ABSTRACT

Agriculture is the backbone of any economy, and efficient water management plays a crucial role in ensuring high crop yield and sustainability. Traditional irrigation methods often result in excessive water wastage or inadequate watering, leading to inefficient crop growth. To address these challenges, this project focuses on the simulation of a smart irrigation system based on fuzzy logic, which provides an intelligent and automated approach to irrigation.

The proposed system utilizes fuzzy logic to determine the optimal irrigation levels based on real-time environmental parameters such as soil moisture, temperature, and humidity. Unlike conventional threshold-based control systems, fuzzy logic enables better decision-making by handling uncertainties and gradual changes in sensor inputs. The system simulates a decision-making model that categorizes sensor readings into linguistic variables such as low, medium, and high and processes them using fuzzy inference rules to regulate water supply dynamically.

To implement the simulation, MATLAB Simulink is employed as the primary tool. The fuzzy inference system (FIS) is designed using membership functions and rule- based control strategies to achieve precise irrigation management. The simulation models different soil conditions and environmental factors to evaluate the efficiency of the system, reducing water wastage and improving irrigation accuracy.

The simulation results are analyzed to demonstrate the effectiveness of fuzzy logic in optimizing irrigation schedules, reducing human intervention, and ensuring optimal crop health