

RootRise



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Idea & Overview

RootRise is an automated plant care system that uses a CNC platform, tool heads, and sensors to handle watering, fertilizing, and seeding with accuracy. It can be controlled locally or remotely, making plant care simple and reliable.





Problems

1

Plant care is time-consuming and requires continuous effort throughout the year.

2

Manual watering, sowing, and fertilizing are exhausting and prone to errors.

3

Many users lack the knowledge to provide the correct amount of water, affecting plant health.

4

Monitoring soil moisture manually is difficult, leading to inconsistent care.

5

Traditional tools are separate and not integrated, requiring repeated manual tasks.

6

Remote monitoring and smart control are limited in existing solutions, reducing efficiency.





Goals

1

Develop a fully automated system for precise and efficient plant care.

3

Integrate sensors to monitor soil moisture, water, fertilizer levels.

5

Reduce manual effort and errors in plant care.

2

Ensure consistent watering, fertilizing, and seeding for multiple plants.

4

Provide both local and remote control for easy system management.

6

Support home gardeners and small farms with reliable and convenient plant management.

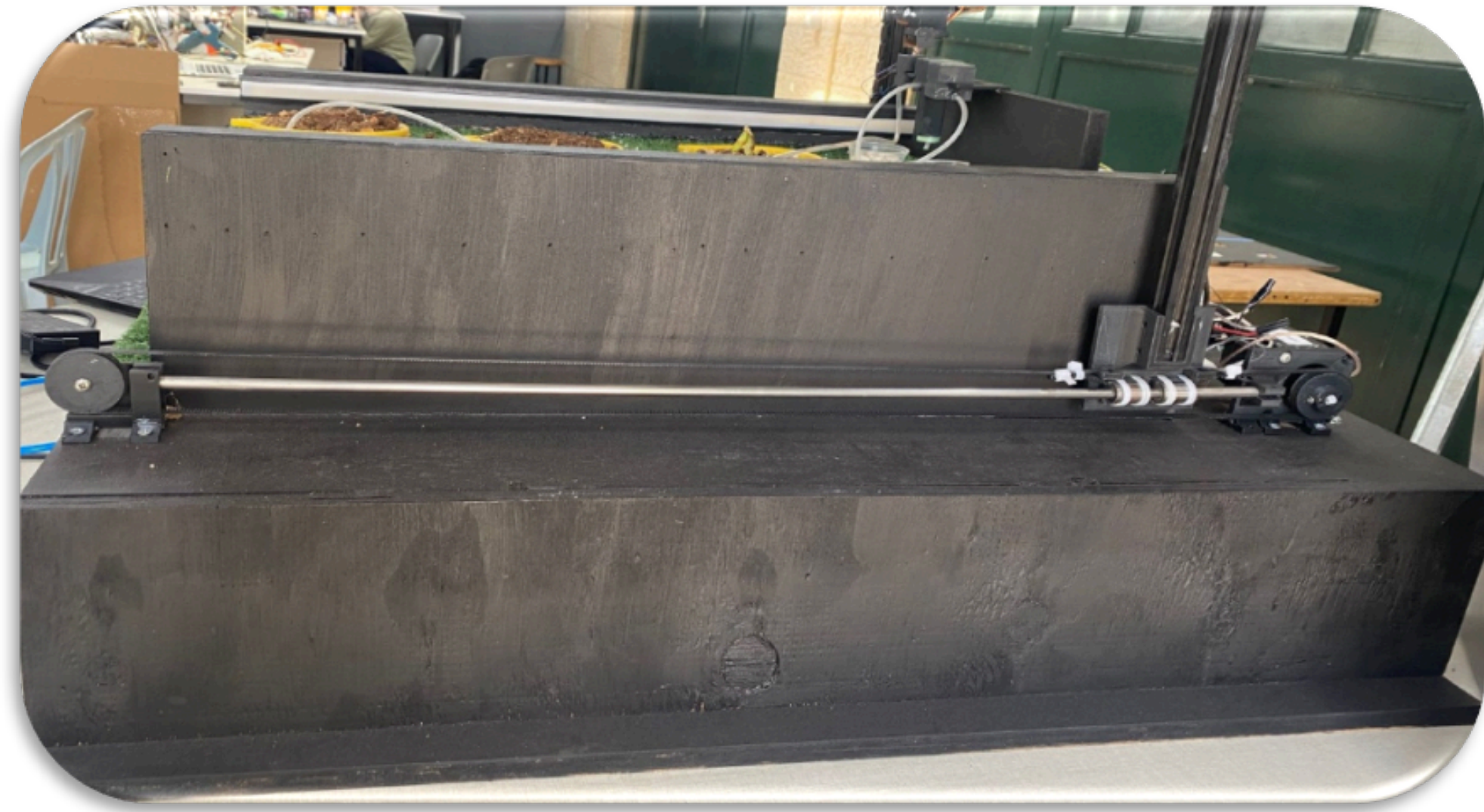


RootRise Features & Components



Automated Movement

Precise movement along X, Y, and Z axes to tend multiple pots.



Components used



Arduino Mega



NEMA 17 stepper motor



NEMA 23 stepper motor



3.5 A stepper driver



Limit Switch



metal rods



Ball bearing rollers



Counterweight

Interchangeable Tool Heads

Magnetic interchangeable tool heads enable automated watering, fertilization, and precise seed planting.



Components used



Relay Module



Water Pump



Water Level Sensor



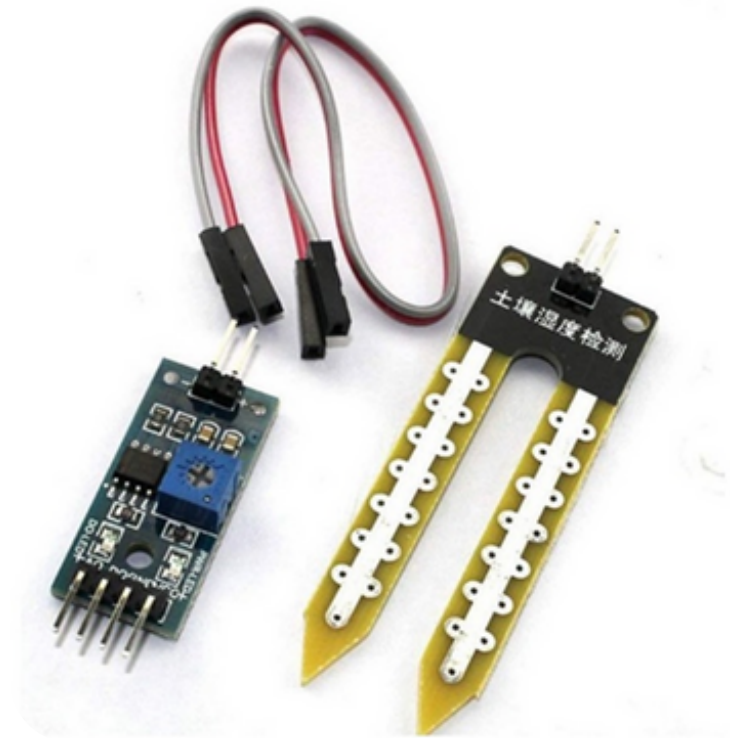
vacuum cleaner motor

Soil Moisture Monitoring

Detects soil wetness to trigger irrigation.



Components used



Soil Moisture Sensor



Servo Motor (MG995)

Lighting Control

Controls the 4K linear lights in two modes: manual, via the keypad, or automatic, adjusting light based on LDR sensor readings.



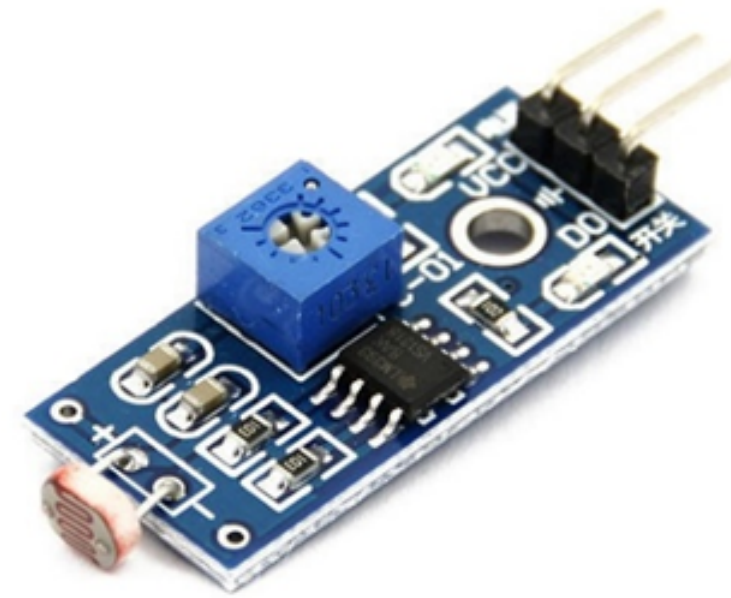
Components used



Linear Light (4K)



Power Supply for Light



LDR Module



Relay Module

User Interface (Local)

Manual control and real-time system feedback.



Components used



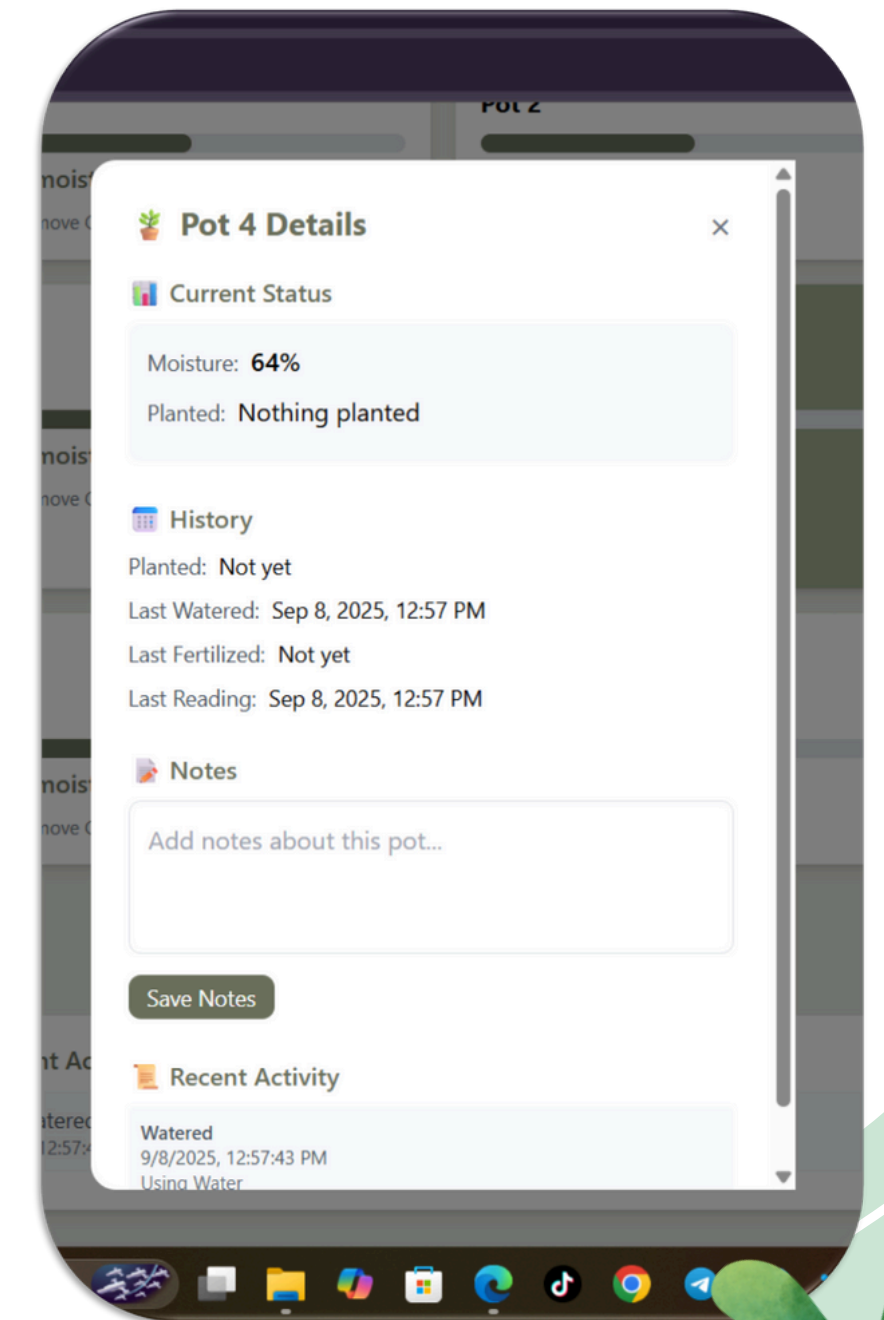
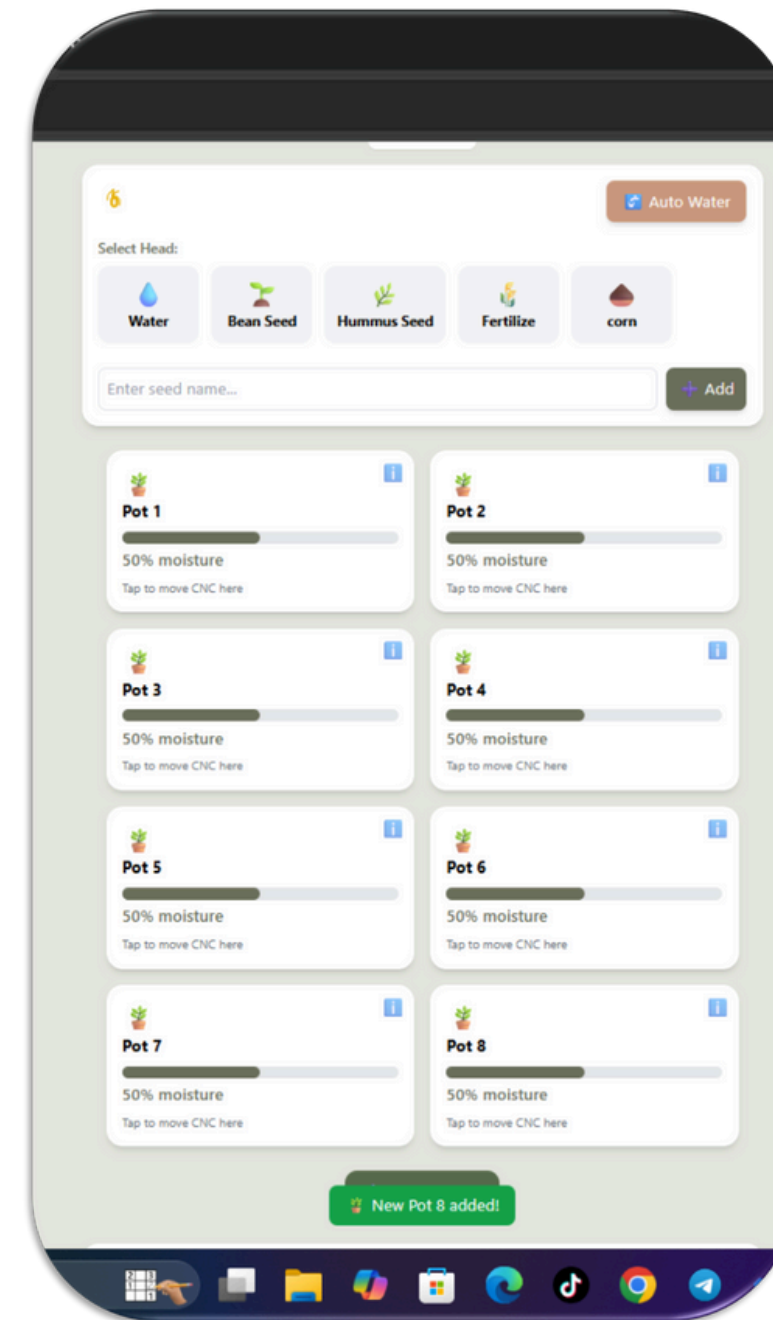
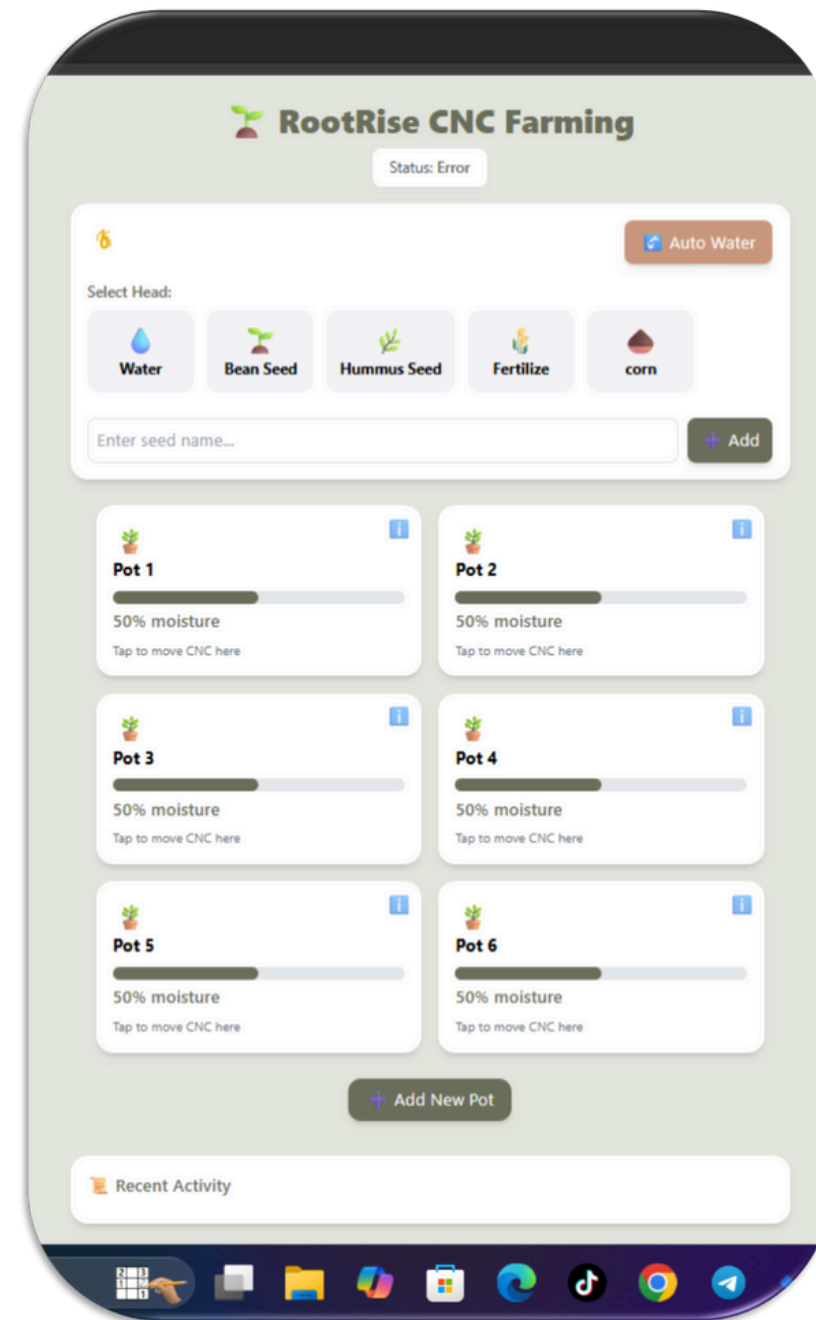
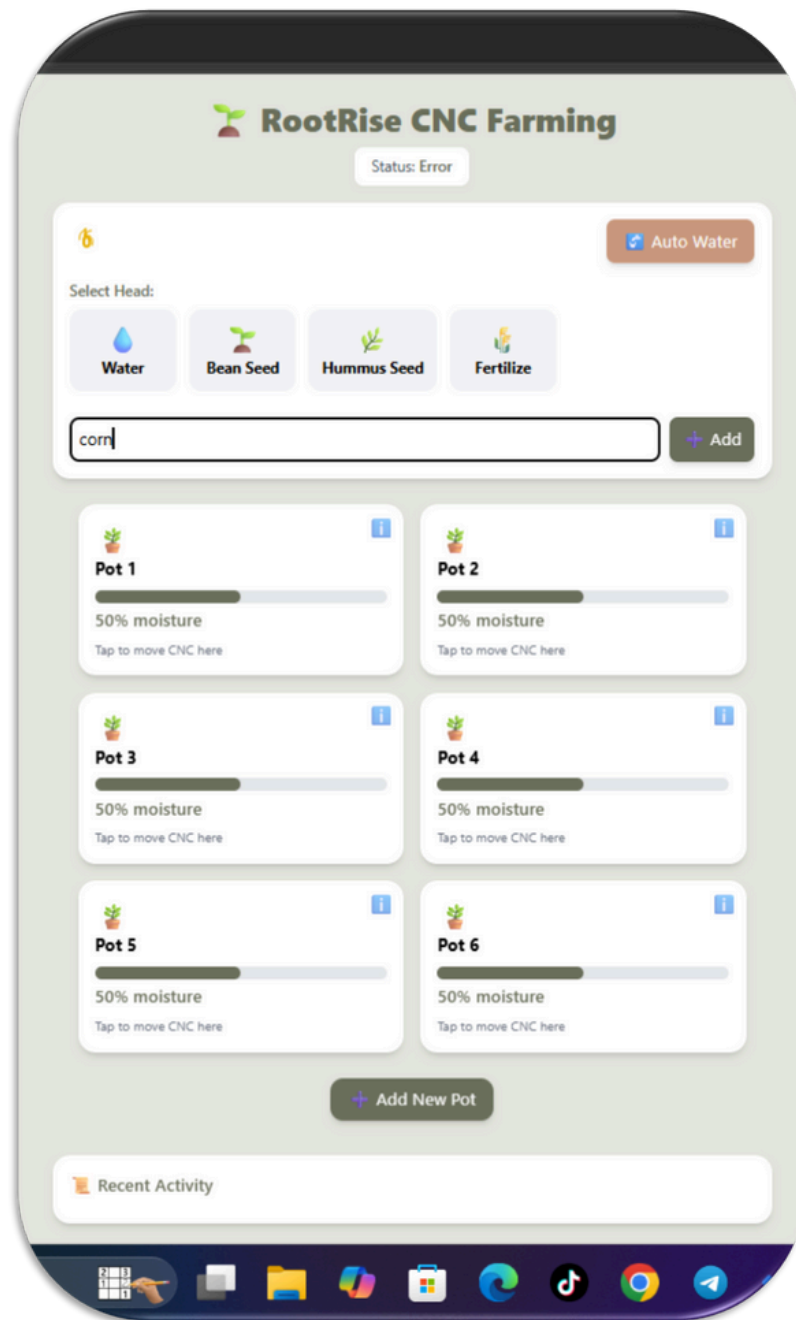
LCD Display (I2C)



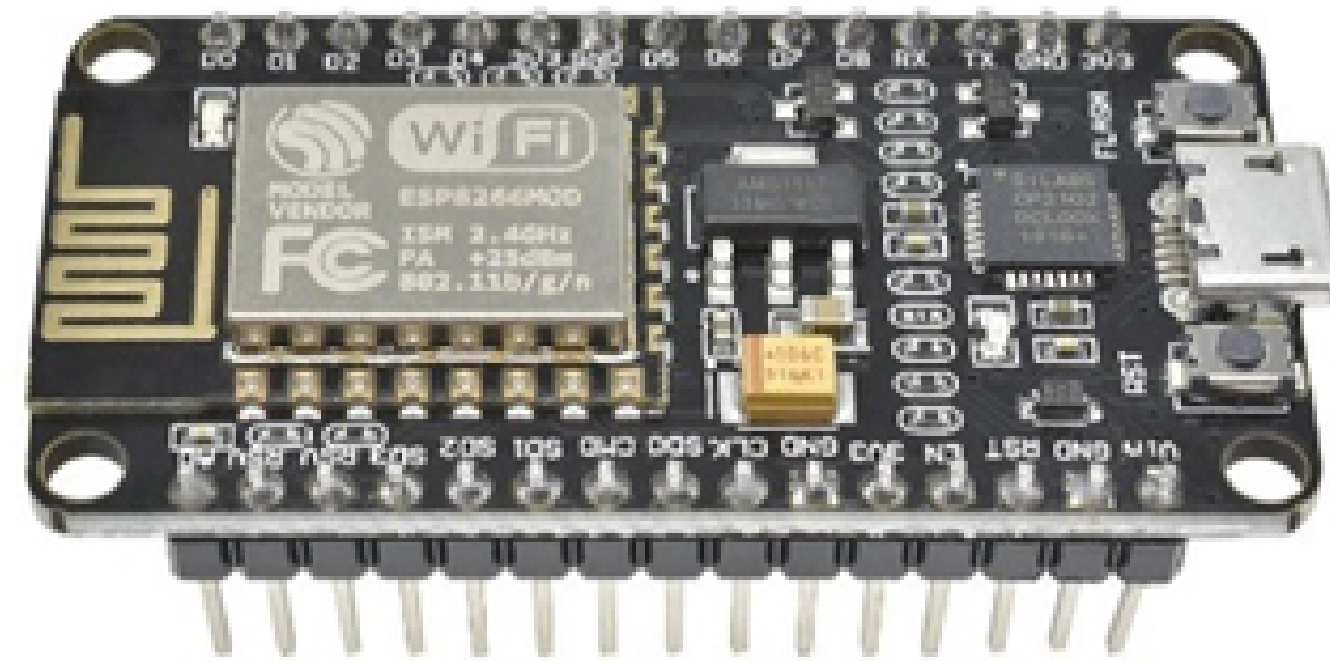
4x4 Matrix Keypad

Remote Monitoring

Web-based control and monitoring of all operations.



Components used



ESP8266 Module

Constraints



- 01 Working with new, unstudied components.
- 02 Ensuring correct positioning of tool heads.
- 03 Balancing the system with Z-axis movement.
- 04 Initial failure of seed suction due to insufficient vacuum power.
- 05 Handling high voltage (220V) safely.



Future Work

01

Expand the system to handle more pots and larger garden areas.

02


Implement smart algorithms for automated watering, fertilizing, and seeding based on weather and growth.

03

Enhance the seed planting mechanism for faster and more precise operation.

04


Improve the app for easier control, alerts, and data analysis.





Conclusion

The RootRise system shows that plant care can be automated in a simple and reliable way. With a soil moisture sensor, stepper motors, a vacuum seed system, pumps for watering and fertilizing, and light control, the system reduces manual work and provides consistent care for small gardens or home plants. Automation makes plant care easier, faster, and more accurate.



Thank you ✨ ✨

