Agricultural Parameters Monitoring System using IoT

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Abstract — Agriculture is the main occupation in India. So many people used traditional methods or techniques in their farming. There are lots of hurdles that arise in traditional farming so there is need to minimize the hurdles in agriculture field and also to increase the productivity there is need to use some innovative technology and technique. In this system we use IOT technique. It is an emerging technology. The Internet of Things (IOT) is used for making agriculture field smart and to solve the measure problems of farmers. IOT technology helps in collecting information of weather conditions like temperature, humidity and also to measure soil moisture and water level. It interacts between objects and things as a shared network with internet connection provided. The aim of this work is introduce a system to collect field data and to reduce farmer's efforts. Farmers also keep updated with the ongoing condition of his agriculture land using their smart phone.

***Keywords*—IOT, temperature, Raspberrypi 3 B**

1. INTRODUCTION

Agriculture plays an important role in the life of an agronomics. It is the backbone of our economic as well as agronomics system. In India so many people uses traditional methods for farming. Therefore the productivity of farm becoming low. Due to this farmers suffer large number of problems. To overcome this problem we design a system based on IOT.

Internet of things (IOT) is widely used technology in now days. IOT is mainly used for connecting devices and collecting data information. Agricultural parameter monitoring is systems which monitor agricultural parameters like soil moisture, temperature, humidity and gas. Raspberry pi 3B module is used for the system.

The aim of proposed system is making agriculture smart using IOT. This technology provides automation. The highlighting feature of the system is smart irrigation with smart control based on real time field data.

1.1 LITERATURE SURVEY

K. Lokesh Krishna et.al., In this paper, design and implementation of a novel wireless mobile robot is designed and implemented. It is equipped with various sensors to monitor different environmental parameters that are suitable for croup yield. Monitoring of crops wirelessly allows reducing labor cost and also helps to track the changes accurately occurring instantly in real time at the field. The proposed system is capable of controlling the essential parameters necessary for plant growth. So this proposed smart agricultural system of farming is user friendly and highly robust.[1] Pratibha S. R. et.al., 'Internet of things' is far and wide castoff in relative devices and gathering statistics. This agriculture monitoring system serves as a reliable and efficient system and corrective action can be taken. Wireless monitoring of field reduces the human power and it also allows user to see accurate changes in crop yield. It is cheaper in cost and consumes less power the smart agriculture system has been designed and synthesized. The developed system is more efficient and beneficial for farmers. It gives the information about the temperature, humidity of the air in agricultural field through MMS to the farmer, if it fallout from optimal range. The system can be used in green house and temperature depend in plants.[2] Carlos Cambra et.al., This paper describes the way that communication technologies and intelligent context- service systems provide autonomous decision without human interaction it uses LoRa WAN network protocol which provides a long distance communication with very low energy consumption levels.[3] Abdullah Na, William Isaac, Produces a agricultural mode in IOT environment which is human centric. It incorporates IOT and cloud computing ubiquitously to remove the inefficiency and lack of management, which are the root of problems in agriculture.[4] Rajalakshmi P. et.al., Described to monitor the crop field using soil moisture sensors temperature and humidity sensor, light sensor and automated the irrigation system the data from sensors are send to web server using wireless transmission and JSON format is used for data encoding to maintain server database. The moisture and temperature of the agriculture field falls below the brink, irrigation system will be automated. The notifications are sent to farmers mobile periodically and farmers can be able to monitor the field conditions from anywhere. The parameters used here are soil moisture sensor, temperature and humidity sensor- DHT11, LDR used as light sensor and web server- NRF24L01 used for transmitter and receiver. This system will be more useful in areas where water is in scarcity and it is 92% more efficient than the conventional approach.[5]

1.2 SYSTEM OVERVIEW:

The Project consists of five major components, Raspberry Pi 3B, DHT11 Sensor, Soil Moisture sensor, Gas sensor (MQ2), LDR (Light Intensity).

Block Diagram:

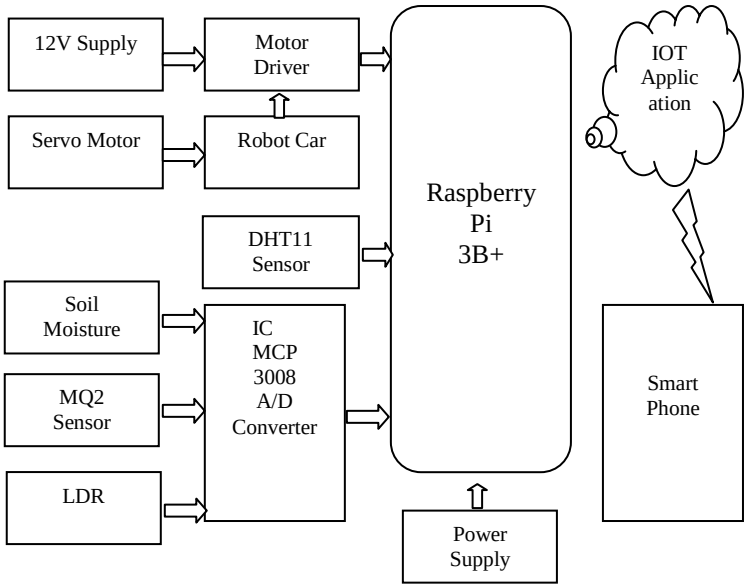

Fig.1 Block Diagram of Agricultural parameters Monitoring system using IOT

Hardware Used:

a) Raspberry Pi 3 B+:

It is main part of the project Raspberry Pi is sensational single board computer (SBC) and development board, which is heavily used for the prototyping of IOT based products. It is used for interfacing various sensors and performing required task. Raspbian is the recommended operating system for use on a Raspberry Pi 3 Model B+ fig 2. It is free operating system which is based on Debian, optimized for the Raspberry Pi hardware. It is a low power, high performance controller for interfacing various sensors and performing the required task based on the written program.

Fig.2 Raspberry Pi model 3B+

b) Soil Moisture Sensor :

The Soil Moisture Sensor is detects moisture level of the soil which is near to the sensor, which is ideal for monitoring the plants or the soil moisture. This sensor uses two probes to pass current through the soil, and then it reads that resistance to get the moisture level. Excess water makes the soil conduct electricity better; while dry soil conducts electricity poor. Fig.3 shows a typical moisture sensor used in the system.

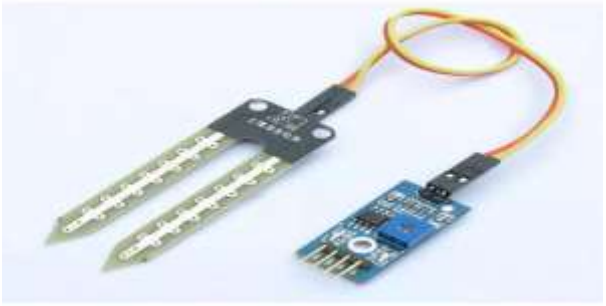

Fig.3 Soil Moisture Sensor

c) Gas Sensor (MQ2) :

This Gas Sensor module is useful for gas leakage detection in home and industry. It can detect Carbon dioxide, H2, LPG, Methane, CO, Alcohol, Smoke, and also Propane. Due to Its fast response time measurements can be taken as early as possible. Also its sensitivity can be change using the potentiometer. When the target combustible gas is alive, the sensor's conductivity is increase along with the gas concentration is also increases.

Fig.4 Gas (MQ2) Sensor

d) DHT11 Sensor :

DHT11 uses a capacitive humidity sensor and a thermistor to measure the air which is around the sensor, and spits out a digital signal on the data pin. It is simple to use, but requires carefully timing to grab data. It is digital sensor.

Fig.5 DHT 11 Sensor

e) LDR :

It is a different type of resistor which is nothing but variable resistance that changes with the intensity of light that falls upon it. Using LDR to provide automation to exterior light is a very smart technique to avoid unnecessary usage of it as mostly in home many of the people forget to switch it off in day time so it is a very powerful approach in releasing such wastage of electricity

Fig.6 LDR

Software Used:

a) Python :

Python is an Language which is interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum, first released this language in 1991, Python is used for design philosophy that emphasizes code readability, a syntax allows programmers to express concepts in few lines of code, and using significant whitespace. It provides constructions of that enable clear programming on small as well as large scales.

b) ThingSpeak:

ThingSpeak is an open source used in Internet of Things application and API Key is used for store as well as retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak allow to the creates the sensor logging applications, location tracking applications, and also a social network of things with status updates.
ThingSpeak was launched as service in support of IoT applications.

2. Graph Plots:

The final Output of the project on ThingSpeak as shown below.

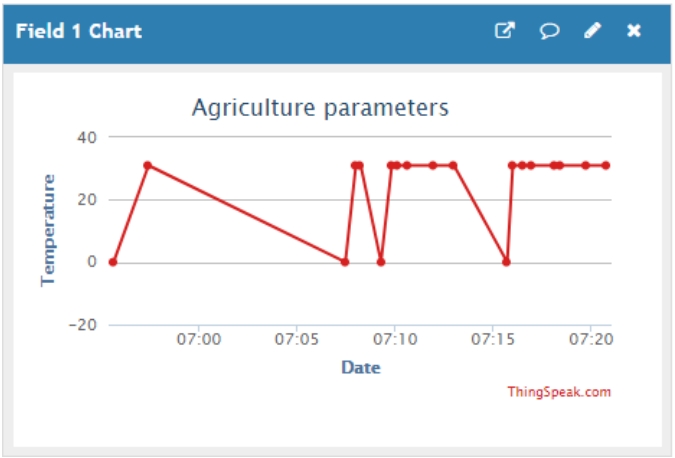

Fig.7 Monitored data from Temperature sensor

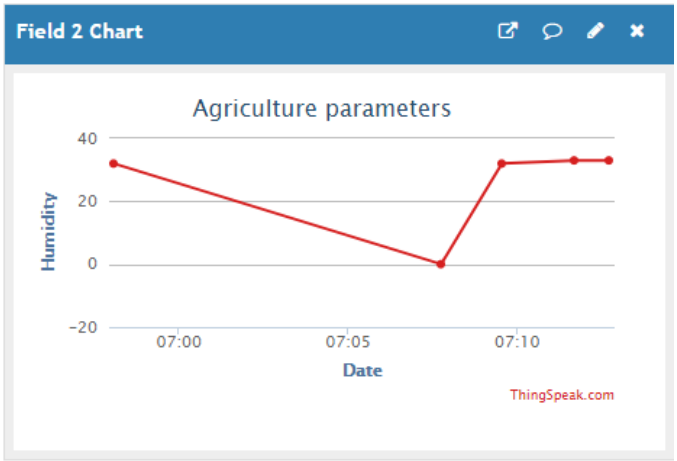

Fig.8 Monitored data from Humidity Sensor

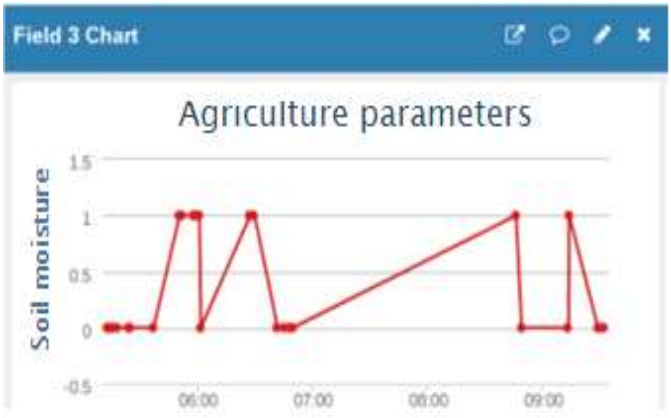

Fig.9 Monitored data from Soil Moisture Sensor

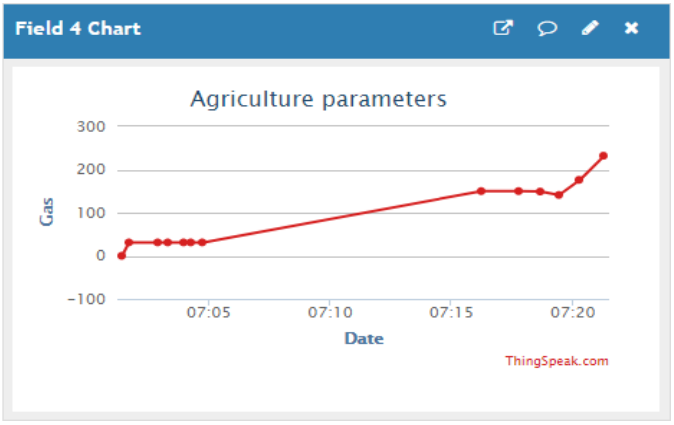

Fig.10 Monitored data from Gas Sensor

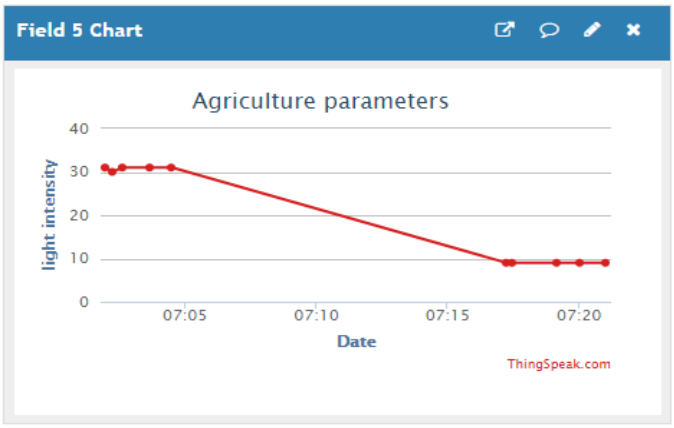

Fig.11 Monitored data from LDR

In the paper, the main aim is to propose model for Agriculture system. In this proposed work, Raspberry Pi 3 Model B+ is the main controller. All the sensors such as soil moisture, humidity, LDR sensor, Gas sensor are interfaced to Raspberry Pi 3 Model B+ which is located on the wireless mobile robot.

CONCLUSION:

In smart agriculture system using IOT has been designed and in this system. The system developed is beneficial and works in cost effective manner. The sensors are successfully interfaced with raspberry pi and wireless communication is done. By using latest IOT concept farmers can get the information about his farm. By using various sensors agricultural product quality can be improved. The system is very useful in areas where water availability is a measure problem. The productivity of the crop increases and the wastages of crops is very much reduce using this agriculture system. The developed system is more helpful and gives more feasible results.

FUTURE SCOPE:

The project can be enhanced by using a sensor to note the soil moisture value such that usage of unnecessary Fertilizers can be reduced. A water meter can be added to estimate the amount of water used for water irrigation and thus giving cost estimation. Further, it also reduces the investment of farmers.

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