NSS Socially Relevant Project Proposal

Title: Smart Drip Irrigation System Using Soil Moisture and Weather Data

Theme: Smart Farming / Water and Waste Management

Team Members:

1. Name: Siri Chandana Roll No.: CH23B039

2. Name: Charan Kumar Roll No.: EE23B014

3. Name: Adithya Nooney Roll No.: EE23B035

1. Problem Statement

Small-scale farmers in rural areas often depend on traditional irrigation methods and manual judgment to water crops. This causes significant wastage of water, uneven irrigation, and lower productivity. With depleting groundwater and increasing climate uncertainty, there is a growing need for smart, affordable, and energy-efficient irrigation systems that can optimize water usage and help farmers make data-driven decisions.

2. Proposed Solution

We propose the development of a Smart Drip Irrigation System that integrates:
- Soil moisture sensors to monitor field water levels,
- Weather data (temperature, humidity, rainfall predictions) via open APIs,
- Automated control of water flow using solenoid valves and microcontrollers (Arduino/NodeMCU),
- Real-time data display through an IoT dashboard and SMS alerts for farmers.

The system will irrigate fields only when soil moisture falls below a threshold or when no rain is expected, ensuring efficient and sustainable water management.

3. Objectives

- To design and implement a low-cost IoT-based irrigation system for small farmers.

- To optimize water usage efficiency by minimizing wastage.

- To create awareness among farmers about technology-enabled farming methods.

4. Methodology

Step	Description	Expected Output

1	Design system layout and select appropriate sensors (soil moisture, DHT11, solenoid valve)	Basic hardware setup ready
2	Develop IoT prototype using Arduino/NodeMCU and integrate weather API	Functional smart irrigation unit
3	Deploy pilot system on a small plot and collect data	Real-time field performance
4	Analyze water usage efficiency and farmer feedback	Project evaluation and optimization

5. Expected Outcomes

- A working prototype of a smart drip irrigation system.

- Reduction in water consumption by up to 40%.

- Increased crop yield and reduced manual effort.

- Awareness among rural farmers about smart agriculture tools.

- Opportunity for large-scale implementation through NSS outreach programs.

6. Timeline

Phase	Duration	Activity
Phase 1	Week 1 –2	System design and hardware assembly
Phase 2	Week 3–5	IoT integration and coding
Phase 3	Week 6–7	Pilot testing and data collection
Phase 4	Week 8–9	Report preparation and presentation

7. Social Impact

- Empowers rural farmers with accessible technology.

- Promotes sustainable agriculture and water conservation.

- Aligns with UN Sustainable Development Goals (SDG 6 & 12) – Clean Water and Responsible Consumption.

- Can be expanded to multiple villages through NSS initiatives.

8. Future Scope

- Integration with mobile apps for remote control and data analysis.

- Inclusion of fertigation (nutrient automation) modules.

- Collaboration with local NGOs and panchayats for large-scale deployment.

9. Conclusion

The proposed Smart Drip Irrigation System aims to provide a technologically feasible, sustainable, and impactful solution to one of the major challenges faced by rural farmers — water wastage. This project aligns with NSS's mission of serving society through innovation, combining engineering knowledge with social responsibility to bring about real change at the grassroots level.

Signature(Faculty Adviser) P.V. (Payal Vijay avahare)