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Development of a Smart Agriculture Robot using IOT

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Abstract
Development of a Smart Agriculture Robot using IOT is presented in this final year project's student's paper. In this paper, we present the recent developments of the works. Climate changes and rainfall has been erratic over the past decade. Due to this in recent era, climate-smart methods called as smart agriculture is adopted by many Indian farmers. Smart agriculture is an automated and directed information technology implemented with the IOT (Internet of Things). IOT is developing rapidly and widely applied in all wireless environments. In this paper, sensor technology and wireless networks integration of IOT technology has been studied and reviewed based on the actual situation of agricultural system. A combined approach with internet and wireless communications, Remote Monitoring System (RMS) is proposed. Major objective is to collect real time data of agriculture production environment that provides easy access for agricultural facilities such as alerts through Short Massaging Service (SMS) and advices on weather pattern, crops etc.
Keywords: Smart agriculture, IOT, Sensor technology

1. Introduction

Agriculture is the basic source of livelihood of people in India. In past decade, it is observed that there is not much crop development in agriculture sector. Food prices are continuously increasing because crop rate is declined. It has pushed over 40 million people into poverty since 2010 [1]. There are number of factors which are responsible for this, it may be due to water waste, low soil fertility, fertilizer abuse, climate change or diseases, etc. It is very essential to make effective intervention in agriculture and the solution is IOT in integration with Wireless sensor networks. It has potential to change the way of development in agriculture and gives great contribution to make it smart agriculture. The internet of things involves a three-tier system. It includes perception layer, network layer and application layer. Perception layer includes sensor motes. Information communication technology (ICT) enabled devices, sensor motes are building blocks of sensor technology [18]

2. Literature Reviews / Surveys

Agriculture is the basic source of livelihood of people in India. In past decade, it is observed that there is not much crop development in agriculture sector. Food prices are continuously increasing because crop rate is declined. It has pushed over 40 million people into poverty since 2010 [1]. There are number of factors which are responsible for this, it may be due to water waste, low soil fertility, fertilizer abuse, climate change or diseases, etc. It is very essential to make effective intervention in agriculture and the solution is IOT in integration with Wireless sensor networks. It has potential to change the way of development in agriculture and gives great contribution to make it smart

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3. Proposed Problem Statement

This paper presents proposed model for smart agriculture to develop real time monitoring system for soil properties like temperature, moisture and to implement decision support advisory models for Pest & Disease forewarning, Crop Disease identification using image analysis. It will also be possible to control various operations of the field remotely from anywhere, anytime by mobile as well [14].

4. Proposed architecture

Proposed system has three modules – Farm side, Server side and Client side. Farm side deployment is as shown in Fig. 1. It consists of six methods as follows [13].

1. Sensing local agricultural parameters.
2. Identification of location of sensor and data collection.
3. Transferring data from crop fields for decision making.
4. Decision support and early warming based on data analysis, domain knowledge and history generated.
5. Actuation and control based on decision.
6. Crop monitoring via camera Module.

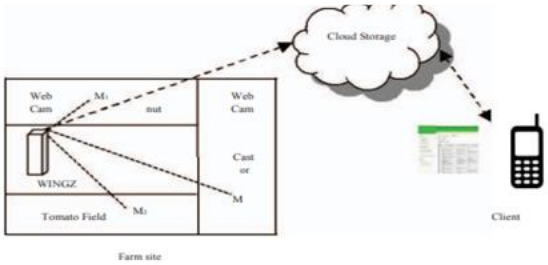

Fig. 1 : Proposed SAIoT module in the project

The perception layer mainly consists of Ubi-Sense mote as shown in Fig. 2. Ubi-Sense mote (M) is a generic sensor board having Temperature and Relative Humidity, Light Intensity, Barometric Pressure, Proximity sensing and Buzzer. Ubi-Sense mote is a generic sensor board having Temperature and Relative Humidity, Light Intensity, Barometric Pressure, Proximity sensing and Buzzer. UbiSense reads values from sensor, detects Proximity IR LED and generates an alarm through Buzzer. It transmits the measured physical value from the Ubi-Sense mote over the Air. Web Cameras and DVR which work together for crop monitoring from which the observation of the stage of crop production and similarly spectral analysis of plant images is possible to know health condition of the plants in real time [12].

Fig. 2 : UBI Note

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Fig. 3 : Wireless transmitter & receiver

5. Practical Implementation

Farm field may have different crop areas. In these crop areas UbiSense motes are installed. Data from Ubi-Sense mote will be transferred to Ubi-mote Server side module. Decision support system will be implemented for alerts, crop monitoring. Client side module consists of web application as well as mobile application on android OS as shown in Figs. 4 & 5 respectively [10].

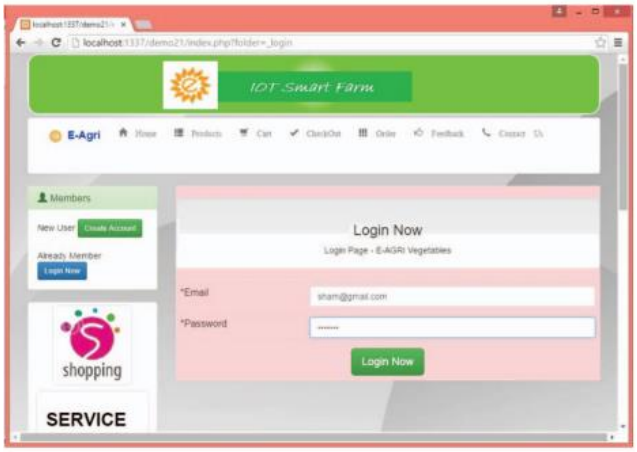

Fig. 4 : Web application developed

6. Conclusions

The paper proposes a wise agricultural model in integration with ICT. ICT have always mattered in Agriculture domain. Village farmers may have planted the “same” crop for centuries, but over period, weather patterns and soil conditions and epidemics of pests and diseases changed. By using the proposed approach, received updated information allows the farmers to cope with and even benefit from these changes. It is really challenging task that needs to provide such knowledge because of highly localized nature of agriculture information specifically distinct conditions. The complete real-time and historical environment information is expected to help to achieve efficient management and utilization of resources.

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