

# SmartGarden: IoT for Indoor Plant Care

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## SmartGarden: IoT for Plant

**SmartGarden** is an affordable, open-source, IoT-based platform designed for monitoring and automating the care of indoor plants. The system integrates environmental sensors, including temperature, humidity, and soil moisture sensors, with a local mobile application for real-time plant management. By using open hardware like Arduino and ESP-01 modules, SmartGarden offers a customizable, offline solution that doesn't depend on cloud services, ensuring privacy and control. Users can monitor plant health, receive alerts, and manually or automatically water plants.

## System Overview

SmartGarden is built using affordable, open-source hardware components, including an Arduino Pro Mini and ESP-01 Wi-Fi module. It uses environmental sensors (SHT21 for temperature and humidity, resistive soil moisture sensor) to monitor plant conditions. The data is sent to a Flutter-based mobile app, enabling real-time monitoring and control. The system is powered by a USB or battery source, and users can manually or automatically irrigate their plants based on sensor feedback.

## Key Features

SmartGarden is an affordable and open-source design that allows real-time monitoring through sensors for temperature, humidity, and soil moisture. It offers both manual and automatic watering control, and the system operates through a local mobile app, eliminating the need for cloud dependency. The platform is scalable, making it suitable for managing multiple plants or entire indoor gardens.

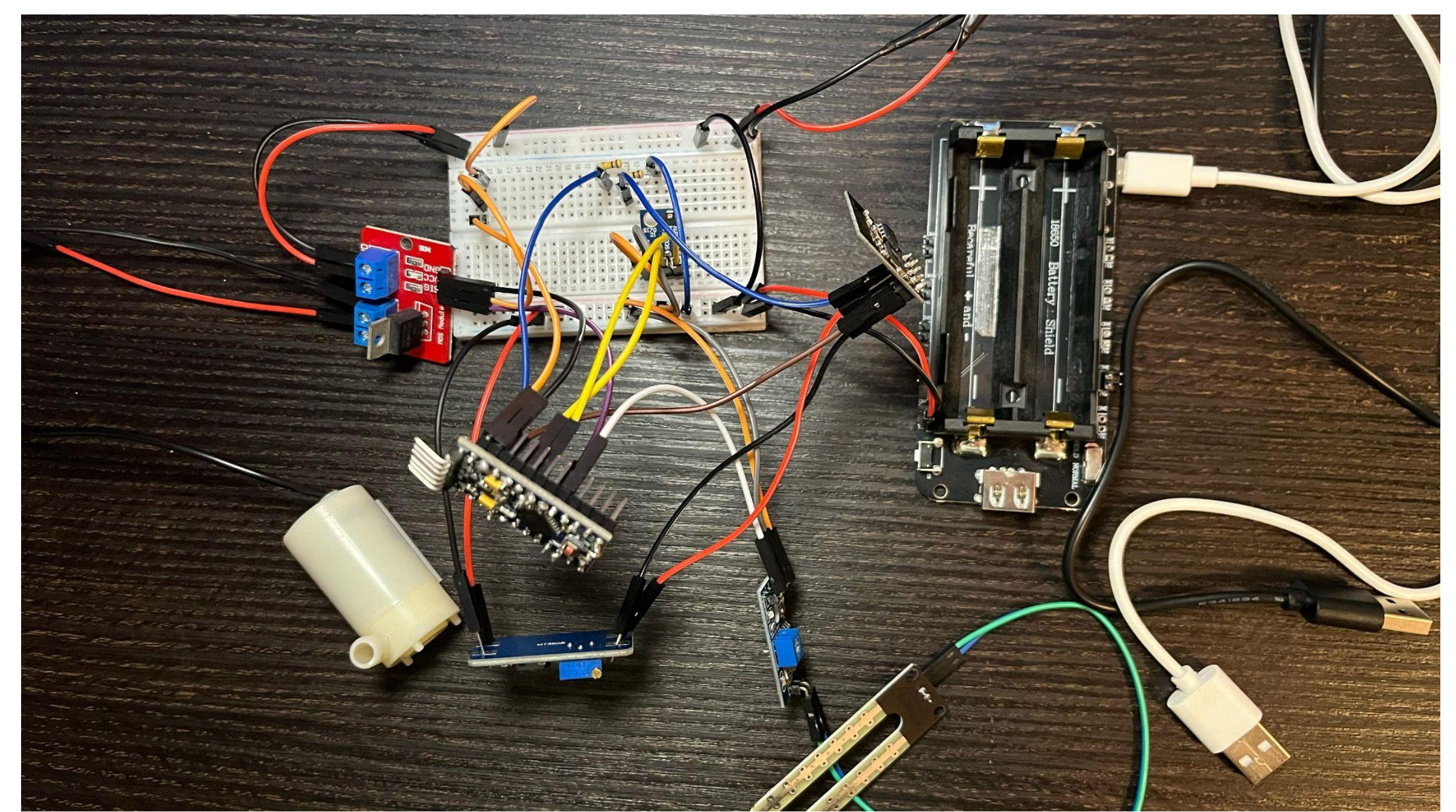


Figure 1: Physical Setup

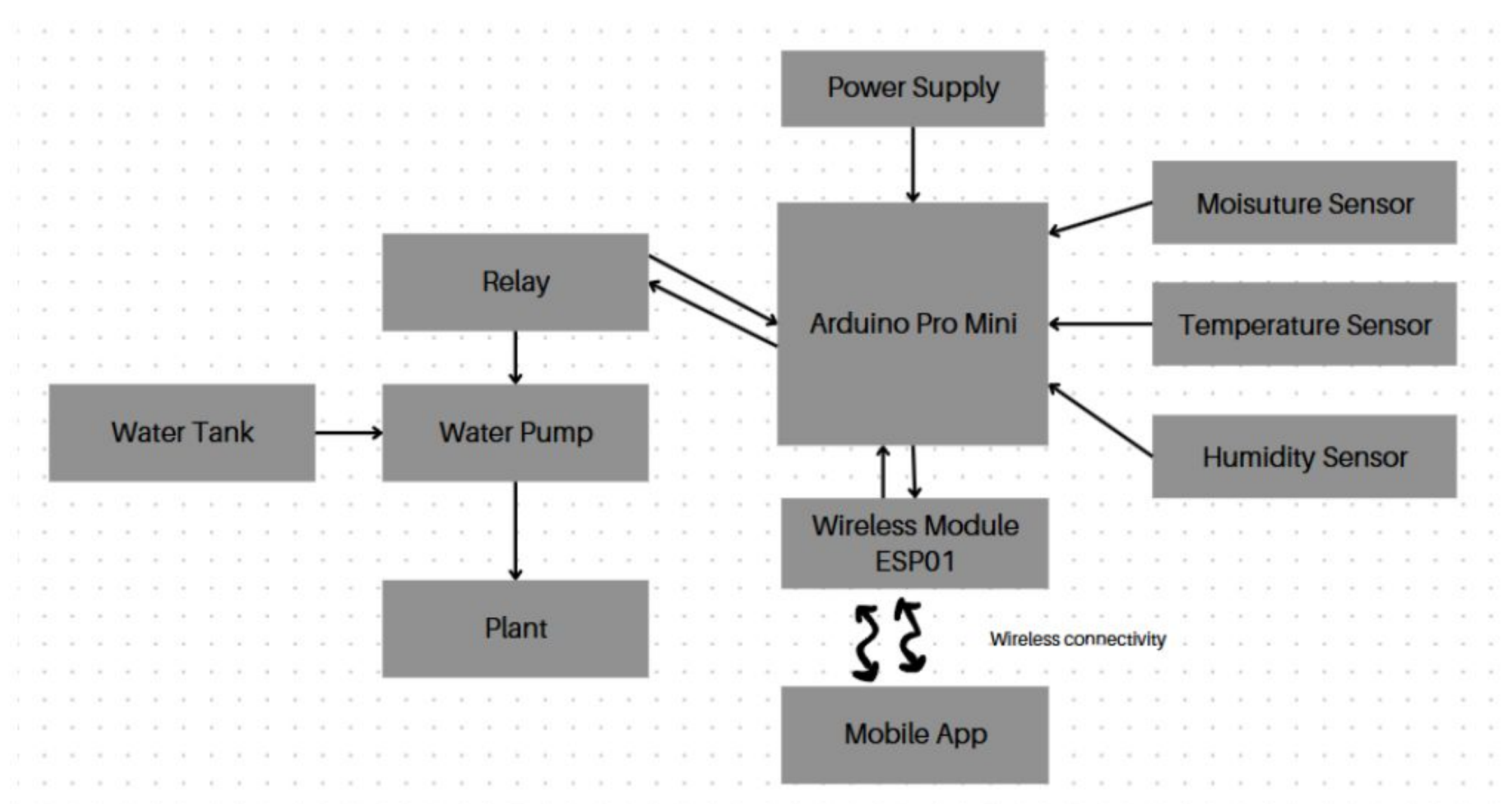


Figure 2: System Architecture

The images show the SmartGarden hardware and how its components connect to monitor and water plants via a mobile app.

## Experimental Results & Future

The SmartGarden system was successfully tested on a Monstera Deliciosa plant. During the trial, the system demonstrated accurate sensor readings for soil moisture, temperature, and humidity, while effectively managing watering based on sensor data. The ESP-01 module maintained stable Wi-Fi communication and ensured real-time updates through the mobile app.

Future improvements include the integration of additional sensors for light, pH, and water levels, as well as the addition of AI-based image processing for plant health diagnostics. The system will also be expanded to support cloud synchronization for enhanced data management and remote monitoring.

## References

- [1] National Gardening Association. 'Houseplant Trends Survey 2020'.
- [2] S. Mishra et al., 'IoT-Based Plant Monitoring Systems: A Review', IEEE Access, 2021.
- [3] D. Kumar and P. Singh, 'Smart Irrigation Using IoT', IJETT, 2020.



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