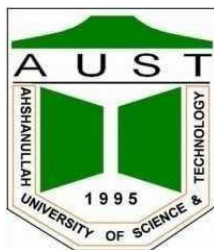


Ahsanullah University of Science & Technology

Department of Computer Science & Engineering

FALL 2020



CSE 3216

Microcontroller Based System Design Lab

Project Report

Project Name:

iSafe Plug

Submitted To

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Objective:

This “iSafe Plug” is a smart upgrade of multiplugs that we use in our day to day life. This turns conventional use of multiplugs in much safer and smart position. It is very normal to use a multiplug for charging our daily use devices. But it’s very common on our side to left these devices charging for too long or sometimes to forget to turn on the plug point. So, by the use of Arduino and Bluetooth module we came up with a solution to control the plugs via Bluetooth and also to check status of the plug points on real-time basis. Again, we hope to implement timer set functionality for a certain period of time for certain devices in order to save the charging device from over-charging and to avoid wasting electricity and also to avoid unwanted accidents. In a word, the multiplug can be interacted by a phone via Bluetooth for its total control. We will also use gas/fume/water detector for detecting smoke or gas leak or water damage to turn off the plug immediately. As a result, this makes the plug friendly for kitchen use too.

Social Values:

Now a day’s use of multiplug is increasing. In today’s world, the tech accessories hunger is drastically increasing in daily life. So, more power points are required to charge these devices. Simple use of multiplug is a solution everyone follows for the problem .But is very risky as our forgetful mind forgets about the devices being charged. As a result the devices over-charges or sometimes lead to a blast of the lithium cells in the device. To solve these problems we are introducing new iSafe Plug. It’s a multiplug that can be controlled via Bluetooth and set timer for a certain period of time and also detect smoke or gas leaks as well as water damage. The most frightening issue in our daily life is letting the phone charging overnight. This smart multiplug will save this whole mess of overnight charging. Again, kitchen appliances like blender or beater cannot sabotage by spilling water on the plug. Also the plug is equipped to detect any smoke or fumes and immediately shut down with an alarm. So , as we can see this device is targeting the most common mistakes of our daily life and making it safer for everyone.

Required Components:

These following parts and tools are required for building this project:

- Arduino Uno
- Bluetooth Module (HC-06)
- Gas sensor (MC Q2)
- Water Sensor (Rain Sensor)
- Relay Module
- Lamp (as AC PORTS)
- Wires
- AC Current supply (Alternator)
- Buzzer
- Logic -toggle/state
- LEDs
- Resistors
- Rectifier diode (1n4007)
- NPN transistor (2n2222)

Working Procedure:

The basic components that react to the input are as follows:

1. Bluetooth Module
 - it controls the multiplex via creating connection between the devices.
2. Gas Sensor

- To detect gas/fume
3. Water sensor
 - To detect water
 4. Relay Module
 - To turn on AC connections of the plug
 5. Arduino
 - Controls the whole
 6. Buzzer
 - Alarm for the consequence of unwanted event

Estimated budget:

Equipment	Quantity	Budget(Tk)
Arduino Uno	1	450
Bluetooth Module (HC-06)	1	350
Resistor	As Need	20
Gas Sensor (MC Q2)	1	120
Relay Module	2	250
AC Port Board	2	300
Buzzer	1	15
AC Wires	2	50
LEDs	1	10
Rain Sensor	1	250
Jumper (Male and Female)	As Need	50
Breadboard	1	100
Total		1965

Code:

```
int val;
unsigned long TIME;
int charge = 7;
int led = 8;
int gas = 12;
int water = 13;
int buzzer = 4;

unsigned long delayStart = 0; // delay started
bool delayRunning = false; // true if still waiting for delay to end

void setup() {

    pinMode(led, OUTPUT);
    pinMode(charge, OUTPUT); // initialize
    pinMode(gas , INPUT);
    pinMode(water, INPUT);
    pinMode(buzzer, OUTPUT);

    digitalWrite(charge, LOW); // turn all off
    digitalWrite(led, LOW);

    Serial.begin(9600);
}

void loop() {

    if( Serial.available()){
        val = Serial.read();
    }

    switch(val){
        case '0':
```

```
digitalWrite(led, HIGH); //LED ON  
Serial.println("LIGHT ON");  
break;
```

```
case '1':  
    digitalWrite(led, LOW); //LED OFF  
    Serial.println("LIGHT OFF");  
    break;
```

```
case '2':  
    TIME = 5000;    //5 second for demo  
    delayStart = millis(); // start delay  
    delayRunning = true; // not finished yet  
    digitalWrite(charge, HIGH);  
    Serial.println("CHARGE ON 5 seconds ");  
  
    break;
```

```
case '3':  
    TIME = 1800000;    //30 minute  
    delayStart = millis();  
    delayRunning = true;  
    digitalWrite(charge, HIGH);  
    Serial.println("CHARGE ON 30 minute");  
  
    break;
```

```
case '4':  
    TIME = 3600000;    //1 hour  
    delayStart = millis();  
    delayRunning = true;  
    digitalWrite(charge, HIGH);  
    Serial.println("CHARGE ON 1 hour");  
  
    break;
```

```
case '5':
```

```
digitalWrite(charge, HIGH); //charger ON
Serial.println("CHARGER ON");
break;
```

```
case '6':
    digitalWrite(charge, LOW); //charger OFF
    Serial.println("CHARGER OFF");
    break;
```

```
default:
    break; // default code (should never run)
}
```

```
if(digitalRead(gas) == HIGH)
{
    digitalWrite(buzzer, HIGH);
    digitalWrite(charge, LOW);
    digitalWrite(led, LOW);
}
```

```
else if(digitalRead(water) == HIGH)
{
    digitalWrite(buzzer, HIGH);
    digitalWrite(charge, LOW);
    digitalWrite(led, LOW);
}
```

```
else if(digitalRead(gas) == LOW && digitalRead(water) == LOW )
{
    digitalWrite(buzzer, LOW);
}
```

```
// off after the TIME
```

```
if (delayRunning && ((millis() - delayStart) >= TIME)) {
```

```

delayRunning = false; //prevent this code being run more then once
digitalWrite(charge, LOW); // turn off
Serial.println("CHARGE COMPLETE");
}

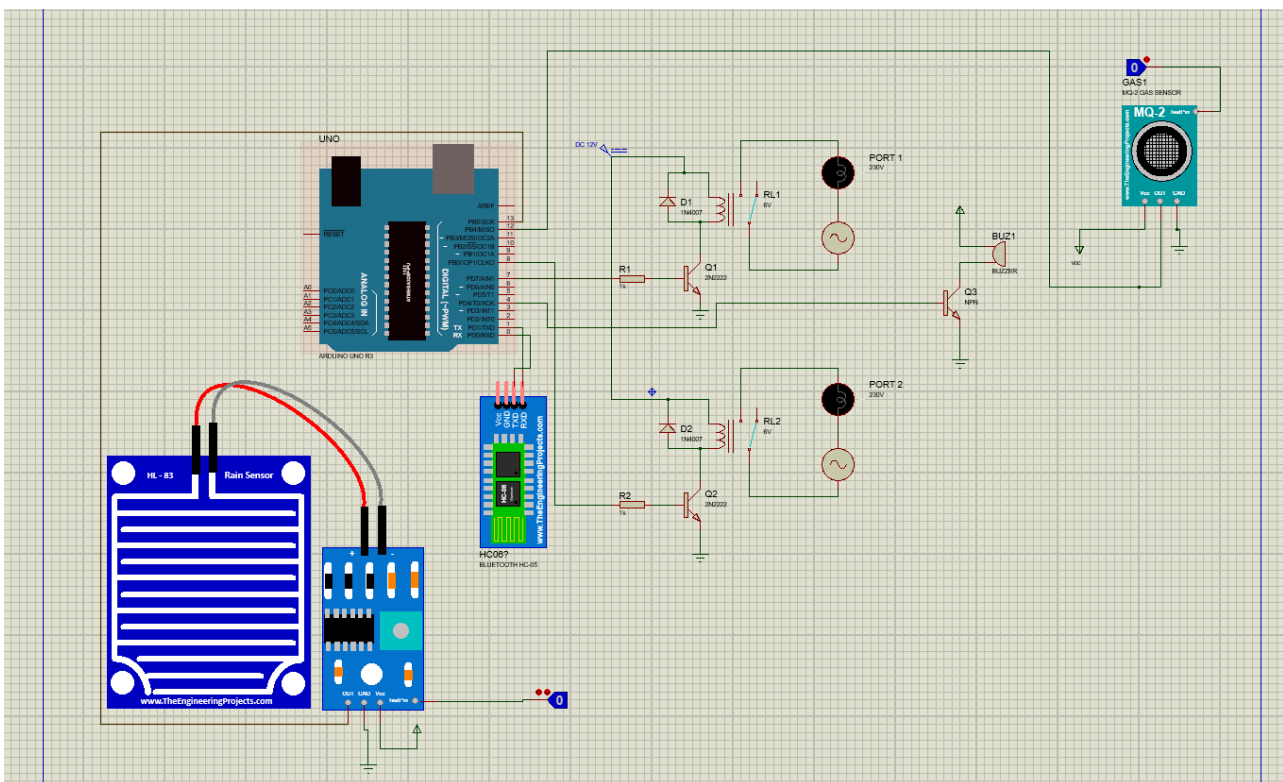
```

```

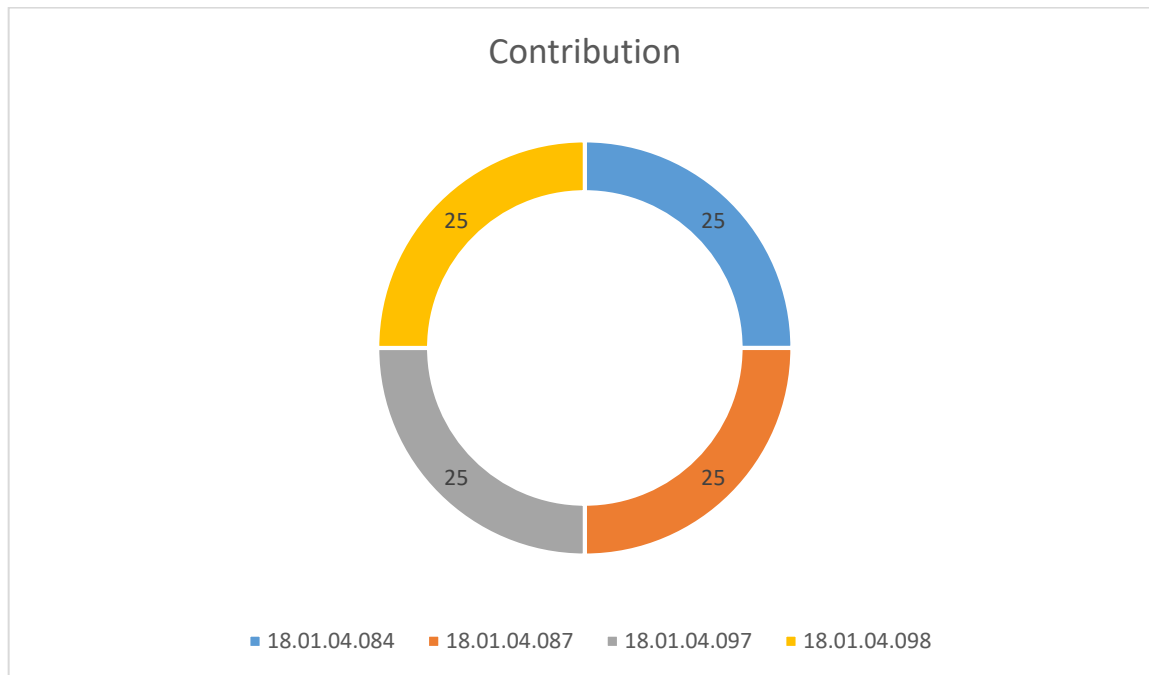
}

```

Circuit Diagram:



Member Contribution:



- Safwan Muntasir (ID: 180104084) – Bluetooth Module & Buzzer
- Mashfiq Rahman (ID: 180104087) – Rain Sensor & Code Implementation
- Arifur Rahman Jawad (ID: 180104097) – Relay & Code Implementation
- Abdullah Al Mohaimen (ID: 180104098) – Gas Sensor & Code Implementation

Difficulties:

1. Connection between proteus Bluetooth module with physical phone is very unstable and hard to establish.
2. Proteus restarts due excessive CPU load.
3. Working with sensor of different library files.
4. Setting up proper power and grounds.

Future Plan:

1. We want to make it wifi based in order to control from anywhere.
2. Adding more smart features like motion detector for turning on lamp or fan based on temperature.
3. Adding integrated hidden security camera and microphone.

Conclusion:

In this project, the various types of sensors used plays vital rule for the safety purpose of its built. Its prime objective is to safeguard and secure charging or connection of devices to avoid accidents. It can overcome the vital thread our everyday life faces. Over charging or electrical problems are not small issues to fool around , so this project holds a whole new importance for the society.