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RESEARCH ARTICLE

ACUTE ADMINISTRATION OF AGRICULTURAL FIELD CONDITIONS UNDER THE CONCEPT-INTERNET OF THINGS

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ABSTRACT

The wireless communication is always evolving with time, so as of now it has reached to another level of not just communicating but collecting, storing, processing and transmitting data with tremendous speed. Over the years of history India have seen different techniques to improvise the crop yield, to maintain soil health and to keep up the occupational growth [1]. The need for smart agriculture is in demand which will bring revolution. The administration of data series using this prototype will be beneficial for maintaining acres of field in just one go from any corner. The Internet of Things (IoT) platform allows the interconnection and linking of this prototype. In this paper, necessary soil health information such as temperature and humidity is collected by installing the sensor in the field, Arduino Uno is used as the microcontroller, further to justify the demand of data handling and utilizing it is uploaded to ThingSpeak that is the IoT hub. Finally, MATLAB is used to get data from ThingSpeak [2]. The datasheet of the data is formed which will be provided in an app for future enhancement.

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INTRODUCTION

India is an agricultural dependable country. The overall growth of the country is based on the yield of crops. This occupation is of hard work and immense dedication. This project is an overall attempt to simplify the management of the land, real time tracking of the conditions as well as real time data recording. The collection of data is very raw and is further processed by taking internet as the backbone as internet is available and can be accessed from any corner. It is an attempt to make farmer resourceful. We have chosen IoT platform as the backbone of the prototype because of its benefits. Using IoT large data can be stored, processed, calculated, summarized, abstracted, and extracted. It is the internetworking of physical devices such as sensors, microcontrollers and internet. The collected data is uploaded to server that is ThingSpeak where an allotted channel id is handled. Further the data can be extracted in any form possible. Here using MATLAB software the data is obtained in processed form. In brief we collect real time data from the agriculture field, such as the temperature and moisture of soil.

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The data collected is in Analog form, further Arduino Uno (microcontroller) based on AT mega328P is used to create a network layer with Wi-Fi module (ESP8266). The Wi-Fi is provided with LAN connection and data is further uploaded to a server and is obtained from the server using MATLAB software (Balaji Bhanu, 2014). This paper is organized as follows. Section II contains the literature survey, Section III contains the flowchart which gives information about the components used and working of the prototype. Section IV contains the data series along with the block diagram. Section V contains the result analysis, Section VI contains conclusion and the future scope of the project.

Literature Survey

(Lokesh Krishna, 2017), K.Lokesh Krishna Omayo Silver Wasswa Fahad Malende K.Anuradha, have proposed an system that is a wireless mobile robot which is designed and implemented. It is equipped with various sensors to monitor different environmental parameters that are suitable for crop yield. It is capable of controlling the essential parameters necessary for plant growth (Shruti, 2016). Shruti A Jaishetty and Rekha Patil have proposed a modern agriculture technique were several sensors such as temperature sensor, rainfall sensor, light sensor and the moisture sensor are installed and

the data is uploaded to IoT hub and hence real time data visualization is obtained. With the help of MATLAB analysis user can predict the future parameter values which is required in field (Balaji Bhanu, 2014). Balaji Bhanu, Raghava Rao, J.V.N. Ramesh and Mohammed Ali Hussain, worked on conditions of farming using wireless sensors and to increase the yield of crops. This wireless system is used to check different conditions such as water level, temperature and humidity. The system is composed of two processors namely ATMEGA8535 and ICS8817 BS with an Analog to Digital converter, wireless sensor nodes with wireless transceiver module based on Zig Bee protocol. Data is stored and retrieved with the help of database and web application.

Flowchart and Working

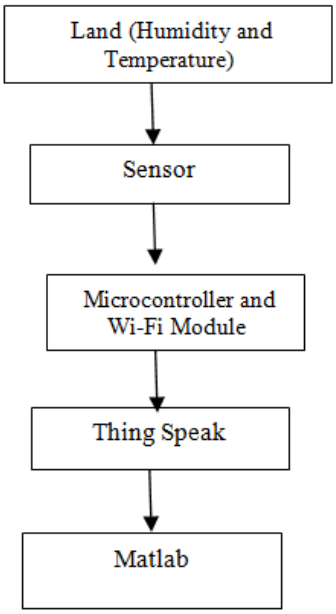

Fig. 1. Flowchart for real time data collection and visualization

Sensor: The agricultural setup of our project is just a small piece of land in which the sensor is installed. The information of soil temperature and soil moisture is collected using the temperature and moisture sensor available that is DHT11. The real down side of this sensor is you can get new data from it once every 2 seconds. To enable DHT11 sensor we require DHT11 library, which has class interface that supports only one function for reading humidity and temperature. Here read () function verifies the data transmission. Further it has a timeout function. With one instance, it's possible to read multiple sensors provided that each sensor has a separate pin. Here we use one sensor to collect a set of data.

Microcontroller and WIFI Module: The sensor is accessed using the Arduino Uno microcontroller board based on the ATmega328P. The digital pin 7 on the board collects the data from the sensor. The microcontroller also connected with Wi-Fi module namely ESP8266 which is a self-contained system on chip (SOC) with integrated TCP/IP stack and MCU (microcontroller unit). The hotspot is provided to the Wi-Fi module by providing AT commands. The AT command AT+CWLAP provides the list of available Wi-Fi hotspots nearby, the following command will help in connecting with the Wi-Fi i.e. is AT+CWJAP=" the name of the network", "password". With this, you can keep the device connected for long duration. The microcontroller (Arduino Uno) forms a gateway network which is responsible for routing the data from the sensors, connectivity and passes it to the next layer. Hotspot is a wireless LAN (WLAN) which can be provided by using a router to give internet service. Here, mobile hotspot is used as an internet service provider.

IOT HUB: For managing the data as well as to extract it from any corner, we use an open source internet of things (IoT) application and Application Programming Interface (API) to store and retrieve data from server which is ThingSpeak. ThingSpeak has integrated support from the MATLAB software. This allows analyzing and visualizing the uploaded data. It represents the data in graphical form according to setting of the channel of ThingSpeak. The channel provides channel Id and allocates the fields according to need. We need two fields, one for the temperature and other for the moisture. The channel has its API key provided to us which was passed to the microcontroller to send the data through ESP8266.

MATLAB: MATLAB software is introduced to keep a record of the data. ParseJson () function that is (JavaScript object notation) is a function that enables any code to collect data from the internet and pass it to MATLAB. MATLAB collects the field data from the specific channel Id provided in the code and gives the necessary Field1 and Field2 information in the command window.

Block Diagram

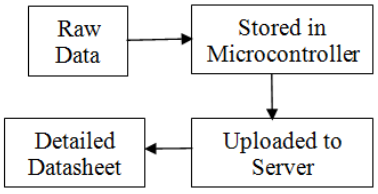

Fig. 2. Block diagram for data flow in real time agricultural field conditions module

The importance of this block diagram is to clarify the need for using MATLAB, firstly the sensor is bound to collect the data and microcontroller is used to store the collected data. On the Arduino serial monitor the data is easily visible but Arduino is not a software which can be used by each of the customer hence to make it more simple the data is only stored in the Arduino microcontroller. To make sure the data is easily available it has to be uploaded to the server. On the server the data is visualized but in the graphical form and hence MATLAB is introduced to display data in simple language that is properly processed. the data is presented in the form of datasheet which is easily displayed and can be easily studied. The main aim is accomplished that the data is in the easiest possible form.

RESULTS

Fig.3. shows experimental setup of a project where the sensor is installed in a small piece of land to collect data and further the microcontroller and ESP8266 are connected. Fig.4. gives the information about the real time data accessibility from any part of the world. The IoT hub ThingSpeak allows the real time visualization of the data of temperature with respective dates. Fig.5. provides real time data visualization on the Thingspeak of the moisture values.

Fig. 3. Experimental setup of the project

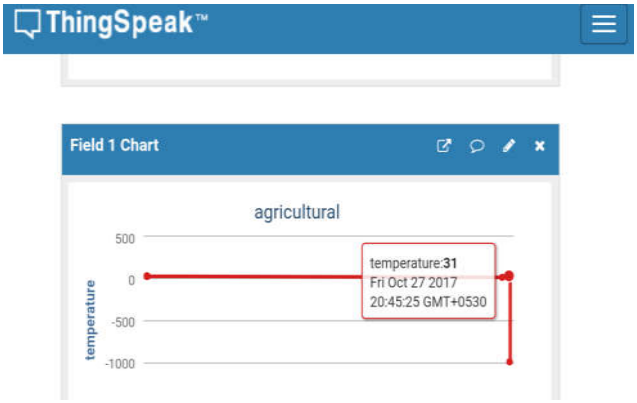

Fig. 4. Analysis of soil temperature

Fig. 5. Analysis of soil moisture

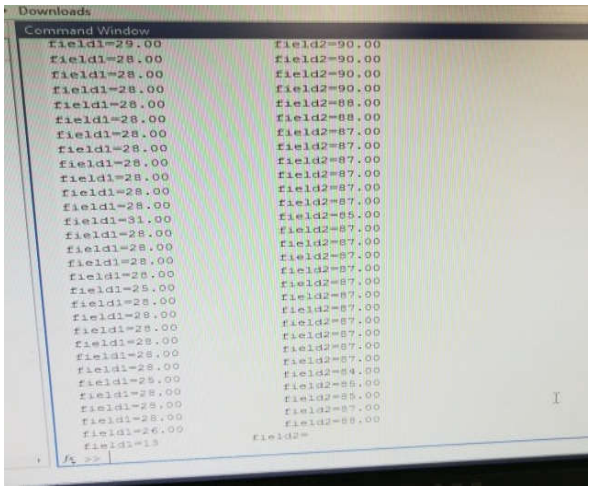

Fig. 6. Indicates the result of the field 1 and field 2 data obtained in MATLAB command window

Fig.6. gives information of the field 1 and field 2 data obtained in the MATLAB command window in the form of datasheet.

	A	B	C	D
1	created_at	entry_id	field1	field2
2	2017-10-10 14:06:20 UTC	1	13	84
3	2017-10-10 14:06:40 UTC	2	13	85
4	2017-10-10 15:11:37 UTC	3	13	80
5	2017-10-10 15:16:53 UTC	4	19	85
6	2017-10-10 15:20:44 UTC	5	19	85
7	2017-10-10 15:21:04 UTC	6	19	85
8	2017-10-10 15:21:24 UTC	7	19	90
9	2017-10-10 15:21:43 UTC	8	19	90
10	2017-10-10 15:22:04 UTC	9	19	90
11	2017-10-10 15:22:23 UTC	10	19	90
12	2017-10-10 15:22:43 UTC	11	19	92
13	2017-10-10 15:23:03 UTC	12	19	90
14	2017-10-10 15:23:22 UTC	13	19	90
15	2017-10-10 15:23:45 UTC	14	19	90
16	2017-10-10 15:24:02 UTC	15	19	90

Fig. 7. Datasheet of field 1 and field 2 data with date and time

Fig.7. gives the visualization of the field 1 and field 2 data obtained from thingspeak in the form of datasheet.

Conclusion and Future Scope

Thus we successfully obtain the required field one and field two data in the command window of MATLAB along with the detailed data sheet of the same. This data will be very helpful in solving issues faced by the land owners in maintaining the quality of the land. IoT offers real time visualization and analysis of data which can be used across the globe and can be analysed and monitored by the land holders across the globe and the same data can be used for research purpose and also for analysing the weather forecast. The future scope of the project holds the mobile app development where this data will be provided to the respected customer of the field, it also includes the development of automatic decision making system development by using necessary sensors. The utilization of data can be done for forecasting, producing controlled conditions and maintaining those conditions for a certain research lab.

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