

**Project Development Phase**  
**Delivery of Sprint-3**

Date	15 November 2022
Team ID	PNT2022TMID34114
Project Name	Smart Waste Management for Metropolitan Cities
Story Points	8

**CODE FOR DATA TRANSFER FROM SENSORS:**

**PROGRAM:**

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 20, 4);
// credentials of IBM Accounts -
#define ORG "j5bxb7" //IBM organisation id
#define DEVICE_TYPE "IOT123edevicetype" // Device type mentioned in ibm watson iot platform
#define DEVICE_ID "IOTece4" // Device ID mentioned in ibm watson iot platform
#define TOKEN "e2)-17xkqIFMvm3@II" // Token
// customise above values -
char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // server name
char publishTopic[] = "iot-2/evt/data/fmt/json";
char topic[] = "iot-2/cmd/led/fmt/String"; // cmd Represent type and command is test format of strings
char authMethod[] = "use-token-auth"; // authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //Client id
//
WiFiClient wifiClient; // creating instance for wificlient
PubSubClient client(server, 1883, wifiClient);
#define ECHO_PIN 12
#define TRIG_PIN 13
```

```
float dist;

void setup()
{
  Serial.begin(115200);
  pinMode(LED_BUILTIN, OUTPUT);
  pinMode(TRIG_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  //pir pin
  pinMode(4, INPUT);
  //ledpins
  pinMode(23,OUTPUT);
  pinMode(2,OUTPUT);
  pinMode(4,OUTPUT);
  pinMode(15,OUTPUT);

  lcd.init();
  lcd.backlight();
  lcd.setCursor(1,0);
  lcd.print("");
  wifiConnect();
  mqttConnect();
}

float readcmCM()
{
  digitalWrite(TRIG_PIN, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN,HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);
  int duration =pulseIn(ECHO_PIN, HIGH);
```

```

return duration * 0.034 / 2;
}

void loop()
{
  lcd.clear();
  publishData();
  delay(500);
  if (!client.loop())
  {
    mqttConnect(); //function call to connect to IBM
  }
}

/* -retrieving to cloud */
void wifiConnect()
{
  Serial.print("Connecting to ");
  Serial.print("Wifi");
  WiFi.begin("Wokwi-GUEST", "", 6);
  while (WiFi.status() != WL_CONNECTED)
  {
    delay(500);
    Serial.print(".");
  }
  Serial.print("WiFi connected, IP address: ");
  Serial.println(WiFi.localIP());
}

void mqttConnect()
{
  if (!client.connected())
  {

```

```
Serial.print("Reconnecting MQTT client to ");
Serial.println(server);
while(!client.connect(clientId, authMethod, token))
{
    Serial.print(".");
    delay(500);
}
initManagedDevice();
Serial.println();
}
}

void initManagedDevice()
{
    if (client.subscribe(topic))
    {
        Serial.println("IBM subscribe to cmd OK");
    }
    else
    {
        Serial.println("subscribe to cmd FAILED");
    }
}

void publishData()
{
    float cm = readcmCM();
    if(digitalRead(34)) //PIR motion detection
    {
        Serial.println("Motion Detected");
        Serial.println("Lid Opened");
        digitalWrite(15, HIGH);
    }
}
```

```
}  
else  
{  
  digitalWrite(15, LOW);  
}  
if(digitalRead(34)== true)  
{  
  if(cm <= 100) //Bin level detection  
  {  
    digitalWrite(2, HIGH);  
    Serial.println("High Alert!!!,Trash bin is about to be full");  
    Serial.println("Lid Closed");  
    lcd.print("Full! Don't use");  
    delay(2000);  
    lcd.clear();  
    digitalWrite(4, LOW);  
    digitalWrite(23, LOW);  
  }  
  else if(cm > 150 && cm < 250)  
  {  
    digitalWrite(4, HIGH);  
    Serial.println("Warning!!,Trash is about to cross 50% of bin level");  
    digitalWrite(2,LOW);  
    digitalWrite(23, LOW);  
  }  
  else if(cm > 250 && cm <=400)  
  {  
    digitalWrite(23, HIGH);  
    Serial.println("Bin is available");  
    digitalWrite(2,LOW);
```

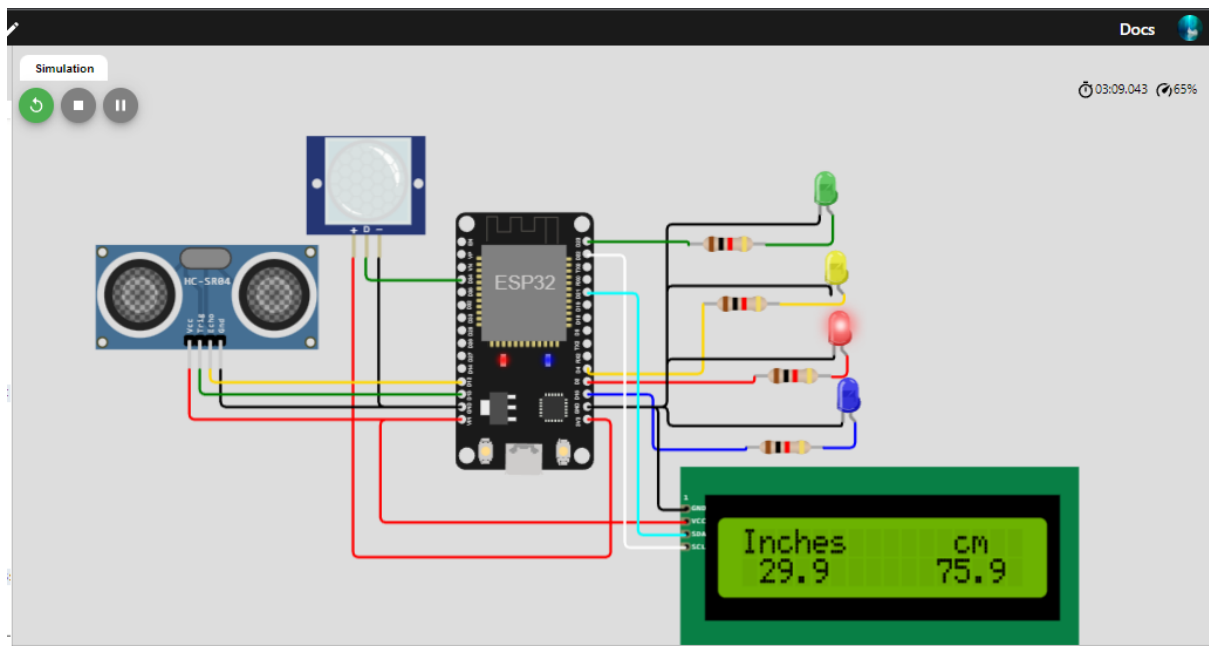
```

digitalWrite(4, LOW);
}
delay(10000);
Serial.println("Lid Closed");
}
else
{
Serial.println("No motion detected");
}
if(cm <= 100)
{
digitalWrite(21,HIGH);
String payload = "{\"High Alert!!\":\":";
payload += cm;
payload += "left\" }";
Serial.print("\n");
Serial.print("Sending payload: ");
Serial.println(payload);
if (client.publish(publishTopic, (char*) payload.c_str())) // if data is uploaded to cloud
successfully,prints publish ok or prints publish failed
{
Serial.println("Publish OK");
}
}
if(cm <= 250)
{
digitalWrite(22,HIGH);
String payload = "{\"Warning!!\":\":";
payload += dist;
payload += "left\" }";
Serial.print("\n");

```

```
Serial.print("Sending distance: ");  
Serial.println(cm);  
if(client.publish(publishTopic,(char*) payload.c_str()))  
{  
    Serial.println("Publish OK");  
}  
else  
{  
    Serial.println("Publish FAILED");  
}  
}  
  
float inches = (cm / 2.54); //print on LCD  
lcd.setCursor(0,0);  
lcd.print("Inches");  
lcd.setCursor(4,0);  
lcd.setCursor(12,0);  
lcd.print("cm");  
lcd.setCursor(1,1);  
lcd.print(inches, 1);  
lcd.setCursor(11,1);  
lcd.print(cm, 1);  
lcd.setCursor(14,1);  
delay(1000);  
lcd.clear();  
}
```

## CIRCUIT DIAGRAM:



## OUTPUT:

### Wokwi Simulation:

WOKWI

SAVE SHARE sketch.ino Docs

sketch.ino diagram.json libraries.txt Library Manager

```
106 float cm = readcmCM();
107 if(digitalRead(34)) //PIR motion detection
108 {
109   Serial.println("Motion Detected");
110   Serial.println("Lid Opened");
111   digitalWrite(15, HIGH);
112 }
113 else
114 {
115   digitalWrite(15, LOW);
116 }
117 if(digitalRead(34)== true)
118 {
119   if(cm <= 100) //Bin level detection
120   {
121     digitalWrite(2, HIGH);
122     Serial.println("High Alert!!!,Trash bin is about to be full");
123     Serial.println("Lid Closed");
124     lcd.print("Full! Don't use");
125     delay(2000);
126     lcd.clear();
127     digitalWrite(4, LOW);
128     digitalWrite(23, LOW);
129   }
130   else if(cm > 150 && cm < 250)
131   {
132     digitalWrite(4, HIGH);
133     Serial.println("Warning!!!,Trash is about to cross 50% of bin level");
134   }
```

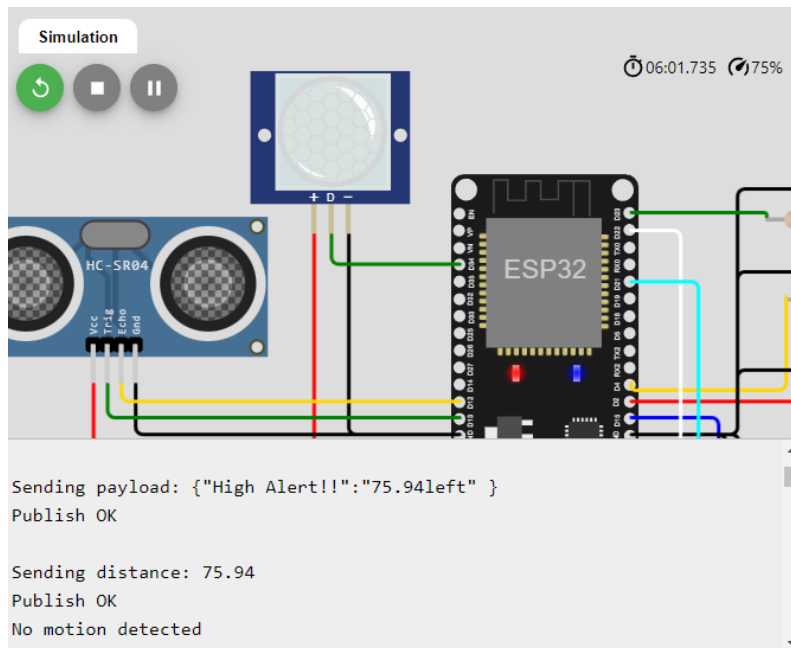
Simulation

04:44.357 67%

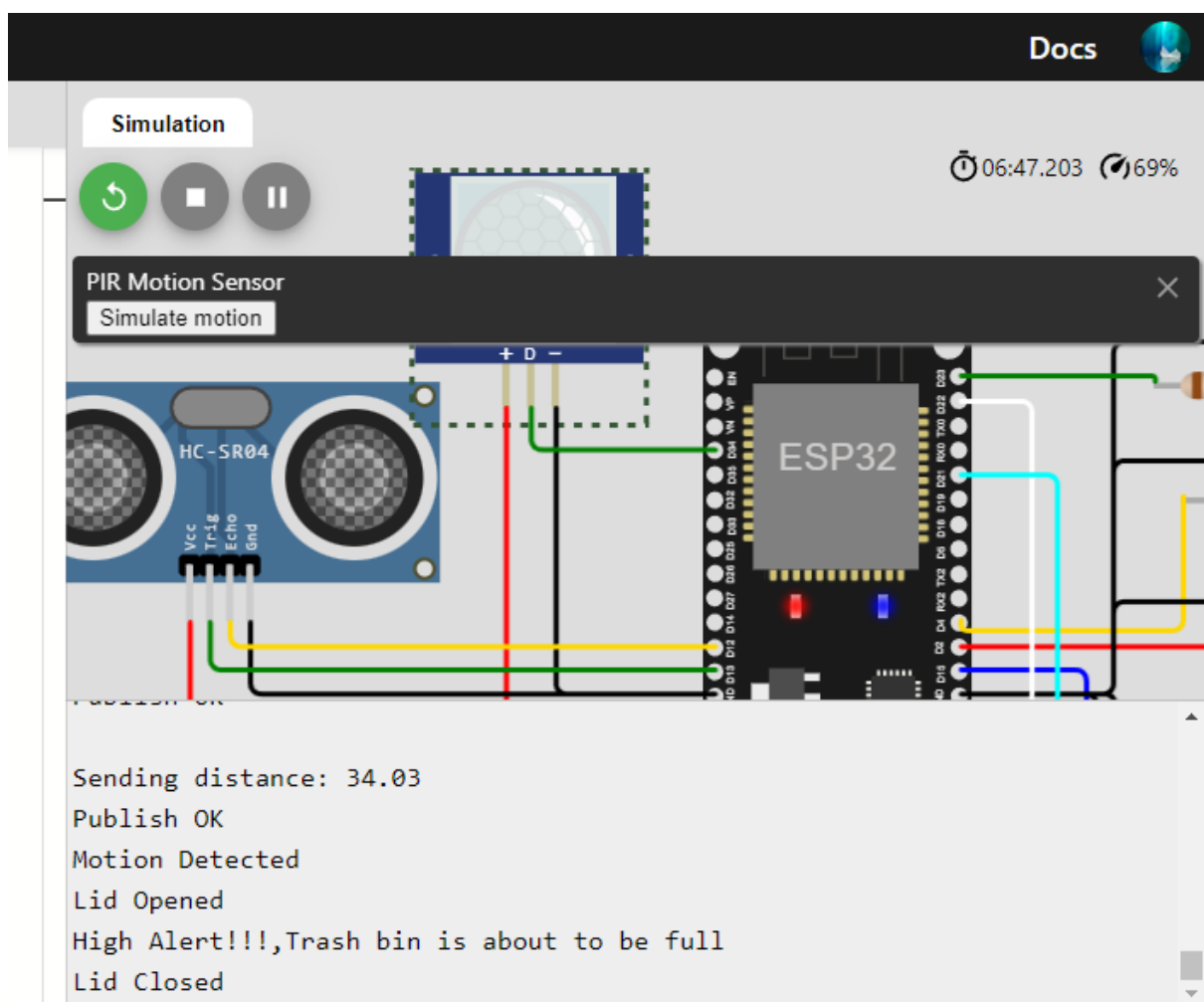
Connecting to Wifi..Wifi connected, IP address: 10.10.0.2  
Reconnecting MQTT client to  
j5bxb7.messaging.internetofthings.ibmcloud.com  
IBM subscribe to cmd OK



## When No Motion Is Detected:



## When Motion Is Detected:



## IBM WATSON IOT PLATFORM :

Watson IoT Platform

960219106031@smartinternz.com  
ID: j5bxb7

Browse

Action

Device Types

Interfaces

Add Device +

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
data	{"Warning!!":"0.00left"}	json	a few seconds ago
data	{"High Alert!!":"33.98left"}	json	a few seconds ago
data	{"Warning!!":"0.00left"}	json	a few seconds ago
data	{"High Alert!!":"33.98left"}	json	a few seconds ago
data	{"Warning!!":"0.00left"}	json	a few seconds ago

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### Wokwi Link:

<https://wokwi.com/projects/348367090939331154>