Smart Water Fountain

Introduction

The Smart Water Fountain project represents a fusion of hardware and software technologies, creating an interactive Internet of Things (IoT) system. This system allows users to remotely control a water fountain through a user-friendly mobile application. Utilizing the power of the NodeMCU ESP8266 microcontroller, an ultrasonic sensor, a water pump, a relay module, and an LED indicator, the project showcases the seamless integration of various components for an engaging and responsive user experience.

Components Selection

The selection of components was critical to the project's success:

NodeMCU ESP8266:

   The NodeMCU ESP8266 was chosen due to its compatibility with IoT applications and built-in Wi-Fi capabilities, enabling seamless communication with the mobile application.

Ultrasonic Sensor (HC-SR04):

   The ultrasonic sensor accurately measures the water level in the fountain, allowing the system to respond dynamically based on the water level.

Water Pump:

   The water pump creates the fountain effect, enhancing the visual appeal of the project and providing a real-world application of the IoT system.

Relay Module:

   The relay module acts as a switch, allowing the microcontroller to control the high-power water pump safely.

LED Indicator:

   The LED serves as a visual indicator, displaying the status of the fountain (Active or Idle) to provide feedback to the user.

Circuit Setup

The components were meticulously connected to ensure proper functionality:

NodeMCU ESP8266:

   Connected to the ultrasonic sensor, water pump, relay module, and LED using appropriate GPIO pins, establishing a secure and responsive communication link.

Ultrasonic Sensor:

   Connected to the NodeMCU ESP8266, with VCC and GND connected to power sources and Trig and Echo pins connected to digital pins for data transmission.

Water Pump and Relay Module:

The pump was connected via the relay module to allow safe high-power control, ensuring efficient and secure operation.

LED:

Connected to a digital pin on the NodeMCU ESP8266, providing visual feedback to the user regarding the fountain's status.
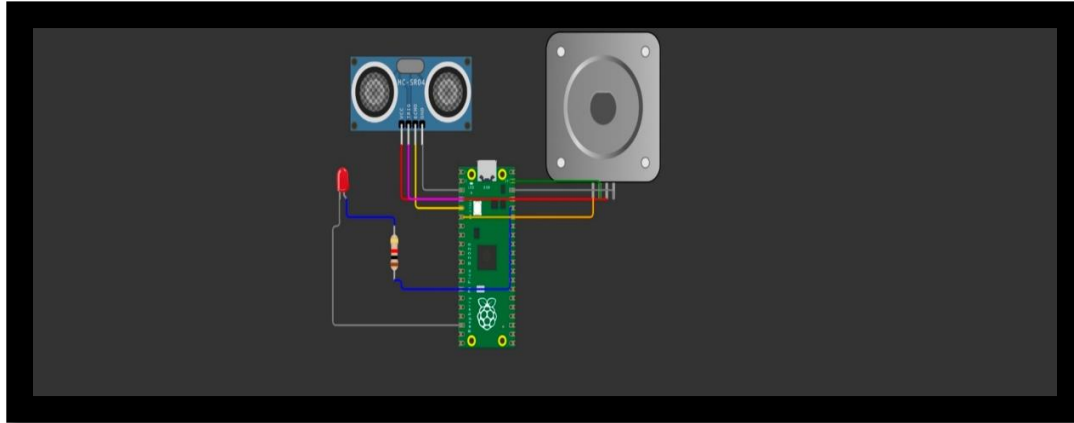
ARDUINO CODE IMPLEMENTATION

The heart of the system lies in the Arduino code, which orchestrates the interactions between the components:

```
#include <ESP8266WiFi.h>

#include <ESP8266WebServer.h>

// Wi-Fi credentials

const char* ssid = "YourWiFiSSID";

const char* password = "YourWiFiPassword";

// Pin configurations

ESP8266WebServer server(80);

const int pumpPin = D1;

const int ledPin = D2;

void setup() {

  // Wi-Fi connection setup

  // Pin mode setup for pump and LED

  // Server endpoints for turning the fountain on/off

}

void loop() {

  // Handle incoming client requests

}
```

MIT APP INVENTOR INTEGRATION

Incorporating the intuitive MIT App Inventor, a user-friendly mobile application was designed:

User Interface:

"Turn On" Button:

Initiates a POST request to the server endpoint "/turnon", activating the fountain.

"Turn Off" Button:

Sends a POST request to the server endpoint "/turnoff", deactivating the fountain.

Blocks Configuration:

"Turn On" Button Click:

Utilizes the Web component to send a POST request to "http://NodeMCU_IP_Address/turnon",triggering the fountain
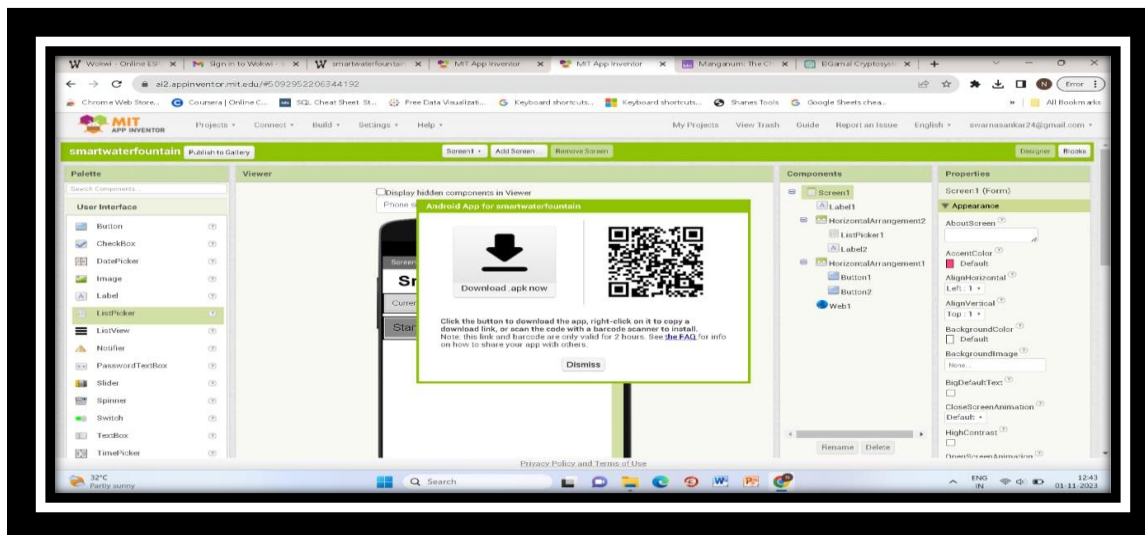
operation.

"Turn Off" Button Click:

Utilizes the Web component to send a POST request to "http://NodeMCU_IP_Address/turnoff",halting the fountain
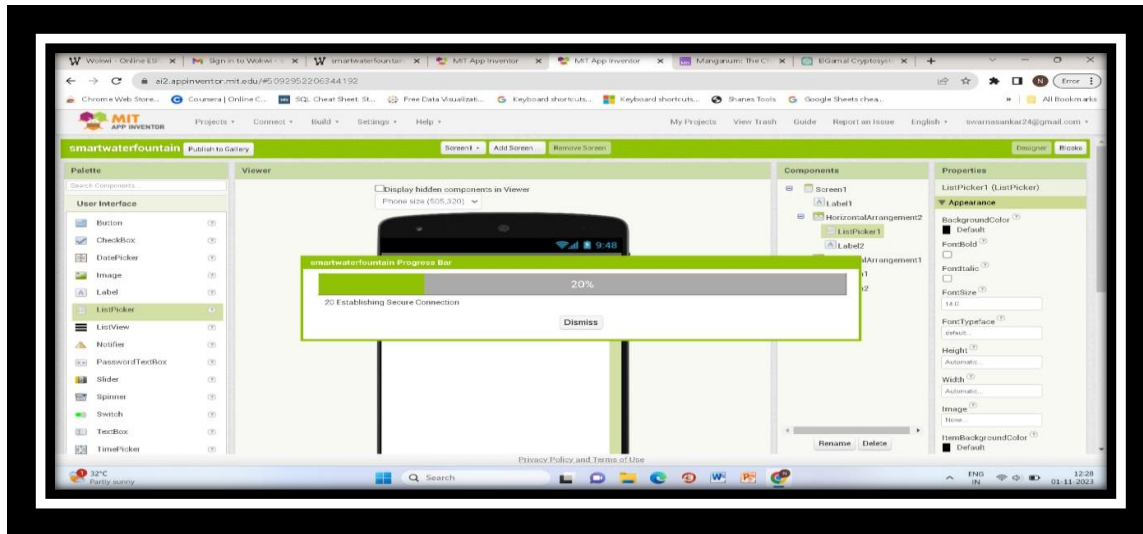
operation.

TESTING AND DEPLOYMENT

1. Hardware Setup:

Assemble the components, ensuring correct connections for seamless communication.
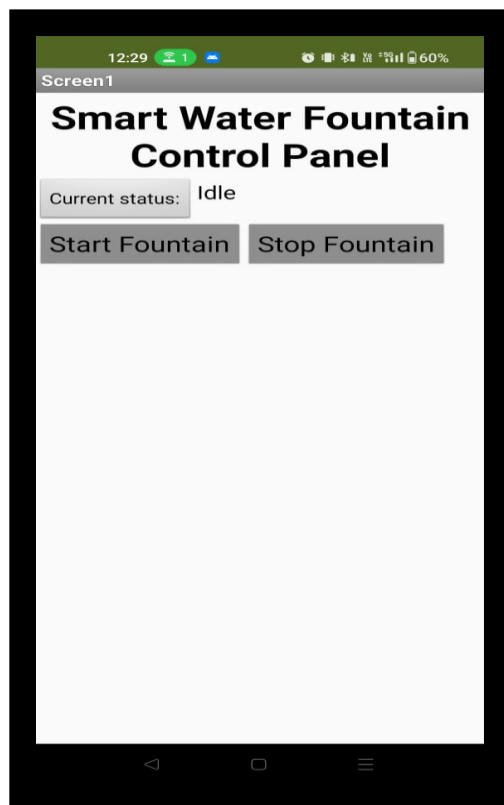

2. Deploy the Arduino Code:

Upload the provided Arduino code to the NodeMCU ESP8266 board, configuring Wi-Fi credentials and IP address.

<u>3. Mobile App Testing:</u>

Utilize the MIT AI2 Companion app to test the mobile application's functionality. Verify the buttons' responsiveness, ensuring they

correctly control the fountain based on user input.

<u>CONCLUSION</u>

In conclusion, the Smart Water Fountain project embodies the harmonious integration of hardware and software technologies. By

leveraging the power of the NodeMCU ESP8266, an innovative IoT system was created, allowing users to interact with a physical device remotely. This project not only showcases the technical prowess in the realm of IoT but also demonstrates the potential for creating engaging and interactive applications that bridge the physical and digital worlds. Through careful component selection, precise circuitry, meticulous Arduino code implementation, and intuitive MIT App Inventor integration, the Smart Water Fountain project stands as a testament to the limitless possibilities offered by the world of Internet of Things.

This comprehensive documentation encapsulates the essence of the Smart Water Fountain project, detailing the project's inception, components, circuitry, code, and user interface.