MULTIDISCIPLINARY LEARNING & RESEARCH CLUB
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Title: IoT-Driven Smart Irrigation for Automated Plant Watering

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Content

1. Introduction

Problem ⚠️

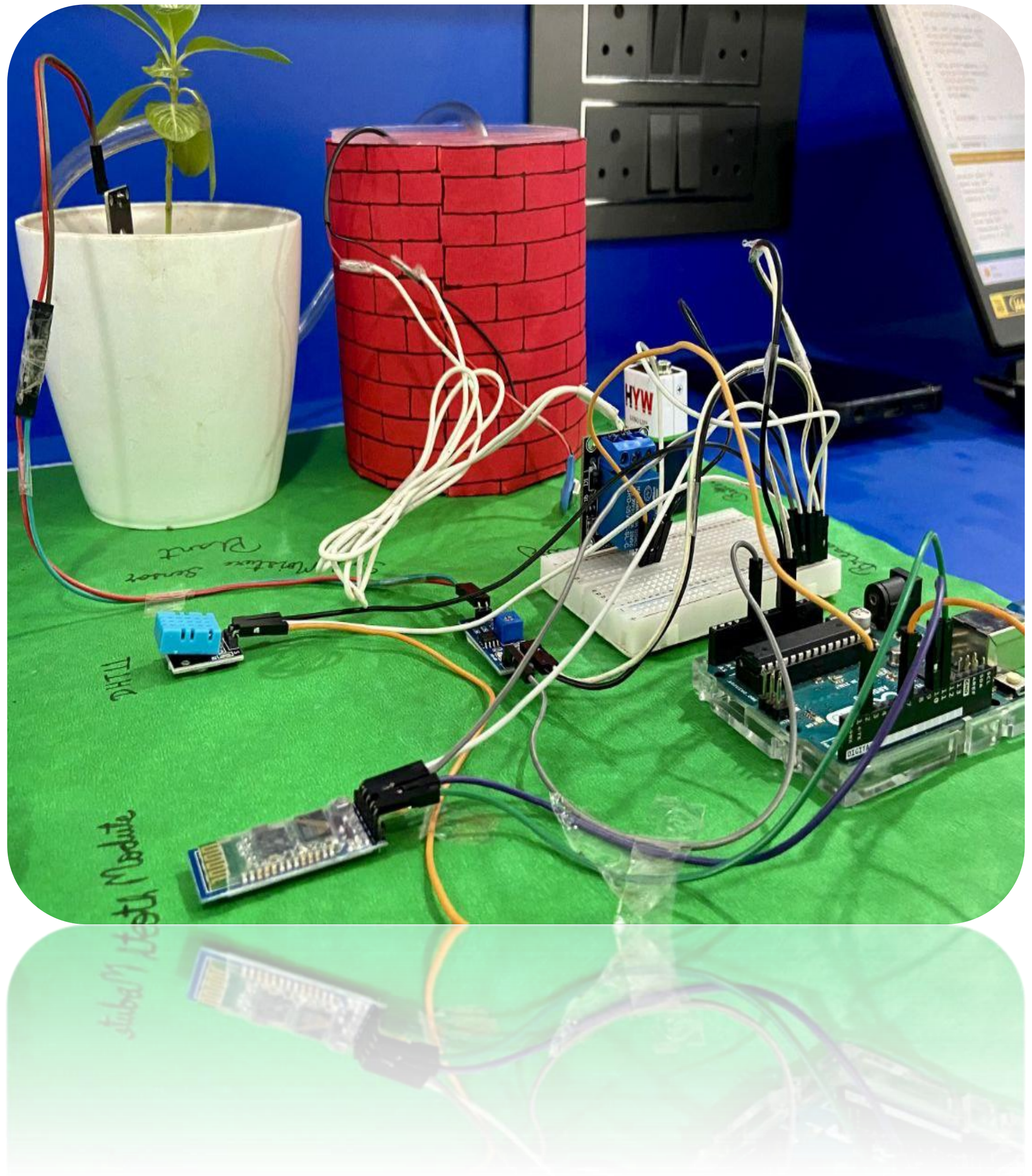
- Water scarcity and inefficient irrigation impact modern agriculture.
- Manual watering leads to overwatering or underwatering, reducing crop yield.

Solution 💡

- IoT-based smart irrigation optimizes water usage and enhances plant health.

Key Features of the System

- Real-time monitoring
- Automated irrigation
- Energy-efficient design
- Mobile connectivity
- Minimal water wastage



2. Objectives & Research Scope

Objectives

- Develop an IoT-based automated irrigation system.
- Optimize water use with real-time soil moisture data.
- Integrate Bluetooth-based mobile monitoring and control.
- Enhance efficiency by reducing manual intervention.

Research Scope

- **Technology Integration:** Utilization of Arduino Uno, soil moisture sensors, DHT11, Bluetooth module, and a DC pump.
- **System Functionality:** Real-time monitoring and automated irrigation.
- **Energy Efficiency:** Low power consumption.
- **Scalability:** Suitable for small-scale and large-scale agricultural applications.

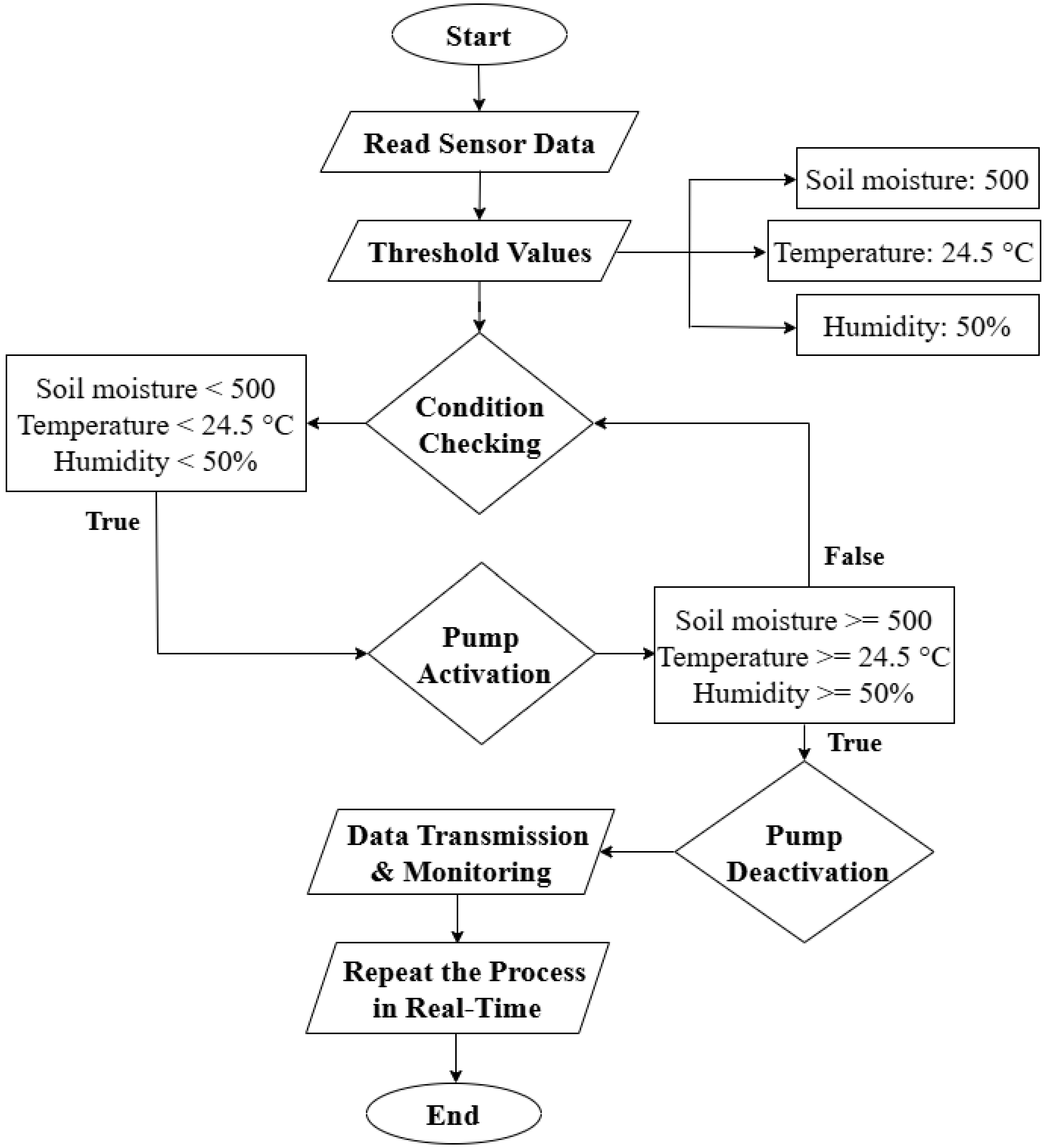
3. Experimental Framework

System Architecture

Hardware	Software
Arduino UNO	Arduino IDE
DHT11	(for coding)
Soil Moisture Sensor	Mobile Application
Relay, DC Pump, etc.	(for Bluetooth monitoring)

Experimental Setup

- **Duration:** 7-day test
- **Method:** Monitored soil moisture, temperature, and water usage
- **Comparison:** Traditional vs. smart irrigation



4. Implementation & Working

Working of System

The proposed system operates in the following sequential steps:

Step 1: Sensor Data Collection

Step 2: Threshold Condition Checking

Step 3: Signal Transmission to Relay Module

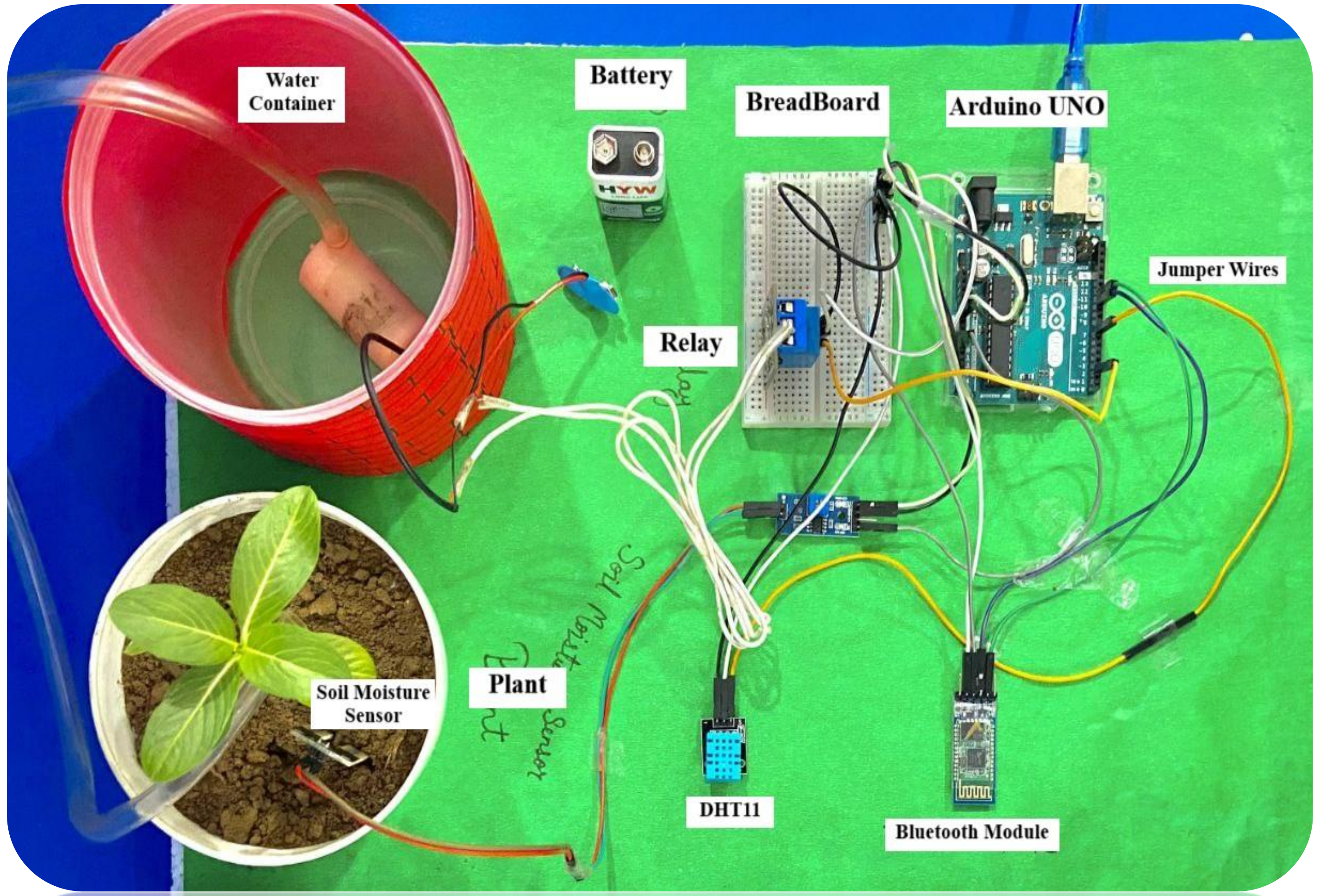
Step 4: Pump Activation

Step 5: Continuous Monitoring of Sensor Data

Step 6: Pump Deactivation

Step 7: Real-Time Data Transmission and Display

Step 8: Arduino IDE Code Execution



5. Results & Observations

Day	Soil Moisture (Before Irrigation)	Soil Moisture (After Irrigation)	Pump Activation	Temperature (°C)	Humidity (%)
1	480	520	Yes	24.0	48%
2	470	515	Yes	23.8	46%
3	490	505	Yes	24.2	49%
4	**460**	**525**	**Yes**	**24.1**	**50%**
5	**500**	**500**	**No**	**24.5**	**51%**
6	485	510	Yes	23.9	47%
7	**470**	**520**	**Yes**	**24.3**	**50%**

6. Comparison with Existing Systems

Feature	Manual Watering	Timer-Based System	Proposed IoT-Based System
Water Trigger	Human Decision	Pre-set time intervals	**Real-time sensor data**
Water Usage	High	Moderate	**Required** (Up to 30% less water use)
Automation Level	None	Partial	**Fully Automated**
Human Effort	High	Moderate	**Minimal**
Crop Health	Uneven	Uneven	**Healthier Crops**
Real-time Monitoring	No	No	**Yes** (IoT-enabled via Mobile Application)

💡 **Advantages:**

❖ Smart irrigation ensures **plants** get the **right amount of water at the right time—automatically!**

❖ The system **adapts** to **various soil types**, ensuring **efficient watering** for **all kinds of plants**. 🌱 💧

7. Conclusion & Future Scope

Conclusion

- **Automation:** Uses real-time sensor data for irrigation
- **Efficiency:** Reduces water wastage and manual effort
- **Usability:** Bluetooth-based remote monitoring

Future Scope

- **AI Integration:** Predicts irrigation needs using weather and crop data
- **Cloud Access:** Enables global monitoring via IoT
- **Sustainability:** Uses solar power to cut costs
- **Scalability:** Supports large farms with LoRaWAN

Thank you

Any Ques?