IoT Programming Final Project (21KHDL)

SMART LIGHTING SYSTEM

Get Started

Presented by **Tran Hieu Tam (21127423)**

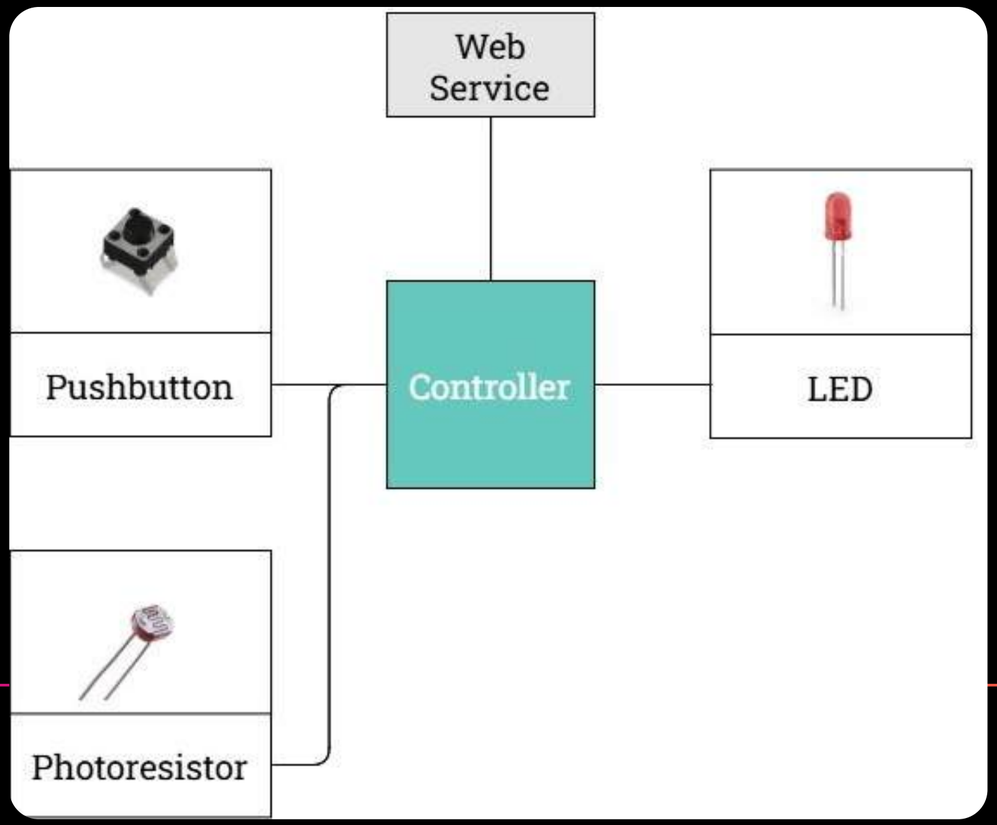
Description:

The smart lighting system offers two operational modes: Auto and Manual. In Auto Mode, the light uses a sensor to automatically turn off during the day and blink at night, adapting to ambient light conditions. Manual Mode allows users to control the light with a button, toggling it on or off as needed. After a set period or a change in day/night conditions, the system reverts back to Auto Mode.

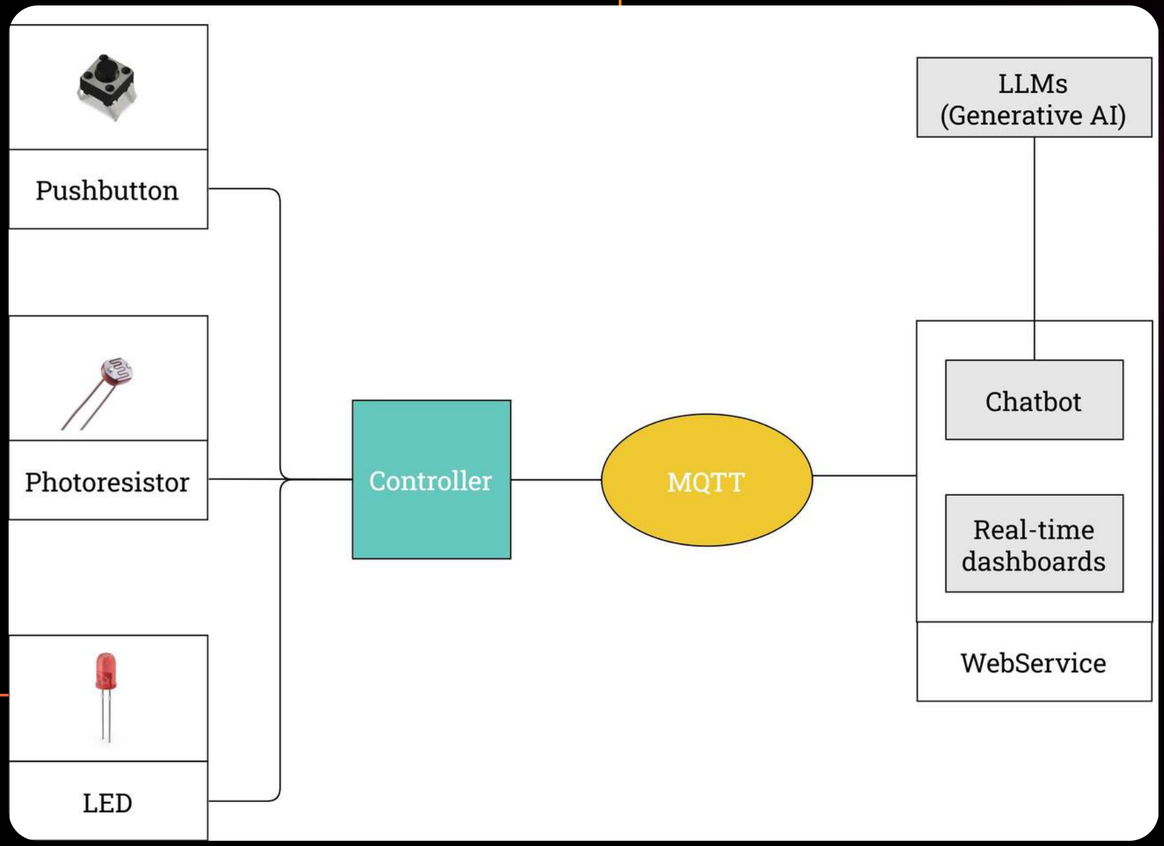
Wireless control enhances functionality with options like IR remote, Bluetooth, or WiFi connectivity. Users can send commands to turn the light on/off or switch between Auto and Manual modes. The system integrates MQTT communication, allowing it to connect to the internet for sending and receiving messages. This feature ensures seamless interaction with other devices or apps, providing real-time updates on the light's status.

Advanced features include ChatGPT integration and a web dashboard for intuitive control. The chatbot interface lets users manage the system using voice or text commands. The web dashboard displays the light's status, enables remote control, and maintains a chat history with timestamps.

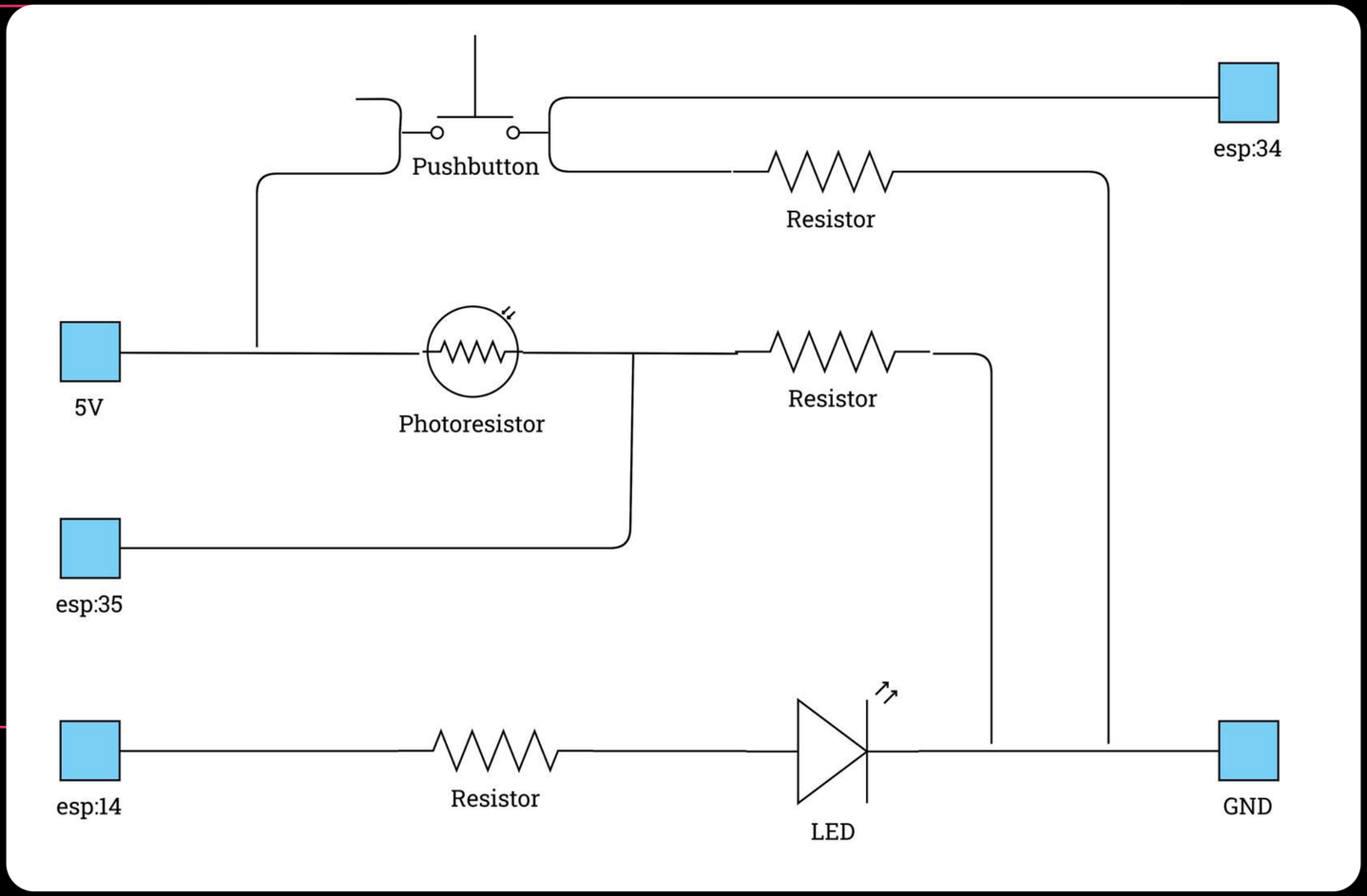
Project Requirements



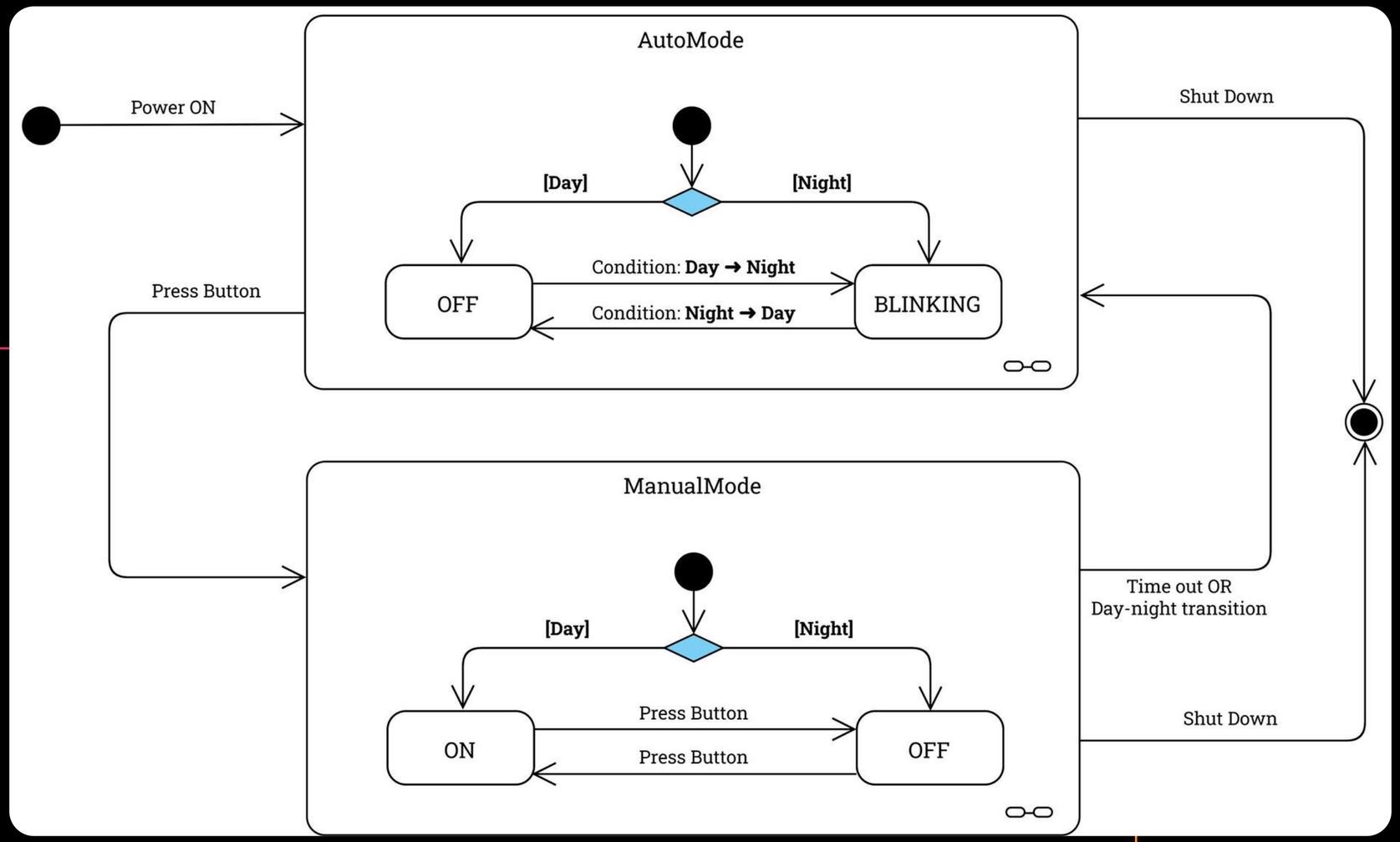
System Design (version 1.0)



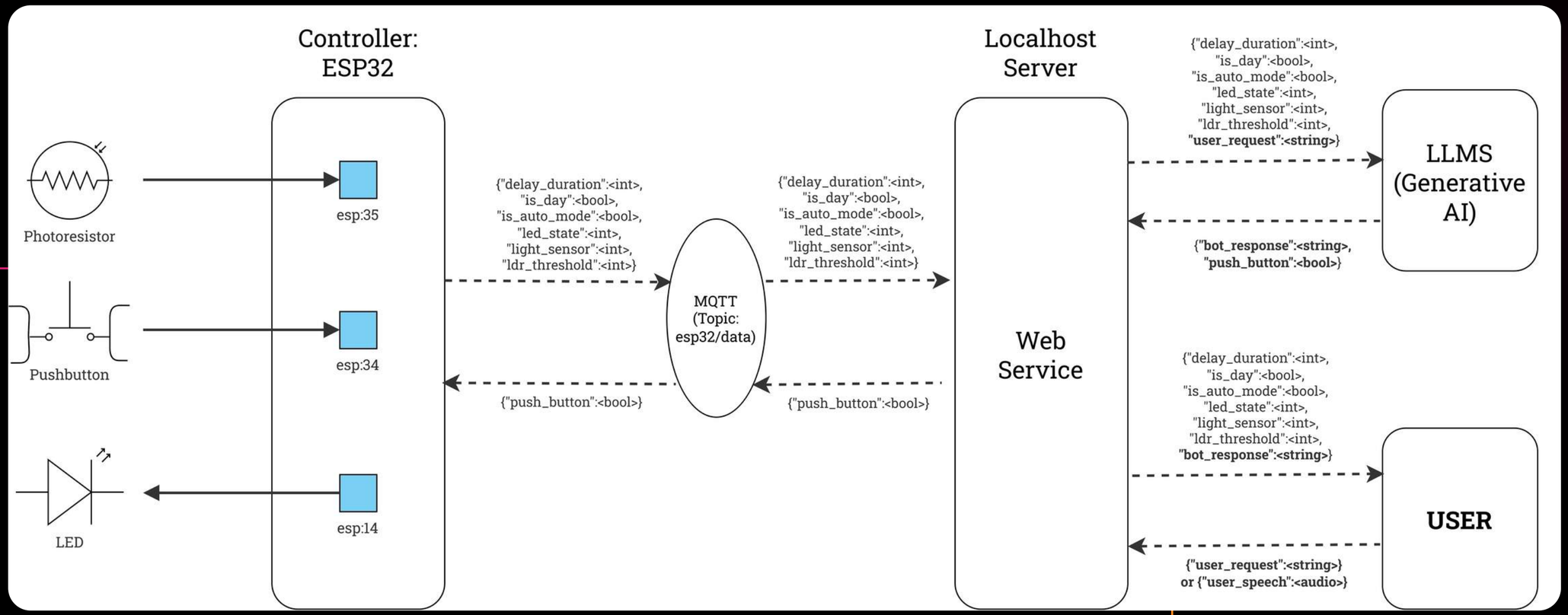
System Design (version 2.0)



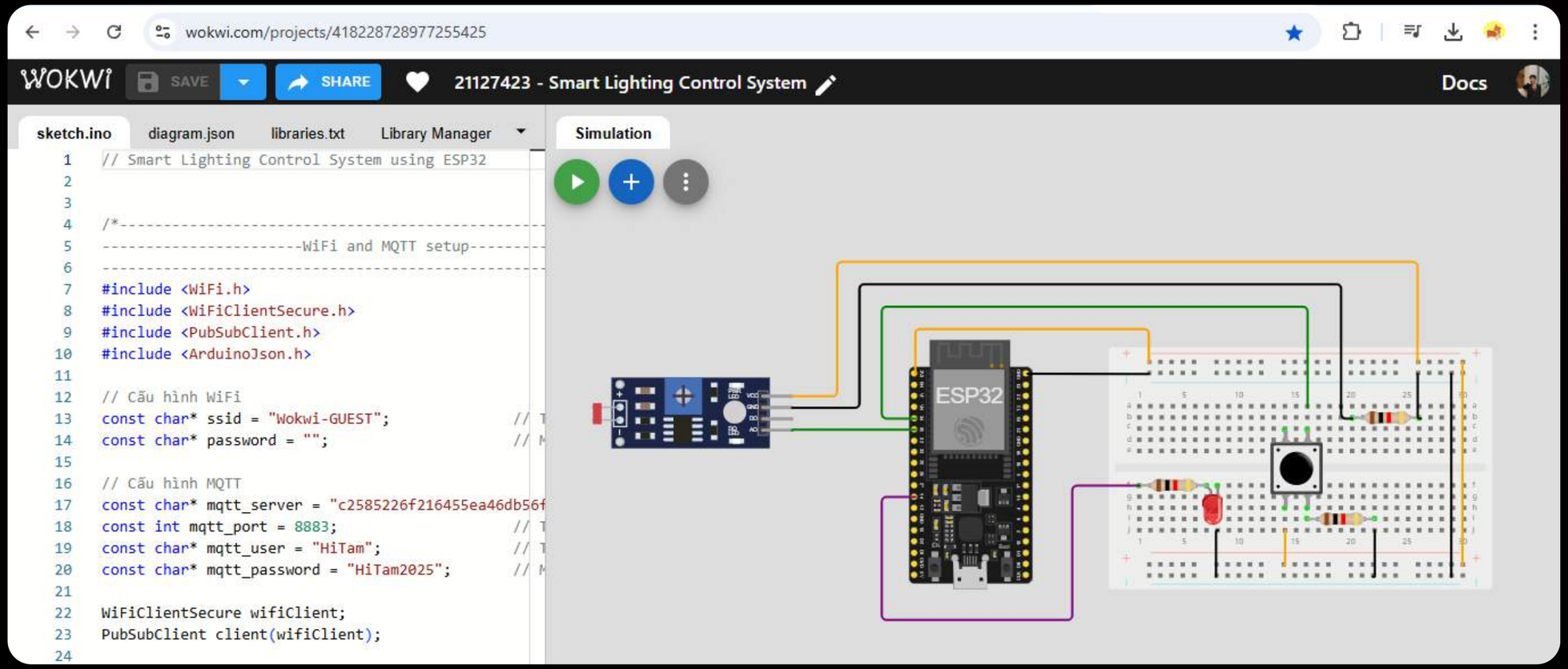
System Circuit



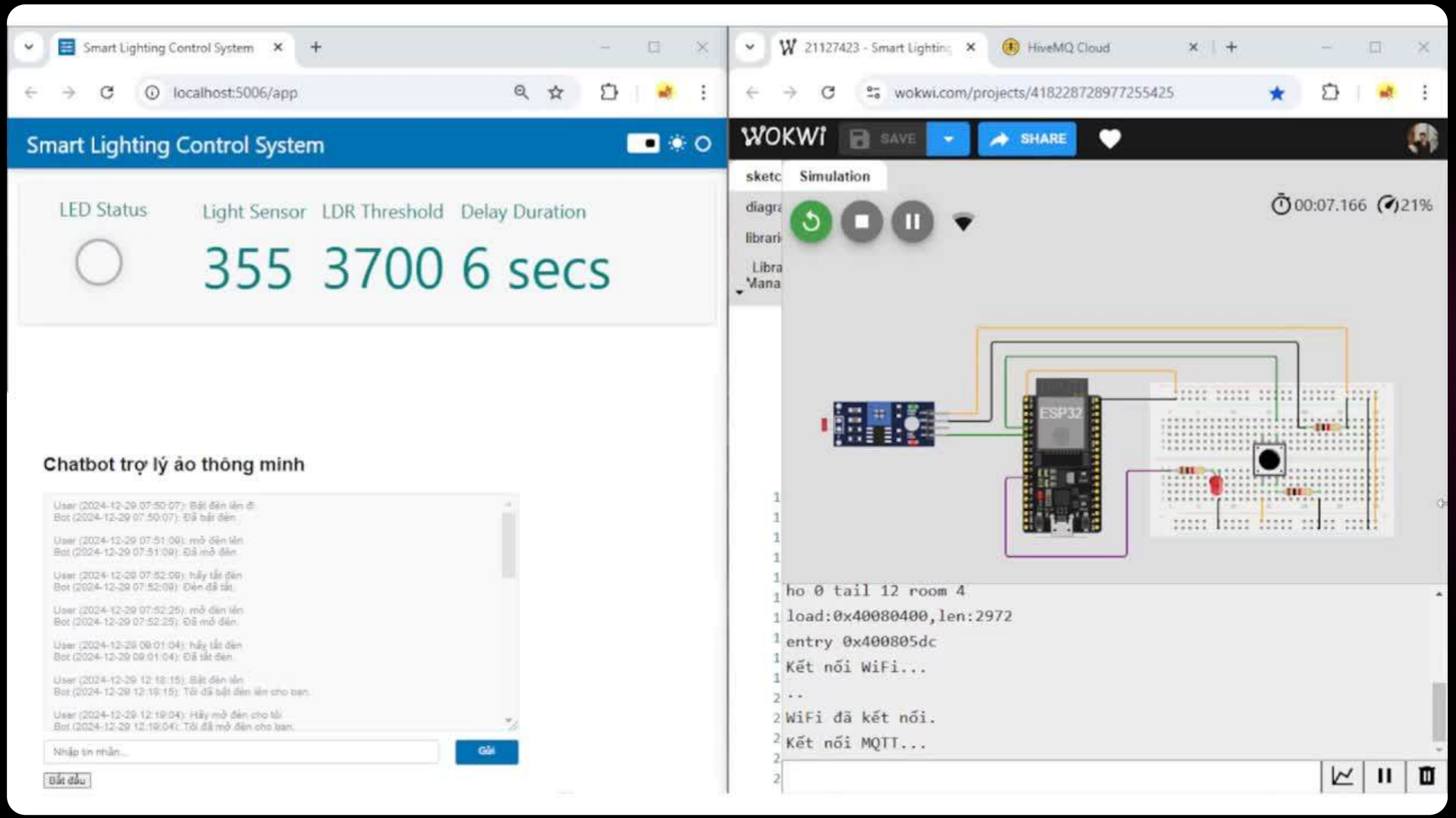
Finite-state machine for Smart Lighting Control System

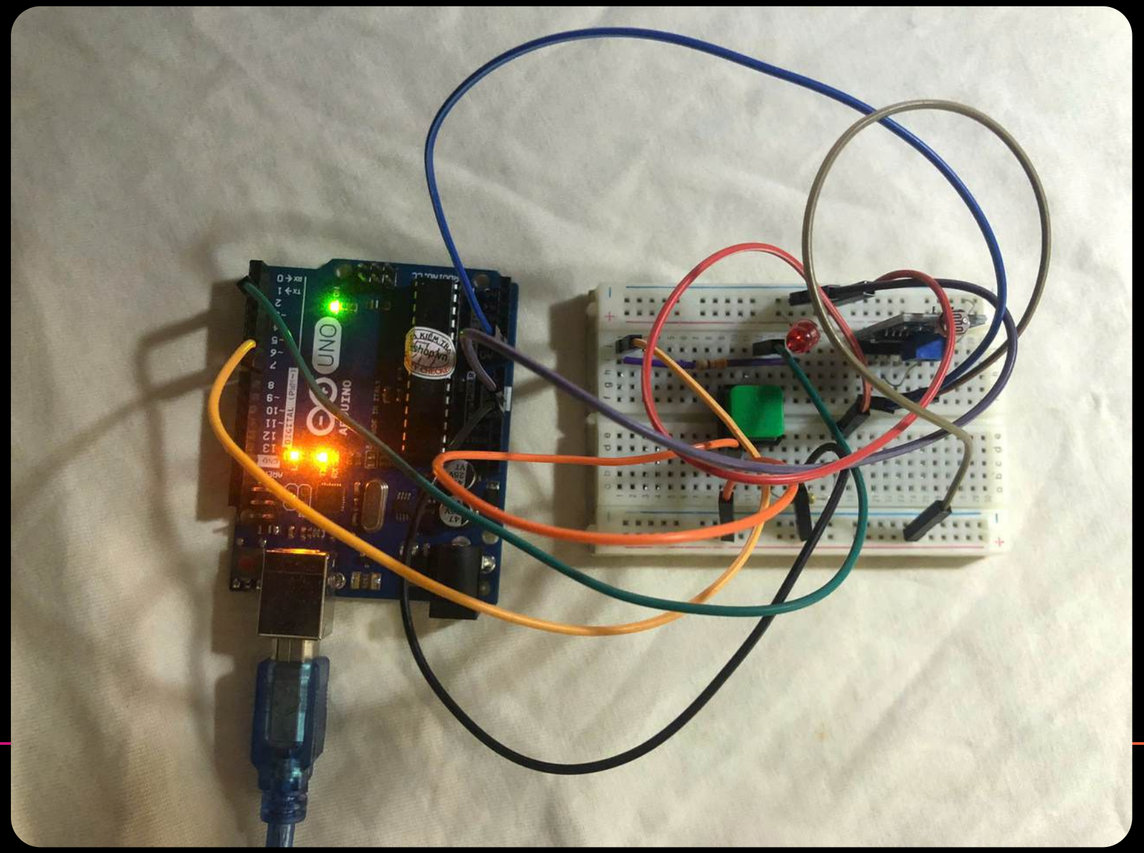


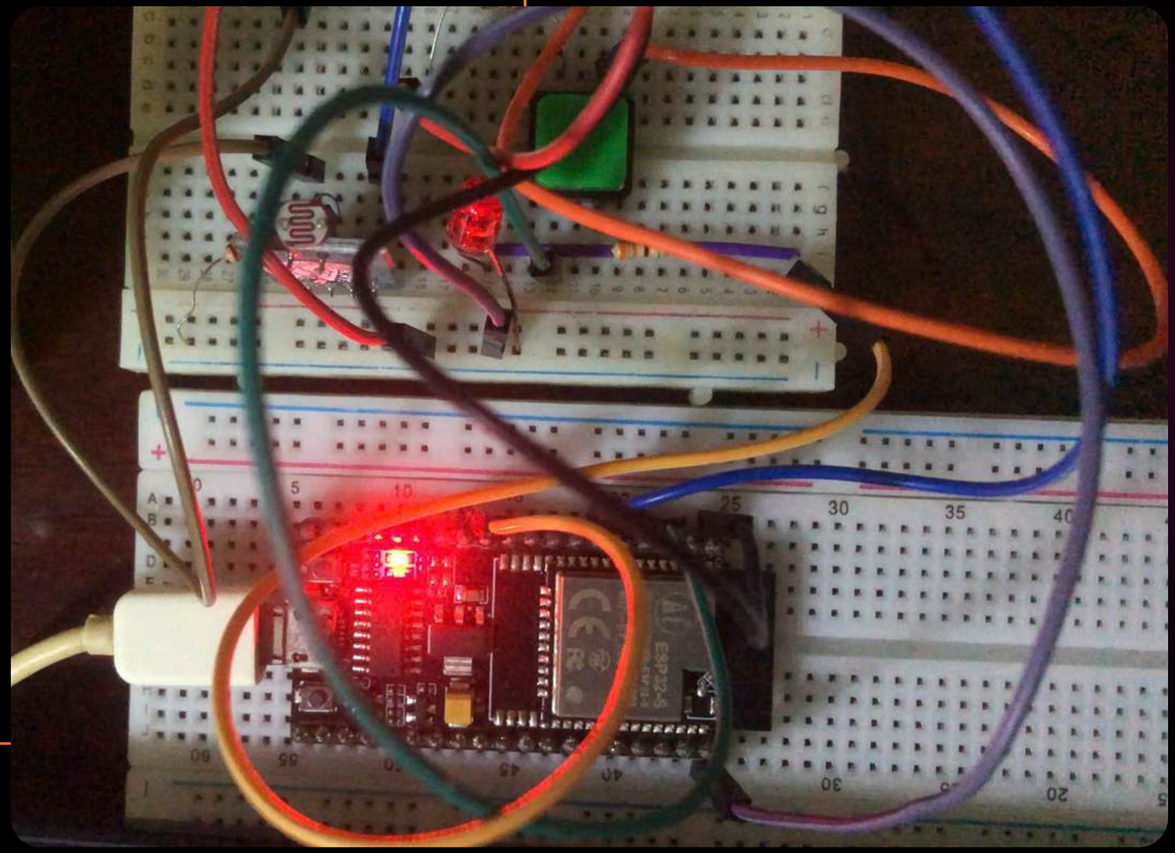
Data communication Diagram



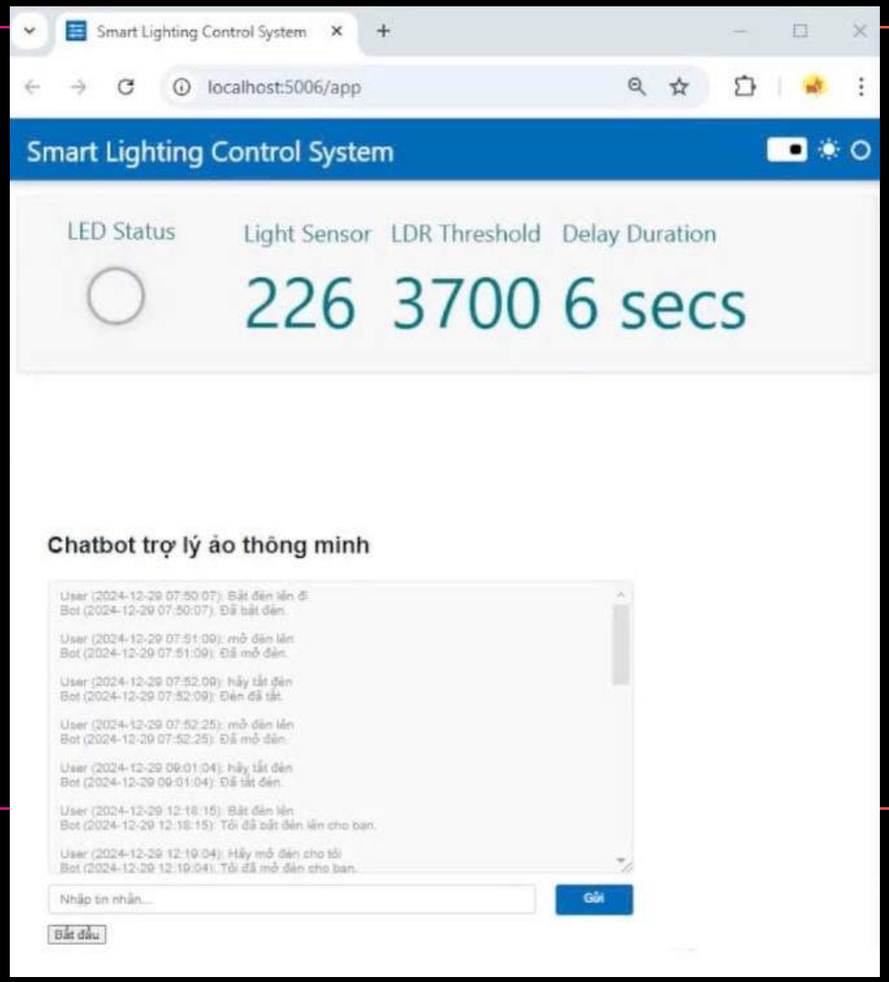
Smart Lighting Control System Simulation on Tinkercad

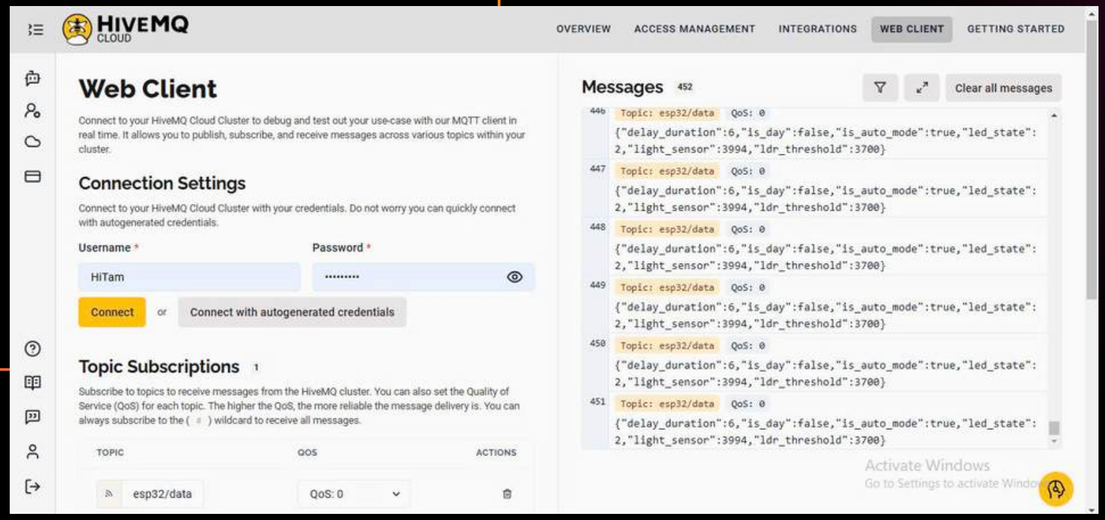

Smart Lighting Control System
localhost:5006/app
Smart Lighting Control System
LED Status
Light Sensor
LDR Threshold
Delay Duration
355
3700
6 secs
Chatbot trợ lý ảo thông minh
Nhập tin nhắn...
Gửi
Bắt đầu
21127423 - Smart Lighting
HiveMQ Cloud
wokwi.com/projects/418228728977255425
WOKWI
SAVE
SHARE
Simulation
00:07.166
21%
ESP32
ho 0 tail 12 room 4
load:0x40080400,len:2972
entry 0x400805dc
Kết nối WiFi...
..
WiFi đã kết nối.
Kết nối MQTT...





Smart Lighting Control System Complete Demonstration on Real Hardware





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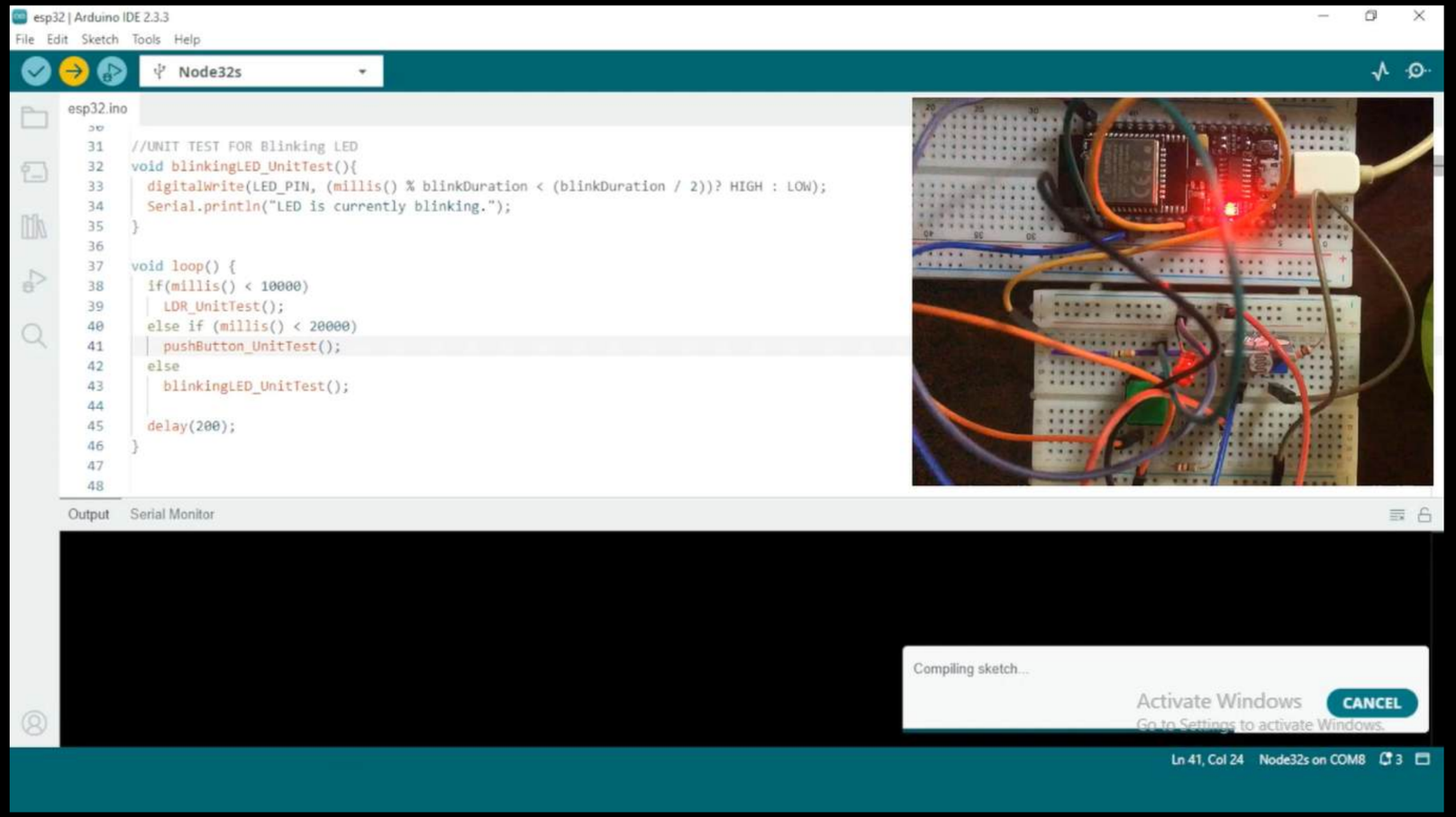


Unit Test on Real Hardware System

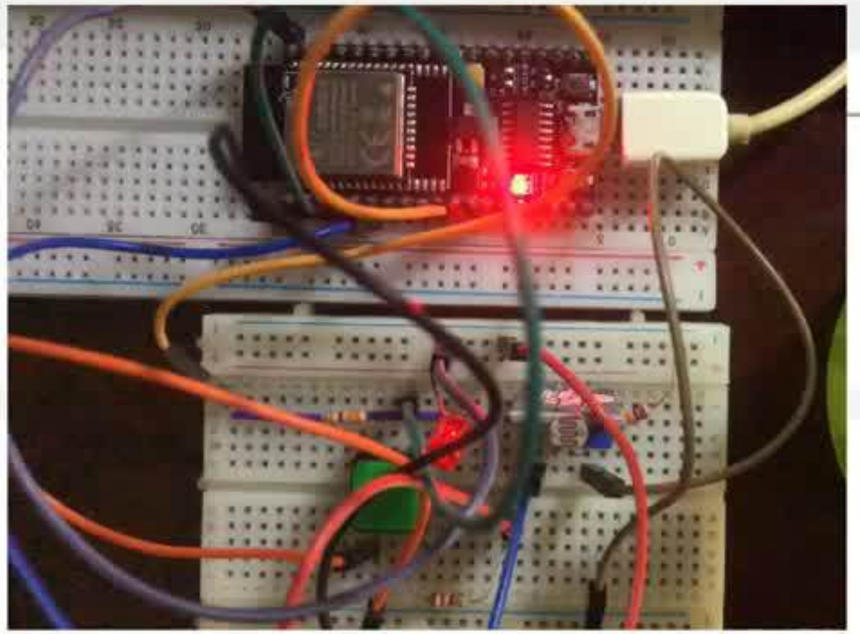
esp32 | Arduino IDE 2.3.3

File Edit Sketch Tools Help

Node32s

esp32.ino

```
31  //UNIT TEST FOR Blinking LED
32  void blinkingLED_UnitTest(){
33    digitalWrite(LED_PIN, (millis() % blinkDuration < (blinkDuration / 2))? HIGH : LOW);
34    Serial.println("LED is currently blinking.");
35  }
36
37  void loop() {
38    if(millis() < 10000)
39      LDR_UnitTest();
40    else if (millis() < 20000)
41      pushButton_UnitTest();
42    else
43      blinkingLED_UnitTest();
44
45    delay(200);
46  }
47
48
```

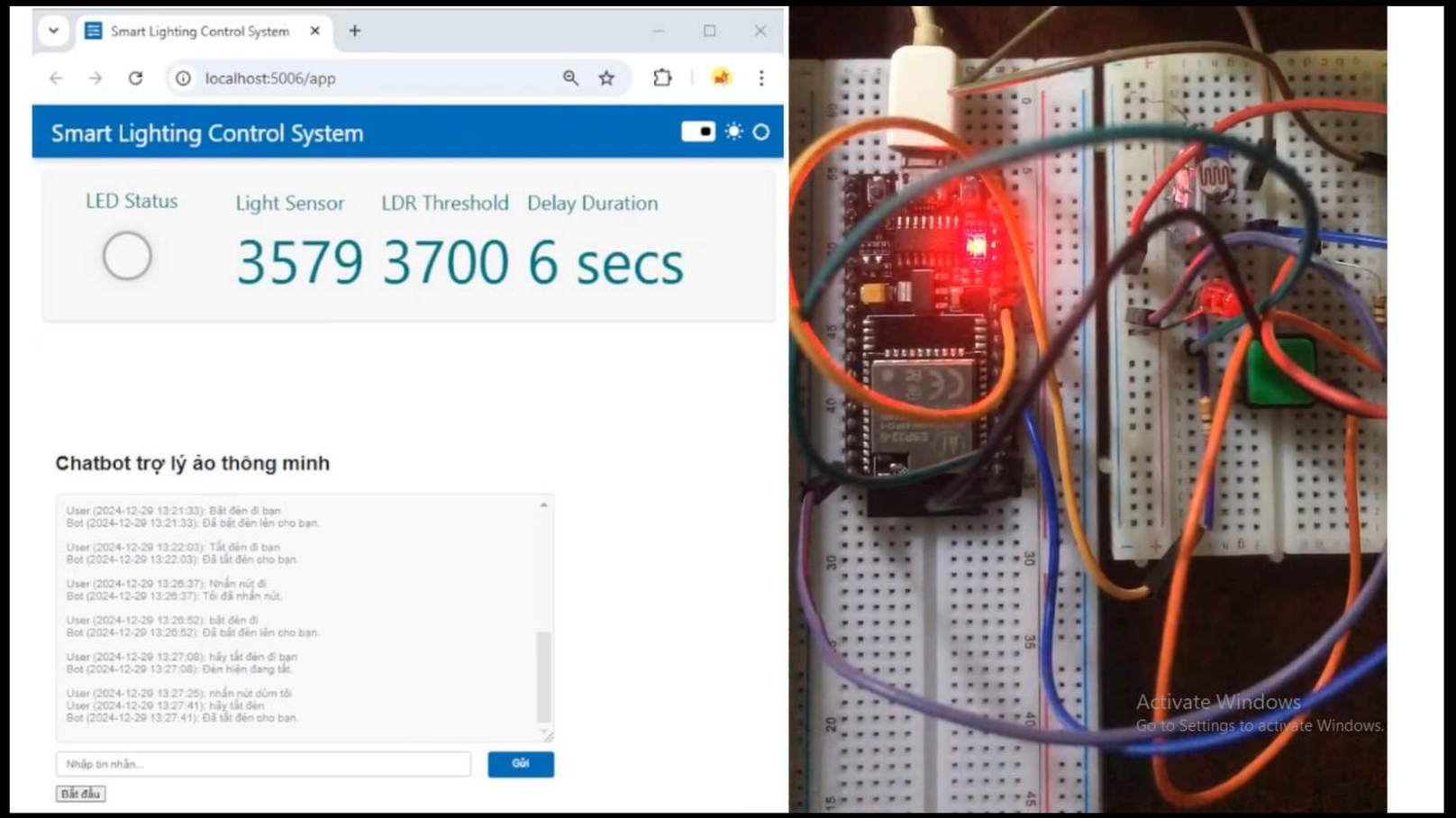


Output Serial Monitor

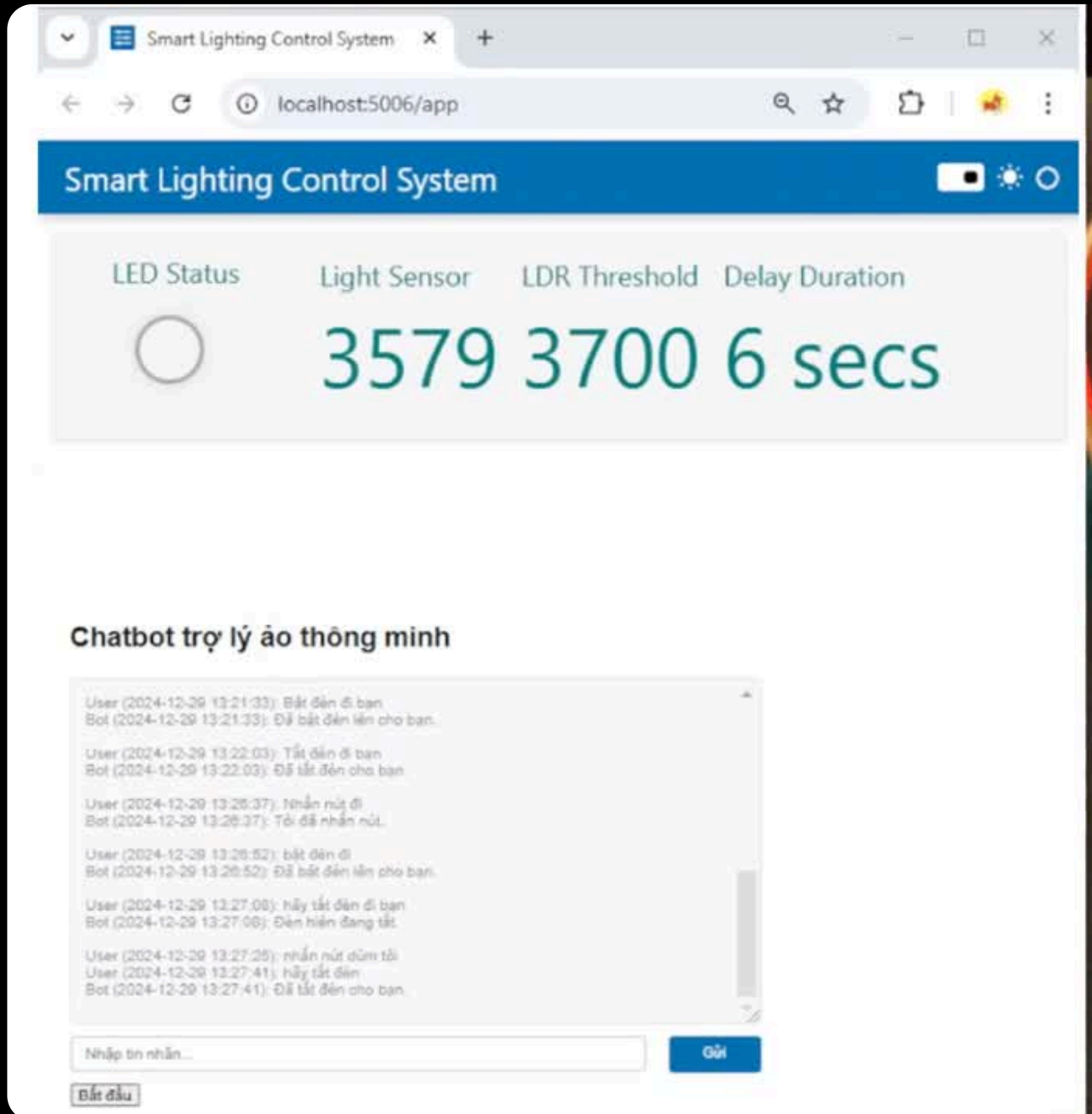
Compiling sketch...

CANCEL

Ln 41, Col 24 Node32s on COM8 3



Complete demonstration on real hardware


Smart Lighting Control System
localhost:5006/app
Smart Lighting Control System
LED Status
Light Sensor
LDR Threshold
Delay Duration
3579
3700
6 secs
Chatbot trợ lý ảo thông minh
User (2024-12-29 13:21:33): Bật đèn đi bạn
Bot (2024-12-29 13:21:33): Đã bật đèn lên cho bạn.
User (2024-12-29 13:22:03): Tắt đèn đi bạn
Bot (2024-12-29 13:22:03): Đã tắt đèn cho bạn
User (2024-12-29 13:26:37): Nhấn nút đi
Bot (2024-12-29 13:26:37): Tôi đã nhấn nút.
User (2024-12-29 13:26:52): bật đèn đi
Bot (2024-12-29 13:26:52): Đã bật đèn lên cho bạn.
User (2024-12-29 13:27:08): hãy tắt đèn đi bạn
Bot (2024-12-29 13:27:08): Đèn hiện đang tắt
User (2024-12-29 13:27:25): nhấn nút dùm tôi
User (2024-12-29 13:27:41): hãy tắt đèn
Bot (2024-12-29 13:27:41): Đã tắt đèn cho bạn
Nhập tin nhắn...
Gửi
Bắt đầu

Thank you for your attetion

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