bike
2.	Mr.Sethuramrao	2018	The major goal of our project is accident detection, notification and prevention. This helmet makes rider to feel comfortable as well as with high protection and security. This smart helmet works on raspberry pi 3controller which is WIFI based, acts as a station for the networking system. Bluetooth and raspberry pi 3 was interfaced with cloud based services. The helmet is interfaced with both vehicle and the cloud in which image can be accessed and send to the receiver. Sensors will send command to raspberry pi 3. Thus the command will be send to the receiver. A software application has been created such that it locates the exact position in terms of Google map. Cloud based services will send messages to receiver contacts in which database are recorded . Most of the accidents are due to rash driving, drunk and drive, using mobile phones while driving ,violating traffic rules and regulations. Many people lose their lives because of the late reporting of accident (ie) they could not able to track accurate GPS location of the accident area. Sometimes we cannot unable to inform about accident at the right time. The primary reason why many people get head injury is because of not wearing helmet

4. METHODOLOGY

4.1 BLOCK DIAGRAM

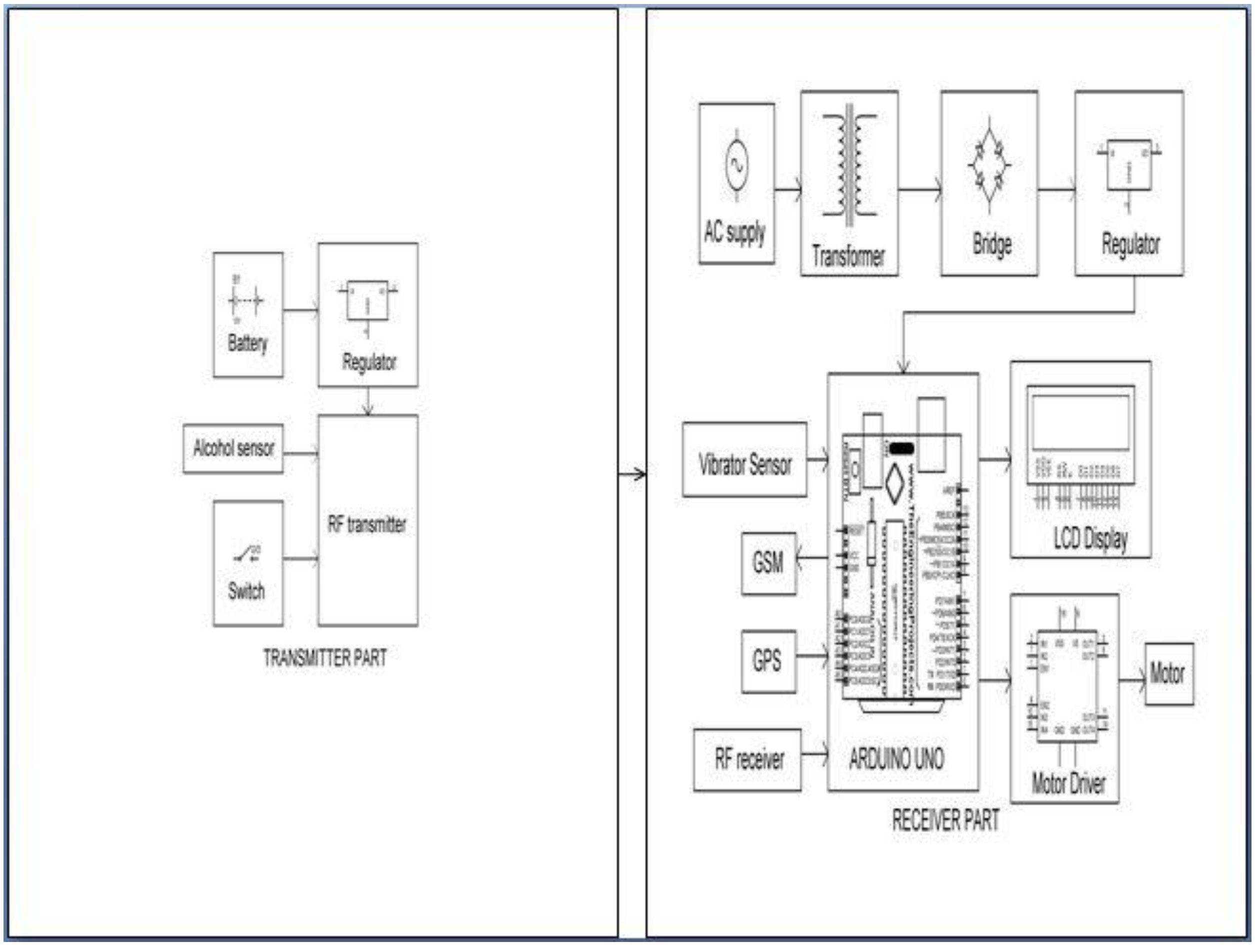

Fig 4.1.1 block diagram

This smart helmet consists of vibrator sensor for detection of accidents. And alcohol sensor detects the alcoholic content in riders' breath. For the detection of helmet, we are put one switch if that switch was pressed then it will detect as helmet detected. If the rider is not wearing the helmet or if there is any alcohol content found in rider's breath, the bike remains off. So when the rider crashes and the helmet hits the ground, then it will sense by the vibrator sensor. And the SMS and GPS location was send to the rider's family member.

This SMS alert was send through the GSM module and the Arduino extract GPS data using the GPS module that is interfaced with Arduino. Through GPS module we can get the exact location of the rider. Smart helmet provides help in case of accident by using GSM and GPS technology.

4.2 Arduinouno 328p

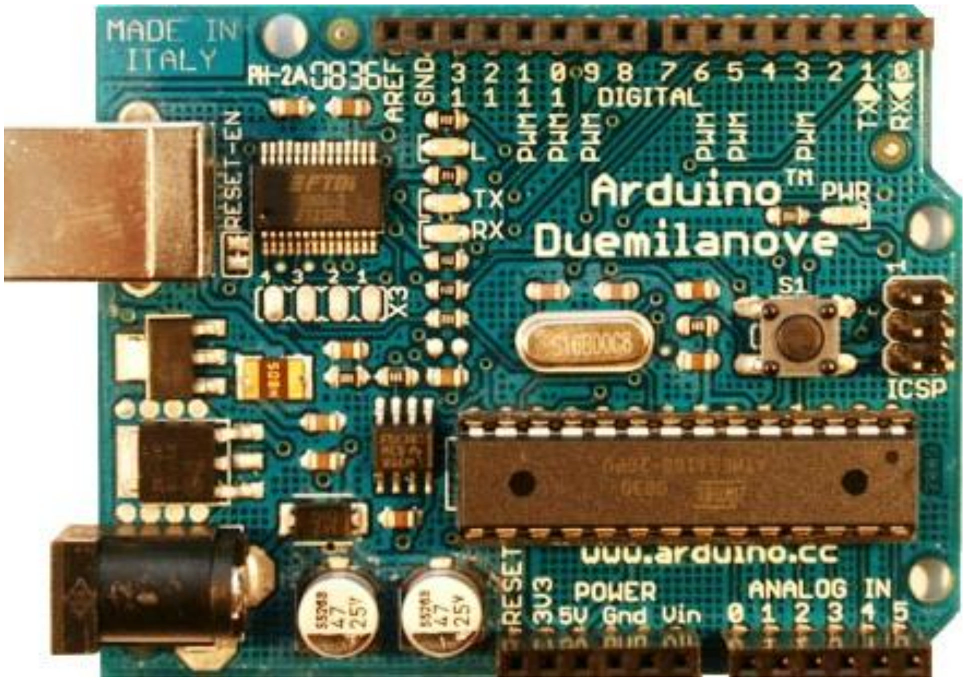

Fig 4.2.1 Arduinouno 328p

- The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market.
- The Arduino is open-source, which means hardware is reasonably priced and development software is free.

Feature

- The Duemalinove board features an Atmel ATmega328 microcontroller operating at 5 V with 2 Kb of RAM, 32 Kb of flash memory for storing programs and 1 Kb of EEPROM for storing parameters.
- The clock speed is 16 MHz, which translates to about executing about 300,000 lines of C source code per second
- The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar.

Specification

- Microcontroller ATmega328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 32 KB (ATmega328) of which 0.5 KB used by bootloader SRAM 2 KB (ATmega328) EEPROM 1 KB (ATmega328)
- Clock Speed 16 MHz

4.3 Module Wise Design

1. **GPS unit:**

Fig 4.3.1 GPS unit

A **GPS navigation device**,**GPS receiver**, or simply **GPS** is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions. The Global Positioning System(GPS) is a global navigation satellite system (GNSS) made up of a network of a minimum of 24, but currently 30, satellites placed into orbit by the U.S. Department of Defence

The GPS was originally developed for use by the United States military, but in the 1980s, the United States government allowed the system to be used for civilian purposes. Though the GPS satellite data is free and works anywhere in the world, the GPS device and the associated software must be bought or rented.

A GPS device can retrieve from the GPS system location and time information in all weather conditions, anywhere on or near the Earth. A GPS reception requires an unobstructed line of sight to four or more GPS satellites,and is subject to poor satellite signal conditions. In exceptionally poor signal conditions, for example in urban areas, satellite signals may exhibit multipath propagation where signals bounce off structures, or are weakened by meteorological conditions. Obstructed lines of sight may arise from a tree canopy or inside a structure, such as in a building, garage or tunnel.

Today, most standalone GPS receivers are used in automobiles. The GPS capability of smartphones may use assisted GPS (A-GPS) technology, which can use the base station or cell towers to provide a faster Time to First Fix (TTFF), especially when GPS signals are poor or unavailable. However, the mobile network part of the A-GPS technology would not be available when the smartphone is outside the range of the mobile reception network, while the GPS aspect would otherwise continue to be available.

2. **GSM Module:**

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

GSM Modem:

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

A GSM modem can also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. GSM modem is usually preferable to a GSM mobile phone. The GSM modem has wide range of applications in transaction terminals, supply chain management, security applications, weather stations and GPRS mode remote data logging.

Working of GSM Module:

From the below circuit, a GSM modem duly interfaced to the MC through the level shifter IC Max232. The SIM card mounted GSM modem upon receiving digit command by SMS from any cell phone send that data to the MC through serial communication. While the program is executed, the GSM modem receives command 'STOP' to develop an output at the MC, the contact point of which are used to disable the ignition switch. The command so sent by the user is based on an intimation received by him through the GSM modem 'ALERT' a programmed message only if the input is driven low. The complete operation is displayed over 16×2 LCD display.

3. **RF RX Module:**

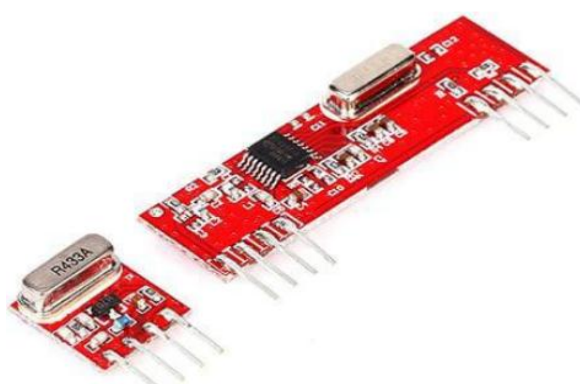

Fig 3.1RF RX module

An RF module (short for radio-frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio-frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver. They are of various types and ranges. Some can transmit up to 500 feet. RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required to achieve operation on a specific frequency. In addition, reliable RF communication circuit requires careful monitoring of the manufacturing process to ensure that the RF performance is not adversely affected. Finally, radio circuits are usually subject to limits on radiated emissions, and require Conformance testing and certification by a standardization organization such as ETSI or the U.S. Federal Communications Commission (FCC).

4. Alcohol Sensor

Fig5.1 MQ3 alcohol sensor

Fig alcohol detector

- The MQ series of gas sensors utilizes a small heater inside with an electro chemical sensor these sensors are sensitive to a range of gasses are used at room temperature.
- MQ135 alcohol sensor is a Sno2 with a lower conductivity of clean air. When the target explosive gas exists, then the sensor's conductivity increases more increasing more along with the gas concentration rising levels.
- By using simple electronic circuits, it convert the charge of conductivity to correspond output signal of gas concentration
- There are different types of alcohol sensors like MQ-2, MQ-3, MQ-4, MQ-5, MQ-6, etc.

Advantages

- power consumption.
- Flexible and Reliable.
- This application is easy to install and easy to operate.
- More reliable than manual operation.
- This project can implement for security of supply.
- Automatically controlled and Easy to use.

Disadvantages

- GSM network is required.
- If helmet is stolen, the bike cannot be started.
- Applications
- It can be used in real time safety system. We can implement the whole circuit into small module later.
- Less power consuming safety system.

- This safety system technology can further be enhanced into four wheeler also by replacing the helmet with seat belt

5. Vibration sensor

Fig 6.1 vibration sensor

- Vibration sensors are piezoelectric accelerometers that sense vibration.
- They are used for measuring fluctuating accelerations or speeds or for normal vibration measurement.
- Examples of applications where the vibration sensors are used: process control systems, aerial navigation and underwater-applications.
- Frequency range from 0.2 up to 2500 Hz. The operating temperature of these sensors is between -50°C and +85°C.

6. Liquid crystal display

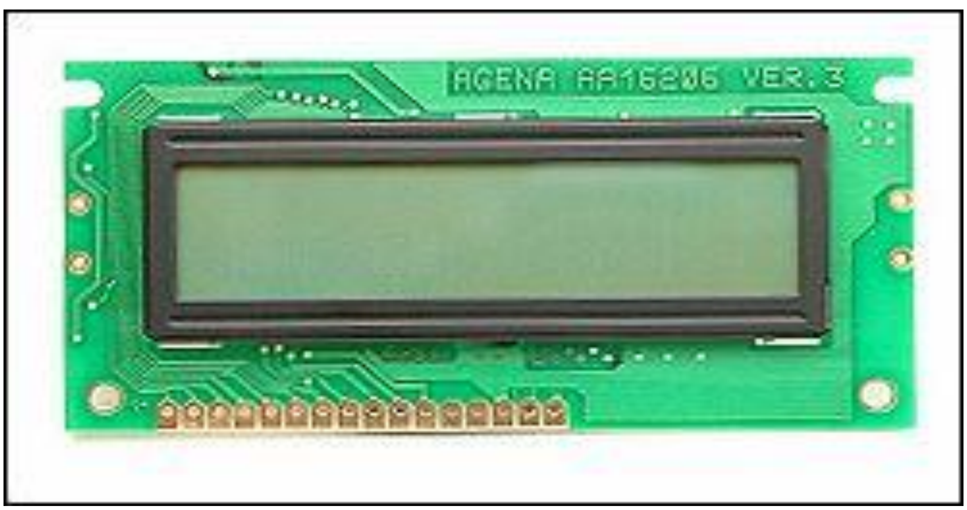

Fig7.1 16X2 LCD

- Most common LCDs connected to the microcontrollers are 16x2 and 20x2 displays.
- This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

- The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (and communicates directly with the LCD.

LCD BACKGROUND

- If an 8-bit data bus is used the LCD will require 11 data lines
- (3 control lines plus the 8 lines for the data bus)
- The three control lines are referred to as EN, RS, and RW
- EN=Enable (used to tell the LCD that you are sending it data)
- RS=Register Se lect (When RS is low (0), data is treated as a command)

  (When RS is High(1), data being sent is text data)
- R/W=Read/Write (When RW is low (0), the data written to the LCD)

  (When RW is high (1), the data reading to the LCD)

7. Max232

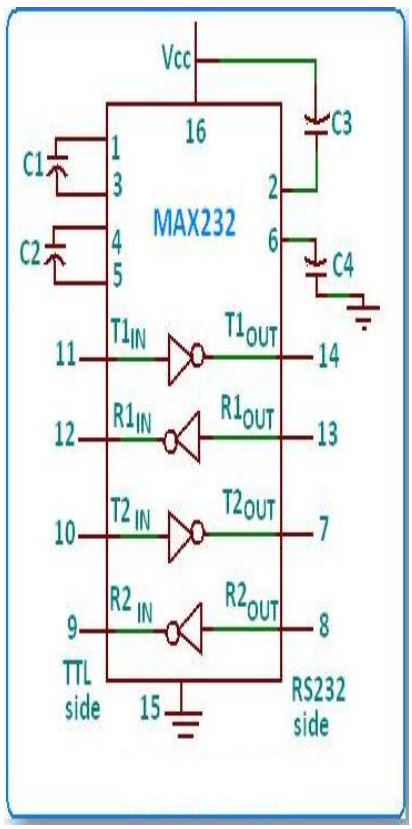

Fig 8.1MAX232

- The MAX232 is an integrated circuit that converts signals from an RS-232serial port to signals suitable for use in TTL compatible digital logic circuits.
- The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals .

- When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15V, and changes TTL Logic 1 to between -3 to -15V, and vice versa for converting from RS232 to TTL.

8. Transistor BC547

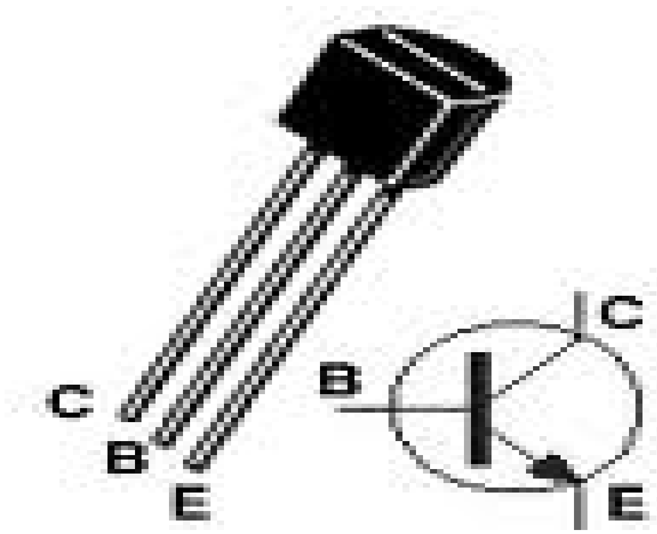

Fig 9.1 transistorBC547

- The BC547 transistor is an NPN Epitaxial Silicon Transistor.
- The BC547 transistor is a general-purpose transistor in small plastic packages.
- It is used in general-purpose switching and amplification BC847/BC547 series 45 V, 100 mA NPN general-purpose transistors.
- Whenever base is high, then current starts flowing through base and emitter and after that only current will pass from collector to emitter

5. CIRCUIT DIAGRAM OF TRANSMITTER

5.1 Supply design

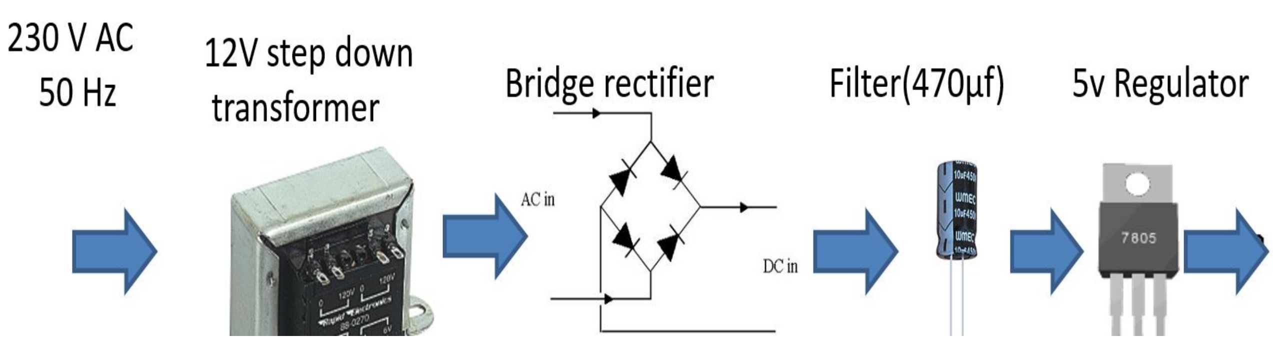

Fig5.1.1 supply design steps

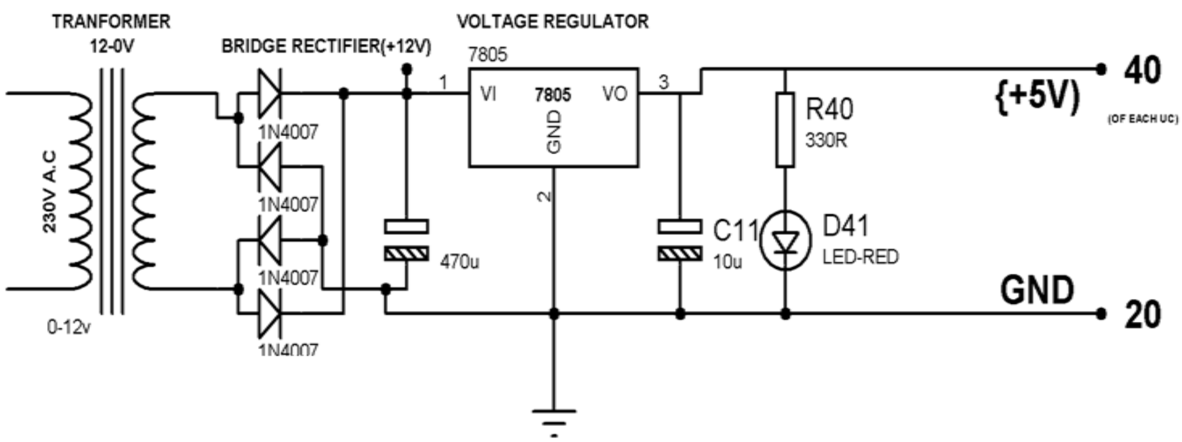

Fig 5.1.2 Supply design circuit

The circuit uses standard power supply comprising of a step-down transformer from 230v to 12v and 4 diodes forming a Bridge Rectifier that delivers pulsating dc which is then filtered by an electrolytic capacitor of about 470microf to 100microF.

The filtered dc being un regulated IC LM7805 is used to get 5v constant at its pin no 3 irrespective of input dc varying from 9v to 14v.

The regulated 5volts dc is further filtered by a small electrolytic capacitor of 10 micro f for any noise so generated by the circuit.

One LED is connected of this 5v point in series with a resistor of 330ohms to the ground i.e. negative voltage to indicate 5v power supply availability.

5.2 Circuit DIAGRAM TX section

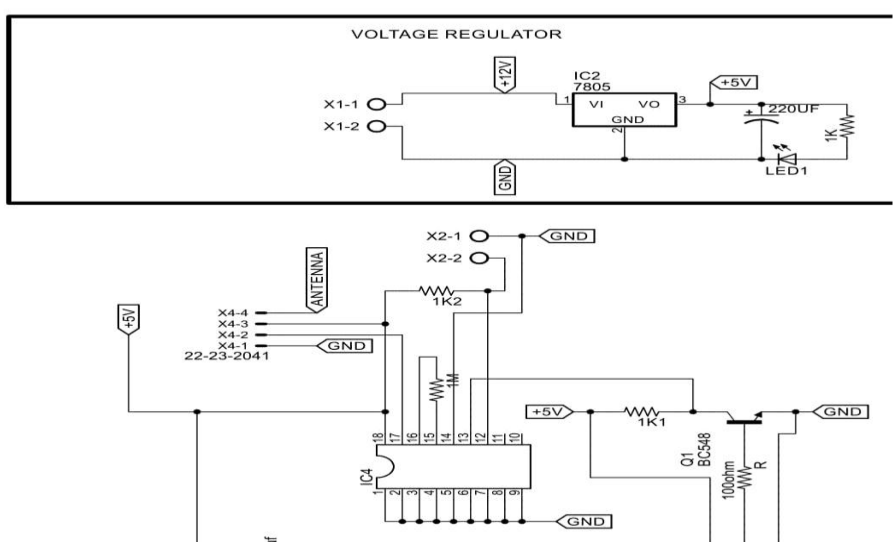

Fig 5.2.1 TX section circuit

5.3 Rx Section

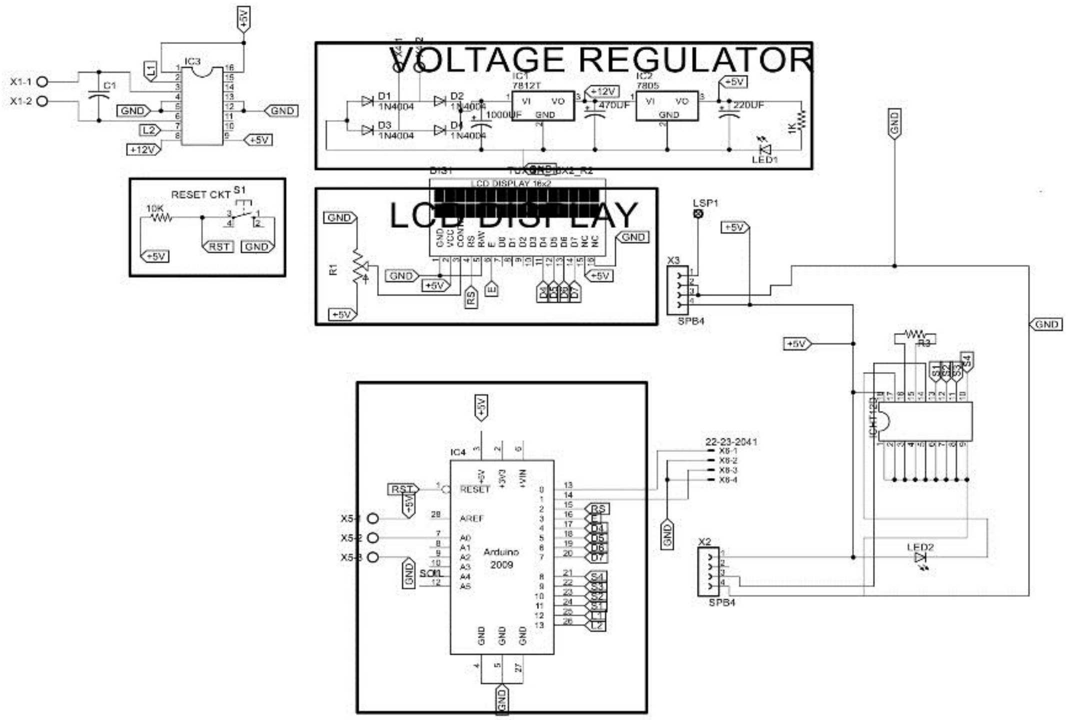

Fig 5.3.1 RX section

ADVANTAGES

- Easy to use in rural areas.
- Low power consumption.
- Flexible and Reliable.
- This application is easy to install and easy to operate.
- More reliable than manual operation.
- This project can implement for security of supply.
- Automatically controlled and Easy to use.

DISADVANTAGES

- GSM network is required.
- If helmet is stolen, the bike cannot be started.

APPLICATIONS

- It can be used in real time safety system. We can implement the whole circuit into small module later.
- Less power consuming safety system.
- This safety system technology can further be enhanced into four wheeler also by replacing the helmet with seat belt.

FUTURE SCOPE

In future if there is a large demand of this type of helmets we can manufacture the whole ckt in printed ckt boards, so that ckt becomes smaller and be easily fitted into helmet. The ckt can also be powered by solar energy so that it uses green energy and does no harm to environment. The flexible solar panels can fixed all along surface of helmets. This type of helmet technology can be implemented for the combat helmets used by the soldiers working under extreme temperatures.

CONCLUSION

This Paper review the smart and safety helmet for the rider. In some project they have used encoder/decoder IC , ultrasonic sensor that may cost very high .Some has only proposed an alcohol detector and accident tracker and many other separately. In future the smart and safety helmet will having all the feature that alcohol detector, accident location tracking system and ignition together .The other feature are too advanced that is the bike will not start unless the biker doesn’t wear helmet .The accident tracker will track the location where the accident is caused and send the SMS to the police or the family members, these all are the feature used in smart and safety helmet.

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