ABSTRACT

The scarcity of clean water resources around the globe has generated a need for their optimum utilization. Internet of Things (IoT) solutions, based on the application-specific sensors' data acquisition and intelligent processing, are bridging the gaps between the cyber and physical worlds. IoT-based smart irrigation management systems can help in achieving optimum water-resource utilization in the precision farming landscape. This project presents an open-source technology-based smart system to predict the irrigation requirements of a field using the environmental conditions along with the weather forecast data from the Internet. The sensing nodes, involved in the ground and environmental sensing, consider soil moisture, soil temperature, air temperature, Ultraviolet (UV) light radiation, and relative humidity of the crop field. The intelligence of the proposed system is based on a smart algorithm, which considers sensed data along with the weather forecast parameters like precipitation, air temperature, humidity, and UV for the near future. The complete system has been developed and deployed on a pilot scale, where the sensor node data is wirelessly collected over the cloud using web services, and a web-based information visualization and decision support system provides the real-time information insights based on the analysis of sensors data and weather forecast data. The system has a provision for closed-loop control of the water supply to realize a fully autonomous irrigation scheme. The paper describes the system and discusses in detail the information processing results of three weeks' data based on the proposed algorithm. The system is fully functional and the prediction results are very encouraging. The proposed system can be further enhanced with real-time soil water content-based soil moisture sensing, which will improve the accuracy of the irrigation demand prediction.