

Smart irrigation management system to enhance agriculture in Bangladesh using UECS and LPWAN

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【Introduction】

Agriculture is the most dominant significant industries in Bangladesh. Besides that currently, this has about 169 million population in the country. To provide the food for the nation, enhancement of the agricultural productivity is the most important for future Bangladesh. The total cultivable land is near about 8.5 million hectares, about 7.56 million hectares are suitable for irrigation but only 3.12 million presently under irrigation. Using groundwater with proper utilization and management 5 million lands can be irrigated (National Encyclopedia of Bangladesh, 2015)¹. Stable electricity supply, High speed internet facility also a big challenge for Bangladesh as a developing country.

Here, the objective of this study was to introduce IoT for a smart irrigation management system using UECS & LPWAN (Low Power Wide Area Network) for the most effective irrigation management systems for Bangladesh to increase irrigation land and also to save water and electricity.

【Materials and Method】

1. UECS for Control System

Ubiquitous Environment Control System (UECS) Hoshi et al. (2004)² was developed to establish environmental monitoring and control system for small and medium scale growers. The UECS has fully supported Internet Protocol (IP) through the Ethernet and Wi-Fi network without any modification. I want to introduce this system because of the advantage of the decentralized Common Corresponding Message (CCM) protocol, a simple function for communication and open source library for improving the system.

2. Smart Irrigation Controller with UECS and LPWAN

Figure 1 shows the system architecture of the Smart

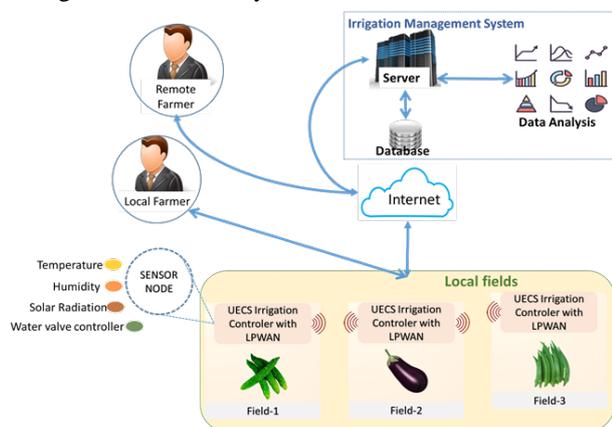


Figure 1. System architecture of Smart Irrigation System Using UECS and LPWAN.

Irrigation management system where different type of Farming field is setup with UECS and LPWAN based irrigation control system. We use Temperature, Humidity, Solar radiation sensor and water valve Controller. Because of the UECS-CCM between each UECS node in a particular farming field, and IM920c Sub-GHz wireless network module to connect each distributed field network. Using this LPWAN with UECS we can communicate with our controller from long distance and reduce dependence on the internet and farmer can control the each of the irrigation field from offline and online.

3. Smart Irrigation based on Field Environment

Smart Irrigation control is one of the applications that can be improved by the utilization of environmental data. So we use Air temperature and humidity sensor. We are collecting temperature and humidity data from the different field and based on that weather data we will control the Irrigation Controller automatically. Experts also able to analysis the weather data for the web server.

【Results and Discussion】

Different type of vegetable field need different timing of irrigation based on the Air Temperature, Humidity and Solar radiation data we can sent the irrigation start value for each of the filed. So by measuring the weather data we can control each field based on the crop type. Because of LPWAN we can control many farming field around 2km area and reduce internet costing of the farmer.

【References】

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