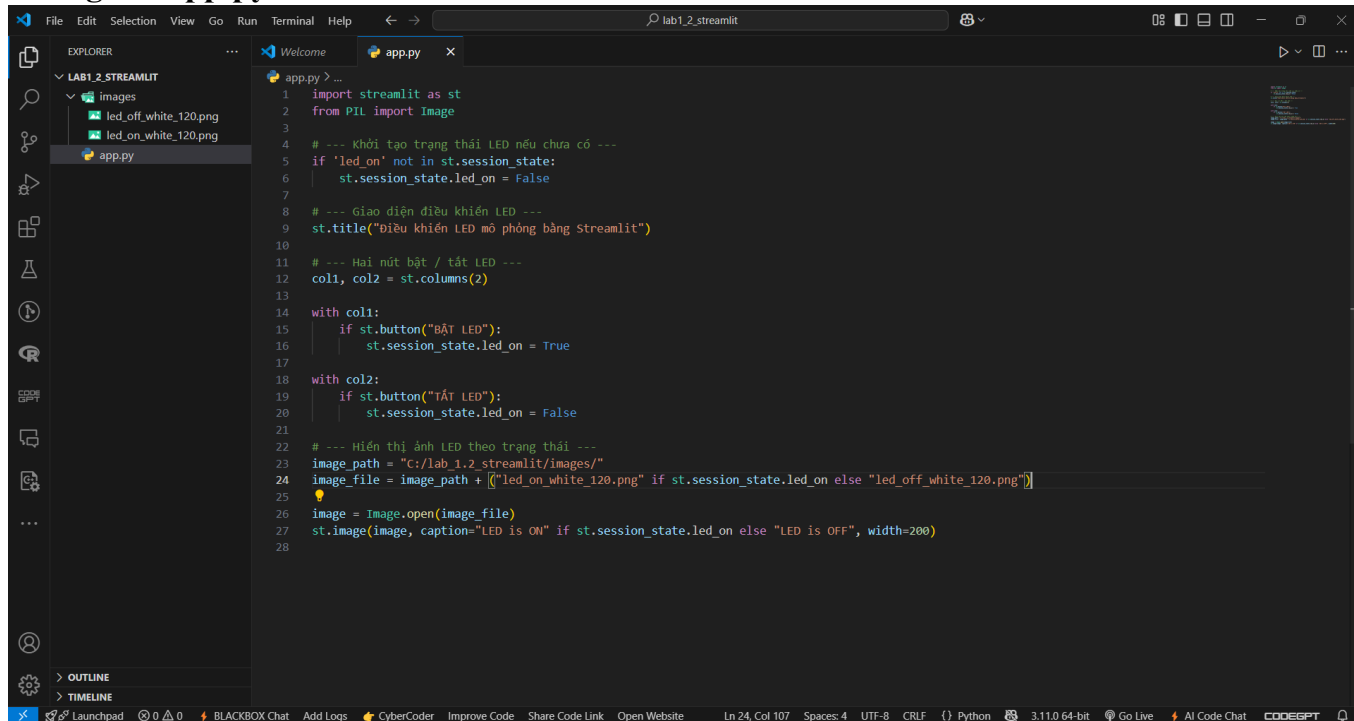


## LAB 1.2 PHIÊN BẢN MÔ PHỎNG ĐIỀU KHIỂN LED QUA HTTP BẰNG STREAMLIT

- Tạo cấu trúc thư mục dự án :

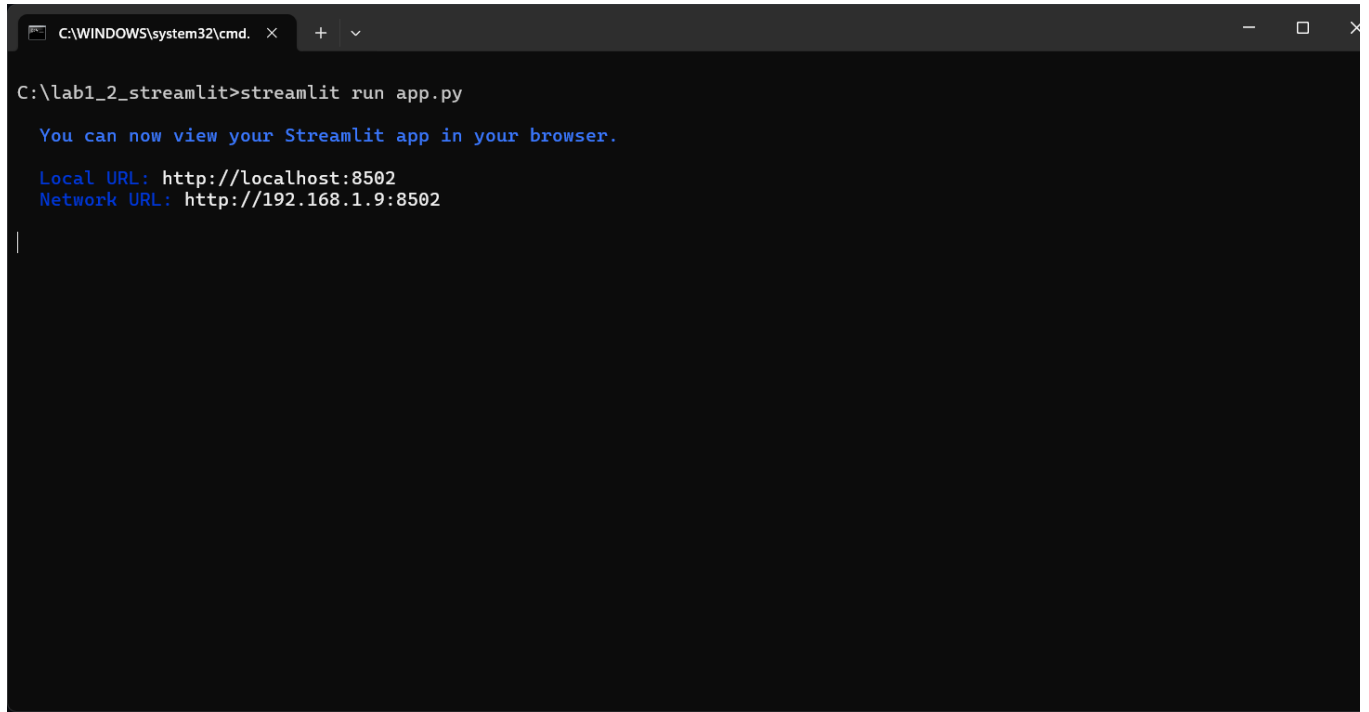
```
lab1_2_streamlit/  
├── app.py  
└── images/  
    ├── led_on.png  
    └── led_off.png
```

- Mã nguồn app.py:



```
app.py > ...  
1 import streamlit as st  
2 from PIL import Image  
3  
4 # --- Khởi tạo trạng thái LED nếu chưa có ---  
5 if 'led_on' not in st.session_state:  
6     st.session_state.led_on = False  
7  
8 # --- Giao diện điều khiển LED ---  
9 st.title("Điều khiển LED mô phỏng bằng Streamlit")  
10  
11 # --- Hai nút bật / tắt LED ---  
12 col1, col2 = st.columns(2)  
13  
14 with col1:  
15     if st.button("BẬT LED"):  
16         st.session_state.led_on = True  
17  
18 with col2:  
19     if st.button("TẮT LED"):  
20         st.session_state.led_on = False  
21  
22 # --- Hiển thị ảnh LED theo trạng thái ---  
23 image_path = "C:/lab_1.2_streamlit/images/"  
24 image_file = image_path + [{"led_on_white_120.png" if st.session_state.led_on else "led_off_white_120.png"}]  
25  
26 image = Image.open(image_file)  
27 st.image(image, caption="LED is ON" if st.session_state.led_on else "LED is OFF", width=200)  
28
```

- **Mở CMD quyền admin để chạy file app.py trước đó:**



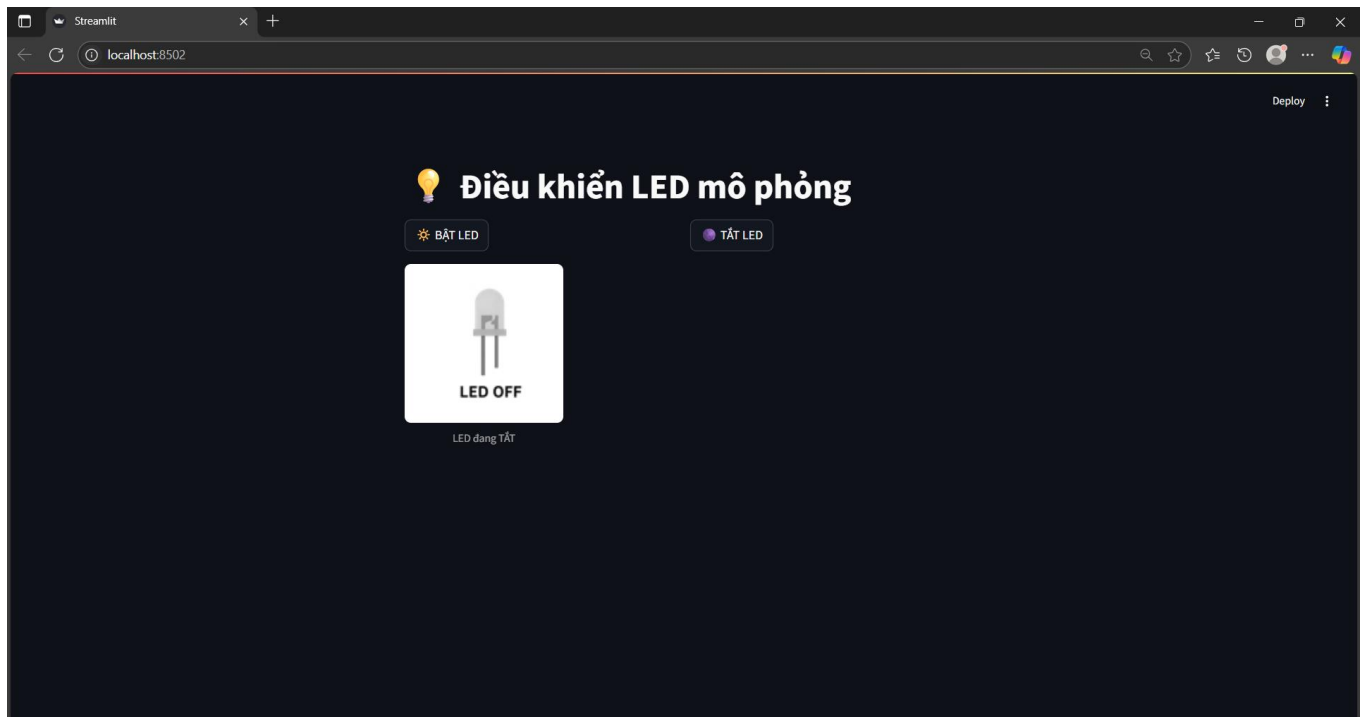
```
C:\WINDOWS\system32\cmd. x + v

C:\lab1_2_streamlit>streamlit run app.py

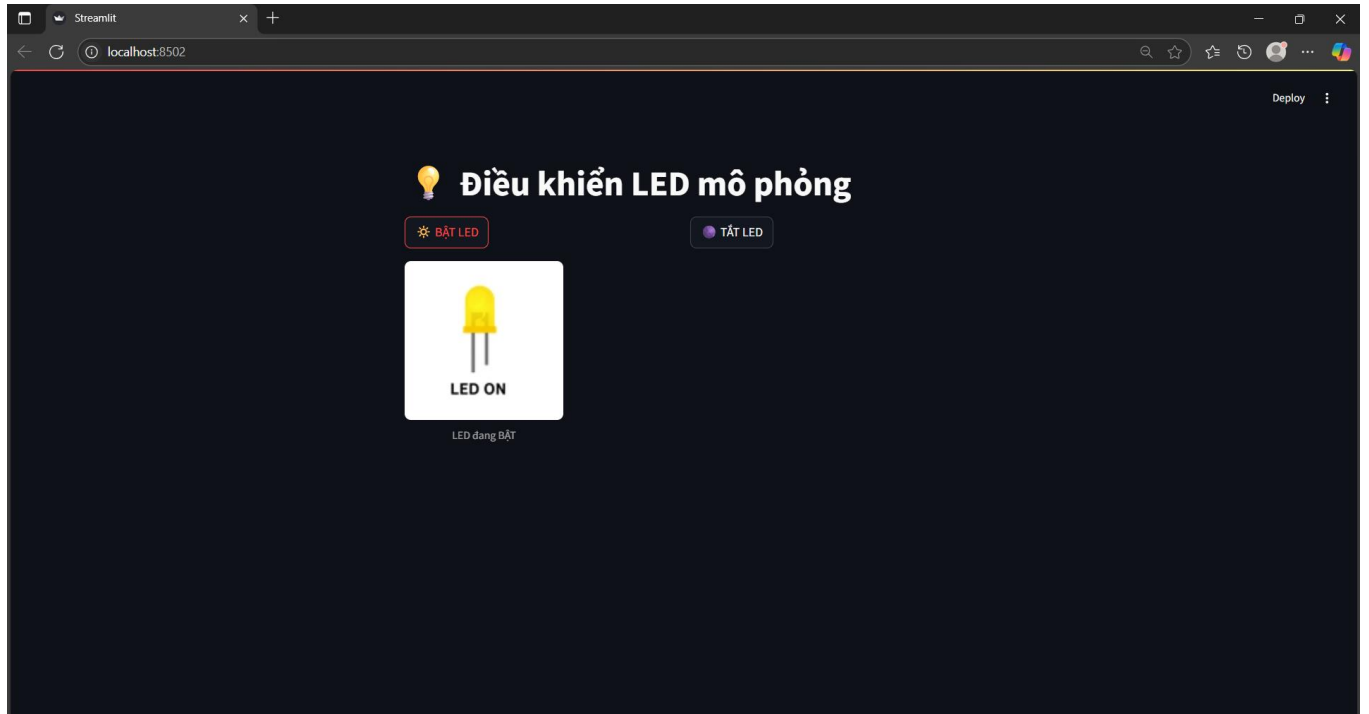
You can now view your Streamlit app in your browser.

Local URL: http://localhost:8502
Network URL: http://192.168.1.9:8502
```

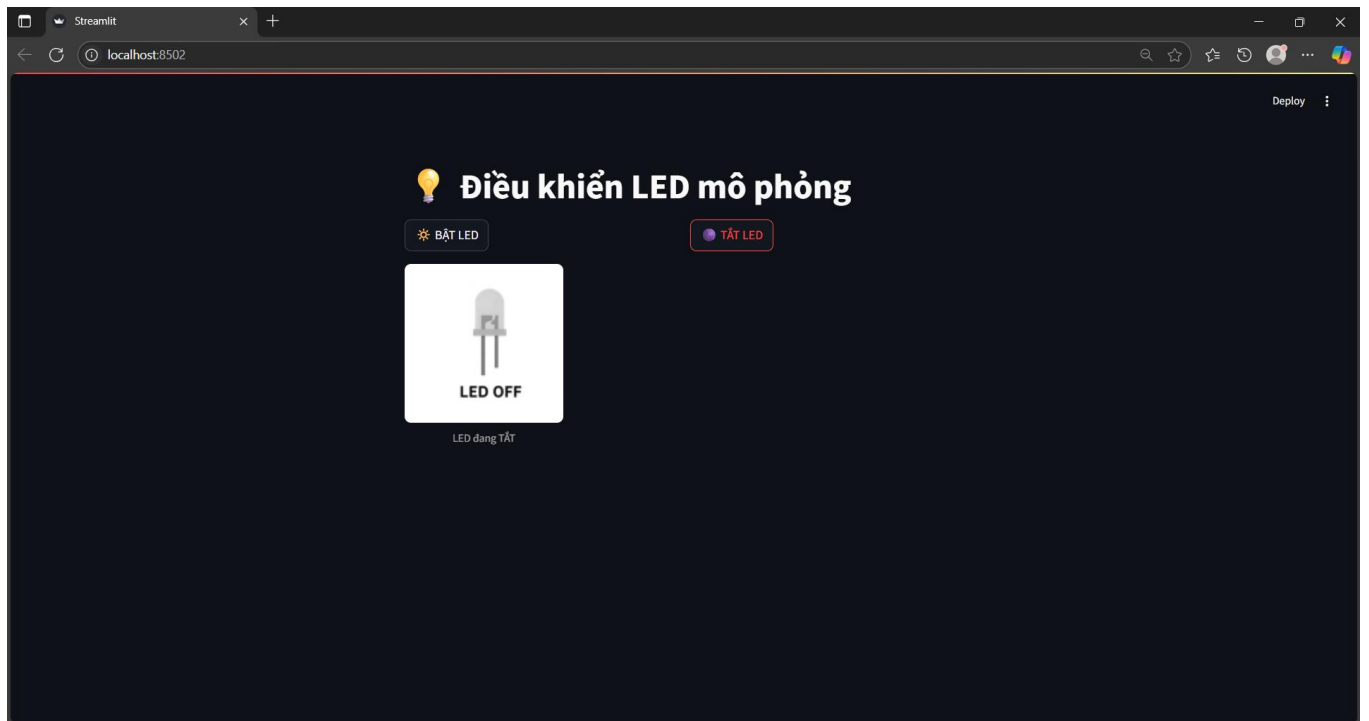
- **Mở trình duyệt trên máy tính và truy cập:**  
*http://localhost:8501*



- Thao tác bật LED và kết quả:

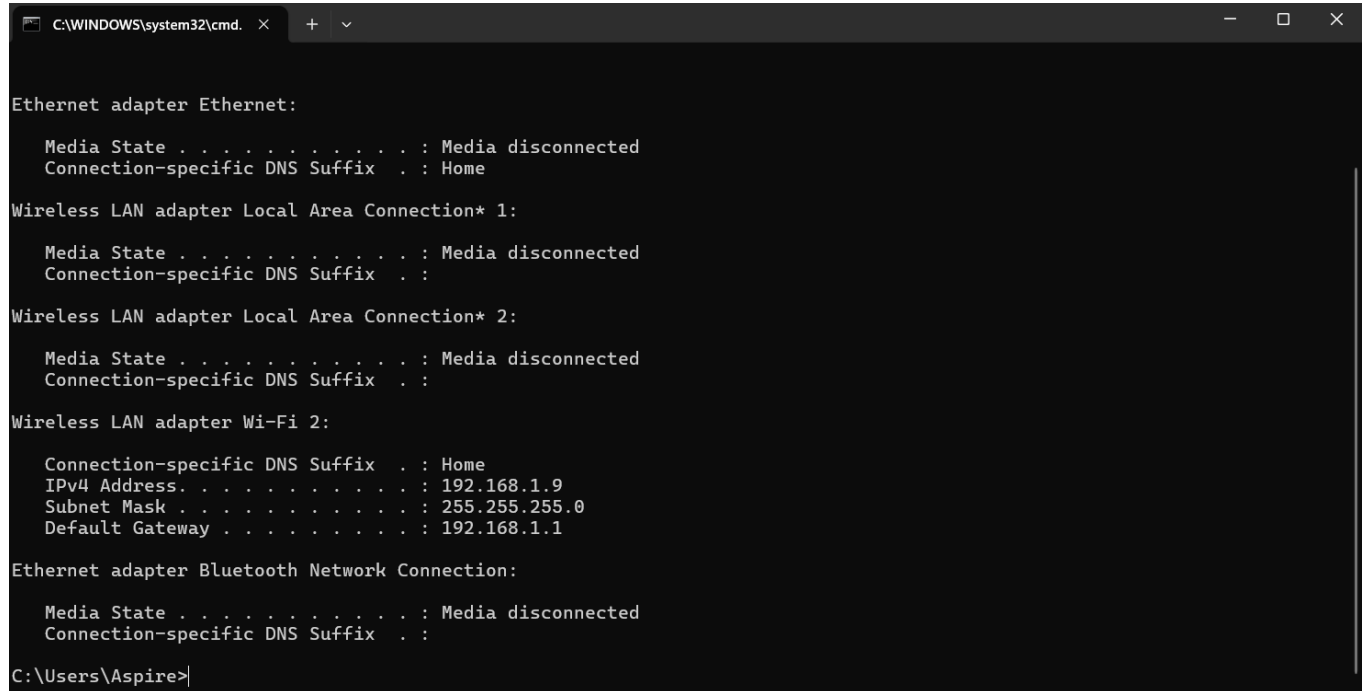


- Thao tác tắt LED và kết quả:



Mở rộng truy cập từ smartphone:

- **Mở CMD và chạy lệnh: ipconfig**

A screenshot of a Windows Command Prompt window. The title bar shows the path 'C:\WINDOWS\system32\cmd.' and standard window controls. The command prompt displays the output of the 'ipconfig' command. It lists network adapters: Ethernet adapter Ethernet, Wireless LAN adapter Local Area Connection\* 1, Wireless LAN adapter Local Area Connection\* 2, Wireless LAN adapter Wi-Fi 2, and Ethernet adapter Bluetooth Network Connection. The Wi-Fi 2 adapter is the active one, showing an IPv4 address of 192.168.1.9, subnet mask 255.255.255.0, and default gateway 192.168.1.1. The prompt ends at 'C:\Users\Aspire>'.

```
C:\WINDOWS\system32\cmd.

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : Home

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi 2:

    Connection-specific DNS Suffix  . : Home
    IPv4 Address. . . . . : 192.168.1.9
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Bluetooth Network Connection:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

C:\Users\Aspire>
```

- **Địa chỉ IPv4 address của máy: 192.168.1.9**