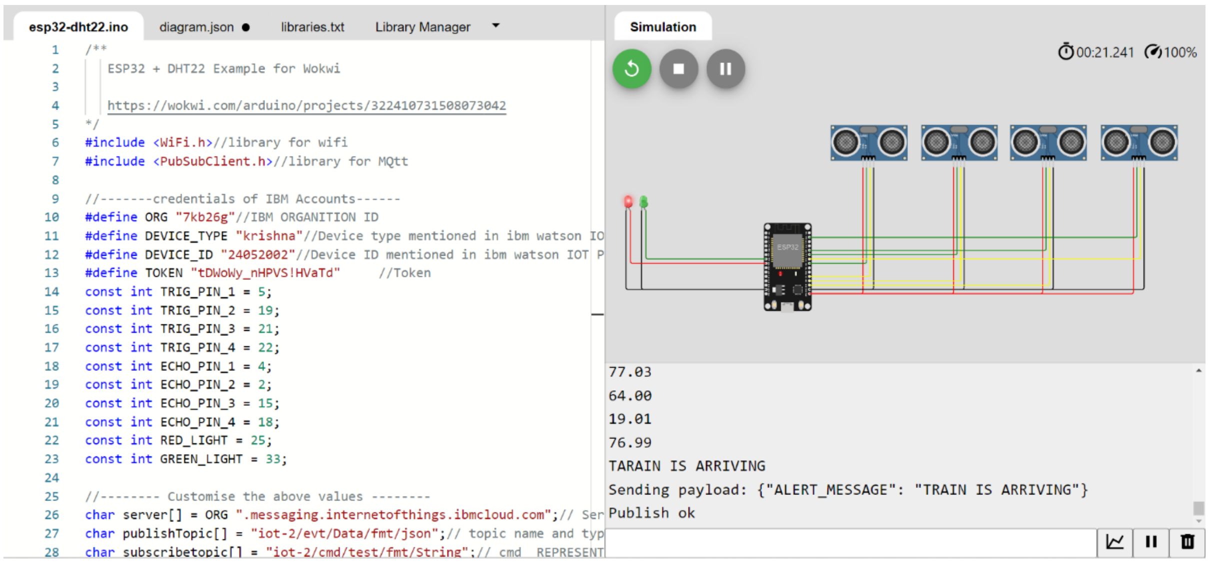
Project Development – Delivery of Sprint-1

Team ID	PNT2022TMID47580
Project Name	Smart Solutions for Railways

Sprint-1 Code:

```
/**
   ESP32 + Ultrasonic Sensor in Wokwi
   Here We use Ultrasonic Sensor to detect whether the Train crossing over the
area, also the sensor detects every motion through its region we use 4
sensors.
   If the motion is detected below 100 in all the 4 ultrasonic sensors, then
the alert message is sent to the IOT Watson
*/
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt

//-------credentials of IBM Accounts------
#define ORG "7kb26g"//IBM ORGANITION ID
#define DEVICE_TYPE "krishna"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "24052002"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "tDWoWy_nHPVS!HVaTd"     //Token
const int TRIG_PIN_1 = 5;
const int TRIG_PIN_2 = 19;
const int TRIG_PIN_3 = 21;
const int TRIG_PIN_4 = 22;
const int ECHO_PIN_1 = 4;
const int ECHO_PIN_2 = 2;
const int ECHO_PIN_3 = 15;
const int ECHO_PIN_4 = 18;
const int RED_LIGHT = 25;
const int GREEN_LIGHT = 33;

//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of
event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd  REPRESENT command
type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id

//-----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, wifiClient); //calling the predefined client
id by passing parameter like server id,portand wificredential

void setup() {
  Serial.begin(115200);
  pinMode(TRIG_PIN_1, OUTPUT);
  pinMode(TRIG_PIN_2, OUTPUT);
  pinMode(TRIG_PIN_3, OUTPUT);
  pinMode(TRIG_PIN_4, OUTPUT);
  pinMode(ECHO_PIN_1, INPUT);
  pinMode(ECHO_PIN_2, INPUT);
  pinMode(ECHO_PIN_3, INPUT);
  pinMode(ECHO_PIN_4, INPUT);
  pinMode(RED_LIGHT, OUTPUT);
  pinMode(GREEN_LIGHT, OUTPUT);
  wificonnect();
  mqttconnect();
}
float readDistance1() {
  digitalWrite(TRIG_PIN_1, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN_1, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN_1, LOW);
  int duration = pulseIn(ECHO_PIN_1, HIGH);
  return duration * 0.034 / 2;
}
float readDistance2() {
  digitalWrite(TRIG_PIN_2, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN_2, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN_2, LOW);
  int duration = pulseIn(ECHO_PIN_2, HIGH);
  return duration * 0.034 / 2;
}
float readDistance3() {
  digitalWrite(TRIG_PIN_3, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN_3, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN_3, LOW);
  int duration = pulseIn(ECHO_PIN_3, HIGH);
  return duration * 0.034 / 2;
}
float readDistance4() {
  digitalWrite(TRIG_PIN_4, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN_4, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN_4, LOW);
  int duration = pulseIn(ECHO_PIN_4, HIGH);
  return duration * 0.034 / 2;
}
void loop() {

  float distance1 = readDistance1();
  float distance2 = readDistance2();
  float distance3 = readDistance3();
  float distance4 = readDistance4();
  Serial.println(distance1);
  Serial.println(distance2);
  Serial.println(distance3);
  Serial.println(distance4);

  if(distance1<=100 && distance2<=100 && distance3<=100 && distance4<=100){
      Serial.println("TARAIN IS ARRIVING");
      PublishData();
      digitalWrite(RED_LIGHT, HIGH);
      delay(700);
      digitalWrite(RED_LIGHT, LOW);
  }
  else{
    Serial.println("TRAIN IS NOT ARRIVING");
    digitalWrite(GREEN_LIGHT, HIGH);
    delay(700);
    digitalWrite(GREEN_LIGHT, LOW);
  }

  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
}

/*....................................retrieving to
Cloud...............................*/

void PublishData() {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  bool status=true;
  String payload = "{\"ALERT_MESSAGE\": \"TRAIN IS ARRIVING\"";
  payload += "}";

  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the cloud
then it will print publish ok in Serial monitor or else it will print publish
failed
  } else {
    Serial.println("Publish failed");
  }

}
void mqttconnect() {
  if (!client.connected()) {
    Serial.print("Reconnecting client to ");
    Serial.println(server);
    while (!!!client.connect(clientId, authMethod, token)) {
      Serial.print(".");
      delay(500);
    }

     initManagedDevice();
     Serial.println();
  }
}
void wificonnect() //function defination for wificonnect
{
  Serial.println();
  Serial.print("Connecting to ");

  WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish
the connection
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}

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

Output:



esp32-dht22.ino | diagram.json | libraries.txt | Library Manager

```
/**
  ESP32 + DHT22 Example for Wokwi

  https://wokwi.com/arduino/projects/322410731508073042
*/
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//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Ser
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and typ
char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd  REPRESENT
```
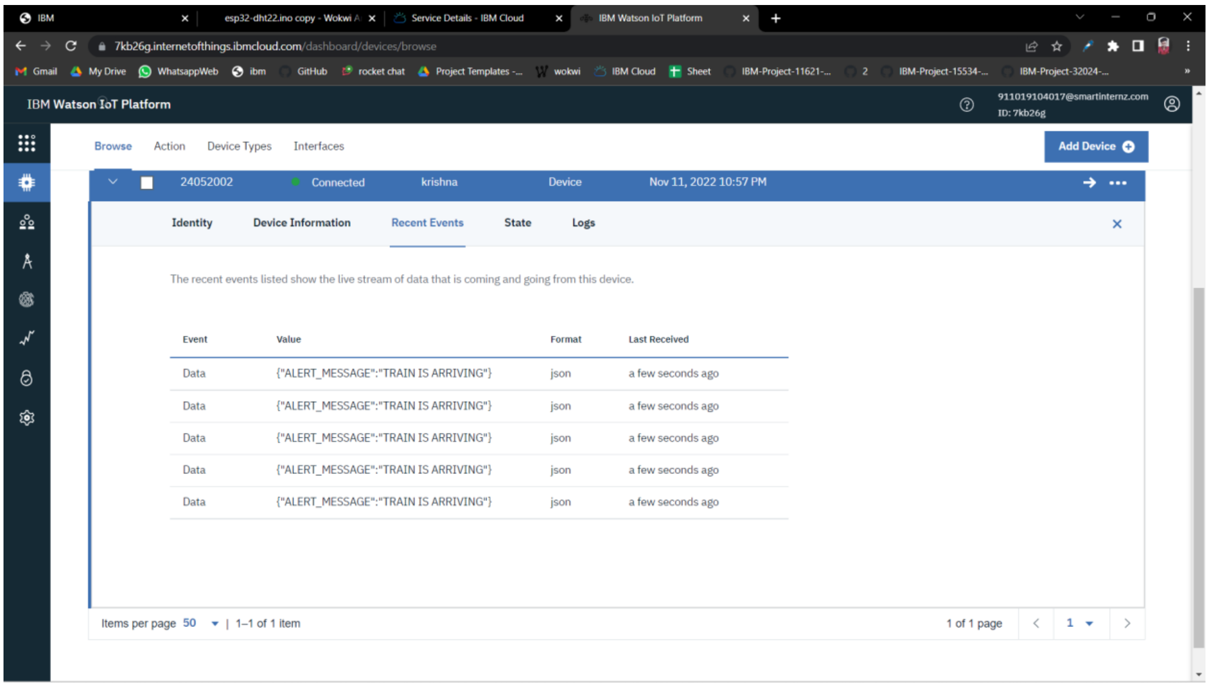

Simulation 00:21.241 100%

```
77.03
64.00
19.01
76.99
TARAIN IS ARRIVING
Sending payload: {"ALERT_MESSAGE": "TRAIN IS ARRIVING"}
Publish ok
```

IBM Cloud Image:



24052002 Connected krishna Device Nov 11, 2022 10:57 PM

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

Event	Value	Format	Last Received
Data	{"ALERT_MESSAGE":"TRAIN IS ARRIVING"}	json	a few seconds ago
Data	{"ALERT_MESSAGE":"TRAIN IS ARRIVING"}	json	a few seconds ago
Data	{"ALERT_MESSAGE":"TRAIN IS ARRIVING"}	json	a few seconds ago
Data	{"ALERT_MESSAGE":"TRAIN IS ARRIVING"}	json	a few seconds ago
Data	{"ALERT_MESSAGE":"TRAIN IS ARRIVING"}	json	a few seconds ago

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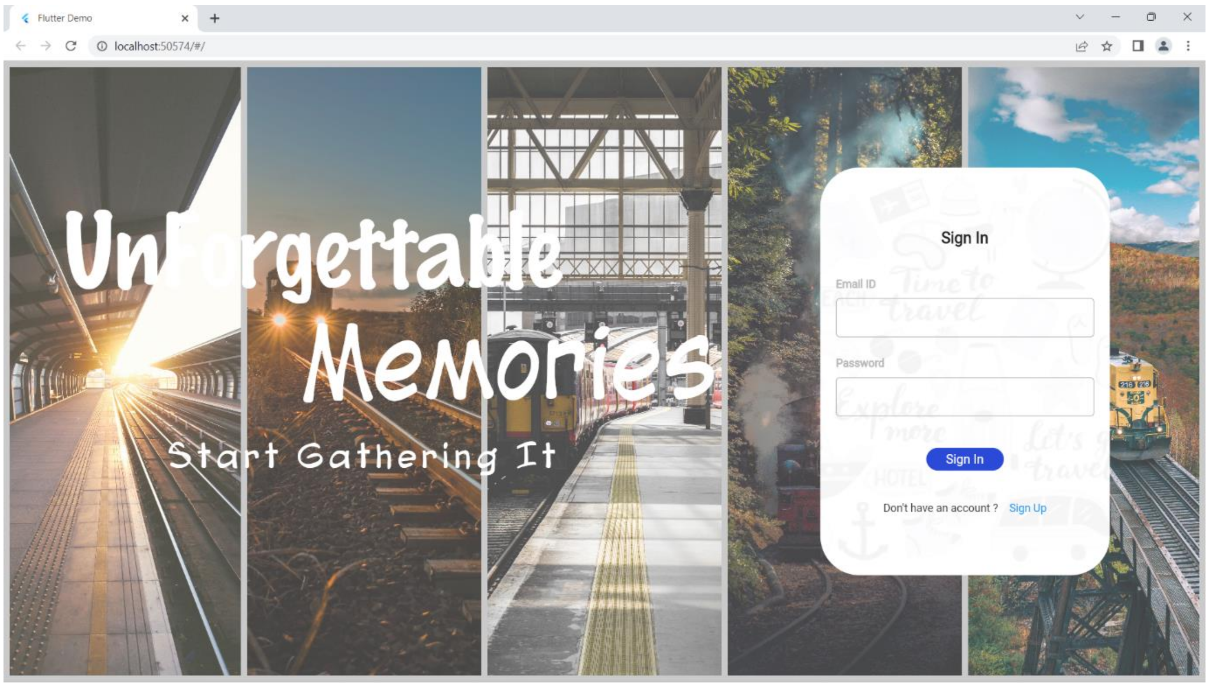
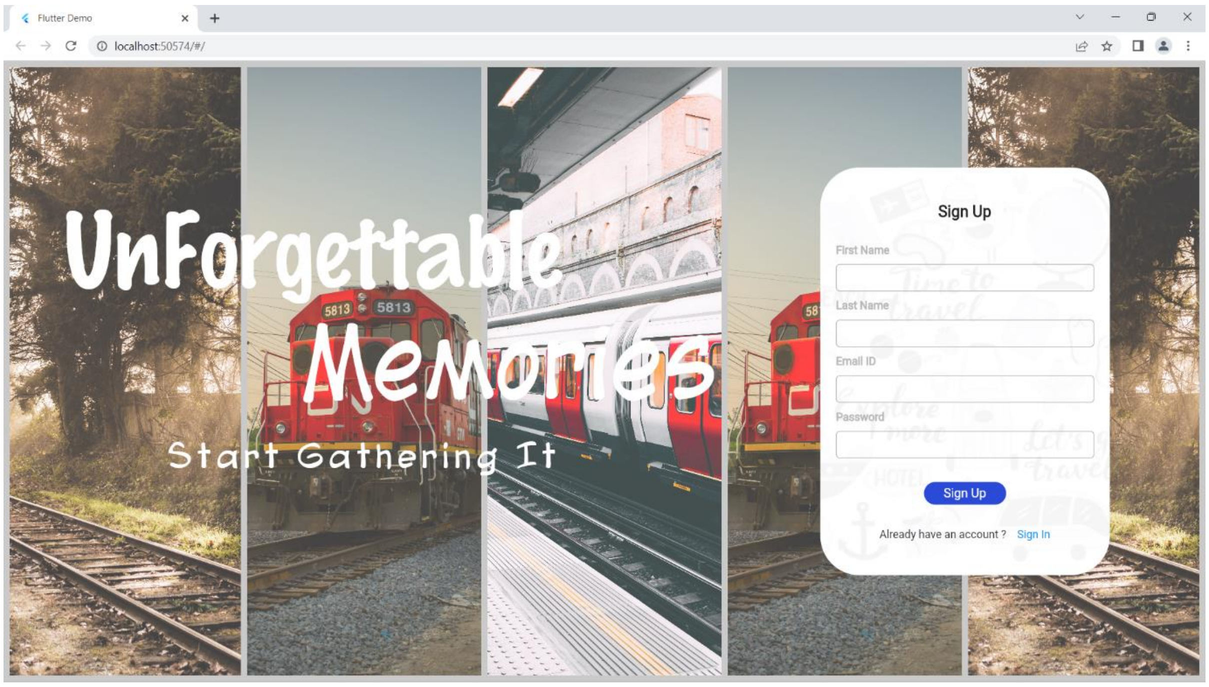
Web Application:

- For this Project We use Flutter Framework for developing the Web Application.
- In Sprint 1, Our Team Developed a Login and Registration UI using Flutter Framework and Dart Language.
- Here the Maria Database is used for Storing the Login Information.

Login Page:



Registration Page:


Flutter Demo
localhost:50574/#/
UnForgettable
Memories
Start Gathering It
Sign Up
First Name
Last Name
Email ID
Password
Sign Up
Already have an account ? Sign In