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Smart Helmet

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Abstract: *This project gives description of a smart helmet which is based on IOT system to avoid accidents during vehicle riding results due to recklessness of riders towards helmet as it won't allow the vehicle to start until the riders wears the helmet. It consists of two modules one for the bike and other for the helmet. The bike module will act as a server and the helmet module will act as a client and the modules will act as an aggregated system when proper connectivity is established between the server and client module. As soon as the Wi-Fi connection is interrupted the bike will stop passing current to the ignition coil and hence stop it's functioning.*

Keywords: Micro controller, Sensor unit, Node MCU

I. INTRODUCTION

IOT is a network of inter related devices sharing information and data, this ability to share information makes a device smart, thus smart device is nothing but a device working over IOT with other devices. Smart helmet works basically on the IOT platform with server-client connectivity. The NodeMCU in the bike module will act as a server which will set-up the connectivity with the helmet module getting the power source from the ignition in the engine. Node MCU is an open source IoT platform. It includes firmware and hardware part. Firm-ware works on the ESP8266 Wi-Fi SoC from Espressif Systems and hardware works on ESP-12 module. Lua scripting language is use by this firmware. ESP8266 features are: It is open source, Interactive, Programmable, Low cost, simple, smart, Wi-Fi enabled, USB-TTL included device. It works on XTOS operating system having memory 128kBytes and Storage 4M bytes. It is powered by USB. For coding, Arduino IDE used. It has 10 GPIO pins, some ground pins and two types of power voltage 3.3v, 5v (used with 3.3v Regulator which inbuilt on Board using Pin Vin). It also consists a relay which is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current.

Fig 1: Smart Helmet

The heart of a relay is an electromagnet (a coil of wire that becomes a temporary magnet when electricity flows through it). Relay is connected to the server and is used to control the motor vehicle functionality to turn on or off the bike as desired, relay is integrated with the ignition coil in the vehicle which supply high voltage current to spark plug and keep running the engine, with the help of relay Node MCU (SERVER) controls the current supply to the ignition coil and directly control engine functioning. An Organic-LED is also present in bike module connected to bike display panel which will show the current status of the system. O-LED is a Light Emitting diode in which the electroluminescent layer is a film of organic compound (millions of small LED lights) that emits light in response to an electric current. The display connects to Node MCU (Server) using only four wires – two for power (VCC and GND) and two for data

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(serial clock SCL and serial data SDA), making the wiring very simple. The data connection is I2C (I²C, IIC or Inter-Integrated Circuit).

II. PROPOSED METHOD

This project focuses to avoid accidents during vehicle riding results due to recklessness of riders towards helmet. In this model, two NodeMCU are used for connectivity, first one in Bike module and another one in Helmet module. Server-Client communication is established between both MCU. It consists of two level security system 1. Password protected 2. String Synchronization. Helmet module acts as access point (Client) it has fix IP address and password so it can connect uniquely with Bike module which acts as Station (Server).Client request to server to connect by sending the string then Server replies client by sending another string, then a successful connection is established between client and server (i.e. Helmet and Bike respectively). Bike module consist of Node MCU, Capacitive touch sensor and a buzzer. The basic connections between them Helmet Module consist of Node MCU, O-LED and Relay. The basic connections between them is When rider turn on the bike the O-LED display present in bike module shows warning "PLEASE WEAR HELMET". When rider wears the Helmet and set the clip for power supply to helmet module then capacitive touch sensor detect the presence of human head inside helmet and client (Helmet module) ask to server (Bike module) for handshaking which will establish.

Design Diagrams flow charts:

Fig 2 : Block Diagram

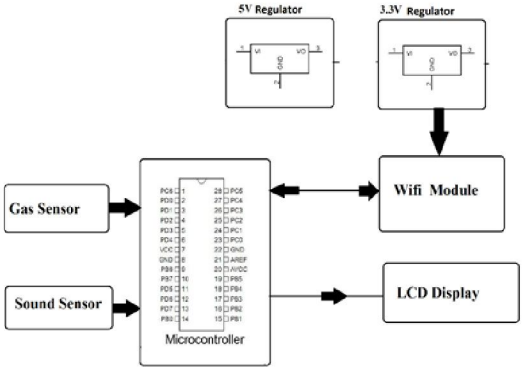

Fig 3 : Circuit Block Diagram

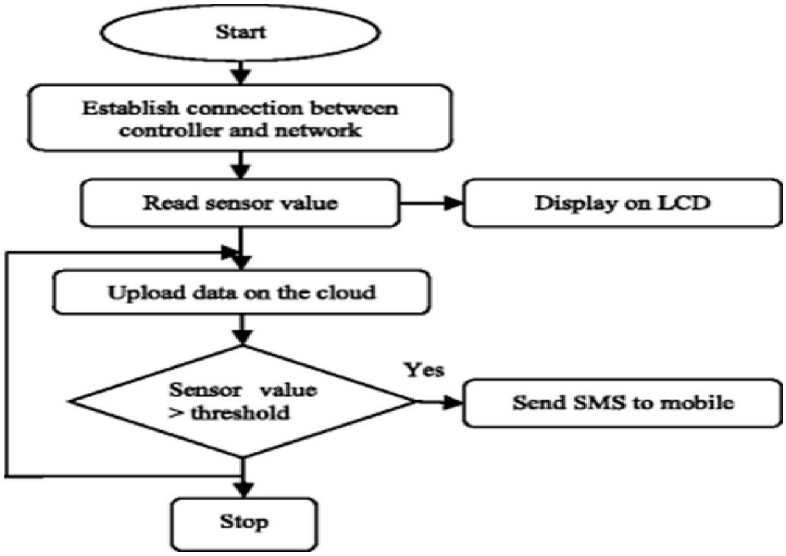

Fig 4 : Flow Chart

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III. HARDWARE DESIGN

3.1 ESP-12E Based Node MCU

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge from existing micro controller to Wi-Fi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect Node MCU dev kit to4 i your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly

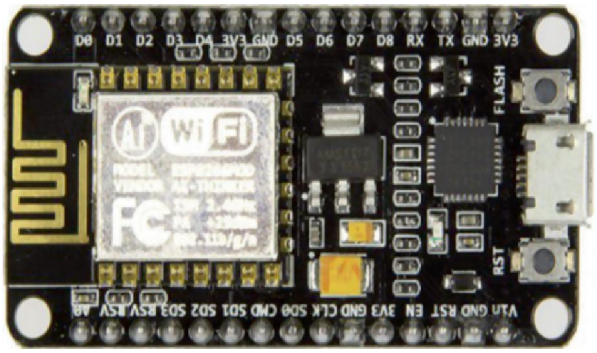

Fig 5 : ESP-12E Based Node MCU

3.2 Smart Helmet

In this project the author has proposed the smart helmet because of growing bike accident now days. people get injured or might be dead and one of the reason is not wearing helmet. Continuously road rules are violated .so as to overcome these problem this helmet is been proposed. The craze of motor bike is really remarkable .the middle class families prefer to buy motor bike over four wheelers, because of the low prices, various variety available in the market, due to cut-throat completion between two wheeler company and durability. Author has also used encoder IC receives parallel data in form of address bits and control bits the other author has used smart system for helmet But in this project author have not focused on the major issue that will occur in future regarding the alcohol and many other.

3.3 Alcohol Sensor

The configuration and structure of the MQ3 alcohol sensor are shown in the figure below. It consists of **2 H-pins** for **supply and ground connection,** 2 A-pins connected to the **power supply,** and 2 B-pins for output and **ground connection.** Since A-pins and B-pins can be interchanged.

Fig 6 : MQ3 Alcohol Sensor

3.4 Temperature Sensor

The temperature sensor is used to sense the temperature of the working environment. The Threshold condition for.

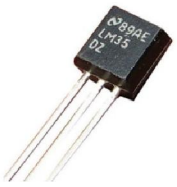

Fig 7: Temperature Sensor

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3.5 Limit Switch

The Limit Switch is used to detect whether the worker properly wears the helmet or not. If the helmet is not worn properly an alert signal is generated to the monitoring unit and they alert the worker by giving necessary instructions.

Fig 8: Limit Switch

3.6 Liquid-Crystal Display

A liquid-crystal display (LCD) is a flat-panel display or another electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead of using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as present words, digits, and seven-segment displays.

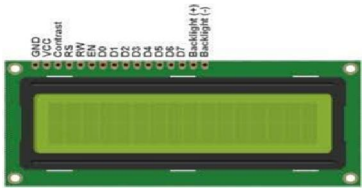

Fig 9 : LCD Pin Out

IV. RESULT

MQ135's voltage and ground are connected to +5V and 0V and the analog output pin is connected to analog pin A0 of Arduino Uno. LCD RS pin to digital pin 12, Enable pin to digital pin 11, D4 pin to digital pin 5, D5 pin to digital pin 4, D6 pin to digital pin 3, D7 pin to digital pin 2, R/W pin to ground, VSS pin to ground, VCC pin to 5V, 10K resistor ends to +5V and ground and wiper to LCD VO pin.

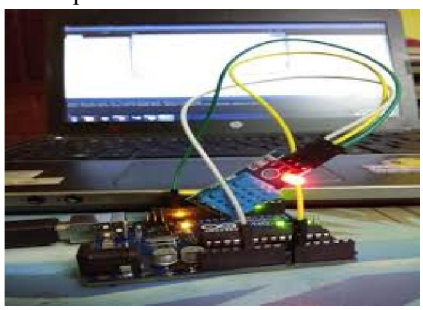

Fig 10: **Connection Setup**

The Analog pin of the MQ-135 sensor is connected to the analog pin of the Arduino UNO.

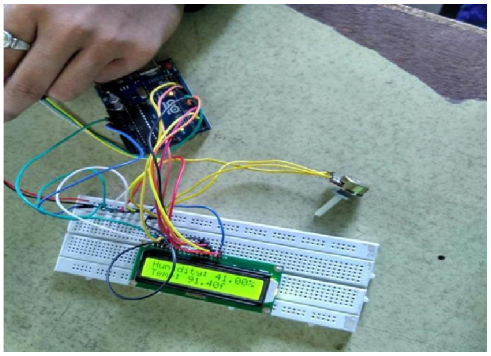

Fig 11: Result Shown In LCD

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V. CONCLUSION

This paper proposes an open platform of a Wi-Fi-enabled indoor air quality monitoring and control system, which could be incorporated into such a 'smart building' structure. The complete software and hardware design of this system is presented, along with a series of control experiments. The proposed system operates over an existing Wi-Fi wireless network utilizing the MQTT protocol. It is capable of monitoring the indoor air quality as well as controlling an air purifier to regulate the concentration of the particulate matter. Experiment results under a real-world office environment demonstrate the effectiveness of the proposed design.

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