ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 12, Iss 1, Jan 2023

INTELLIGENT HELMET SYSTEM FOR PREVENTION OF ACCIDENT AND BIKE STARTER

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ABSTRACT
Smart Helmet is designed to prevent most of the fatal accidents as it acts as the protective head gear for the rider. This smart helmet provides safety for the rider and also finds out the location where vehicle is located by sending the location through message in case of vehicle theft and fall detection. The Smart Helmet through belt-tie sensor detects whether the rider is wearing the helmet or not and switches the ignition ON only if the helmet is worn, otherwise it remains in OFF condition. This also follows the same condition as that of the belt-tie sensor where the ignition will not turn ON if the rider is drunk. Relay module is used as a link which communicates between the Helmet module and the Engine Control Unit (ECU). One interesting feature here is in case if vehicle theft the vehicle can be tracked by sending the message to the number present in the GSM SIM slot, and if the vehicle has met with an accident, then the Tilt sensor/MEMS in the ECU senses the Axis and message by the GSM is sent to the registered number with their current location using GPS module.

1. INTRODUCTION
This project aims to provide safety for bike riders. Even since helmets have been made compulsory, still people drive without helmets. Comparatively, in the last few years, there has been a rapid hike in the number of road accidents. According to vehicle safety, India meets only two out of the seven vehicle safety standards by the World Health Organization (WHO). Two-wheelers account for 27% of total road crash deaths. Nearly 73% of motorcycle riders involved in accidents continued to wear helmets as shown in the records. Section 129 of the Motor Vehicles Act, 1988 makes it required for every single riding a two-wheeler to wear protective headgear following to standards of the BIS (Bureau of Indian Standards). In India, a drunk and drive case is a criminal offense of The Motor Vehicle act 1939, which implies the bike rider will get punished. In existence bike riders easily get escaped from the law. These are the three main issues that motivate us for developing this project. The first step is to check whether the helmet is worn or not. If the helmet is worn then ignition will start otherwise it will remain off till the helmet is not worn. For these, we use a touch sensor. The second step is alcohol detection. The alcohol sensor is used as a breath analyzer which checks the presence of ethanol in rider breath and if it crosses permissible range ignition cannot start. It will send the message to the registration number. MQ3 sensor is used for these. When these

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two conditions are satisfied then only the bike ignition will start. The third main issue is accident detection. If the rider met an accident with him he cannot receive medical help instantly, it's a big reason for deaths. There are a lot of deaths due to late medical help or the accident place is unmanned. In the rider falls for that detection, we place MPU6050 at the bike unit. Due to this mechanism, we detect the accident occurs or not. The aim of this project is to make a protection system in a helmet for the good safety of bike rider in the helmet unit the sensor module is built using sensors like alcohol sensor and MEMS sensors. All the above sensors are connected to Arduino Uno. Once the person wears the helmet the signals get transmitted. Whenever the rider presses the helmet switch the location of the bike using GPS, the coordinates sent to particular mobile number in terms of message alert using GSM.

1.1 Embedded Systems:

An embedded system is a system which is going to do a predefined specified task is the embedded system and is even defined as combination of both software and hardware. A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. "Embedded" reflects the fact that they are an integral part of the system. At the other extreme a general-purpose computer may be used to control the operation of a large complex processing plant, and its presence will be obvious. All embedded systems are including computers or microprocessors. Some of these computers are however very simple systems as compared with a personal computer.

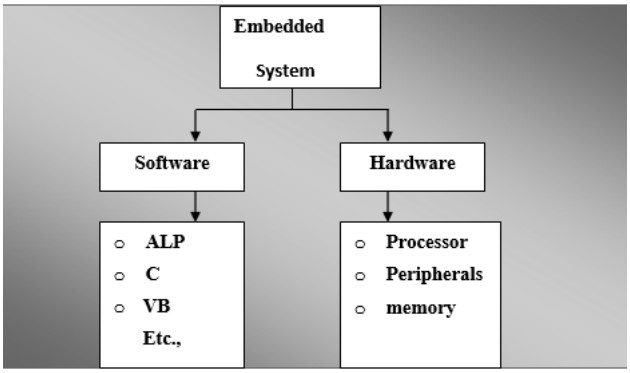

FIG 1: Block diagram of Embedded System

1.2 Specifications:

TABLE-1: Atmega328 specifications

Microcontroller	ATmega328P – 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/OPins	40 Ma
DC Current on 3.3V Pin	50 Ma

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Flash Memory	32 KB (0.5 KB is used for Boot loader)
SRAM	2 KB
EEPROM	1 KB
Frequency (ClockSpeed)	16 MHz

1.3 16 * 2 Alphanumeric LCD

Liquid crystal display is very important device in embedded system. It offers high flexibility to user as he can display the required data on it. A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly. LCDs therefore need a light source and are classified as "passive" displays. Here the lcd has different memories to display data, those are discussed below.

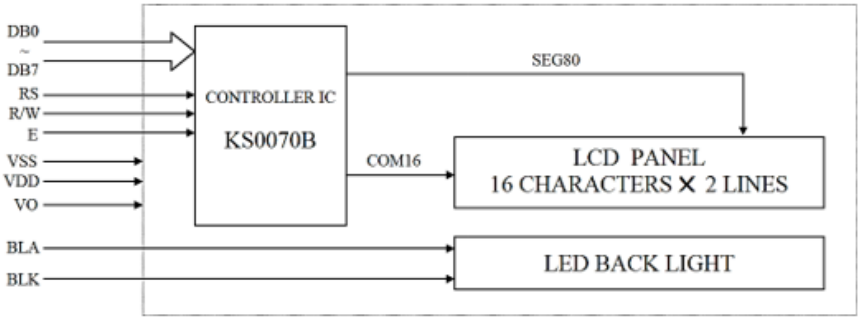

FIG 6: Block Diagram of LCD

1.4 DC MOTOR:

A DC motor is an electrical machine that converts electrical energy into mechanical energy. In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation. In this session, let us know what is a DC motor, types of DC motor and their applications.

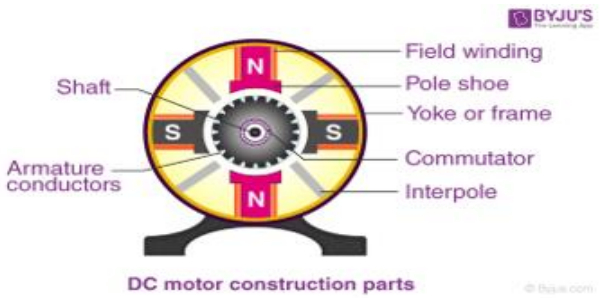

FIG 12: DC Motor Diagram

1.5 DC Motor Working

In the previous section, we discussed the various components of a DC motor. Now, using this knowledge let us understand the working of DC motors. A magnetic field arises in the air gap when the field coil of the DC motor is energised. The created magnetic field is in the direction of the radii of the armature. The magnetic field enters the armature from the North pole side of the field coil and “exits” the armature from the field coil’s South pole side.

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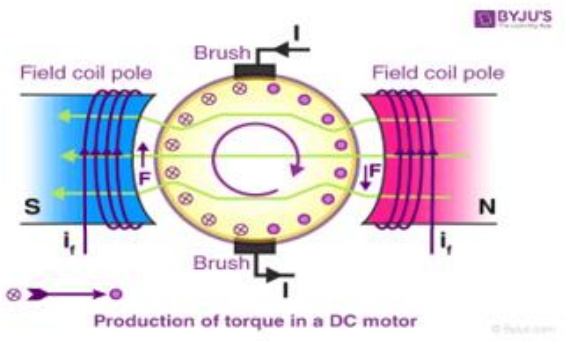

FIG 13: Working of DC motor

2. LITERATURE SURVEY

Jesudoos proposed a mechanism, where sensors such as vibration sensor and gas sensor, mems are used. The gas sensor is used to detect the amount of liquor he had consumed by checking the breath of a person wearing the helmet. The bar control of the vehicle is handled by MEMS. Accident is detected by vibration sensor. Load of the vehicle is recognized by load checker. The Sensors are interfaced with the PIC microcontroller. The gas sensor will detect if a user consumed alcohol and display on the LCD display. If an accident occurs the vibration sensor, sense the accident and send information through GPS to the hospital. If there is any rash driving is done by the rider the MEME sensor detect the amount of the person from his bank account. In this system exactness and accuracy are high and ambulance is booked automatically based on ten locations.

K.M. Mehata proposed a technique which provides safety to the workers or to identify any fall of the workers in working area. The proposed system has two components. One is the wearable device built using sensors and electronic elements. Another component is the cell phone. The communication between the two components is provided by GSM module. These devices also monitor the health and safety of the worker is continuously. This system ensures good fall detection and alerts the register person to give medical attention.

2.1 BLOCK DIAGRAM

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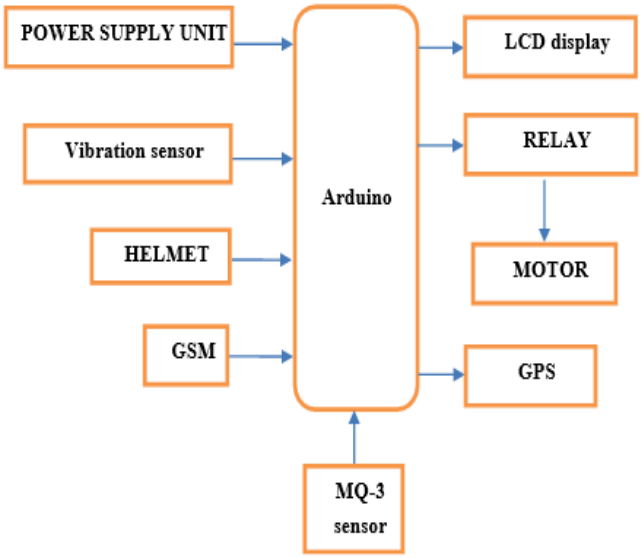

Arduino Uno: The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

LCD display: 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. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits.

Vibration sensor: A vibration sensor is a device that measures the amount and frequency of vibration in a given system, machine, or piece of equipment.

GPS: The Global Positioning System (GPS) is a satellite-based navigation system that provides location and time information.

GSM: A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network.

RELAY: A relay module is a relay that's been mounted on a board with other components to provide isolation and protection.

MOTOR: An electric motor is an electrical machine that converts electrical energy into mechanical energy.

MQ-3: The Grove - Gas Sensor (MQ3) module is useful for gas leakage detection (in home and industry). It is suitable for detecting Alcohol, Benzene, CH4, Hexane, LPG, CO. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible.

HELMET SWITCH: The push button switch is usually used to turn on and off the control circuit, and it is a kind of control switch appliance that is widely used.

ARDUINO IDE: The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus.

3. SOFTWARE

3.1 SOFTWARE REQUIREMENTS

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- Proteus simulation
- Arduino software
- Programming language

3.2 ARDUINO SOFTWARE:

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals-has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open- source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

3.3 HOW TO DOWNLOAD THE ARDUINO SOFTWARE (IDE):

Get the latest version from the download page. You can choose between the Installer (.exe) and the Zip packages. We suggest you use the first one that installs directly everything you need to use the Arduino Software (IDE), including the drivers. With the Zip package you need to install the drivers manually.

3.4 CONNECTING A BATTERY

For stand-alone operation, the board is powered by a battery rather than through the USB connection to the computer. While the external power can be anywhere in the range of 6 to 24 V (for example, you could use a car battery), a standard 9 V battery is convenient. While you could jam the leads of a battery snap into the Vin and Gnd connections on the board, it is better to solder the battery snap leads to a DC power plug and connect to the power jack on the board. A suitable plug is part number 28760 from www.jameco.com. Here is what this looks like.

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FIG 31: Arduino with battery

Disconnect your Arduino from the computer. Connect a 9 V battery to the Arduino power jack using the battery snap adapter. Confirm that the blinking program runs. This shows that you can power the Arduino from a battery and that the program you download runs without needing a connection to the host PC.

4. STARTING NEW DESIGN

Step 1: Open ISIS software and select new design in File menu

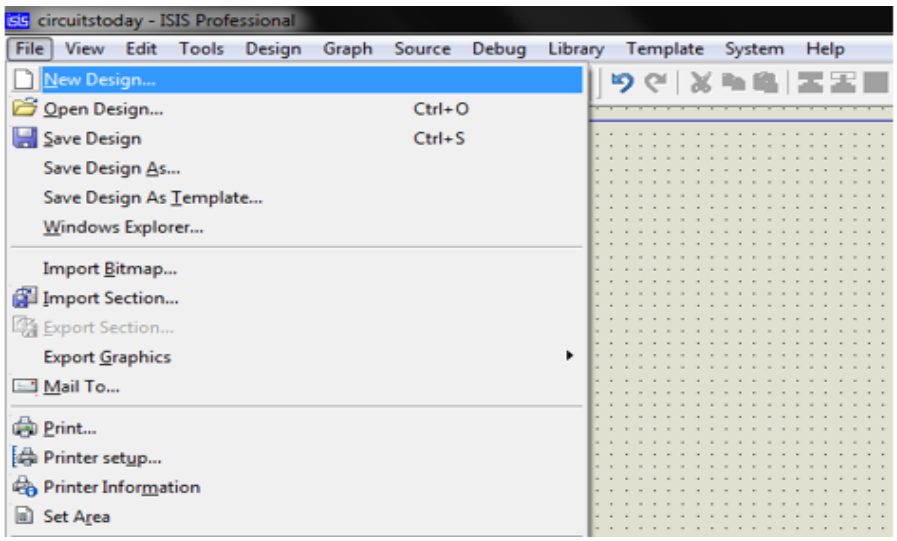

FIG 32: Proteus File Menu

Step 2: A dialogue box appears to save the current design. However, we are creating a new design file so you can click Yes or No depending on the content of the present file. Then a Pop-Up appears asking to select the template. It is similar to selecting the paper size while printing. For now, select default or according to the layout size of the circuit.

Step 3: An untitled design sheet will be opened, save it according to your wish, it is better to create a new folder for every layout as it generates other files supporting your design. However, it is not mandatory.

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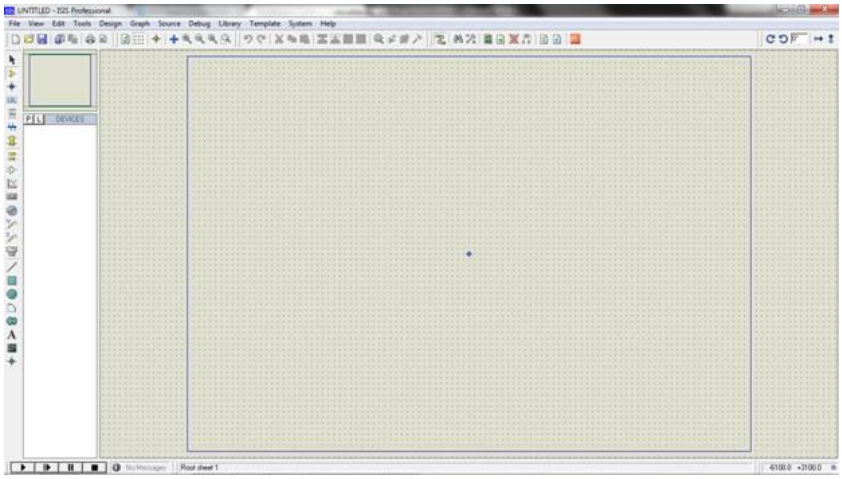

FIG 33: Proteus Design Sheet

Step 4: To select components, Click on the component mode button.

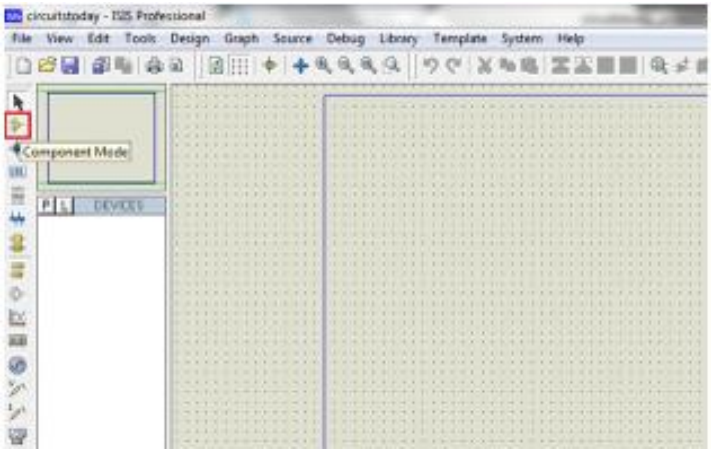

FIG 34: Component Mode

Step 5: Click on Pick from Libraries. It shows the categories of components available and a search option to enter the part name.

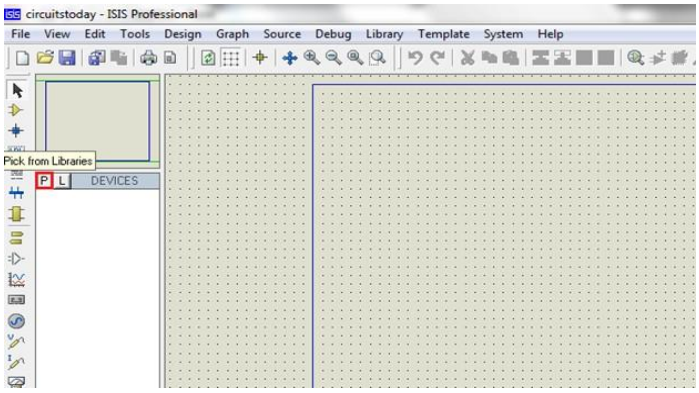

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FIG 35: Pick from Libraries

4.1 APPLICATIONS & ADVANTAGES

4.1.1 Applications

- Used in motor vehicles to ensure safety of the rider.
- Alcohol detector can also be implemented in cars.
- It can be used in real time safety system.
- This safety system technology can further be enhanced in car and also by replacing the helmet with seat belt.
- Vehicle monitoring.
- Can be applied to the persons who are working in the underground.
- Mining helmets.

4.1.2 Advantages

- Detection of accident in remote area can be easily detected and medical services provided in short time.
- Simply avoiding drunken drive by using alcohol detector. It will reduce the probability of accidents.
- Decrease in death rates due to head injuries.
- Reduces the work load of traffic police.
- Security system for motorcycles.
- Less power consuming safety system.
- Provide wireless connection security.

5. RESULT

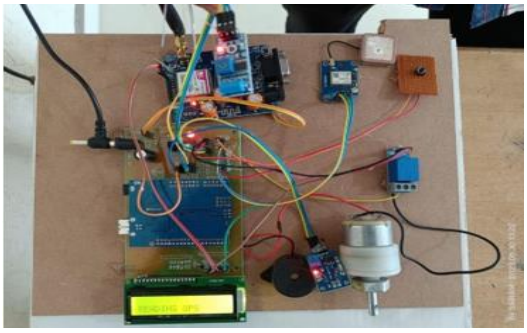

FIG 41: Result

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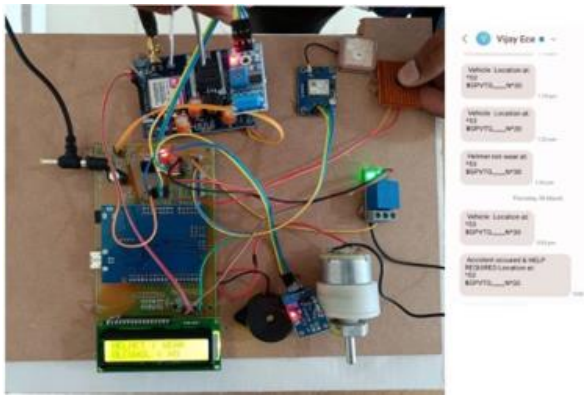

FIG 42: Output

6. CONCLUSION

Nowadays, most cases of accidents area unit by motor bikes. The severities of those accidents are increased because of the absence of helmet or by the usage of alcoholic drinks. In our project we have a tendency to develop an electronic smart helmet system that efficiently checks the wearing of helmet and drunken driving. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries throughout accidents caused from the absence of helmet and additionally reduce the accident rate due to drunken driving. We have a tendency to introduce advanced sensors techniques and radio frequency wireless communications are included in this project to make it a good one. Our system efficiently checks the wearing of helmet and drunken driving. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate because of drunken driving.

7. FUTURE SCOPE

We can implement various bioelectric sensors on the helmet to measure various activities. 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. We can make use of small camera for the recording the drivers activity. If there is a large demand of this type of helmets we can manufacture whole circuit in printed circuit board, so that circuit becomes smaller and can be easily fitted into helmet. In future we can enhance our project through placing high efficiency RF transmitter.

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