Modelling and structuring IoT based Smart Farming through Monitoring and Security

Mohammad Tanzil Idrisi

Rani Laxmi Bai Memorial School, Lucknow

Abstract: : This paper potray you about how we can enhance our farming techniques through latest technology and get 100% out of it. And this paper will show you how can monitor and secure our farming. India is a nation which is having more population and it is imperative to take care of the food adequately to all the individuals. The primary concern which is expected to satisfy this prerequisite is exceptional "farming" with enough water and minerals in the dirt keeping up this is bit risky. So incorporating the agribusiness field with Technology will make sound. Programmed soil highlights and condition bringing and choice taking should be possible by utilizing sensors and actuators, developing the seed and getting the yield isn't the solitary thing, we can give security to cultivate land just as to the product (obtained yield).
And in this paper I am going to show some of the ways to work on problem.

Keywords: IOT, Internet Of Things, Security System, Smart Farming.

I. INTRODUCTION

Agribusiness is the fundamental control of India like nations and ranchers are the foundation of our nation. It is the obligation of each individual to consider agribusiness and rancher and give answer for the issues which are right now emerging in the field of farming [2]. Presently it is an ideal opportunity to consider "Internet of Things" which can give more adaptable and simple to utilize and give greater usefulness in the farming. "Internet of Things" (IOT) will give everything work done and data updates and current status of the field to the individual from anyplace and whenever [7]. These days ranchers likewise refreshed, improved. They additionally offering significance to the training and pondering innovation.

Advanced mobile phones have been as of now being used in all towns. So it is anything but difficult to arrive at the ranchers from internet. As we probably am aware there is inadequate water supply to the harvests. Various yields needs unique measure of water [4]. So giving the water according to the need without squandering water is significant. Fundamentally there is a colossal measure of populace it is acceptable that all individuals should be served. It is important to develop more yields, which will take care of all populace without squandering the characteristic assets, legitimate utilizations in the farming field is the insight. This should be possible by utilizing the sensors, which will detect and give the data about necessity [1].

These days security is the significant thing which will be considered in each field. Same like, giving security in the farming is the best interesting point [9]. Anything to the field which get section can be gotten by actualizing the security. The improved work to do is, giving the knowledge to all security framework, so it can control other electronic gadgets. Data can be assembled from all sensors which are situated on various ranch lands [5], so data can be accumulated, put away and dissected which can direct for taking choice as such act like a master [6].

The shrewd farming with wise security framework will be the advantageous method to get the security to the field just as to the grain store. In this paper we gave a presentation about security gadget usage, which will get the data dependent on the detected information.

II. LITERATURE WORK

As we as a whole realize that these days we are giving unmistakable fascination for security since world is getting extremely touchy and there is a lot of dread about dangers, criminals, perilous causes and so on

Till now security is given to the product frameworks [9] like layers of IOT frameworks. Numerous issues like unapproved access, mocking, pernicious code disease, man-in-the-center assault, DoS assault sniffing assault, and so on Giving security to various layer issues has been finished. Likewise security to cloud is given, in which the put away information can be brought and gotten to and abused. So this has been forestalled and kept up.

To get shield from these sorts of issues we need to get adjust each time about everything. Indeed, even in horticulture framework individuals utilize all the more exorbitant equipment and manures and so on there should be the execution of security framework. Presently it is an ideal opportunity to give security and assurance to the farming fields.

III.PROCESS

In the proposed work, we present our internet based shrewd cultivating framework with security. A. Execution The cultivating framework is an unpleasant framework wherein the things which will be utilized should be compact and the utilization should be taken consideration.

Presently we are thinking about four boundaries in which we are intrigued to get the information from field and expansion to this, coordinating security framework with the current framework. The data can be got from the field through various kinds of sensors and raspberry pi go about as a worker which will settle on choice and initiate regulators
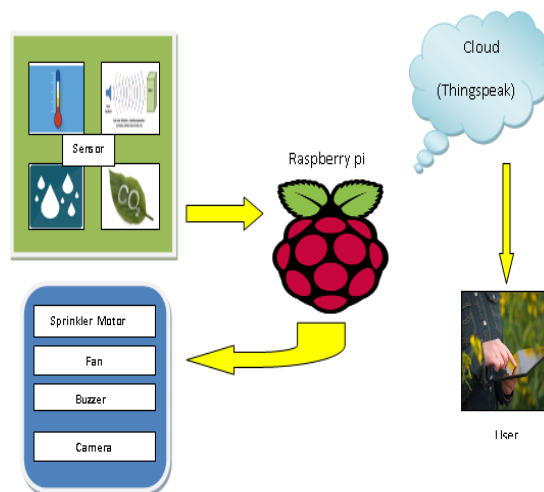

Fig. 1 Framework Block Diagram

Different sensors will sense the current updates about the field and send it to raspberry pi which will analyze the data and make decision, which actuators can be activated based upon their respective sensor values. Example, if temperature in the soil is more than the threshold values then the motor of sprinkler will be activated to supply water to the field. Similarly for Gas –buzzer, for Humidity-Fan, for Motioncamera.

Then the values taken by the raspberry pi will be sent to the Things Speak in which the data will be represented in graphical representation, so that user can access it and can get information about variations happened in the field. The each part of this whole set up is in different layers based upon their functionality. For this implementation we made ready some set of to experiment.

We used four sensors, their respective four controllers and raspberry pi which is shown in figure 1. The hardware and software coordination will lead to most wonderful product and that product can be used in any application field and new ideas may get arise. As we know technology has begun to run like anything. The connection of hardware components should be done very carefully.

If any mistake happens then it may lead to get damage of hardware components. Working with electricity is not the easy thing. We need to connect the components when we have complete knowledge about it.

IV.IoT Kits
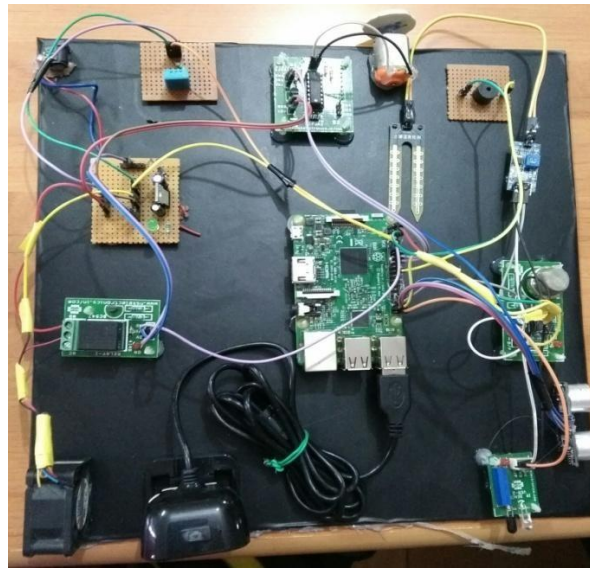
Before this, basically in the Linux Operating System based raspberry Pi should have software part in it. To provide this we need to install software Python code in SD card. All functionality which is necessary for us should be written. And SD card should be inserted in the socket which is present on the Raspberry Pi hardware device.

Then for giving input as text or for selecting some option keyboard and mouse are connected to USB ports. There are four USB ports for this Raspberry Pi. We used two for keyboard and mouse. And one USB port for connecting camera.

Another one socket (HDMI) is provided for connecting monitor. One more socket (ETHERNET) for connecting LAN cable for giving internet connection.

Apart from this we used a relay device for triggering the fan. Power sharing circuit board which will provide power to relay, DHT, motor driver, fan, which intern provided power through adapter. Motor driver is used which will help to run motor.

A.   System Components
The hardware devices which are used in this implementation are listed in below table 1 with their functionality for what purpose they have been used to do work.

1)   **Table 1: List of Hardware Devices**

SI.NO.	Hardware	Functionality
1.	Raspberry Pi	It will act like an operating system and CPU which helps for decision making.
2.	Temperature Sensor	This will sense the water content in the soil and send it to raspberry pi.
3.	Gas Sensor	This will sense any gas which is present in the field area.
4.	PIR Sensor	It will sense the motion based upon the heat of moving object.
5.	URD Sensor	It will sense and measure the distance of the object which is moving.
6.	DHT Sensor	This will sense the humidity of the environment.
7.	FAN	This actuator will get activate when the humidity value crosses the threshold value.
8.	Buzzer	This device will make sound when the gas is detected in the field area.

9.	Motor	This is the device which will be further connected to sprinkler. This will get start when there no water content in the soil.
10.	Camera	This will get the snapshot of a field when the motion of any object is detected.

A. APPLICATIONS & RESULTS

Now this is the time to discuss about the major part of this whole implementation.

A. Cost and Analysis

Getting the solutions is not at all a big deal there may be different solutions for single problem. It is the intelligence to choose the best efficient and low cost solution to a problem.

In the agriculture it is compulsory to use hardware. But we have to check low cost which will do more work and finally which is more durable one.

The hardware which we have used for implementation is listed in below table 2 with their cost.

2) Table 2: Hardware Cost Estimation

SI. NO.	HARDWARE	COST in Rs
1.	Raspberry Pi	2800
2.	Camera	800
3.	Ultrasonic sensor	249
4.	IR sensor	110
5.	Moisture Sensor	145
6.	Humidity sensor	120
7.	Sprinkler Motor	600
8.	FAN	150
9.	Buzzer	200
10.	Other devices (approx)	900
	Total	6074

B. Data Analysis in Cloud

Our main intention is to provide security to the agriculture field it can be a field or store room by putting intelligent camera system in the field as well as in store room. Basically we used four sensors they are: temperature, humidity, gas, motion detection sensors and as discussed above there are controllers too. Each sensor will do its work that is sensing the changes occurring in the environment, and these values will be stored and based upon them we can control the farm land. Automatically actuators are made to on/off by reading those sensor values.

For our experiment purpose we set the temperature sensor threshold value to 31, if the value is more than this threshold value motor will start running. Then for humidity we took 0/1 value, if „1‟ is detected fan will get run else it will stop itself.

„1‟ indicates that humidity is present and „0‟ indicateshumidity is not present. Same as humidity we took condition for gas sensor. If the value is „1‟ buzzer will beep which means some gas is present in the field else it will not make any sound. Even motion detection will also run on 0/1 conditions. It will print as motion detected and URD sensor will measure the distance of the object and camera is made to capture the image. Continuously for every second we made to read the values and check the values.

Then we have created one GUI for watching the current values from anywhere and anytime. For this functionality we opened one user account in Things Speak. Thing Speak will provide privacy to store the data in graphical representation way, which will make easy to look after the updates.

Thing Speak is an open source internet of things application and API to store and retrieve data from things using the HTTP protocol over the internet or via a local area network. Things Speak enables the creation of sensor logging applications, location tracking application and a social network of things with status updates.

Things Speak has integrated support from the numerical computing software MATLAB from math works. Allowing Things Speak users to analuze and visualize uploaded data using Matlab without requiring the purchase of a Matlab license from Math Works.

Why To Use Thing Speak to Collect Data?

Thing Speak is having two types of channel: private and public. The sensors are enabled to send data to cloud which in turn is made to store either in private or a public channel. By default Thing Speak will store data in private channel. We can make it to store it in public channel if we want to store data with others. We can analyze and visualize data, calculate new data, can interact with social media, web services and other devices when the data is stored in Thing Speak. The experimental value readings which are stored in cloud are shown in separate individual field charts which are shown in below figures 3-7.

Figure 3: Thing Speak's Motion Detected Readings

Figure 4:Thing Speak's Moisture Detected Reading

Figure 5: Thing Speak's Gas Detected Readings

Figure 6: Thing Speak's Temperature Readings

Figure 7: Thing Speak's Humidity Readings

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CONCLUSION

In the Agriculture, day to keep posted is most basic thing to focus. Especially Security is the most fundamental thing which is principally packed in this work. Getting the exact qualities about update from the cloud which will prompt take choice. Programmed controlling of the homestead field should be possible without visiting. Future work is to applying the AI strategy with huge arrangement of information base will make to move assistant improved, exact, dynamic. This will demonstration like a specialist.

BIOGRAPHY

I am **Mohammad Tanzil Idrisi**. In 2020, I graduated from senior high school Rani Laxmi Bai and am currently planning to attend college and choose computer science as my major in undergraduate. I have also worked as a freelancer and software developer in Eulercod Technologies & Ematron Pvt. Ltd. company. I have also been instructor at three different E-learning company, where I have guided young students to learn program and solve some of the real life problems.

I am a author, and penned down three books till now. I am also a founder of a non-profit organization called Nisha Organization, which works on improving life. I am an AI and ML enthusiast. Area of Interest: Iot, Robotics, AI, App development, Web development, raspberry pi and etc. My ambition is to work in NASA as a scientist.