

Title: IoT-based Automatic Pan Evaporimeter Monitoring and Irrigation Control System for Crops(Conference Paper)

Author

- Kabir, M.S.,
- Niloy, K.M.,
- Hossen, M.I.,
- Afrose, S.,
- Mofazzol, M.I.H.
- [View Correspondence \(jump link\)](#)
- ^aAmerican International University-Bangladesh, Dept. of Electrical & Electronics Engineering, Dhaka, Bangladesh
- ^bUttara University, Dept. of Computer Science Engineering, Dhaka, Bangladesh

Abstract

This research study intends to automate the manual pan evaporimeter system and scheduling irrigation by considering soil water content and crop evapotranspiration. Automating the pan evaporimeter means performing tasks without human intervention, such as measuring the daily water evaporation amount, calculating and storing data, and refilling the pan with water. A waterproof ultrasonic sensor was used to measure the water evaporation amount. The ultrasonic sensor was installed on an innovatively designed structure facing the pan's water surface. The sensor measured the distance between the water surface and the sensor. The surface level decreased as the water evaporated over time, which caused an increment in the distance between the ultrasonic and water surfaces. By this, the sensor calculated the daily evaporation amount. The pan needed to be refilled when all water evaporated; a submersible pump was used to refill the pan automatically. A relay switch controlled the pump, and a

microcontroller turned on the switch based on sensor value. The entire setup was IoT-enabled to monitor and control the system remotely on a mobile device. The entire system was backed up by solar energy to run on clean energy. A solenoid valve was used to control the flow of irrigation water. Pan evaporation estimated the amount of water that could be lost owing to evaporation and transpiration. Soil moisture sensors provided a direct measurement of the amount of water present in the soil. The two combined generated a dynamic and responsive irrigation plan that maximized water use and promoted the healthy development of crops. That approach was used. The ultrasonic sensor accurately measured water evaporation, but the installation process was complex. So, a need arises to develop a simple system or scale-type sensors to overcome the complexity. © 2024 IEEE.

Author keywords

crop evapotranspirationESP-32Internet of Things (IoT)Optical rain sensorWaterproof ultrasonic sensor

- **ISBN:** 979-835037642-5
- **Source Type:** Conference Proceeding
- **Original language:** English
- **DOI:** 10.1109/I-SMAC61858.2024.10714894
- **Document Type:** Conference Paper
- **Publisher:** Institute of Electrical and Electronics Engineers Inc.