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Design and Implementation of Agriculture Monitoring and Preventing of Wild Animals Entering into the Agricultural Fields

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Abstract- The Internet of Things allows people and things to be connected Anytime, Anyplace, with anything and anyone, ideally using any path/network and any service. Internet of Things (IoT) plays a crucial role in smart agriculture. Smart farming is an emerging concept, because IoT sensors capable of providing information about their agriculture fields. The paper aims making use of evolving technology i.e. IoT and smart agriculture using automation. Monitoring environmental factors is the major factor to improve the yield of the efficient crops. The feature of this paper includes monitoring temperature and humidity in agricultural field through sensors using DHT11 Sensor. IR Sensor is Interfaced With Arduino to detect animals and intimates to the farmers mobile using Wi-Fi IoT Module.

Keywords: Soil moisture sensor, IOT, Cloud networking, Wi-Fi networking

1.INTRODUCTION

As the world is trending towards new technologies and implementations it is a necessary goal to trend up in agriculture too. Many researches are done in the field of agriculture and most of them signify the use of wireless sensor network that collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution to increase the yield of crops. There are number of other factors that decrease the productivity . Hence, automation must be implemented in agriculture to overcome these

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problems. In order to provide solution to such problems, it i necessary to develop an integrated system which wills improve productivity in every stage. But, complete automation in agriculture is not achieved due to various issues. Though it is implemented in the research level, it is not given to the farmers as a product to get benefitted from the resources. Hence, this paper deals about developing smart agriculture using IoT and given to the farmers.

2. LITERATURE SURVEY

The existing method and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method the farmers they themselves verify all the parameters and calculate the readings.

[1] **Smart Precision Based Agriculture Using Sensors**

It focuses on developing devices and tools to manage, display and alert the users using the advantages of a wireless sensor network system.

[2] **IoT Based Smart Agriculture**

It aims at making agriculture smart using automation and IoT technologies. The highlighting features are smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, human detection and keeping vigilance.

[3] **Providing Smart Agriculture Solutions to Farmers for Better Yielding Using IoT**

The cloud computing devices that can create a whole computing system from sensors to tools that observe data from agricultural field images and from human actors on the ground and accurately feed the data into the repositories along with the location as GPS coordinates.

[4] **Smart Farming System Using Sensors for Agricultural Task Automation**

This idea proposes a novel methodology for smart farming by linking a smart sensingsystem and smart irrigator system through wireless communication technology.

[5] **Design and Development of Precision Agriculture System Using Wireless Sensor Network**

It proposes a low cost and efficientwireless sensor network technique to acquire the soil moisture and temperature from various location of farm and as per the need of crop controller to

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take the decision whether the irrigation is enabled or not.

[6] **Automated Irrigation System Using a Wireless Sensor Network and GPRS Module**

It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information.

[7] **Real- Time Automation and Monitoring System for Modernized Agriculture**

The atmospheric conditions are monitored and controlled online by using Ethernet IEEE 802.3.The partial root zone drying process can be implemented to a maximum extent.

[8]It is designed for IoT based monitoring system to analyze crop environment and the method to improve the efficiency of decision making by analyzing harvest statistics.

[9] **Agricultural Protection System Based on IoT**

In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. The variations are seen in color, texture and morphology.

[10] **A Hybrid Wired/Wireless Networking Infrastructure for Greenhouse Management**

In this paper, greenhouse is a building in which plants are grown in closed environment. It is used to maintain the optimal conditions of the environment, greenhouse management and data acquisition

3.EXISTING SYSTEM

Traditionally, Agricultural lands are monitoring by the formers directly.

- In Existing System was related to wireless sensor network, researchers measured soil related parameters such as temperature and humidity.
- Sensors were placed below the soil which communicates with relay nodes by the use of effective communication protocol providing very low duty cycle and hence increasing the life time of soil monitoring system.
- The system was developed using microcontroller, universal asynchronous receiver transmitter (UART) interface and

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sensors while the transmission was done by hourly sampling and buffering the data, transmit it and then checking the status messages.

DISADVANTAGES.

- The drawbacks of the system were its cost and deployment of sensor under the soil which causes attenuation of radio frequency (RF) signals
- If the formers having more than one land, they have to appoint the person to monitor the land parameters and to protect the animals.

PROPOSED SYSTEM

- A sensor node is installed in every Agricultural Lands.
- It senses moisture and temperature of the field falls below the brink.
- In Agricultural Lands, The wild animal's detection can also be automated in addition to irrigation.
- When animals enters in to the land, the IR will detect and Ammonia gas will be produced and repel the animal by using smoke producer.
- The notifications are sent to farmers' mobile periodically and updated in IoT Cloud. The farmers' can able to monitor the field conditions from anywhere. This system will be more useful in areas where water is in scarce.
- This system is more efficient than the conventional approach.

ADVANTAGE

- Formers no need to wait and watch to protect the animals to enter into their agricultural lands.
- Since most of the monitoring is done remotely, it will help the farmer to gain information which is crucial for the business during his/her spare time

IOT CLOUD

Cloud offers a platform for developers that enable them to easily capture sensor data and turn it into useful information. Cloud platform is used to send data to the cloud from any Internet-enabled device. We can then configure actions and alerts based on our real-time data and unlock the value of our data through visual tools. Cloud offers a REST API that allows you to read and write

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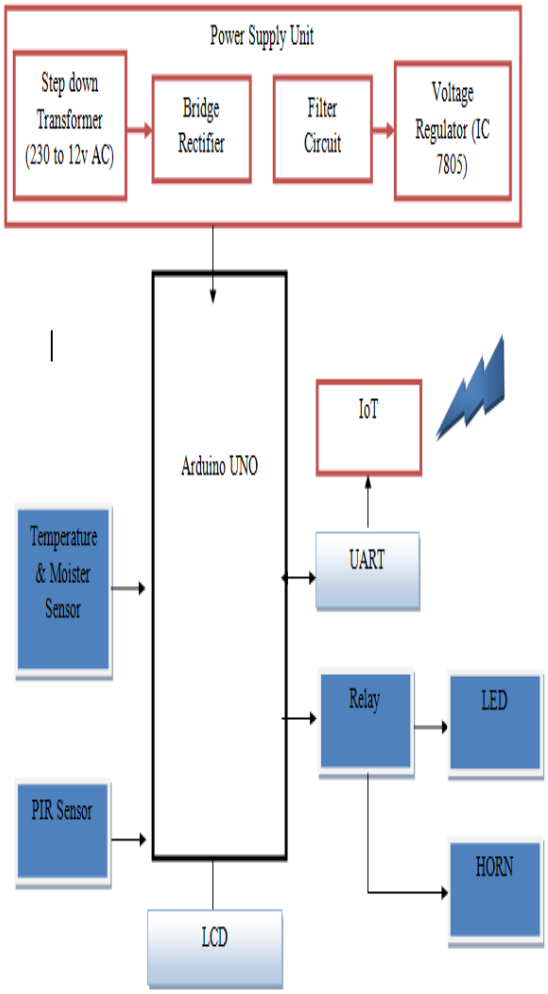
data to the resources available: data sources, variables, values, events and insights. The API supports both HTTP and HTTPS and an API Key is required. The variables are created and unique variable ids are assigned to it. The values are plotted in a graph with the date and time in X axis and the values in the y-axis. All the values are displayed to the user with the corresponding date and time and hence the values can be viewed at any time by the user. The threshold values can be set on the Cloud platform an email or sms or call can be sent to the user when the threshold levels are met. Hence Cloud is an Inter of Things platform which helps in monitoring all the parameters and displays the values to the user. A threshold values are also set to take corrective actions. The API key which is generated in Cloud should be added in the Arduino code to connect to the cloud. An APIkeyisthe "Master Key"; a unique and immutable key that is used only to generate our account's tokens. A token is a temporary and revocable key which is to be used in our API request. It gets created ones an account is created in Cloud. Tokens created in our account profile will never expire

4. SYSTEM BLOCK DIAGRAM



Smart agriculture also known as precision agriculture allows farmers to maximize yields using minimal resources such as water, fertilizer and seeds. By deploying sensors and mapping fields farmers can begin to understand their crops at a microscale, conserve resources and reduce impact in the environment. Advances in sensor

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technology have also proven beneficial to the agricultural industry through its application for infield soil analysis.

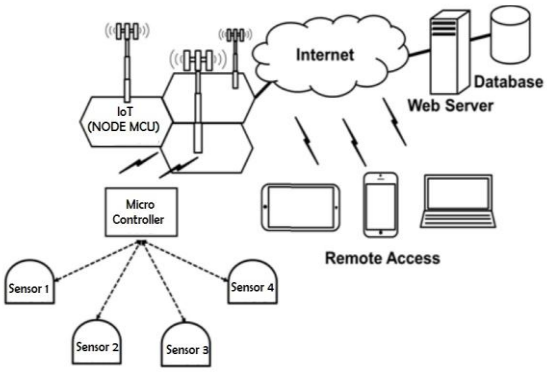


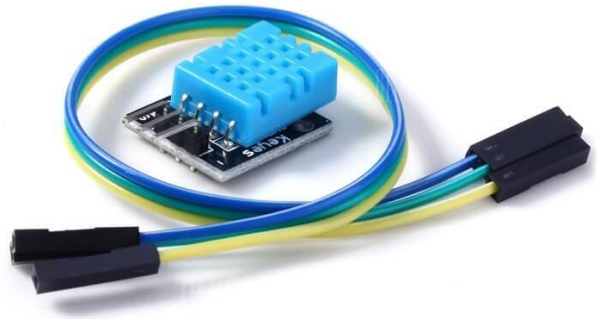
Fig. 1. Configuration of the Agriculture monitoring system. Based on microcontroller, IoT, and Sensors.

5. IMPLEMENTATION

5.1. SENSORS DATA ACQUISITION

There sensors used are already discussed. Let discuss about data acquisition from sensors one by one. The sensor is interfaced with Arduino microcontroller and programmed. Once it is programmed it is placed inside a box and kept in the field. An IR is an electronic **sensor** that measures infrared light radiating from objects in its field of view Which is to be monitor the animal motion in the agricultural land.

5.2. DHT SENSOR:



The DHT11 temperature and Humidity sensor is used. The total amount of water vapor in air is defined as a measure of humidity.. Relative humidity is calculated because when there is a change in temperature, relative humidity also changed. The temperature and humidity changes occur before and after irrigation. The amount of water droplets in air is increased after irrigation. This causes decrease in temperature which in turn increases the relative humidity of the surroundings. The temperature and humidity reading are often notified to the user so that the user can be able to know the field conditions from anywhere. The temperature and humidity sensor can also be used in green houses.

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5.3 WIRELESS DATA TRANSMISSION:

The data acquired from sensors are transmitted to the web server using wireless transmission. Node MCU module is used for wireless transmission between the field and the web server. **Node MCU** is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espress if Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the dev kits. The Node MCU is used here while interfacing with Arduino micro-controller and fast connection establishment. When the data from the Node MCU receives the web server the data will be stored in Cloud server. The Ethernet cable is connected to the Arduino micro-controller using Ethernet shield for Arduino. The Arduino Ethernet will be assigned an IP Address which should be in web cloud. The Arduino is given with the address of the web server to send request. The web server designed using PHP script to insert values in the appropriate table. The web server processes the request and stores the received data in its database. Here we are using Ubidots cloud for monitoring the data.

5.4. DATA PROCESSING AND SENDING ALERT

The data received from the field are wirelessly transmitted using Node Mcu and then saved in web server mysql database using Internet connection at receiver end. Periodically the data are received and stored in database. The data processing is the task of checking the various sensors data received from the field with the already fixed threshold values. The threshold values vary according to the crops planted. This is because different crops need different amounts of water. For example in a paddy field to produce 1 kg of rice 5000 liters of water and for wheat it is liters. Similarly, the temperature and humidity varies for different crops. The sensor values also vary according to the climatic conditions. The soil moisture will be different in summer and winter seasons. The temperature and humidity also varies in summer, winter and rainy season. The threshold values are fixed in the website after considering all these environmental and climatic conditions. The message will be sending to the formers mobile automatically if the soil moisture value falls below the threshold and vice versa.

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5.5. WEB APPLICATION:

The web application is designed to monitor the field and crops from anywhere using internet connection. The web application is designed using HTML and PHP script.PHP is server side scripting language for the web development. PHP can be used with HTML code and with various web engine frameworks. PHP is an efficient alternative to Microsoft's Active Server pages. The PHP script will parse the data and display it on android device. The webpage developed insert the sensor data in mysql database when it receives request from the IoT Module. The webpage can be easily queried and information can be retrieved in an efficient manner using mobile.

Here, we are using Ubidots cloud server for connecting the sensor data from arduino. The Ubidots Cloud also used to monitor the crop field. The Ubidots also used to sends the Mail alert to the farmers. The webpage and Arduino can be communicated using the processing IDE. The processing is a open source like Arduino IDE which includes text editor, compiler and display window. The serial library in the processing is used to read and write data to and from external devices.

6. APPLICATIONS:

Our idea not only tries to mitigate the primitive techniques related to agriculture but also serve the community by opening new avenues for employment. The applications are extensive with easy implementation.

The foremost function of our project is to monitor the land temperature and humidity using digital means. This will provide the accurate values of various parameters upon which the growth depends. Besides this, it will help the farmer to monitor more than one agricultural land at the same time.

We plan to make it user-friendly by involving a simple web portal along with mobile messaging. Since monitoring through our system requires less manpower, people with physical disabilities can be employed for the monitoring of fields.

Overall, our project idea is feasible, which can easily be implemented and has a wide scope in terms of its application.

7. CONCLUSION

The sensors are successfully interfaced with raspberry pi and wireless communication is achieved. All observations and experimental tests

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prove that this project is a complete solution to the field activities irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and aids to manage the water resources effectively reducing the wastage

8. FUTURE WORK

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

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