AI DRIVEN SENSOR DRIVEN SYSTEM FOR IRRIGATION AND WATER WASTE MINIMIZATION

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INTRODUCTION

Precision farming is one of the most important features in agriculture in a country with a large population, fertile soil and abundant water . This system is suitable for different types of water use such as interpretation water , river water and water discharge. In agricultural situations, water quality management is important due to limited water resource and agriculture dependence on irrigation .It solves the waste water problem by optimizing irrigation based on soil moisture content and ambient temperature to reduce waste water and promotes plant growth using on-site sensors and data analysis. The integration AI with sensor driven frameworks offers a promising arrangement for the challenges that framing faces due to water shortage. This inventive approach revolution's conventional water system hones by optimizing water utilization and minimizing wastage through sensors, showing the clients almost the precise edit water needs.

MOTIVATION

The motivation of AI driven sensor driven system for irrigation system is to address challenges in traditional irrigation methods and achieve a range of benefits such as water conservation, improved plant growth, labor savings, sustainable practices, reduced runoff and precision irrigation. Water conservation translates to lower water bills for farmers and reduced energy consumption for pumping water. The data collected by sensors allows for informed decision-making and adjustments to irrigation strategies for better efficiency.

SCOPE OF THE PROJECT

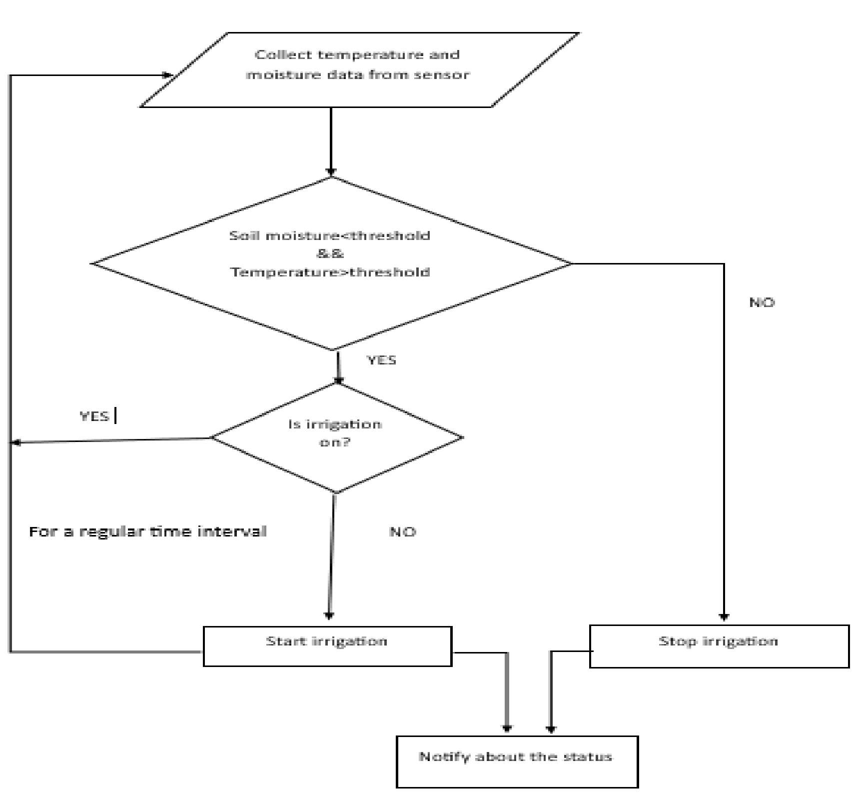
The scope of smart irrigation is:

- Development and integration of hardware components including NodeMCU, LCD display, IoT connectivity, and soil sensors.
- Implementation of real-time soil humidity monitoring assistance and semi-automated operation of turning on and off motors.
- Software development focusing on creating user-friendly interfaces and algorithms for efficient water waste minimization and controlling.

METHODOLOGY

The smart irrigation system employs the following methodology to provide minimal and easiest irrigation process to the user :

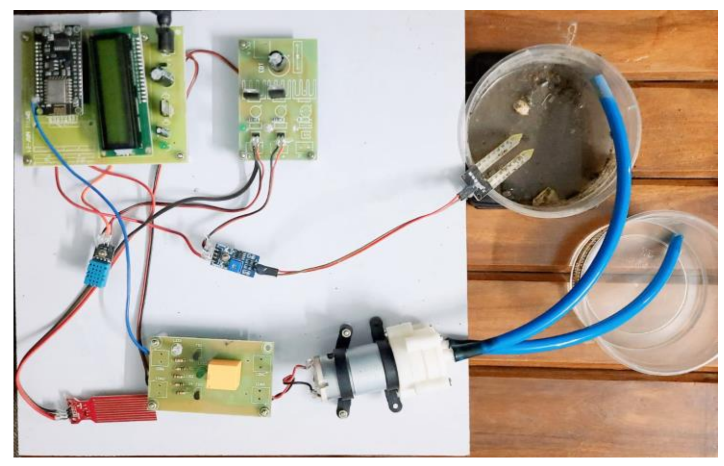
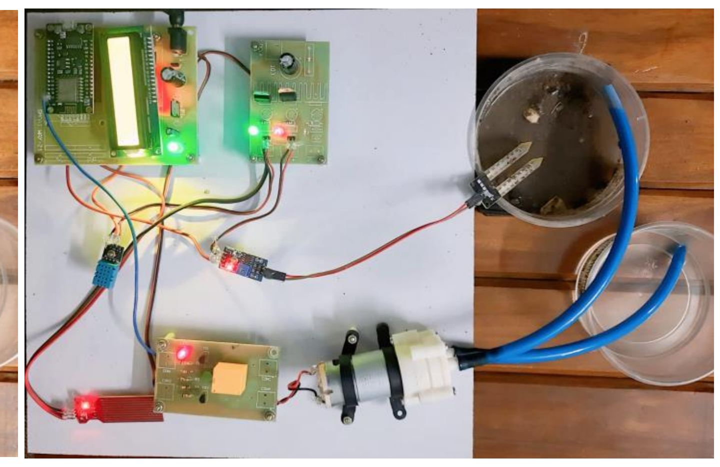
1. **NodeMCU as Central Controller**: The NodeMCU serves as the central controller of the system, coordinating data exchange between various components such as thesoil moisture sensor, rain detection sensor, temperature sensor.
2. **Soil moisture sensor**: Moisture sensor probes the soil, taking real-time readings on its moisture content. This data is then fed to the irrigation system's controller. Based on pre-set thresholds or algorithms, the controller activates the water source (like a pump) when the soil moisture dips below a certain level, indicating the plants need watering.
3. **LCD Display for Information Presentation**: The LCD display presents information such as the temperature level, soil moisture level and the rain indication to the user.
4. **Rain detection snesor**: The rain detection sensor acts as a smart supplement to the soil moisture sensor, working together to optimize water usage. The sensor uses various technologies (like tilting plates or electrical conductivity) to detect rainfall. When rain is present, the sensor sends a signal to the irrigation controller. This triggers the controller to shut down the watering system, preventing the pump from running during rainfall.



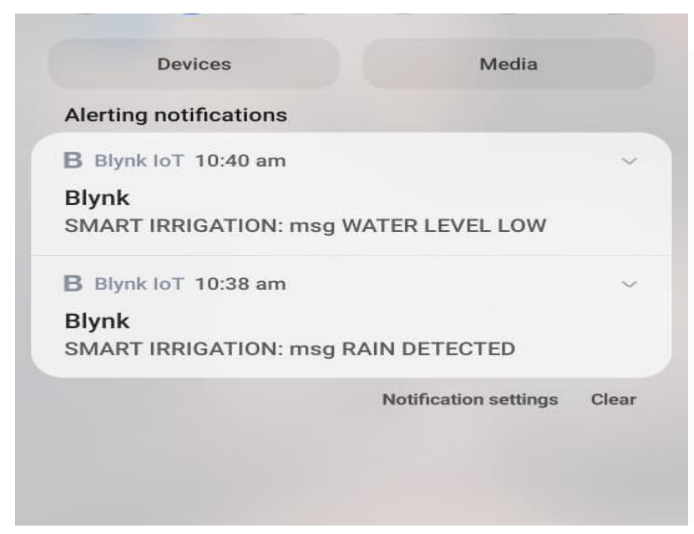
RESULTS

The smart irrigation system includes improved efficiency by monitoring the field continuously by implemnenting soil and rain sensors.

HARDWARE ASSEMBLING AND IMPLEMENTATION:

USER INTERFACE AND NOTIFICATIONS:



CONCLUSION

Integrating into water management at scale represents a revolutionary step in permaculture . Leveraging the power of smart algorithms and advanced technology , this innovation provides accurate water, stability, real-time monitoring and decision-making information and improves efficiency. It is and AI-powered sensor-based system that purifies water according to the specific needs of crops. This optimization reduces water waste, improves resource use, and maximizes crop yields, helping to improve agriculture and food security. Waste materials and environmental impacts to promote sustainable development. By using water efficiency according to the actual needs of crops, and save water, reduce soil erosion, rescue nutrient leaching, thereby protecting the long-term health of the agricultural ecosystem for production purposes or weather events respond quickly to improve farm management. The proactive approach reduces lose and optimize productivity and ensures the quality service and farm profitability. By analyzing large amounts of data collected by sensors, the system can identify trends, patterns and relationships to inform strategic decisions that will improve overall agricultural and manufacturing performance. Sensor-based systems represent an agricultural water productivity and data- driven decision making to solve problems of water scarcity and environmental degradation. As global population increases and climate change worsens, such new technologies will play a key role ensures the sustainability and productivity.

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