

Sprint 2

Software-Create device in theIoT
Watson Platform,workflow for IoT Scenarios using
LocalNode

Date	15-11-2022
Team ID	PNT2022TMID03604
Project Name	Project – Smart Farmer-IoT Enabled smart Farming Application

Program:

```
#include <Adafruit_LiquidCrystal.h> //Includes the library for LCD Display
```

```
#include <Wire.h> //Includes the library for connections
```

```
#include <Servo.h> //Includes the library for Servo Motor
```

```
Servo s;
```

```
int e = 4;
```

```
int t= 5;
```

```
int r =12;
```

```
int b =11;
```

```
int g = 10;
```

```
int sec= 0;
```

```
int Sensor = 0;
```

```
int soil = 0;
```

```
int motorPin= 9;
```

```
Adafruit_LiquidCrystal lcd(0);
```

```
void setup()
```

```
{
```

```
Wire.begin();
```

```
pinMode(A0, INPUT); // Temperature Sensor
```

```
pinMode(A1, INPUT); // Soil Moisture Sensor
```

```
pinMode(t, OUTPUT); // Ultra sonic Trigger
```

```

    pinMode(e, INPUT);           // Ultra sonic Echo
    pinMode(b, OUTPUT);          // GREEN light for LED
    pinMode(g, OUTPUT);          // BLUE light for LED
    pinMode(r, OUTPUT);          // RED light for LED
    pinMode(motorPin, OUTPUT);   // DC motor
    s.attach(3);                 // Servo Motor
    lcd.begin(16, 2);            // LCD 16x2 Display
    lcd.setBacklight(0);
    Serial.begin(9600);
}

```

```

float readDistanceCM()
{
    digitalWrite(t, LOW);
    delayMicroseconds(2);    digitalWrite(t,
    HIGH); delayMicroseconds(10);

    digitalWrite(t, LOW); int
    duration = pulseIn(e, HIGH);
    return duration * 0.034 / 2;
}

```

```

void loop()
{
    // Soil Moisture:

    Sensor = analogRead(A1);      //
    Reads data from Soil Moisture  sensor
    soil = map(Sensor, 0, 1023, 0, 117);
}

```

// Low analog value indicates HIGH moisture level and High analog value indicates LOW moisture level

// data = map(analogValue,fromLOW,fromHIGH,toLOW,toHIGH)

Serial.print("Soil Moisture value:");

Serial.println(soil);

//'data = 0' indicates total wetness and 'data = 100' indicates total dryness

// Temperature: double a = analogRead(A0); // Reads data from
Temperature sensor **double t = (((a / 1024) * 5) - 0.5) * 100;**

Serial.print("Temperature value:"); //Temperature value in Celsius
Serial.println(t);

// Ultrasonic sensor: float distance = readDistanceCM(); //Reads
data from Ultrasonic sensor

Serial.print("Measured distance: ");
Serial.println(readDistanceCM());

// LCD Display: lcd.setBacklight(1); //ON the
background light in LCD **lcd.clear();**

// Conditions:

/*If the temperature is Greater than 20 and less than 35 and also the moisture of soil is less than 60 then the GREEN light will be turned ON indicating the Normal condition */ if (t >= 20 && t < 35 && soil >= 40 && soil <50)

{

digitalWrite(b, 0);

digitalWrite(g, 1);

digitalWrite(r, 0); s.write(90);

```

digitalWrite(motorPin, HIGH);
lcd.setCursor(3, 0);
lcd.print("ON MOTOR");
delay(1000);    lcd.clear();
    Serial.println("Water Partially Flows");
}

```

/*If the temperature is Greater than 35 and less than 45, then the BLUE light will be turned ON indicating the Intermediate risk condition due to slightly warm weather */

```

    else if (t >= 35 && t < 45)
    {
        digitalWrite(b, 1);
digitalWrite(g, 0);
digitalWrite(r, 0);    s.write(90);
digitalWrite(motorPin, HIGH);
lcd.setCursor(3, 0);
lcd.print("ON MOTOR");
delay(1000);    lcd.clear();
    Serial.println("Water Partially Flows");
}

```

/*If the temperature is Greater than 45 or the moisture of soil is less than 30, then the RED light will be turned ON indicating the Critical condition due to highly warm weather or the low moisture content in soil */ **else if (t >= 45 || soil < 30)**

```

{

```

```

    digitalWrite(b, 0);
digitalWrite(g, 0);
digitalWrite(r, 1);    s.write(180);
    digitalWrite(motorPin, HIGH);
Serial.println("Water Fully Flows");
lcd.setCursor(2, 0);    lcd.print("ON
MOTOR!!!");
    lcd.setCursor(3, 1);
    lcd.print("Low Water");
delay(1000);    lcd.clear();
}

```

/*If the level of water is MORE in the field it will be indicated by distance sensor for less than 10cm and also the moisture of soil is greater than 80, then the YELLOW light will be turned ON indicating the high water level */

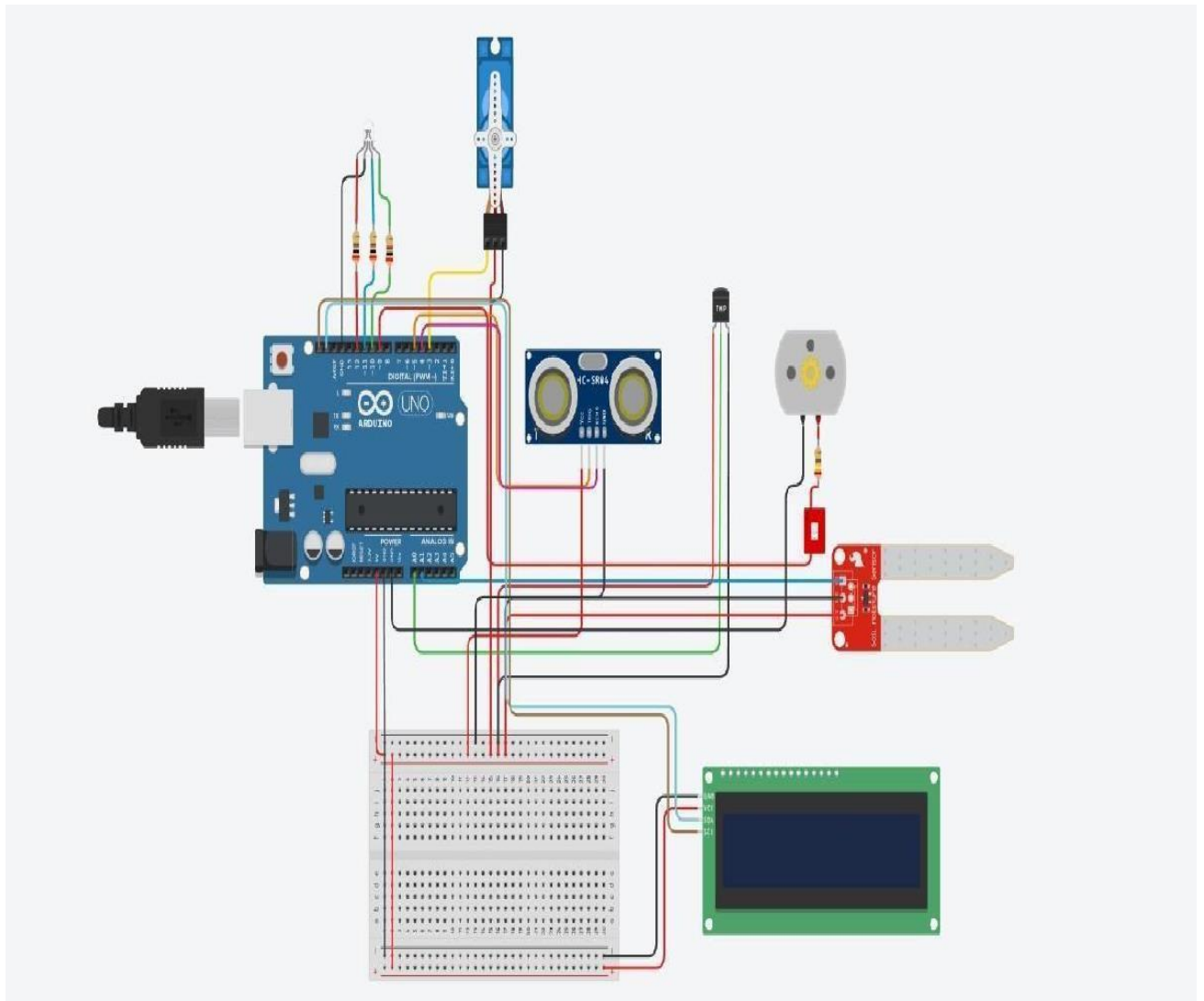
```

else if (distance<10 && soil> 80)
{
    digitalWrite(b, 0);
digitalWrite(g, 1);
digitalWrite(r, 1);    s.write(0);
    digitalWrite(motorPin, LOW);
Serial.println("Water Does Not Flow");
lcd.clear();    lcd.setCursor(3, 0);
lcd.print("OFF MOTOR");
delay(1000);    lcd.clear();
lcd.setCursor(1, 0);lcd.print("DRAIN
WATER!!!");    delay(1000);
lcd.clear();

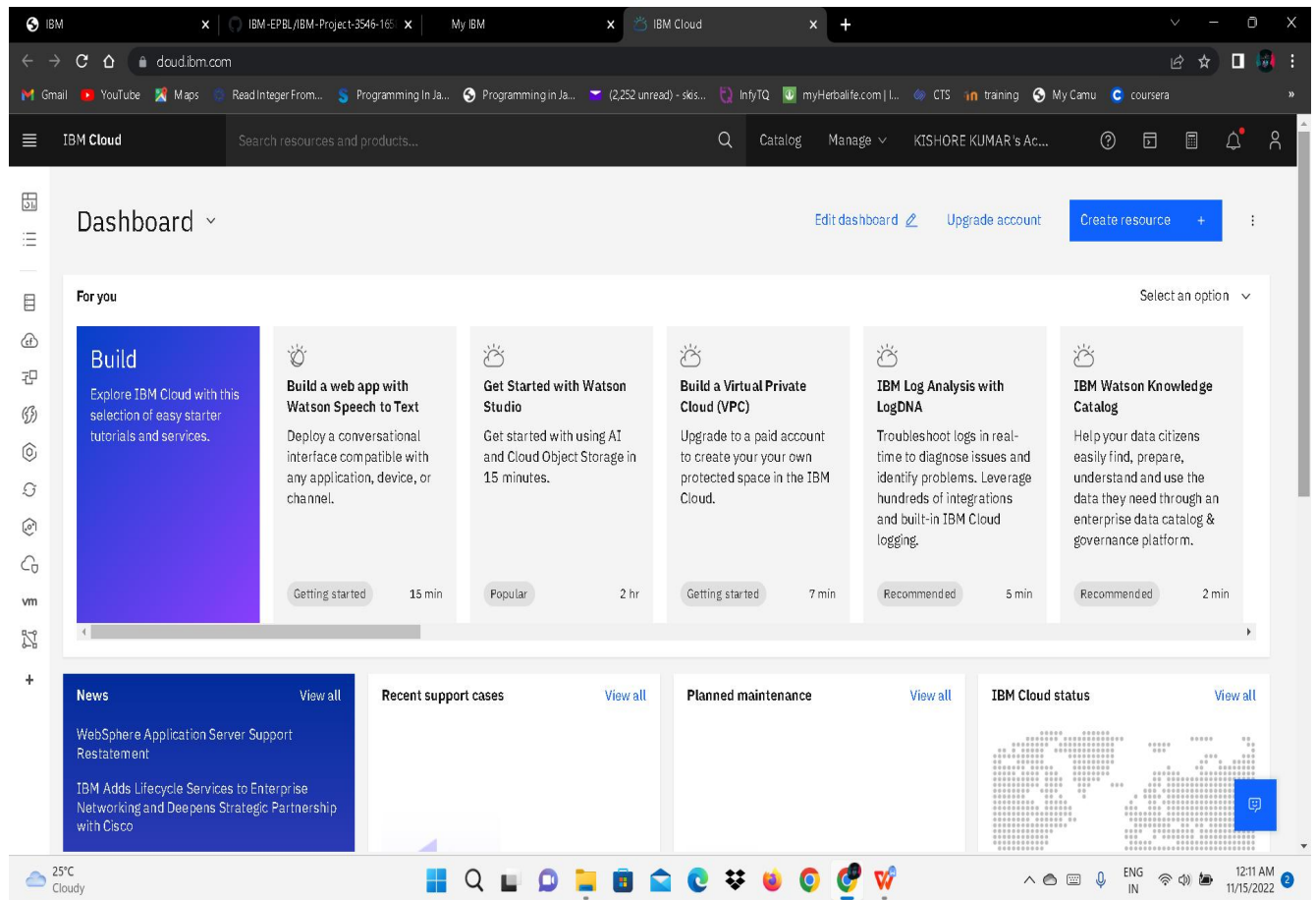
```

```
}  
else  
{  
  digitalWrite(b, 1);  
  digitalWrite(g, 1);  
  digitalWrite(r, 0);  
  s.write(0);  
  digitalWrite(motorPin, LOW);  
  lcd.setCursor(3, 0);  
  lcd.print("OFF MOTOR");  
  delay(1000);  
  lcd.clear();  
  Serial.println("Water Does Not Flow");  
}  
lcd.setCursor(0, 0);  
lcd.print("Temp:");  
lcd.print(t);  
lcd.print("degree");  
lcd.setCursor(0, 1);  
lcd.print("SoilWetness:");  
lcd.print(soil); lcd.print("%");  
Serial.println(" ----- ");  
delay(1000);  
}
```

Circuit Diagram:



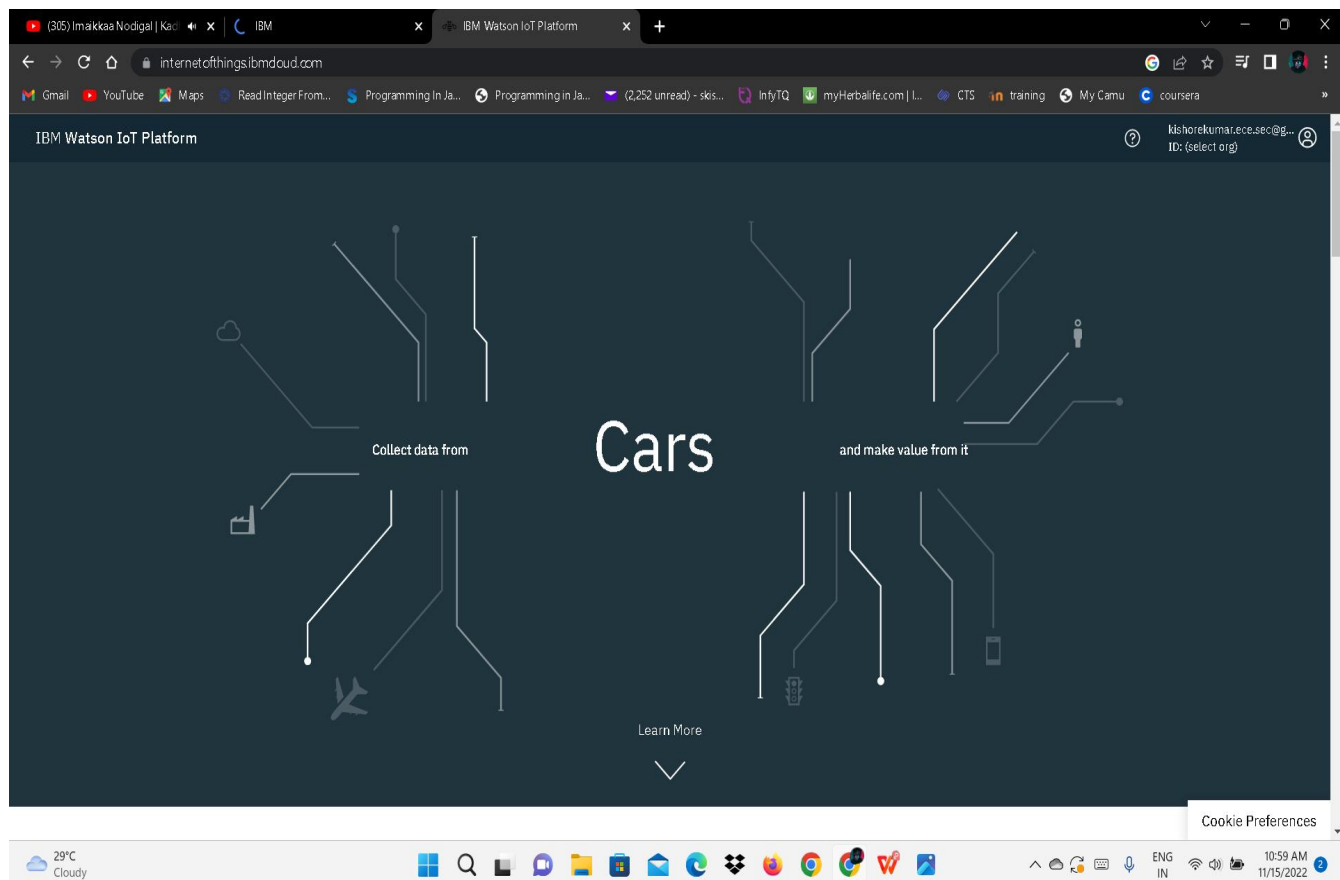
Launch IBM Watson IoT Platform:



The screenshot shows the IBM Cloud dashboard. The top navigation bar includes the IBM logo, a search bar, and links to Catalog, Manage, and the user's account (KISHORE KUMAR's Ac...). The main content area is titled "Dashboard" and features a "For you" section with several recommended actions:

- Build**: Explore IBM Cloud with this selection of easy starter tutorials and services.
- Build a web app with Watson Speech to Text**: Deploy a conversational interface compatible with any application, device, or channel. (Getting started, 15 min)
- Get Started with Watson Studio**: Get started with using AI and Cloud Object Storage in 15 minutes. (Popular, 2 hr)
- Build a Virtual Private Cloud (VPC)**: Upgrade to a paid account to create your own protected space in the IBM Cloud. (Getting started, 7 min)
- IBM Log Analysis with LogDNA**: Troubleshoot logs in real-time to diagnose issues and identify problems. Leverage hundreds of integrations and built-in IBM Cloud logging. (Recommended, 5 min)
- IBM Watson Knowledge Catalog**: Help your data citizens easily find, prepare, understand and use the data they need through an enterprise data catalog & governance platform. (Recommended, 2 min)

Below the "For you" section, there are four more widgets: "News" (WebSphere Application Server Support Restatement, IBM Adds Lifecycle Services to Enterprise Networking and Deepens Strategic Partnership with Cisco), "Recent support cases", "Planned maintenance", and "IBM Cloud status". The bottom of the dashboard shows a weather widget (25°C Cloudy) and a taskbar with various application icons.



The screenshot shows the IBM Watson IoT Platform landing page. The top navigation bar includes the IBM logo, a search bar, and links to Catalog, Manage, and the user's account (KISHORE KUMAR's Ac...). The main content area features a large graphic with the word "Cars" in the center, surrounded by icons representing data collection and value creation. The text "Collect data from" and "and make value from it" is visible. A "Learn More" button is located at the bottom of the graphic. The bottom of the page shows a weather widget (29°C Cloudy) and a taskbar with various application icons.

Steps to configure:

- Create an account in IBM cloud using your email ID
- Create IBM Watson Platform in services in your IBM cloud account
- Launch the IBM Watson IoT Platform
- Create a new device
- Give credentials like device type, device ID, Auth. Token
- Create API key and store API key and token elsewhere.

Create a new device:

The screenshot shows the IBM Watson IoT Platform interface. The browser address bar displays the URL: `qr3el2.internetofthings.ibmcloud.com/dashboard/devices/drilldown/NodeMCU:12345?returnTo=/devices/browse`. The page title is "Device Drilldown - 12345". On the left, a sidebar menu lists various options: "Device Credentials" (selected), "Connection Information", "Recent Events", "State", "Device Information", "Metadata", "Diagnostics", "Connection Logs", and "Device Actions". The main content area is titled "Device Credentials" and includes a descriptive paragraph: "You registered your device to the organization. Add these credentials to the device to connect it to the platform. After the device is connected, you can navigate to view connection and event details." Below this text is a table with the following data:

Organization ID	qr3el2
Device Type	NodeMCU
Device ID	12345
Authentication Method	use-token-auth
Authentication Token	12345678

Below the table, a warning icon and text state: "Authentication tokens are non-recoverable. If you misplace this token, you will need to re-register the device to generate a new authentication token." A link "Find out how to add these credentials to your device" is provided at the bottom of the section. The bottom of the screen shows a Windows taskbar with the date and time as 11:07 PM on 10/20/2022.