

Phase 5: Project documentation & submission

Title: Environmental monitoring

Objectives:

- **Enhance Green Spaces:** Improve the management and overall quality of urban and rural green spaces.
- **Incorporate Technology:** Integrate IoT sensors, data analytics, and automation into park management.
- **Sustainability:** Promote sustainability by optimizing resource utilization and monitoring environmental conditions.
- **Visitor Experience:** Enhance the experience of park-goers through interactive applications and real-time information.
- **Eco-friendliness:** Create more eco-friendly outdoor environments by leveraging innovation and connectivity.

Device Deployment:

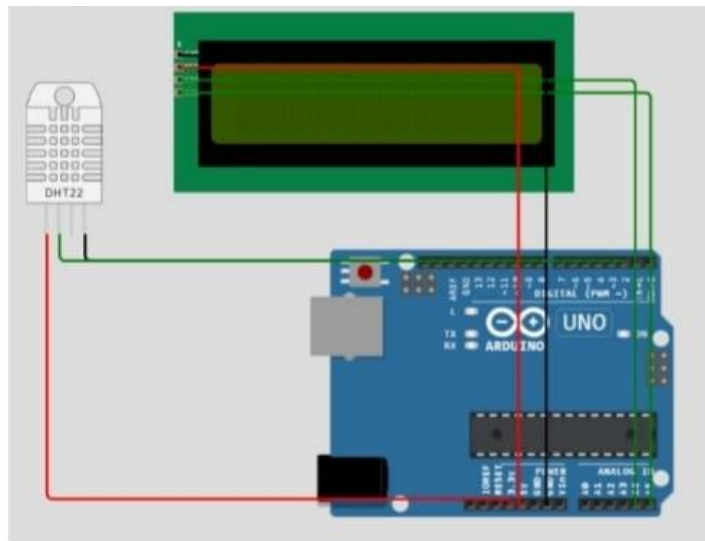
Platform development and code implementation for IoT involves creating a software and hardware ecosystem that connects and manages IoT devices. It includes selecting appropriate hardware components, developing firmware for IoT devices, establishing cloud or edge infrastructure for data processing, ensuring security, and building user interfaces. The code implementation encompasses programming IoT devices to collect and transmit data, developing server-side applications for data processing and analytics, and creating user interfaces for monitoring and control. The goal is to build a scalable, secure, and user-friendly platform that leverages IoT technologies for various applications. Firebase is a powerful Google-backed platform for developing mobile and web apps, offering features like real-time databases and authentication. In contrast, MIT App Inventor is a beginner-friendly, visual interface tool primarily for creating Android apps. They can be used together to harness Firebase's backend capabilities while simplifying app creation through MIT App Inventor's visual components, making it accessible to a wide range of developers, including beginners.

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Circuit Diagram:



Coding:

```
#include <LiquidCrystal_I2C.h>

#include "DHT.h"

#define DHTPIN 2

#define DHTTYPE DHT11

LiquidCrystal_I2C lcd(0x27, 16, 2); // I2C address 0x3F, 16 column and 2 rows
DHT dht(DHTPIN, DHTTYPE);

void setup()
{
  dht.begin(); // initialize the sensor
  lcd.init(); // initialize the lcd
  lcd.backlight(); // open the backlight
}

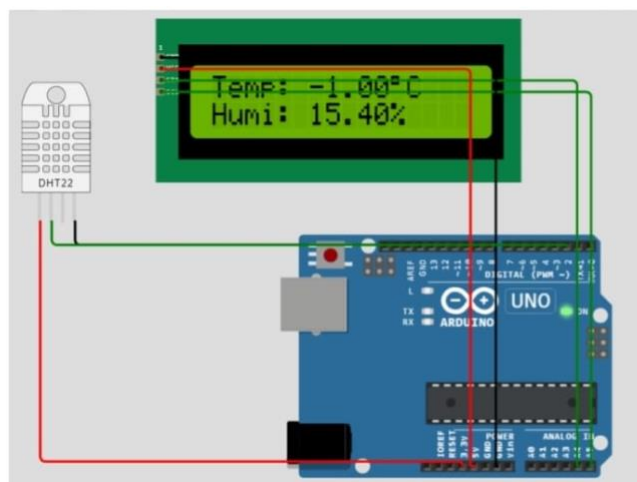
void loop()
{
  delay(2000); // wait a few seconds between measurements
  float humi = dht.readHumidity(); // read humidity
```

```

float tempC = dht.readTemperature(); // read temperature
lcd.clear();
// check if any reads failed
if (isnan(humi) || isnan(tempC)) {
  lcd.setCursor(0, 0);
  lcd.print("Failed");
} else {
  lcd.setCursor(0, 0); // start to print at the first row
  lcd.print("Temp: ");
  lcd.print(tempC); // print the temperature
  lcd.print((char)223); // print ° character
  lcd.print("C");
  lcd.setCursor(0, 1); // start to print at the second row
  lcd.print("Humi: ");
  lcd.print(humi); // print the humidity
  lcd.print("%");
}
}

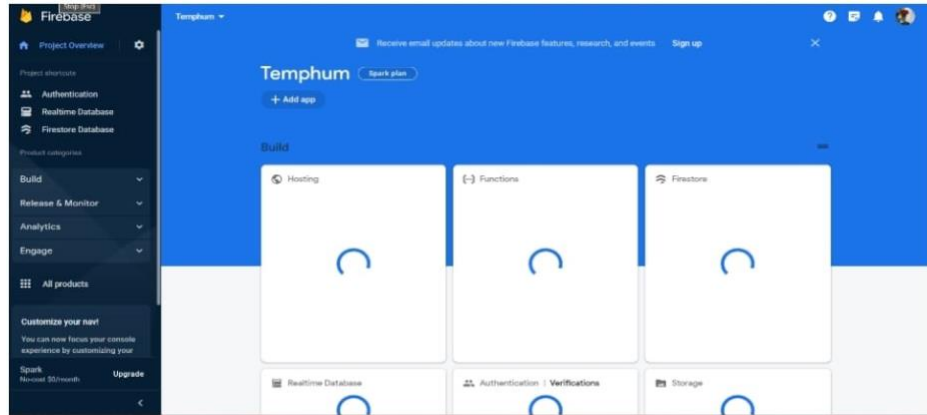
```

Sample output :

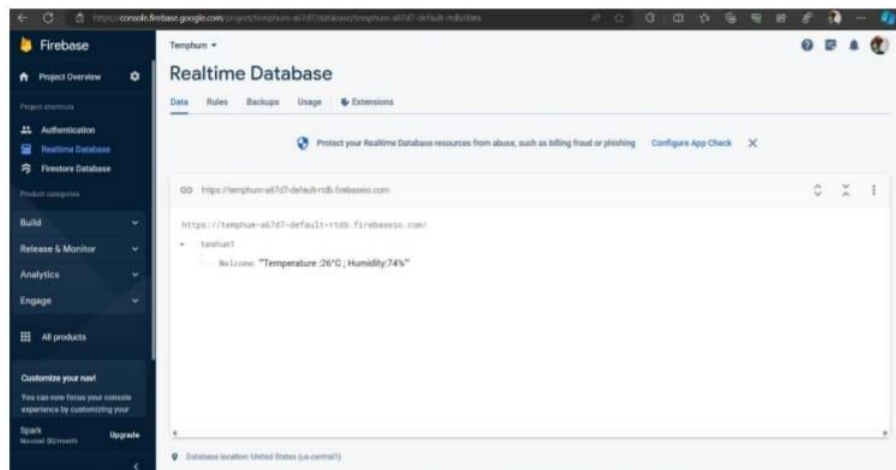


Firestore Platform:

Firebase is a comprehensive mobile and web app development platform by Google. It offers a wide range of features, including real-time database, authentication, cloud functions, cloud storage, and analytics.



Monitoring in Parks project, ensuring seamless accessibility and reliability for park visitors, enabling informed outdoor engagements.



Firebase Data Display:

➤ Database url:

<https://temphum-a67d7-default-rtdb.firebaseio.com/>

App Development:

Utilizing "MIT App Inventor," create a mobile application.

MIT App Inventor:

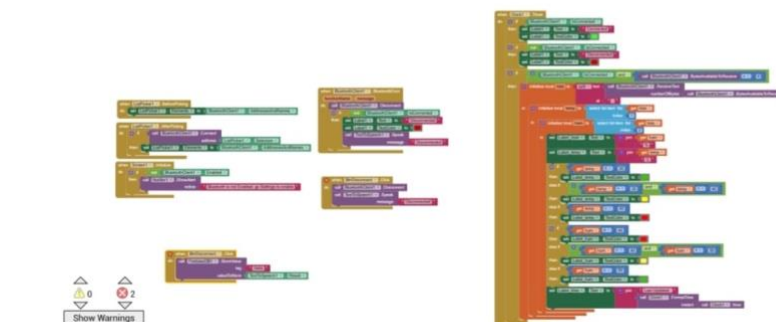
MIT App Inventor is a user-friendly, visual, and beginner-friendly platform for creating Android apps. It's primarily focused on teaching programming and app development to individuals without extensive coding experience. Users can create apps by visually

assembling components and blocks to define the app's functionality. It's an excellent tool for educational purposes, prototyping, or developing simpler apps.

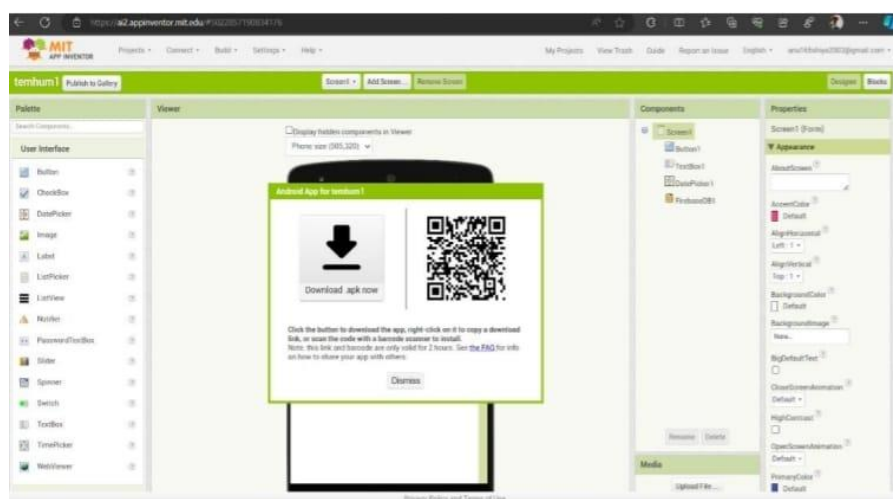
Design view :



Block view:



Using "MIT App Inventor," we can use our generated application on our mobile device by either scanning the QR code or entering the six digits.



Benefits to park visitors after lot:

- **Real-Time Information:** IoT sensors can provide real-time updates on weather conditions, event schedules, and park information through mobile apps, enhancing the visitor experience.
- **Interactive Features:** Smart parks can offer interactive maps, guided tours, and educational content, making visits more engaging and informative.
- **Safety:** IoT devices like security cameras and emergency alerts can enhance safety and security, providing peace of mind to visitors.

Conclusion :

In conclusion, the integration of IoT technology in park management presents a transformative opportunity to create more enjoyable, accessible, and sustainable outdoor environments for visitors. By providing real-time information, interactivity, safety enhancements, and resource optimization, smart parks not only address modern urban challenges but also foster a harmonious relationship between the natural world and cutting-edge technology, ultimately enhancing the overall quality of the park-goer experience.