A Framework for Technologically Advanced Smart Agriculture Scenario in India based on Internet of Things Model

Dr. Vikash Kumar Singh, Devendra Singh Kushwaha, Manish Taram, Anuradha Taram
1Head (I/C) Dept. of C.S, 2Assistant Professor, 3Research Scholar, 4Student
IGNTU Amarkantak, (M.P.)

ABSTRACT

In last couple of years there were so many advancements that have been introduced to the agricultural industry in India like Green-House technology, Canal-Based irrigation System, River Dams for water harvesting and so on but there are few of them which can actually reduce the physical labor of farmers now as we are living in 21st century things have to be changed as farmers are working very hard in spite of unfavorable climate conditions in India. Therefore we would like to introduce the concept of smart agriculture through this paper based on smart objects of Internet of Things Model.

Keywords – Wi-Fi, RFID, NFC, IoT, IR (Infra-Red Blasts)

INTRODUCTION

A network of small and big electronic devices like smart phones, pagers, sensors, laptops, smart watches medical and household applications etc; with internet facility in them such that they can interact through it is called Internet of Things having an acronym as IoT.[1]

Idea is to connect almost every electronic device in this world so that each and every device can act as a computer at least in way that enables them to interact with each other. This type of communication is called as M2M or machine to machine communication. There are also other means of communication such as machine to human-M2H etc which are possible through IoT framework.[2]

There is a dilemma that whether objects really have to be computer fitted inside them to be called as smart objects; No, answer is simple because it is not necessary to be a computer fitted inside every object so that it can be called as a smart object rather a smallest device which is able to communicate with other devices through Bluetooth, Wi-Fi, NFC chips (Near Field Communication) or IR Blastsetc is a smart device.[3]

Following technologies are used in IoT Model:

✓ Bluetooth - Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices and building personal area networks (PANs). This technology is very popular nowadays and is used to transfer data files, audio, video and images.[4]

Figure 1: A Block Diagram of functional blocks in the Bluetooth system.
NFC (Near Field Communication) NFC or Near Field Communication is a short range high frequency wireless communication technology. In this technology a radio communication is established by touching the two phones or keeping them in proximity of a few centimeters. It is mainly aimed for mobile or handheld devices. NFC is an extension of Radio frequency identification or RFID technology. RFID is mainly used for tracking and identification by sending radio waves. NFC is based on RFID which is a system that communicates using radio waves between a reader and an electronic tag attached to an object its operating frequency is 13.56 MHz and data rate varies from 106 kbps to 424 kbps. [6]

RFID – This technology is known as Radio Frequency Identification. Radio-frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by electromagnetic induction from magnetic fields produced near the reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of meters from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader and may be embedded in the tracked object. [7]

APPLICATION IN SMART AGRICULTURE

An agricultural framework consisting of smart technology is need of today’s 21st century era. There can be a drastic change in primitive methods used by Indian farmers. Actually farmers often need real time data on various aspects of land, weather, seed, fertilizers and water etc. This framework will help our Indian farmers to take better crops in time and they can be saved from any losses that can occur in a complete crop-cycle. [8]

Few of the smart ways are suggested as follows:

Temperature – censors that can perfectly measure the right temperature of the soil and weather comes in handy while initiating a crop.
Humidity – many crops required an estimated amount of soil humidity which can be measured by smart devices.[9,10]

Micro-organisms – Some micro-organisms are too required for best quality of crop soil so they can also be detected using smart devices and in case of non-availability they can be deployed too using smart methods.[13,14]

Irrigation – this could be better termed as smart irrigation as censors and any other devices that can check the right amount of water to be supplied to the crops and which can automatically control the water flow. Also, smart devices fitted within can also communicate with the farmers updating them about the future water supply requirements.[15,16]

Water Harvesting – There are many farming places in our country which don’t have proper water supply or are having a dry soil. For these type of areas a water harvesting method fitted with smart devices can be used. A water harvesting method can consist of a pond, overhead-tanks or any other means of water storage. They too can keep record of storage and inform the respective farmers about supplies and cleaning time of them.[17,18]

SOFTWARE STRUCTURE OF SMART AGRICULTURE SYSTEM

For a whole system to be smart there should be software system which can monitor and record the data sent by all the devices there will be requirement of terminal link, business link and machine to machine M2M platform in which all the sensor data can be joined with communication terminal directly and can communicate with M2M platform directly. A definite radio frequency can be used to connect with M2M platform. This system can get all the data in real time which can be used to send to smart phones creating a M2H machine to human interface through SMS sending apps.[19]
CONCLUSION

Further studies are required for the establishment of such a system. Remote monitoring system with internet and wireless communications combined is proposed. At the same time, taking into account the system management, information management system can be designed. The collected data by the system could be provided for agricultural research and management facilities. Study shows that agriculture monitor system based on IOT technology has certain precision of monitor and control. According to the need surrounding monitor, this system has realized the automatic control on the environmental temperature, humidity factors. And the system has offered a good growth condition, it should be easy to operate, the interface should be friendly, offering the real time environmental factors in the crop field.

REFERENCES