Smart Agriculture System Using AIOT

The Smart Agriculture System uses Raspberry Pi to optimize irrigation. It monitors soil dryness with a moisture sensor and environmental conditions with temperature and humidity sensors. A stepper motor automates irrigation, activating when soil is dry and stopping when it's wet. Real-time data, including soil moisture, temperature, humidity, and irrigation status, is displayed on a web page for farmers to manage fields efficiently.

1. Components and Tools Required

Hardware :

- RaspberryPi
- Arduino Board
- Soil Moisture Sensor
- Humidity & Temp Sensor
- Stepper Motor
- Connection wires
- Power Supply

The IoT kit provided by Xtrans Solution provides you the raspberry pi and Arduino models along with necessary sensors for the project.

Software :

- Python(3.10 or 3.11)
- Other python libraries(will be mentioned in installation)
- VS Code on laptop and RaspberryPi OS on raspberryPi

2. Setting up the code provided in Zip file

- Copy and paste the RaspberryPI Code folder to the Raspberry pi , while the Server Side Code folder should be sent to the device where the server and Smart agriculture will run, here a laptop.
- In a empty folder in the laptop, create a python virtual environment and activate it, i.e, open terminal :

```
python -m venv env
env\Scripts\activate
```

Setup Instructions

1. **Hardware Setup:**
    1. Connect the soil moisture sensor to MCP3008 (channel 1).
    2. Wire MCP3008 ADC to Raspberry Pi SPI pins (MISO, MOSI, CLK, CE0).
    3. Attach DHT sensor to GPIO pin 4.
    4. Connect stepper motor to GPIO pins [13, 4, 6, 5].
    5. Wire 16x2 LCD display to Raspberry Pi as per pin definitions.

2. **Install Dependencies:**

    sudo apt update

    sudo apt install python3 python3-pip python3-flask

    pip3 install Flask-SocketIO RPi.GPIO spidev Adafruit_DHT

    sudo raspi-config # Enable SPI under Interface Options

3. **Deploy Code**:

- Extract ZIP file and place files in a directory (e.g., ~/plant_monitor).
- Ensure plant_monitor.html is in the templates folder.

4. **Run the Script**:

    python3 monitor.py

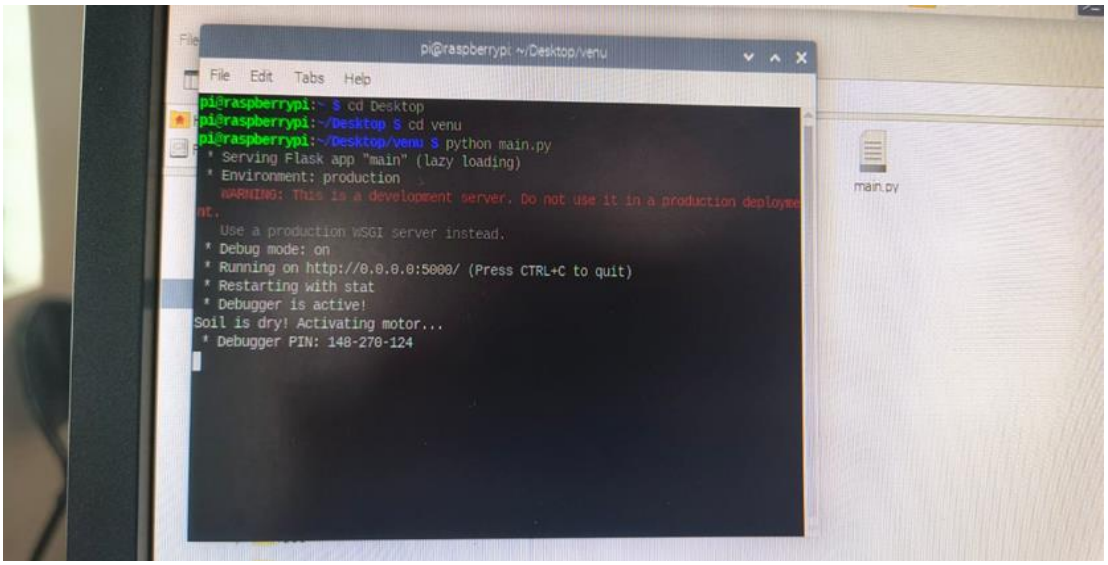
5. **Access Web App**:

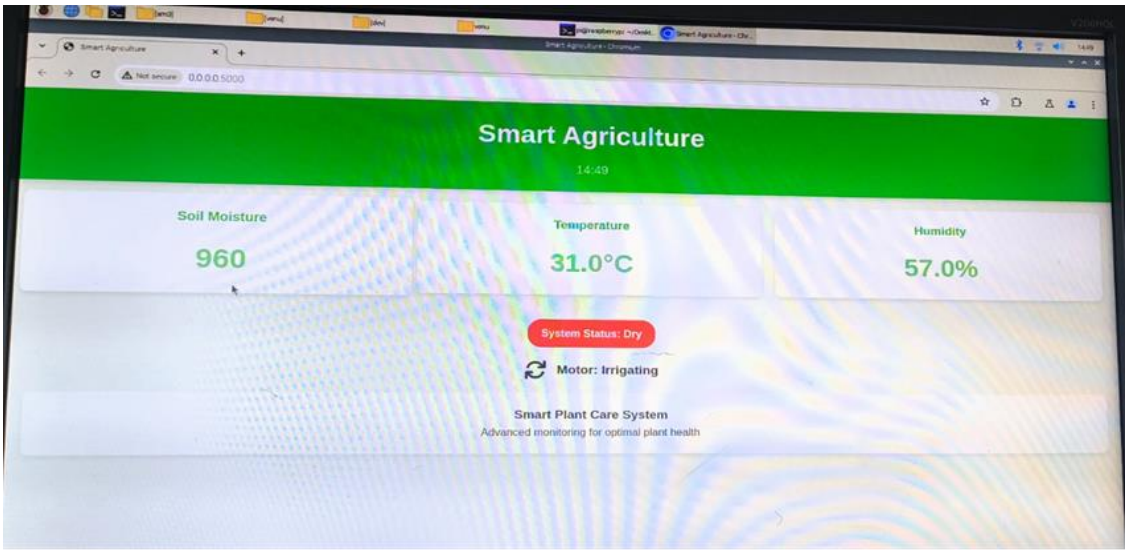
    Open a browser and go to link.

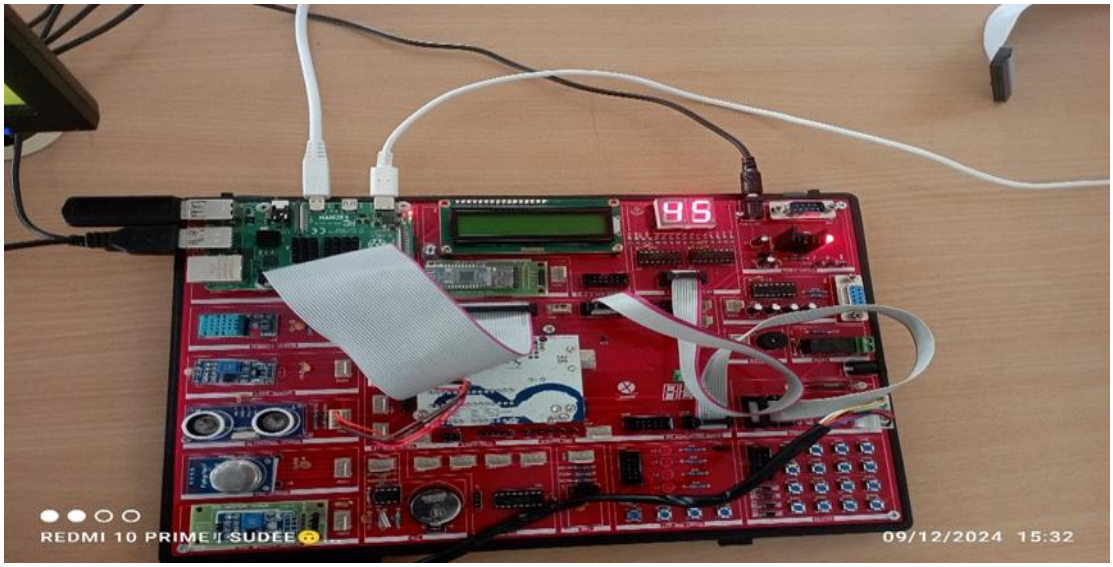
Features

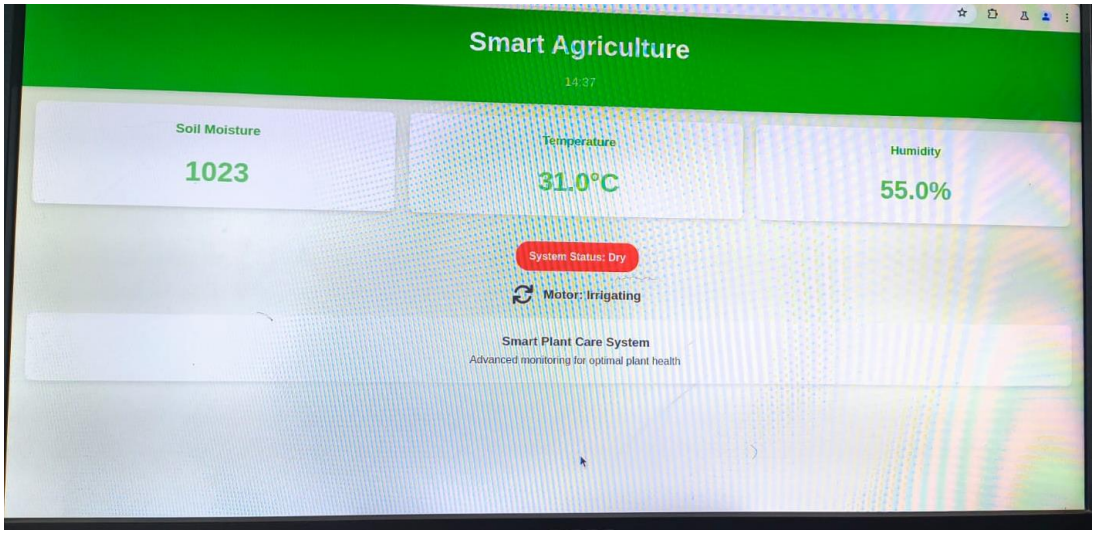
- Real time Monitoring
- Automated Irrigation
- Predictive analysis
- Weather forecasting

Snapshots


pi@raspberrypi: ~/Desktop/venu
File Edit Tabs Help
pi@raspberrypi:~ $ cd Desktop
pi@raspberrypi:~/Desktop $ cd venu
pi@raspberrypi:~/Desktop/venu $ python main.py
* Serving Flask app "main" (lazy loading)
* Environment: production
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
* Debug mode: on
* Running on http://0.0.0.0:5000/ (Press CTRL+C to quit)
* Restarting with stat
* Debugger is active!
Soil is dry! Activating motor...
* Debugger PIN: 148-270-124
main.py


Smart Agriculture
14:49
Soil Moisture
960
Temperature
31.0°C
Humidity
57.0%
System Status: Dry
Motor: Irrigating
Smart Plant Care System
Advanced monitoring for optimal plant health


REDMI 10 PRIME | SUDEE
09/12/2024 15:32


Smart Agriculture
14:37
Soil Moisture
1023
Temperature
31.0°C
Humidity
55.0%
System Status: Dry
Motor: Irrigating
Smart Plant Care System
Advanced monitoring for optimal plant health