

ABSTRACT

The increasing global food crisis drives the need for innovation in the agricultural sector to ensure food security. One of the primary challenges is optimizing water usage in agriculture, particularly for red spinach, which requires optimal environmental conditions to thrive. Conventional farming systems have proven inadequate in addressing the challenges posed by climate change and limited resources, highlighting the necessity for adaptive technology-based solutions.

This research proposes the development of a Smart Drip Irrigation system based on Artificial Intelligence of Things (AIoT), integrated with a mobile application for monitoring and controlling soil temperature, moisture, and plant water needs automatically. The system employs temperature and soil moisture sensors connected to an ESP32 microcontroller and Raspberry Pi. The collected data is processed using artificial intelligence algorithms to predict irrigation requirements and regulate water flow more efficiently.

The implementation results show that the system improves water usage efficiency by, reduces crop failure risks, and increases red spinach productivity compared to conventional methods. Thus, this system contributes not only to national food security but also to advancing sustainable modern agricultural practices for the future.

Keywords : AIoT, LSTM, Red Spinach, Smart Drip Irrigation, Sustainable Agriculture