Design And Development of New Hitech Safety Smart Helmet

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Abstract- *The smart helmet is a kind of protective headgear used by the rider which makes riding the bike much safer than before. The main purpose of this helmet is to provide safety to the rider. This can be implemented using advanced features such as alcohol detection and fall detection. This not only makes it a smart helmet, but it is also a feature of the smart bike. It is mandatory to wear a helmet, without which the ignition switch cannot be turned on. The RF module can be used as a wireless link for communication between the transmitter and receiver. If the passenger is drunk, the ignition is automatically switched off, sending a message to the number registered with its current location. Uses HT12e encoder with MQ3 transmitter and alcohol sensor.*

Keywords- Alcohol Detection, MQ3 Transmitter, Alcohol Sensor, HT12e encoder.

I. INTRODUCTION

Recently, helmets have become mandatory in Telangana. Traffic accidents are increasing in India every year. As per Section 129 of the Motor Vehicles Act 1988, every person who rides a two-wheeled bicycle is required to wear protective headgear as per BIS (BIS) standards. Driving under the influence (DUI) is also a criminal offense under the Motor Vehicle Act 1939, which states that a cyclist will be punished. Currently cyclists easily escape the law.

These are the three main issues that motivate us to develop this project. The first step is to determine if the helmet is worn or not. If the helmet is worn, the ignition will start otherwise it will remain off. For this purpose, a Force Sensing Sensor (FSR) is used. The second step is the discovery of alcohol. The alcohol sensor is used as a breath analyzer that detects the presence of alcohol in the passenger's breath and if it exceeds the permissible limit, the ignition cannot be started. A message will be sent to the number stating that "the passenger is drunk and trying to ride the bike". The MQ-3 sensor is used for this. When these two conditions are met, only the ignition begins. The aim of this project is to make a protection system in a helmet for the safety of cyclists. The manufactured smart helmet is equipped with various sensors responsible for detection. There are two main units in this project. Each unit uses a microcontroller. Signal transmission between the helmet unit and bike unit is done using a RF module.

II. DEVICES USED

2.1 MQ3 Alcohol Sensor

The MQ-3 gas sensor shown in Figure 2 is used to determine the alcohol content of breath. It can be placed directly in front of the mouth. The sensor responds to the various molecules in the alcohol and determines whether the passenger is drunk. The sensor also has a potentiometer for adjusting the concentration of gases. We titrate the reagent to 0.4 mg / l of alcohol concentration in the air and use a resistance of 200 KΩ. It has 4 pins which are GN D, VCC, A out and D out. The sensor supports analog and digital outputs. Here we use the digital output of this sensor.

2.2 RF Transmitter Module

RF The transmitter unit is a small subset PCB capable of transmitting radio waves and modulating radio waves to transmit data (see Fig. 4). Transmission modules are usually implemented in conjunction with a microcontroller that provides data to the module that can be transmitted. Transmitters RF are typically subject to regulatory requirements that dictate maximum transmitter power output, harmonics, and band-edge requirements. A receiver RF receives the modulated signal RF and demodulates it. There are two types of modules, such as a heterogeneous receiver and a heterogeneous receiver. Ultra-regenerative nodules are usually low cost and low power styles employing a series of amplifiers to extract modulated knowledge from a radio radiation. Super regenerative modules square measure typically imprecise as their frequency of operation varies significantly with temperature and power provide voltage. Super-heterodyne receivers have a performance advantage over super regenerative; i.e. they provide inflated accuracy and stability over an outsized voltage and temperature vary. This stability comes from a set crystal style that within the past supposed to mean a relatively dearer product. However, advances in receiver

chip style currently mean that presently there's very little value distinction between super-heterodyne and super-regenerative receiver modules.

2.3 Voltage Regulator

Fig.1

Voltage sources in an exceedingly circuit could have fluctuations leading to not providing fastened voltage outputs. A transformer IC maintains the output voltage at a continuing price. 7805 transformer, a member of the 78xx series of fastened linear voltage regulators wont to maintain such fluctuations, could be a widespread transformer microcircuit (IC).

The xx in 78xx indicates the output voltage it provides. 7805 IC provides +5 volts regulated power offer with provisions to feature a sink

2.4 433 MHz RF Receiver module

The 433 MHz RF transmitter and receiver module is a pair of small RF (i.e. radio-frequency) electronic modules used to send and receive radio signals between any two devices. The transmitter module sends the data from the transmitter end and the Receiver module receives that data at the receiver's end.
433 MHz RF transmitter and receiver Module

433MHz RF Transmitter and Receiver Module Pinout:

- Transmitter
- Receiver

2.5 HT12e Encoder

The primary perform of HT12E is to encrypt a 12-bit and send it out through the output pin. Since the IC comes with Associate in Nursing in-built generator it's terribly simple to form this IC work. The IC incorporates a wide selection of in operation voltage from a pair of.4V to 12V, however ordinarily the Vcc pin (pin 18) is supercharged by +5V and also the ground pin (pin 9) is grounded. Pull the Transmission modify pin (pin 14) to ground to activate transmission. For coding an information the IC would require Associate in Nursing generator , fortunately this IC has one in-built. we tend to simply need to connect the OSC1 and OSC2 (pin fifteen & 16) through a 1M resistance to invoke it. The 4-bit knowledge that must be sent must lean to the pins AD0 to AD1 Associate in Nursingd an address of 8-bit must be set mistreatment the pins A0 to A7. it's important that your Decoder ought to even have this same address for them to speak to every different. A basic association diagram for the HT12E IC is shown below

In the above circuit I actually have set the 8-bit address information as 0b00000000, by connecting all address pins to ground. If you would like security you'll connect any of the eight pins to 5V to create it high. the entire IC is high-powered by a +5V provide that may be obtained from a transformer like 7805.The pins AD3, AD2, AD1 and AD0 square measure connected to any Digital IC which might give the 4-bit information. They'll even be connected to switches to manually send and receive information. during this image I actually have created all four information bits as zero (low), once this can be decoded we are going to get identical reasonably bits on the output facet of HT12D, equally we are able to build any changes on these 4-bits and that they are mirrored on the output facet of the HT12D decoder IC.

The encoded 12-bit will be obtained from the Dout pin (pin 17). This information ought to be sent to the HT12D for coding, it will either be sent directly through a wire or by employing a wireless medium like RF or IR. You'll decide the way to established the HT12D when this from here.

Applications:

1. Used to convert Parallel 4-bit data to series data
2. Highly useful in wireless communication projects involving RF or IR
3. Remote controlled systems like garage doors, Car alarm systems, Car door controls etc.
4. Can be used in Home automation for short range remote switching
5. Safety systems like Burglar alarm system, Smoke or Fire alarm system etc..

2.6 Buzzer

Fig2: Buzzer

The two commonest technologies employed in buzzer styles ar magnetic and piezo. Several applications use either a magnetic or a piezo buzzer; however the choice concerning that of the 2 technologies to use relies upon many alternative constraints. Magnetic buzzers operate at lower voltages and better currents (1.5~12 V, > twenty mA) compared to piezo buzzers (12~220 V, < 20 mA), whereas piezo buzzers typically have larger most force per unit area level (SPL) capability than magnetic buzzers. However, it ought to be noted that the larger SPL accessible from piezo buzzers needs larger footprints

In a magnetic buzzer, a current is driven through a coil of wire that produces a flux. a versatile magnetism disk is drawn to the coil once the {present this} is present and returns to a "rest" position once the present isn't flowing through the coil. The sound from a magnetic buzzer is created by the movement of the magnetism disk in an exceedingly similar manner to however the cone in an exceedingly speaker produces sound. A magnetic buzzer may be a current driven device; however the facility supply is usually a voltage.

III. CONSTRUCTIONS

It is already mentioned that the project is divided into two units namely helmet and bike. In helmet unit, also called the transmitter unit shown in Figure 3, the force sensing resistor is placed on inside upper part of the helmet where actually head will touch with sensor surface. And alcohol sensor is placed on in front of rider's mouth so that it can sense easily. Solar panels are mounted on upper side of helmet which is in direct sunlight. And the battery and regular circuits were fixed inside the helmet. Secondary controller and RF transmitter circuit were also placed inside the helmet. Antenna is located outside the helmet.

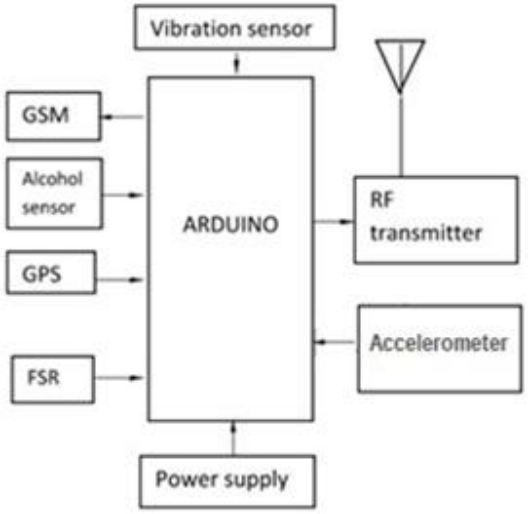


Fig 3: Transmitter unit

The receiver unit shown in Figure 5 is placed in the bike. The RF receiver accepts all the data from the helmet (i.e transmitter) unit. Depending on the conditions, if true, the ignition starts and bike moves. The GSM can continuously send the location information of the bike. If any accident occurs, the vibration sensor gets activated and sends the location information to the registered mobile number.

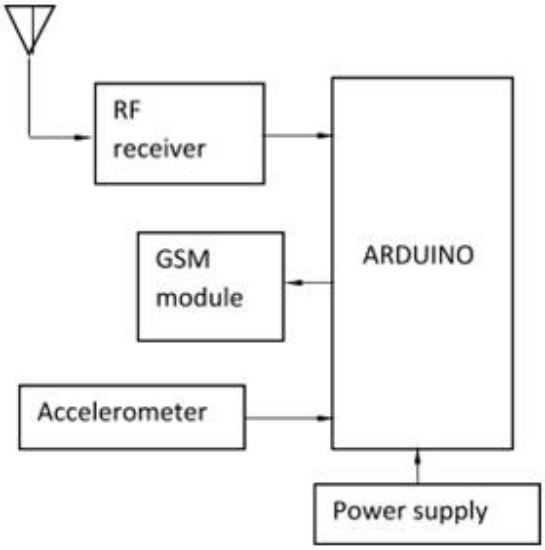


Fig5: Receiver unit

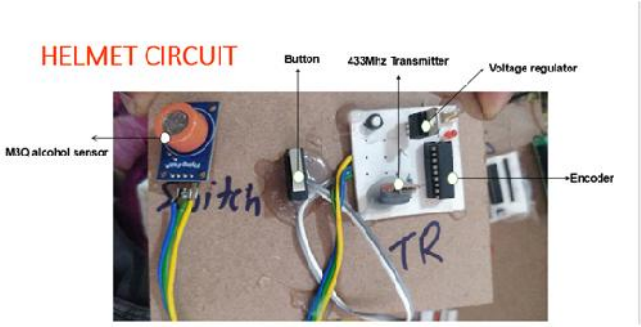


Fig6: Designing of circuit

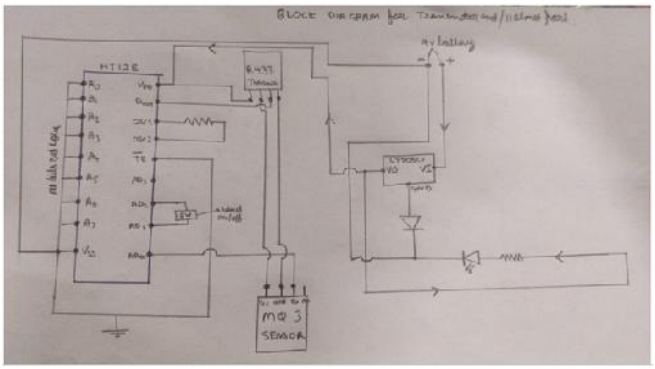
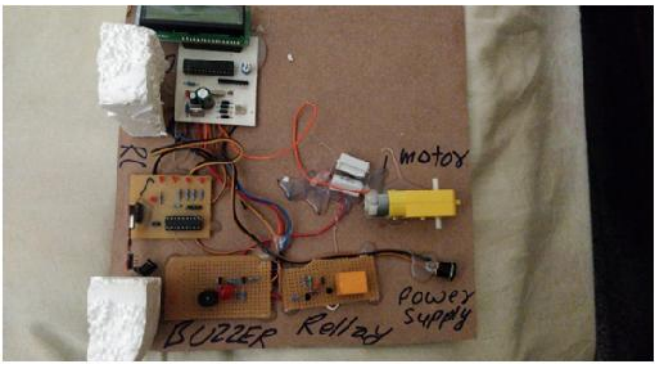


Fig3: Block diagram of the circuit.

IV. FLOW DIAGRAM OF THE CIRCUIT



V. 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.

VI. FUTURE SCOPE

1. We can implement various bioelectric sensors on the helmet to measure various activities.
2. We can use small camera for the recording the drivers activity. It can be used for passing message from the one vehicle to another vehicle by using wireless transmitter.

VII. RESULTS AND DISCUSSION

The designed Smart helmet ensures the safety of the rider by making it necessary to wear helmet, and also ensures that the rider hasn't consumed alcohol more than the permissible limit. If any of these prime safety rules are violated, the proposed system will prevent the biker from starting the bike.

We can also improve the system in helping efficient handling of the aftermath of accidents by sending a SMS with the location of the biker to the police station. This ensures that the victims get proper and prompt medical attention, if he/she meets with an accident.

We can implement various bioelectric sensors on the helmet to measure various activities. 2. We can use a small camera for recording the driver's activity. It can be used for

passing messages from one vehicle to another vehicle by using a wireless transmitter.

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