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Smart Helmet with GPS & Speedometer

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Abstract: *Every day around the world a large percentage of people die from road accident and effectively approach is made to solve problem by using "Smart Helmet". The working of smart helmet is very simple the sensor placed inside the helmet will detect the rider has worn the helmet or not if not then the bike will note start. More crashes and death are resulting from poor road and unsafe helmet, just correct use of helmet will reduce the risk of fatal injuries by 42% and head injuries by 69% Reported by WHO.*

Key words: *GPS, MQ-3 ALCOHAL SENSOR, OLED DISPLAY, Li-Ion BATTERY, SPEEDO METER*

I. INTRODUCTION

Now a days we seen that there to many accidents due to people not wearing the Helmet, also they not follow the rules like don't Drink and Drive. And we seen that from our youngster some people drive bike very fast. That's why this accident causes. So from this project we tries to overcome this type of accidents.

The main working of smart helmet is to detect the speed of vehicle should be less than 60km/hr. and the secondary work of our project is to detect the alcohol. For detect the speed we use a speedometer, and for alcohol detection we use MQ-3 alcohol sensor. And all operation managed by Arduino Nano, this is the heart of our project. For indication Purpose we use LED's And Buzzer.

II. WORKING PRINCIPLE

The circuit is design around Arduino Nano Microcontroller. This system consist of a GPS module i.e. ublox Neo 6M, OLED Display, Buzzer, Warning Red LED, 5V Solar panel, TP4056, Li-Ion Battery charger, Li-Ion Battery of 3.7V. Initially System Boot-Up and Initialize GPS modem & OLED Display tries to connect with 6 Satellites as soon as GPS modem receives connection from all 6 Satellite begins to receive latitude and longitude data. As the vehicle moves from one location to another the latitude and longitude data tends to change in latitude and longitude data. Calculate the speed in Display on OLED screen and Warns for over-speeding if speed increase over 60km/hour

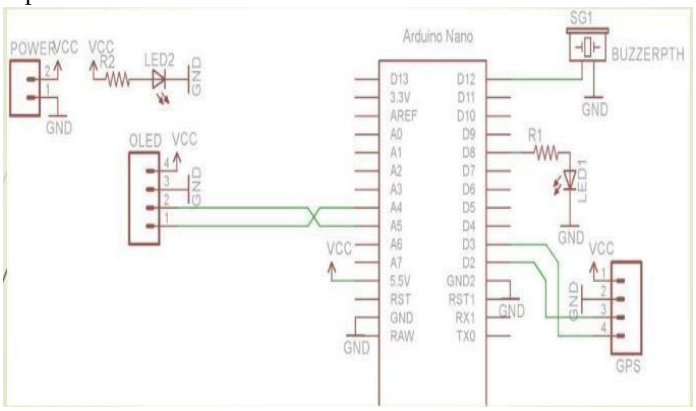

Fig.1. Circuit Diagram of Smart Helmet with GPS & Speedometer

1.Microcontroller (ARDUINO UNO) :

The Arduino Uno is a microcontroller board based on the ATmega328. (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 computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to- serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to serial converter.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

Fig.1.1. Arduino Nano Pinout

2. The Global Positioning System (GPS):

It is a satellite-based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides the user with information. Using GPS technology, one can determine location, velocity and time, 24 hours a day, in any weather conditions anywhere in the world for free. Global Positioning System was originally developed for military. Because of its popular navigation capabilities and because GPS

technology can be accessed using small, inexpensive equipment, the government made the system available for civilian use. GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock. GPS is funded by and controlled by the U. S. Department of Defense (DOD). While there are many thousands of civil users of GPS worldwide, the system was designed for and is operated by the U. S. military. The architectural components of GPS are typically referred to as the control segment (ground stations), the space segment (satellites) and the user segment (receivers).

Determining Position Upon taking in all available satellite signals, the receiver compares the time that the satellite sent the signal to the time it was received for each of the available signals. Tri-lateralization (similar to triangulation) then calculates the position by comparing the difference among the signals.

3. NEO6M GPS Module :

Here we are using the NEO6M GPS module. The NEO-6M GPS module is a popular GPS receiver with a built- in ceramic antenna, which provides a strong satellite search capability. This receiver has the ability to sense locations and track up to 22 satellites and identifies locations anywhere in the world. With the on-board signal indicator, we can monitor the network status of the module. It has a data backup battery so that the module can save the data when the main power is shut down accidentally.

VCC: Input voltage pin of Module

GND: Ground pin

RX, TX: UART communication pins with Microcontroller

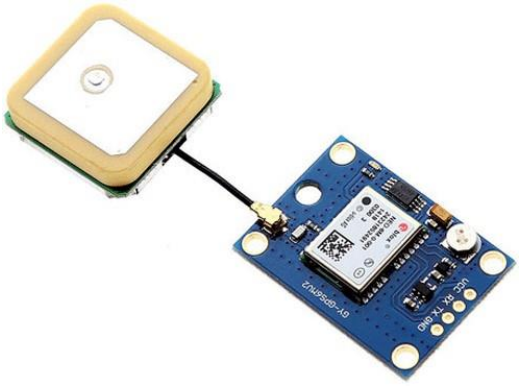

Fig.3.1. NEO6M GPS Module

Fig.3.2 Pin Out of GPS Module

4. OLED Display:

The term OLED stands for “Organic Light emitting diode”, it uses the same technology that is used in most of our televisions but has fewer pixels compared to them. It is real fun to have these cool looking display modules to be interfaced with the Arduino since it will make our projects look cool. We have covered a full Article on OLED displays and its types here. Here, we are using a Monochrome 4-pin SH1106 OLED 1.28” OLED display. This Display can only work with the I2C mode.

Technical Specifications:

- Driver IC: SH1106
- Input Voltage: 3.3V-5V DC
- Resolution: 128x64
- Interface: I2C
- Current consumption: 8 mA
- Pixel color: Blue
- Viewing angle: >160 degree

Pin Description:

- VCC: Input power supply 3.3-5V DC
- GND: Ground reference pin
- SCL: Clock pin of the I2C interface
- *SDA: Serial Data pin of the I2C interface*

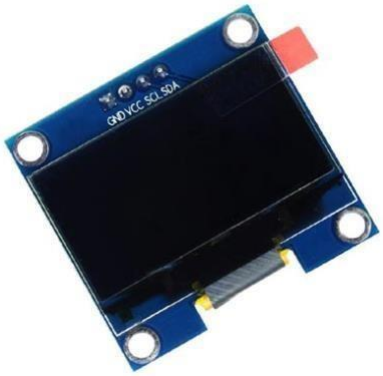

Fig.4. OLED Display Pinout

5. MQ-3 ALCOHAL SENSOR:

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air. It's conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. This module provides both digital and analog outputs. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc.

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0- 3.3V ADC.

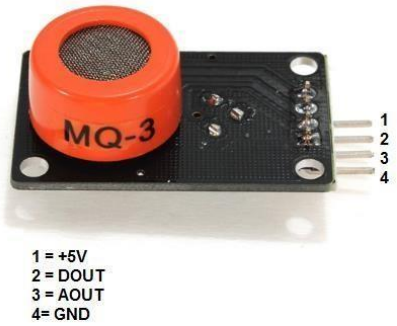

Fig.5. MQ-3 ALCOHAL SENSOR

6. 5V SOLAR PANEL:

A solar cell panel, solar electric panel, photo-voltaic (PV) module or solar panel is an assembly of photo-voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV panel, and a system of PV panels is called an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

In Below figure we have seen solar Panel is a combination of 7 layers, which consist of Aluminum frame, Tempered Glass, Encapsulant-EVA, Solar cells, Encapsulant-EVA, Back Sheet, Junction Box.

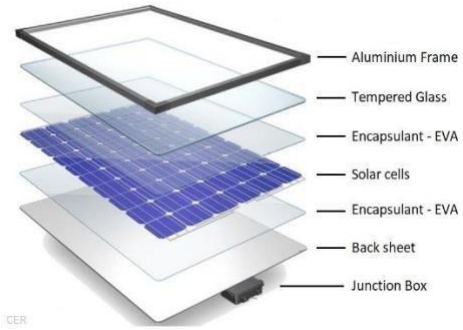

Fig.6. SOLAR PANEL

7. BUZZER:

It is an active buzzer, which basically means that it will buzz at a predefined frequency (2300 ±300 Hz) on its own even when you just apply steady DC power. If you are looking for a buzzer can produce varied tones from an oscillating input signal. One advantage to an active buzzer is that you can still produce a sound from the buzzer connected to a microcontroller, such as an Arduino, by just driving a standard high output on the connected pin. The benefits of this are that you don't need to use processing power, hardware timers, or additional code to produce sound.

Fig.7. Buzzer

8. 5V Li-Ion BATTERY:

The battery cell can provide more than 500 charge and discharge cycles. This makes it extremely economical, and provides an expected life similar to that of the device in which it is used. Provide long storage life with few limiting conditions. It offers problem-free charge after long storage, permitting to use in a wide range of applications.

Fig.8. Li-Ion Battery

1	Rated Capacity	2200mAh
2	Nominal Voltage	5V
3	Max Charge Voltage	4.2V
4	Discharge Cut Off Voltage	2.75V
5	Charging Current / Max. Continuous Discharging Current	1C
6	Cycle Life	500times 80% SOC 80%DOD

III. FINAL CIRCUIT

IV. SOCIETAL BENEFITS

The safety helmet system devised aims to reduce the number of deaths caused by not wearing helmets. We want the riders to be safe and adhere to the law. As for a society we would want to see more discipline when it comes to commuting. Pollution statistics keep the citizens informed about the pollution of the locality they live in.
As people become aware of the pollution levels they transform into a more concerned and responsible Human beings thus making them more disciplined. As this change begins our environment will be more livable, safer, healthier and friendly

V. CONCLUSION

In this project, we developed a Smart Helmet based system which was successfully able to detect whether the rider as worn the helmet or not. It also sets an alarm if he has consumed alcohol beyond permissible levels. Apart from this, the system also monitors atmospheric pollution levels.

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