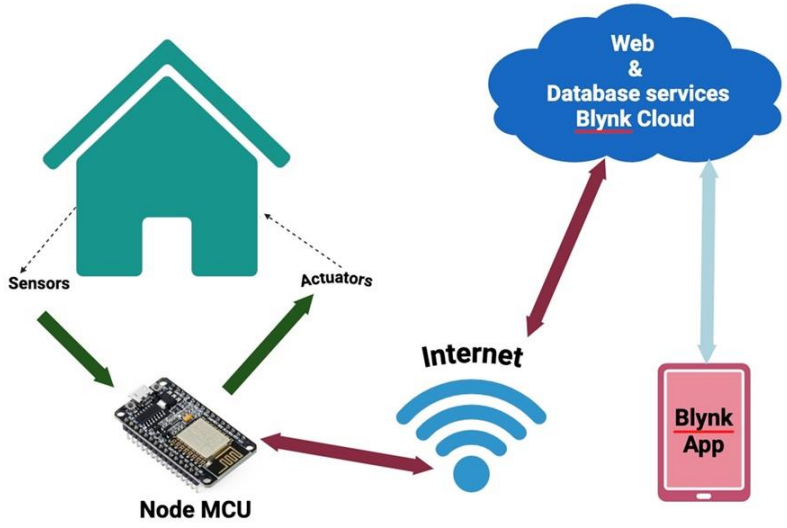
Internet-of-Things (IoT) for Greenhouses

In the framework of the undergraduate course:
„Artificial Intelligence in Agriculture“



Own Drawing

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IoT-based system to consolidate indoor environmental control systems with real-time data from microclimate sensors in agricultural buildings

Samer et al. (2025)

A prototype of a wireless intelligent monitoring and controlling system for indoor environment in agricultural buildings:

Objective: Development, assembly and testing of a microcontroller-based prototype

Components:

- Sensors,
- Node MCU Microcontroller,
- LCD Module,
- Wi-Fi Module and
- Relay Module.

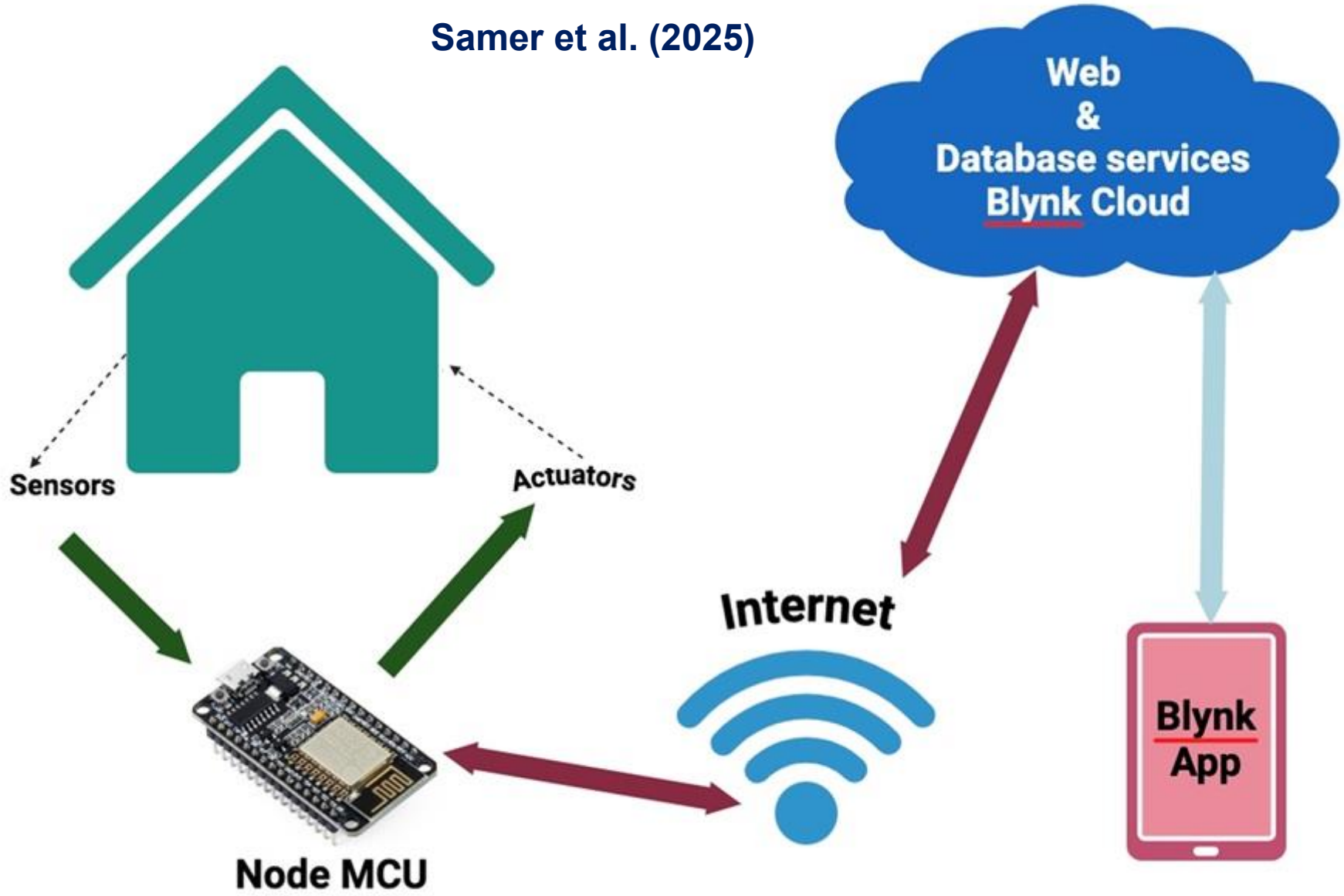
Sensors:

- Photo-Resistor Sensors,
- Soil Humidity Sensors
- Air Humidity Sensors,
- Air Temperature Sensors and
- Further Sensors.

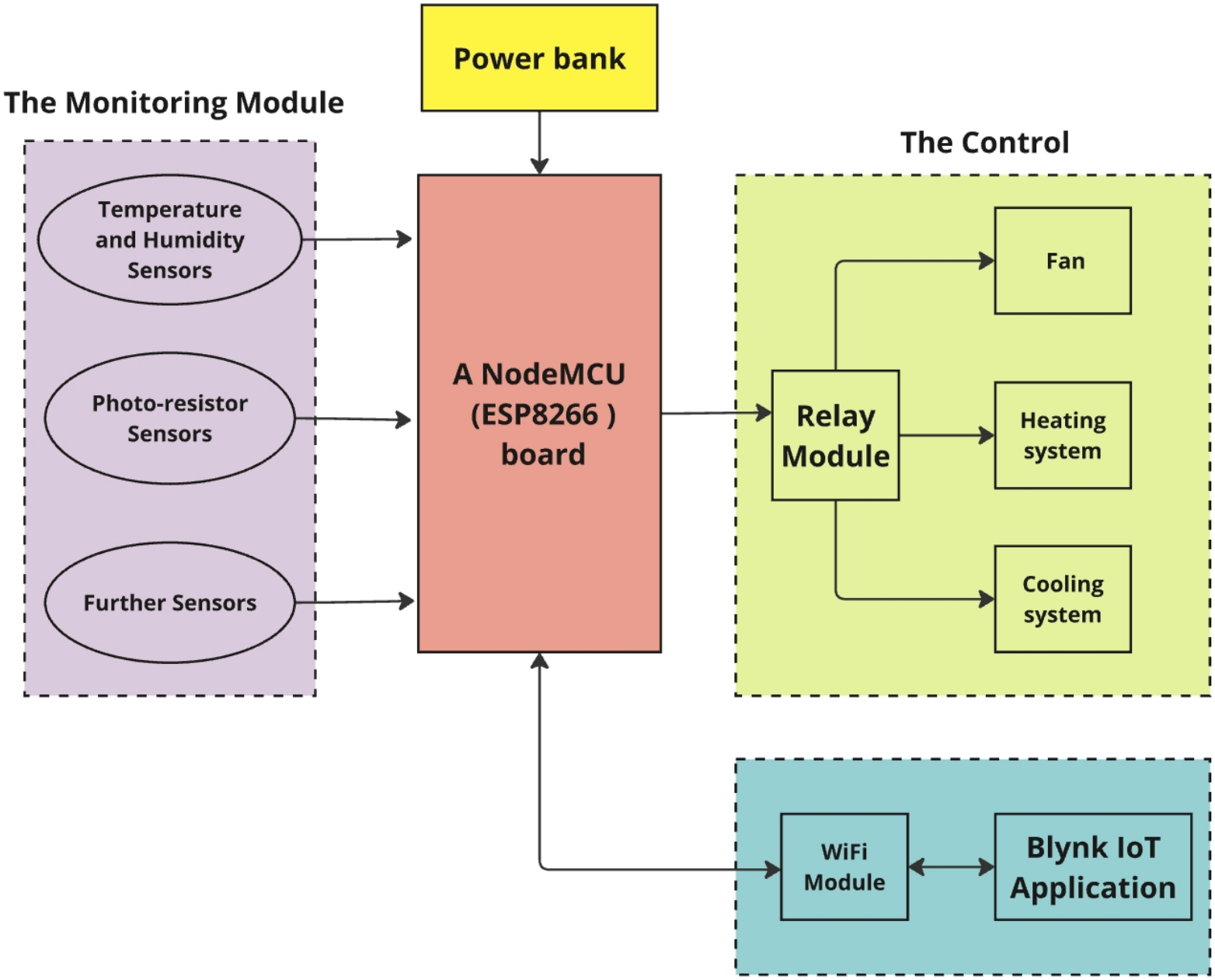
Software:

- Blynk IoT Platform (Web App) and
- Arduino C++ IDE.

Samer et al. (2025)

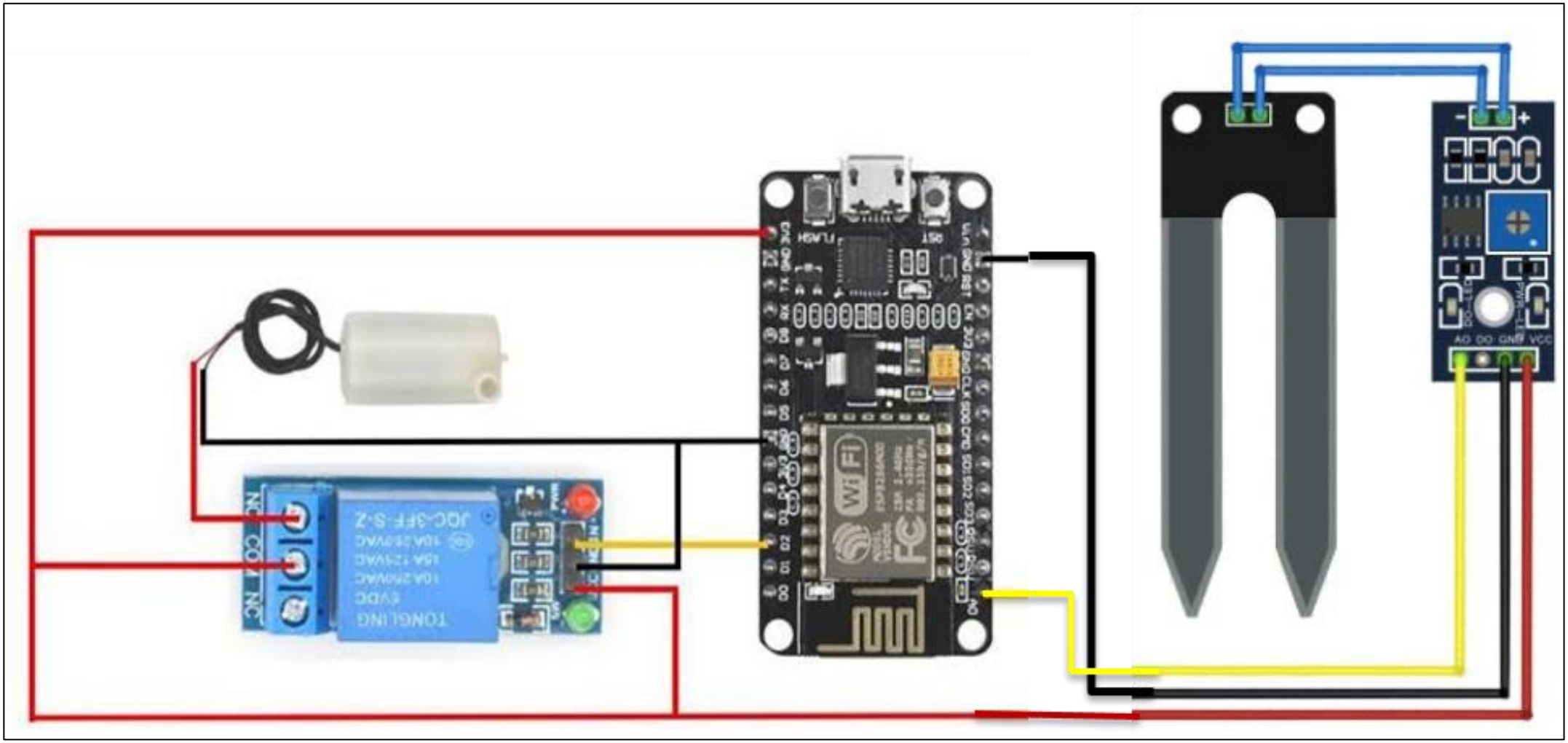


Hardware design based on Node MCU Microcontroller with Blynk app



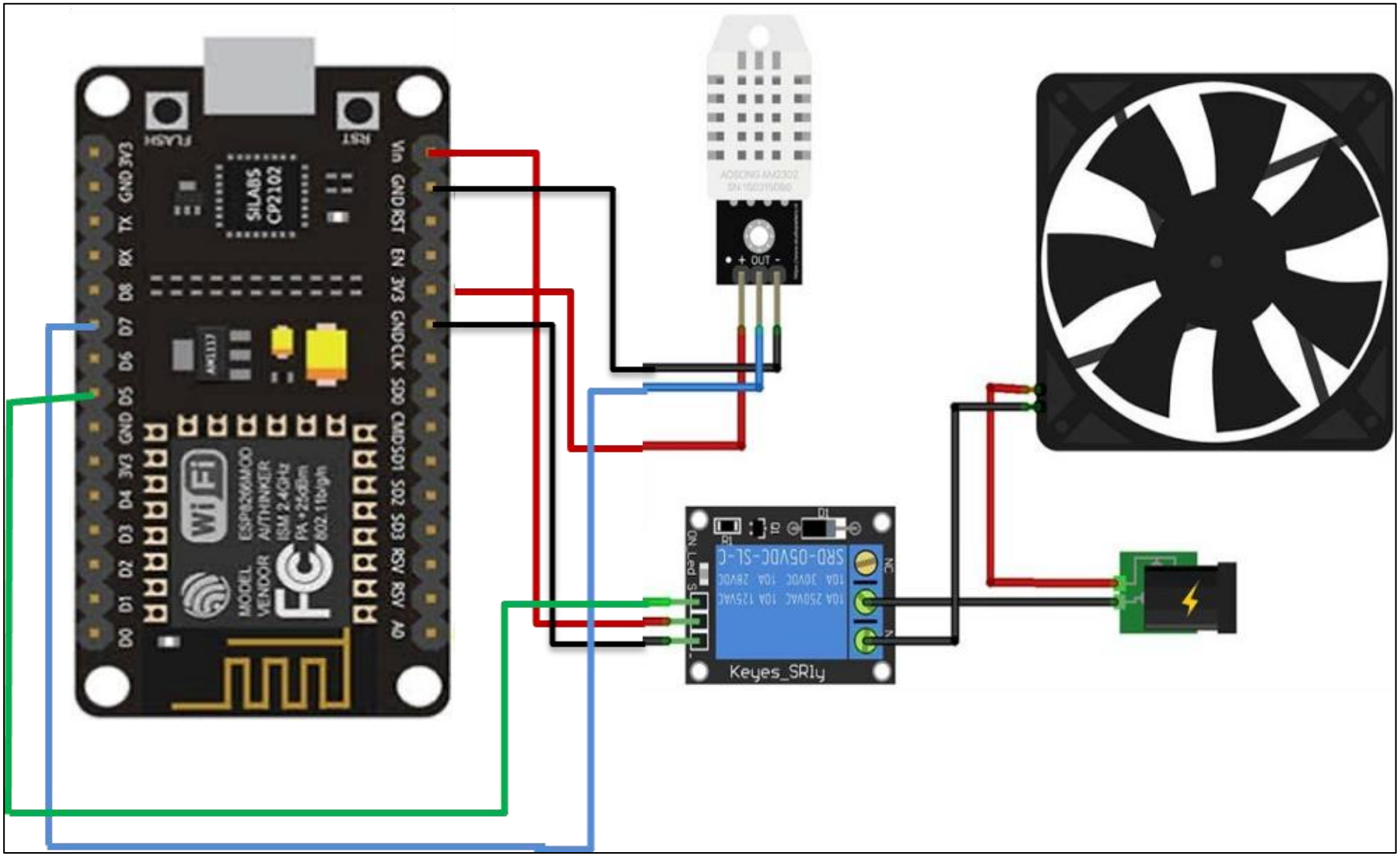
Block Diagram of the Smart System Prototype

Samer et al. (2025)



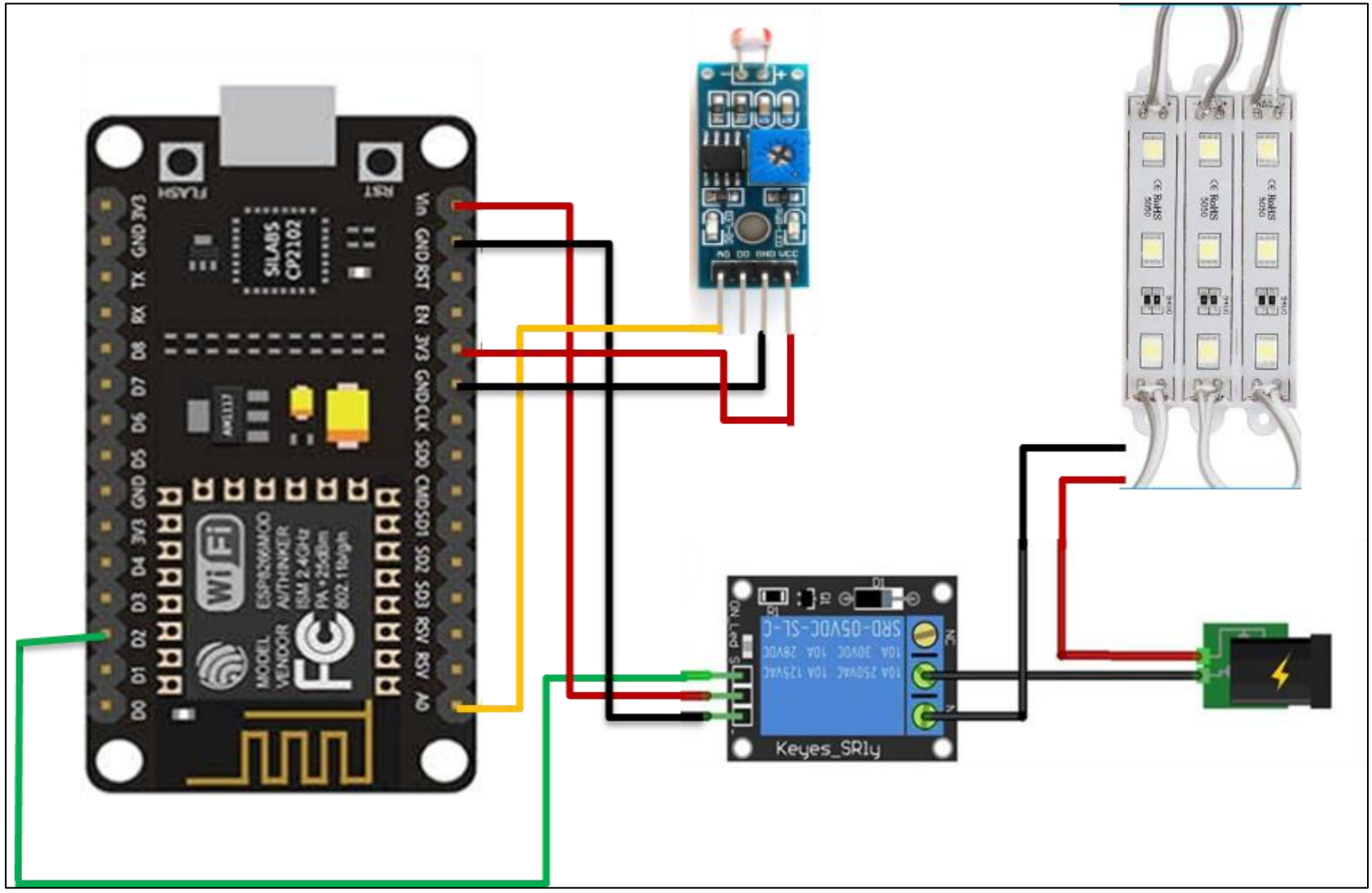
Circuit connecting the soil humidity sensors with the microcontroller, relay module and water pump

Samer et al. (2025)



Circuit connecting the air temperature and air humidity sensors with the microcontroller, relay module and fan control

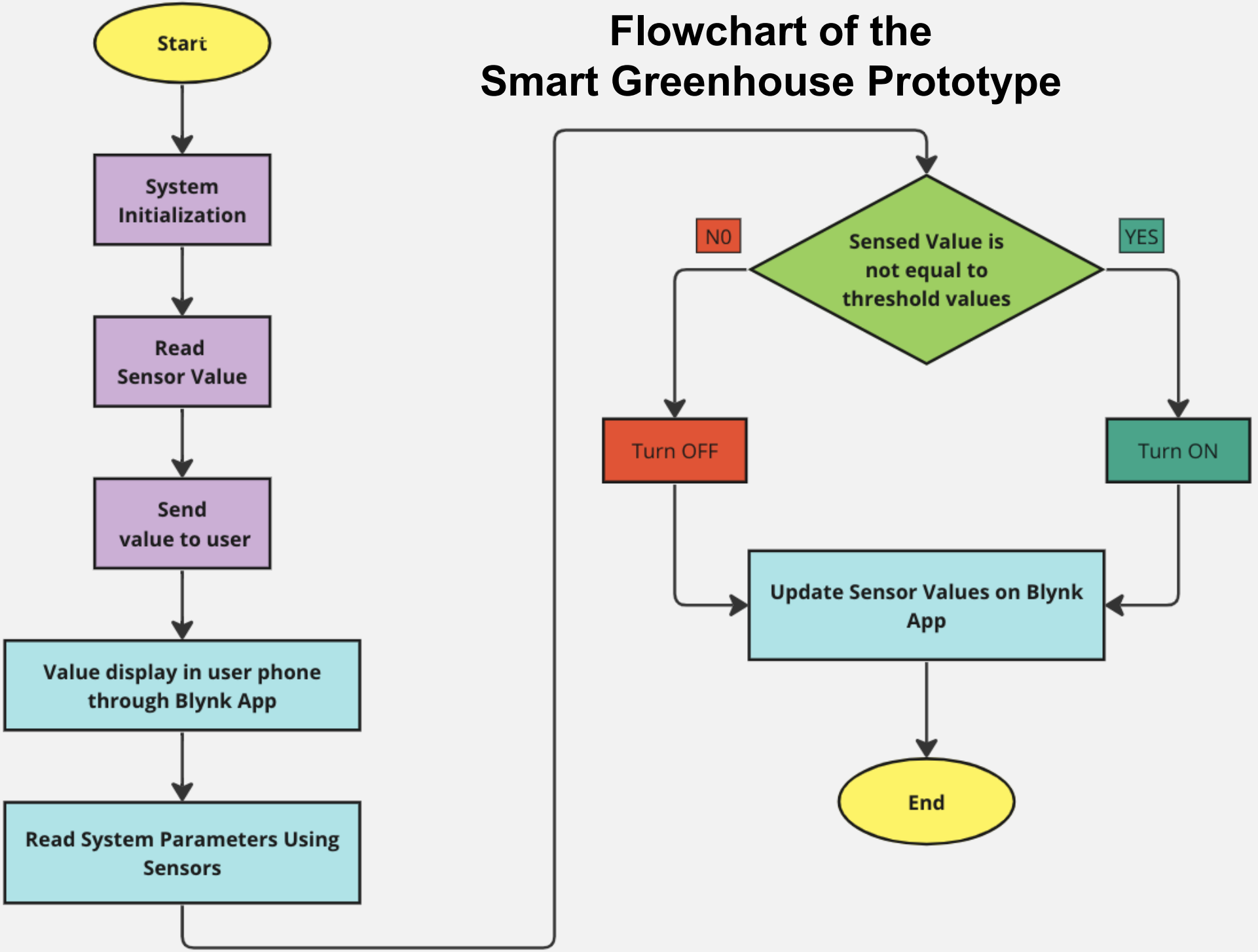
Samer et al. (2025)



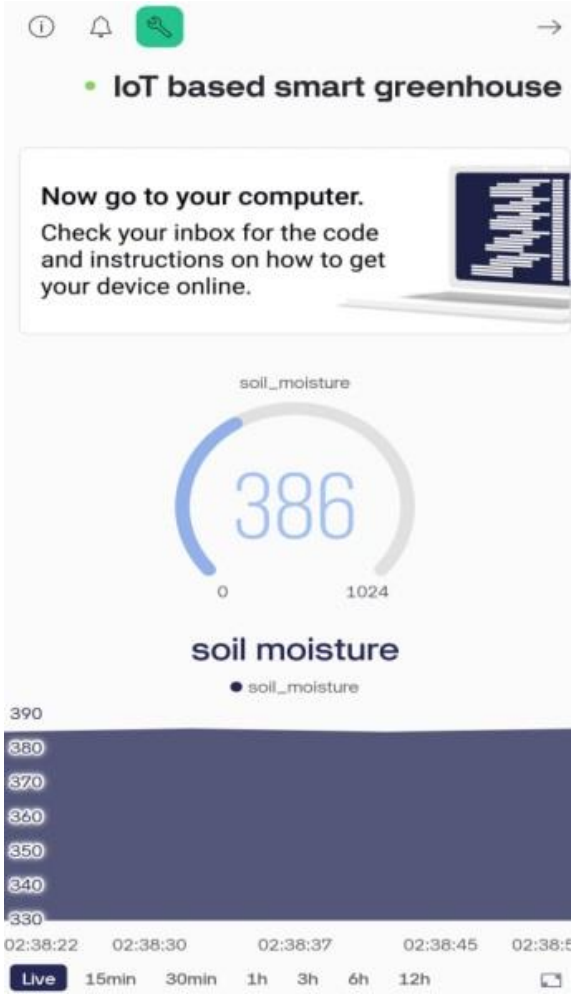
Circuit connecting the light intensity sensors with the microcontroller, relay module and lighting system

Samer et al. (2025)

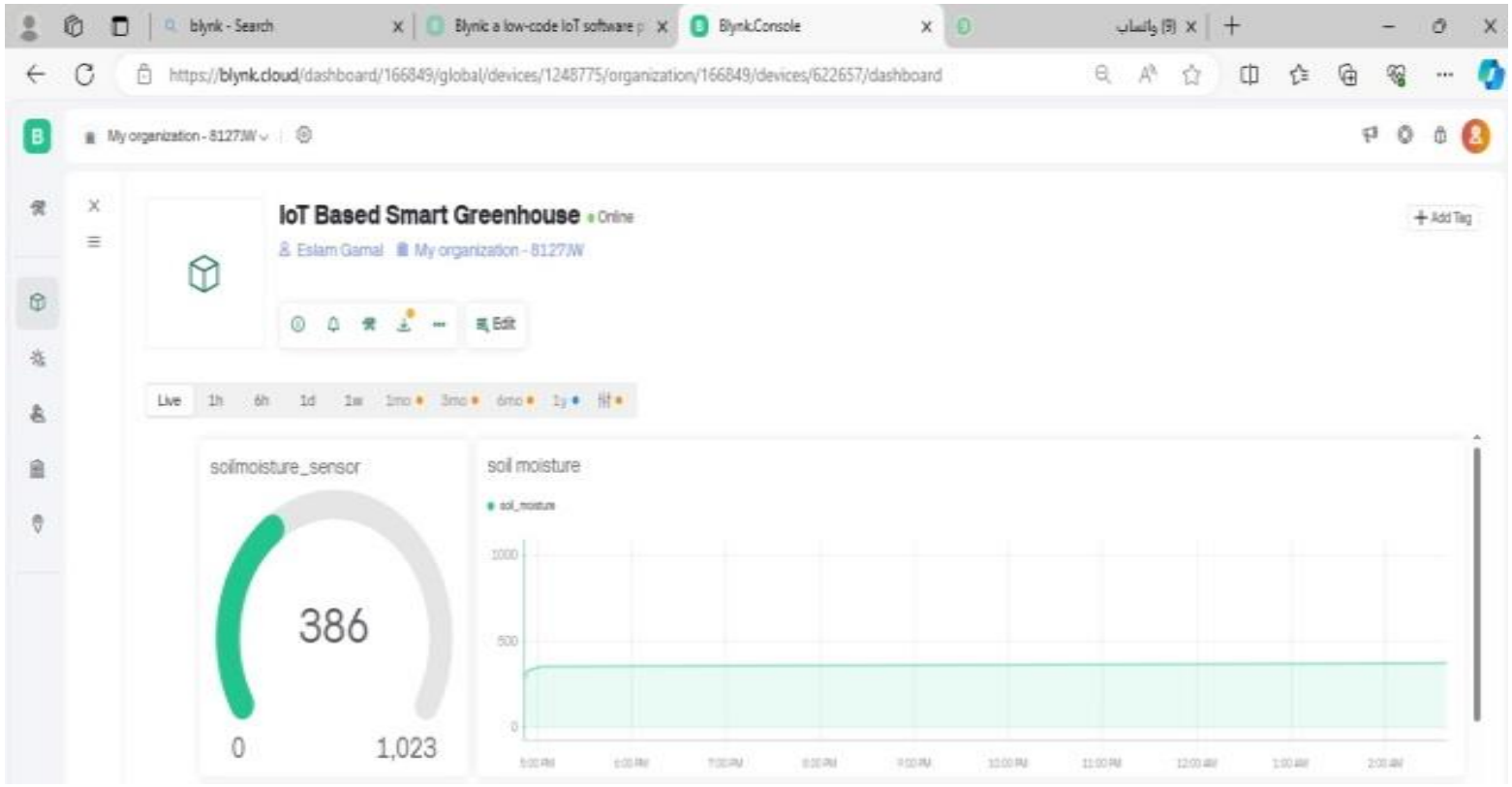
Flowchart of the Smart Greenhouse Prototype



Source: Samer et al. (2025)



(a)



(b)

(a) Soil humidity via Blynk IoT app, and (b) Soil humidity via Blynk IoT Platform on PC

Samer et al. (2025)

(a)

(b)

(a) Air temperature via Blynk IoT app, and (b) Air humidity via Blynk IoT app

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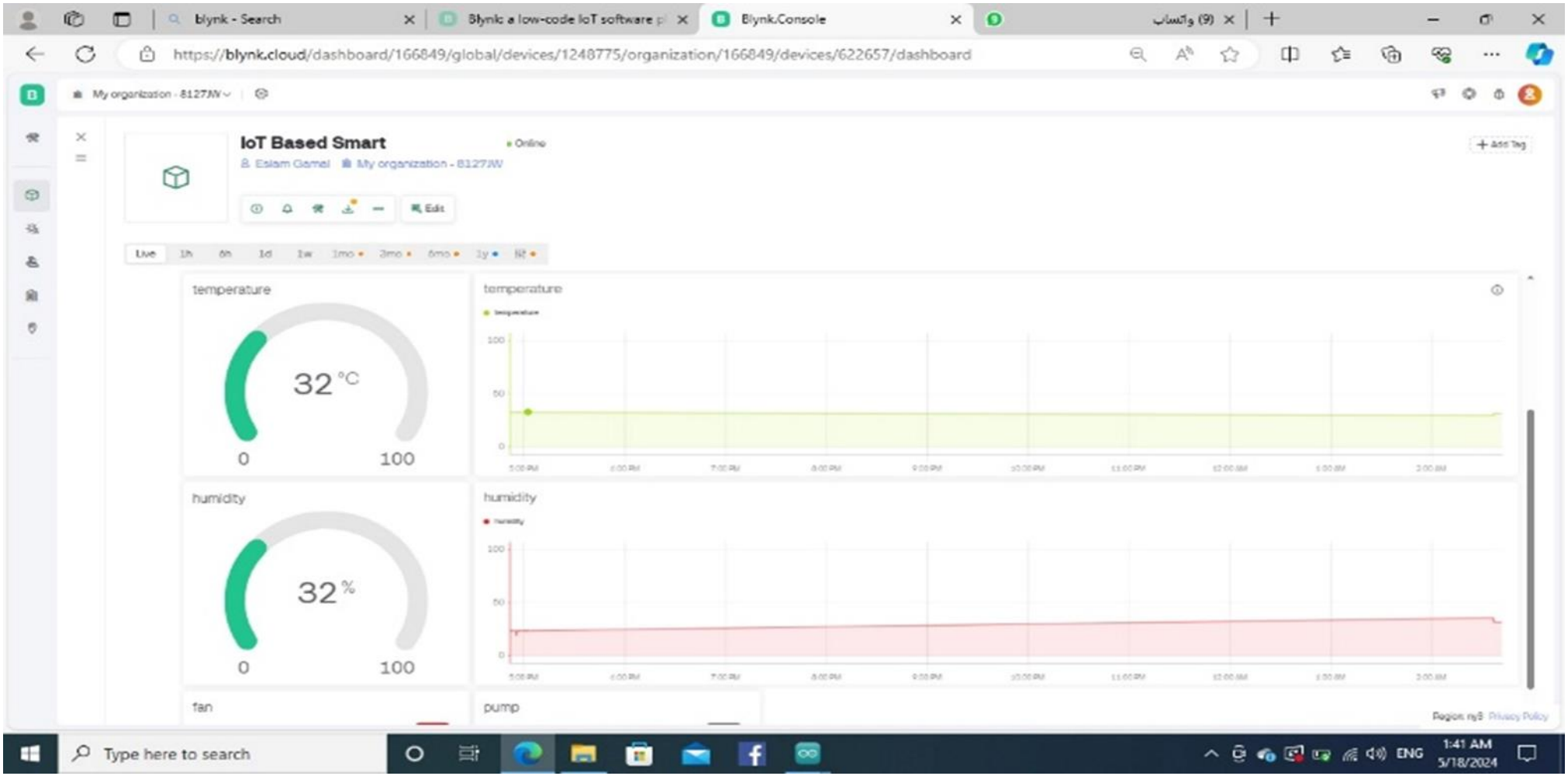

Air temperature and air Humidity via Blynk IoT Platform on PC

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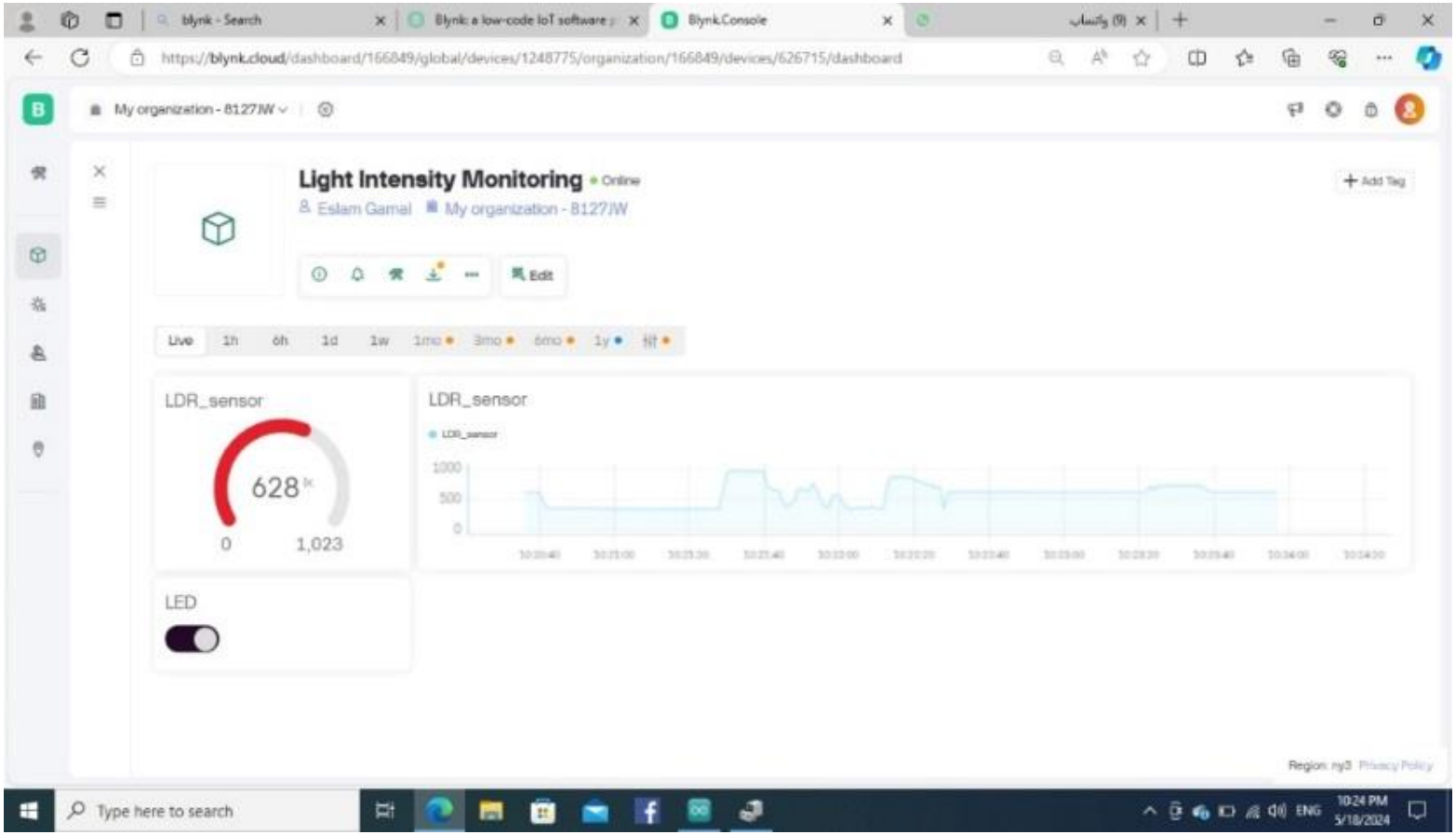

(a) (b)

(a) Light intensity via Blynk IoT app, and (b) Light intensity via Blynk IoT Platform on PC

Samer et al. (2025)

Soil moisture, air temperature and air humidity via LCD display

Samer et al. (2025)

The internet-based smart system:

1. offers a practical indoor environmental control,
2. provides an efficient resource management,
3. reduces the manual intervention, which
4. leads to increasing productivity.

Samer et al. (2025)

Thank you for your attention!