

Implementing Smart Helmet

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ABSTRACT

In present time many cases of bike accident can be seen around us. Peoples get injured or might be dead and one of the reason is not wearing helmet. Many peoples could save their life in accident cases if they wore helmet at the time of accident. Continuously road rules are violated. So as to overcome these problems, a Smart helmet is proposed having a control system built inside a helmet. Smart Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. The idea is obtained after knowing that the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. In this paper we implement, make wearing the helmet compulsory. Avoid drunk and drive, If person met with an accident, no one is there to help him. Simply leaving or ignoring the person he may die. In such situation, informing to ambulance or family members through mobile to rescue him for an extent, to guide a route using Google map navigation in Helmet, If there is pollution in the air automatically close window of Helmet.

Keywords: Smart helmet, air pollution, alcohol detection, bike start-stop.

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I. INTRODUCTION

The thought of developing this project comes to do some good things towards the society. Day by day the two wheeler accidents are increasing and leads to loss of many lives. Accord to a survey of India there are around 698 accidents occurring due to bike crashes per year. The reasons may be many such as no proper driving knowledge, no fitness of the bike, fast riding of bike, drunken and drive etc. One of the prime reasons that leads to accidents is "drunk and drive". Due to drinking and driving two wheeler riders often get into accidents. Almost 70% of the accidents in our country can be prevented if the riders stop consuming alcohol before riding. The people involved in the accidents need to be taken care of and immediately taken to the emergency room. But there is a lag in handling the aftermath of road accidents in the country. The nearby police station needs to be notified immediately about the accidents so that they can be taken to the hospitals immediately. nearly half the injured people die due to lack of treatment in proper time. The many reasons for this such as late arrival of ambulance, no persons at place where the accident occur to give information to the ambulance or parents.

This is a situation we observe our day to day life, a thought of finding some solution to resolve this problem come up with this idea of giving the information about accident as soon as possible and in TIME....!!!!Because after all time matters a lot, if everything is done in time, at least we can save half the lives that are lost due to bike accidents.

Considering three major factors for avoiding the accident causes such as –

- Make wearing the helmet compulsory.
- Avoid drunk and drive.
- If person met with an accident, no one is there to help him. Simply leaving or ignoring the person he may die. In such situation, informing to ambulance or family members through mobile to rescue him for an extent.

This motivates 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 project aims at the security and safety of the bikers against road accidents. The circuit is so designed that the bike won't start without wearing helmet. It introduced a security system on the rider with the perfect helmet usage before riding.

The idea of proposed system work is to give information about the smart helmet, here we use the different sensors for implementing the smart helmet system. We use the ultrasonic sensor, alcohol sensor, piezoelectric sensor, gas sensor these sensor control using the arduino uno microcontroller. Here we also use the GPS for detecting the location, and GSM for the Sending the SMS to the registered mobile number.

II. LITERATURE SURVEY

The idea of developing this project comes from social responsibility towards the society. Bike riding is a lot of fun, but accidents happen. People choose motorbikes 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 detection is done by MQ-3 sensor and helmet detection is 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.[1].

The system automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving. There is a transmitter at the helmet and a receiver at the bike. There is a switch used to sure the wearing of helmet on the head. 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 and a relay interfacing circuit. [2].

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not

for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library. [3].

The India is one of busy traffic countries and this system can control many of the traffic problems. In the area of mining technology, real-time monitor and control of mine hazard are more complex. Mine safety modules are configured to communicate to ground control or a central station. A real critical issue in mines is hazardous gases. Systems used in a mine can create intense vibrations and increase the level of hazardous gases such as CO, SO₂, NO₂ and particulate matter. The working conditions can be very noisy and miners don't watch each other constantly. Miners tend to stay in groups and will be no more than 5 meters (m) from each other. A warning system needs to be incorporated that will warn miners within a 5 m radius that a miner is experiencing a hazardous event. This system needs to process and transmit the event within 1 second (s). These systems measure the environment around the miner with gas sensors and are then used to implement evacuations.[4].

III. BLOCK DIAGRAM

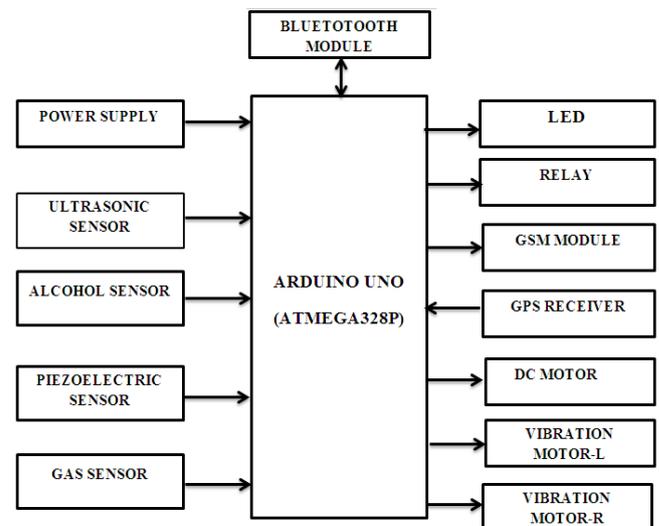


Fig 1. Block diagram

Block Diagram Description:

Arduino Board-

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Alcohol Sensor:

Alcohol sensor sense the alcoholic content whether the rider drunken or not, if he drunken bike will not start showing as alcohol detected on LCD display.

- High sensitivity to alcohol and small sensitivity to Benzene .
- Fast response and High sensitivity
- Stable and long life

Specifications:

- Circuit voltage $5V \pm 0.1$
- Heating voltage $5V \pm 0.1$
- Load resistance $200K\Omega$
- Heater resistance $33\Omega \pm 5\%$
- Heating consumption less than 750mw

Ultrasonic Sensor:

HC-SR04 is an ultrasonic ranging module that provides 2 cm to 400 cm non-contact measurement function. The ranging accuracy can reach to 3mm and effectual angle is $< 15^\circ$. It can be powered from a 5V power supply. Ultrasonic transmitter emitted an ultrasonic wave in one direction, and started timing when it launched. Ultrasonic spread in the air, and would return immediately when it encountered obstacles on the way. At last, the ultrasonic receiver would stop timing when it received the reflected wave.

Specifications:

- Working Voltage: DC 5V
- Working Current: 15mA
- Working Frequency: 40Hz
- Max Range: 4m
- Min Range: 2cm
- Measuring Angle: 15 degree
- Trigger Input Signal: $10\mu S$ TTL pulse
- Echo Output Signal Input TTL lever signal and the range in proportion

Relay-

A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. The heart of a relay is an electromagnet (a coil of wire that becomes a temporary magnet when electricity flows through it). When current starts flowing through the control coil, the electromagnet starts energizing and thus intensifies the magnetic field. Thus the upper contact arm starts to be attracted to the lower fixed arm and thus closes the contacts causing a short circuit for the power to the load. On the other hand, if the relay was already de-energized when the contacts were closed, then the contact move oppositely and make an open circuit.

Piezoelectric Sensor –

Today, **PIEZOELECTRIC POLYMER SENSORS** are among the fastest growing of the technologies within the \$18 billion worldwide sensor market. Like any new technology, there have been an extraordinary number of applications where "**PIEZO FILM**" has been considered for the sensor solution. In the 20 years since the discovery of piezoelectric polymer, the technology has matured, practical applications have emerged from a long list of possibilities, and the rate of commercialization of the technology is accelerating. These documents provide an overview of piezoelectric polymer technology and nomenclature, its properties, and sensor design

considerations. It also explores a range of sensor applications that have been successfully developed in recent years. Solving unique sensor problems is a particular strength of our group of applications engineers. We welcome the opportunity to provide assistance to you during your evaluation of piezo film sensors for your design.

DC Motor-

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. DC motors are compact and display high output, and their speed is easy to control. They may be driven by battery or any other power supply and are therefore also easy to use.

Vibration motors-

The **Eccentric Rotating Mass vibration motor**, or ERM, also known as a pager motor is a DC motor with an offset (non-symmetric) mass attached to the shaft. As the ERM rotates, the centripetal force of the offset mass is asymmetric, resulting in a net centrifugal force, and this causes a displacement of the motor. With a high number of revolutions per minute, the motor is constantly being displaced and moved by these asymmetric forces. It is this repeated displacement that is perceived as a vibration.

GSM model-

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. While GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

GPS Model:

The SKG13BL is a complete GPS engine module that features super sensitivity, ultra-low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol. It is based on the high performance features of the MediaTek MT3337 single-chip architecture, Its $-165dBm$ tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The small form factor and low power consumption make the module easy to integrate into portable device like PNDs, mobile phones, cameras and vehicle navigation systems.

Power supply-

It consists of step down transformer, bridge rectifier, capacitors and voltage regulator ICs. 230V AC is converted to 12V DC using transformer and bridge rectifier. This 12VDC is further reduced to 5V DC using voltage regulator IC.

IV. ALGORITHM STEPS

Algorithm:

1. Start
2. Check where biker wear a Helmet or not using ultrasonic sensor
3. Check alcohol content in the rider's breath using Alcohol Sensor If alcohol concentration is more than the threshold, it will not allow the bike to start else the bike will run smoothly.
4. If Both Condition Satisfy then Start the Bike.
5. If high pollution is Present in Environment which is Sensed by the Gas sensor then automatically close the Helmet Window .
6. If the rider crashes, the helmet hits the ground and the piezoelectric sensor detects the vibrations that are created when the helmet hits the ground and then the microcontroller detect the accident occurrence and it will send an SMS containing information about the accident and location of accident using GSM and GPS modules.
7. If biker want to visit unknown place then by adding destination location in system the system will guide a route using two vibration motor .
8. If right turn is there then right motor will vibrate if Left turn is there the left motor will vibrate.
9. Stop.

V. RESULT

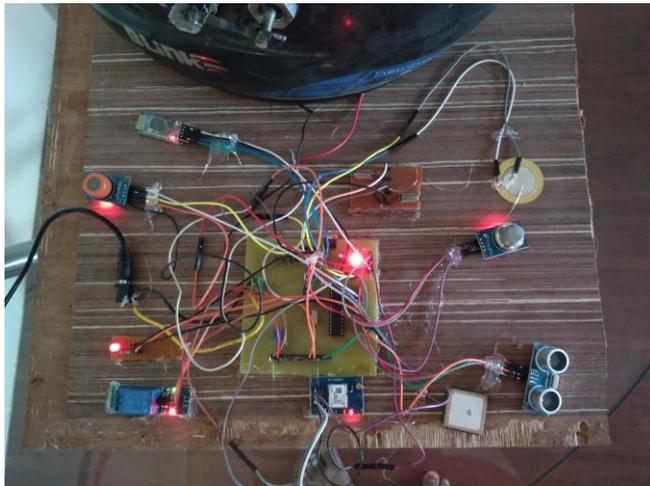


Fig 2. Hardware setup

Above fig 2 shows the once power supply is ON the alcohol sensor and ultrasonic sensor is on for detecting the values. In above fig show different component hardware used like, GPS, Different sensor, Bluetooth device, etc.



Fig 3. Full Smart helmet setup

Above fig 3, shows the full setup of the proposed system, here helmet window is closed if pollution is present in air that mean once the environment air pollution is more than normal air pollution then automatically helmet window is closed for the safety.

VI. CONCLUSION

Smart Helmet ensures the safety of the rider, by making it necessary to wear helmet, and ensures that the rider hasn't consumed any alcohol. If any of these prime safety rules are violated, the system will prevent the biker from starting the bike. The system also helps in efficient handling of the biker after occurrence of accidents by sending a SMS with the location of the biker to the Relatives . This ensures that the victims get proper and prompt medical attention, if met with an accident. If biker want to visit unknown place then by adding destination location in system the system will guide a route using two vibration motor .

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