DESIGN AND IMPLEMENTATION OF AGRICULTURE MONITORING SYSTEM FOR SMART FARMING

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***Abstract*— The Automation of farming activities can transform agricultural domain to dynamic from being manual leading to higher production in farm with lesser human interaction. With new technological advancement in controlled environment agriculture systems, the level of farming productivity has increased. The purpose is a smart Agriculture System that can analyse an agriculture environment and intervene to maintain its adequacy. The system deals with general agricultural environment, such as, temperature, humidity, pH, and nutrient support. The system is a combination of hardware and software components. The hardware part consists of sensors and embedded system and software is the webpage designed using PHP. The webpage is hosted online and consists of a database in which readings from sensors are stored using the hardware. The farm owner can monitor the process online through a website.

***Keywords*— Sensors , Automation , Smart farming.**

Introduction

Agriculture is the basis of livelihood for the population through the production of food and important raw materials. Agricultural growth is considered necessary for development and for a country transformation from a traditional to a modern economy. Almost all the farmers are still depending on the traditional way of farming. It is being observe that the yield of crops, fruits have not been increasing. Even in some parts it is declining. Science and technology has proved its importance in those fields. Therefore there is need to grab the fruitfulness of science and technology in the field for higher yield and growth in agriculture. Most of the papers signifies the use of wireless sensors network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in terns helps to monitor the system. Climate change aspects crop product and hinders agricultural growth in those parts of the world. It also poses a threat to livestock production. It calls for collective action. National governments and corporate sectors can provide coordinated approaches to climate change, integrated risk management, agricultural and food security policies.

I. Objective

The Objective is to develop and implement agricultural and environmental monitoring system using sensor measurements of agricultural fields. Creation of such system requires constructing innovative technology which can generate new information as per the seed as timely understanding grassland condition, crop growth condition and yield prediction which is most valuable data food security in the country. At first, it is the use S-NPP data for environmental monitoring in regional scale and to develop 10-days composite NDVI image product for whole land area of the region. The second is to produce image products Sentinel-2 and Landsat-8 data and estimate crop field condition. Sentinel-2 is new satellite of European Space Agency (ESA) having capability for agricultural application.

II. LITERATURE SURVEY

[1]. The aim of the paper is making agriculture smart monitoring and IoT technologies. Smart GPS based remote controlled will perform the operations like,

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spraying, moisture sensing etc. It includes smart irrigation with smart control and intelligent decision making based on accurate real time field data and smart warehouse management. It monitors temperature maintenance, humidity maintenance and theft detection in the warehouse. All the operations will be controlled by smart device and it will be performed by interfacing sensors, Arduino Nano modules.

[2]. 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 data.

[3]. This paper describes Wireless sensor Networks. i.e. acquisition, collection and analysis of data such as temperature and soil moisture. The benefits of irrigation process in agriculture are decreasing water consumption and environmental aspects.

[4]. This paper proposed an automation irrigation system to optimize water use on agricultural crops. The system consisted of distributed wireless network of various sensors.

III. Existing System

1. The existing system consists of manual implementation of all the things that are needed for this system. Suppose if a person wants to know about the agriculture land profile of a particular field, then he would to go to his land for analyzing it .Moreover, the existing methodology requires a expert even for viewing the data consolidated from the agricultural land. Rather than the web module of the existing system requires the use of computer and the knowledge of operating computer and accessing internet which is again a wild process.

2.This paper gives information about field activities, irrigation problems, and storage problems using remote controlled robot for smart irrigation system and smart warehouse management system respectively.

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Description Of Agricultural Monitoring System

1. Blockdiagram

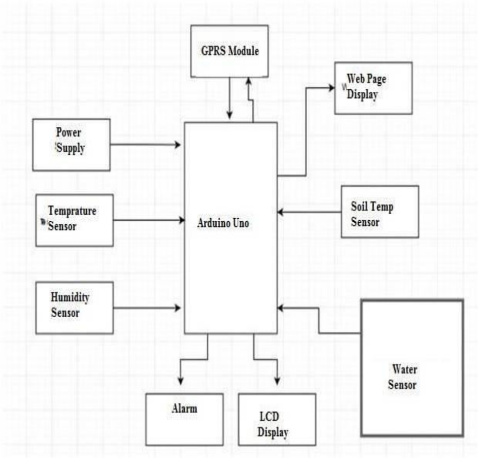

Fig 1. Block diagram of Agricultural Monitoring System

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2.1 Types of sensor

In the project we are using the different types sensor which is use to sense .the water , temperature ,soil moisture ,Humidity etc.

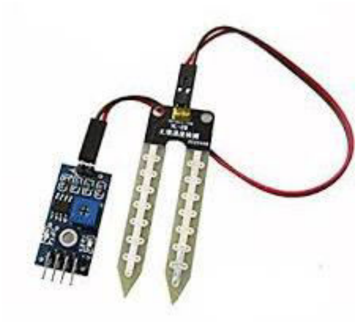

Fig 2.1 Soil Sensor

2.2 Temprature and Humidity Sensor

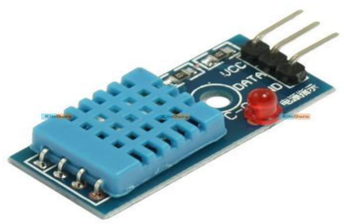

Fig 2.2 Temprature and Humidity sensor.

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2.3 Water Sensor

Fig 2.3 Water Sensor.

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2.4 ARDUINO NANO

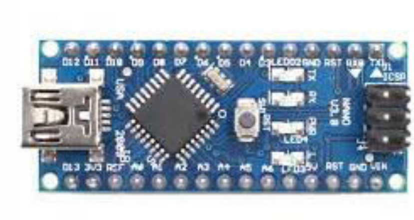

FIG 2.4 ARDUINO NANO

3.1 Description of block diagram

1. In this project various sensors are deployed like temperature, humidity, soil, water sensor. The data is collected from these sensors which are connected to the Arduino nano.
2. The received data is verified with the threshold values. if the data exceeds the threshold value the LED stat to blink. This alarm is sent as a message to the farmer and automatically the power off after sensing.
3. The values are generated in the web page and the farmer gets the detailed description of the value. The user has to switch On and OFF the Arduino nano by pressing the button in the Arduino Application developed.
4. The Arduino Nano gets switched ON and OFF automatically if the value exceeds the threshold point. Soon after the Arduino nano is started automatically an alert must be sent to the user.
5. This is achieved by sending a message through the GPRS module. Other parameter like the temperature, humidity, soil, water sensor show threshold value and it is used just to indicate the value of all sensors.

3.2 Description of Sensors

3.2.1 Soil Sensor

The Soil Moisture Sensor is used to measure the volumetric water content of soil. Simply insert this rugged sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent.

3.1.1.1 Specification Of Soil Sensor

1. Range: 0 to 45% volumetric water content in soil
2. Accuracy: ±4% typical
3. Typical Resolution: 0.1%
4. Operating temperature: −40°C to +60°C

3.2.2 Temperature and Humidity Sensor

A humidity sensor (or hygrometer) senses, measures and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Temperature sensors tend to measure heat to ensure that a process.

3.2.2.1 Specification Of Temperature and Humidity Sensor

1. Power Supply DC min 2.2 , max 5.5
2. Low Level Output Voltage min 0 , max 20
3. High Level Output Voltage min 80 , max 100

3.2.3 Water Sensor

A water sensor is a device used in the detection of the water level. A water detector is an electronic device that is designed to detect the presence of water and provide an alert in time to allow the prevention of water leakage.

3.1.3.1 Specification Of Water Sensor

1. Outputs: 4-20 mA or 0.5 to 2.5 VDC
2. Supply Voltage: 3.3 to 5 VDC
3. Dimensions: 60 x 20mm

3.1.4 ARDUINO NANO

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the Arduino but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. There are 14 digital pins which can be configured as input or output and 8 analog pins incorporated on the board. More or less all these analog pins can be used and configured exactly the same way as digital pins. Arduino Nano comes with a crystal oscillator of frequency 16 MHz. It is used to produce a clock of precise frequency using constant voltage.

IV.REQUIREMENT GATHERING

4.1 Software Requirement

1. Front end : HTML , PHP
2. Back end : Database (Mysql)
3. Operating System : windows

4.2 Hardware Requirement

1. Sensor : Soil-Moisture sensor , Temperature Sensor , Humidity sensor.
2. Processor : Pentieum IV 1.13 GHZ.
3. Meomery : 2 GB.
4. Wireless Module : ESP8266.
5. Board : Arduino Nano.

VI. PROJECT ANALYSIS

6.1 Use case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system and depicting the specifications of a use case. A use case diagram can portray the different types of users of a system and the various ways that they interact with the system.

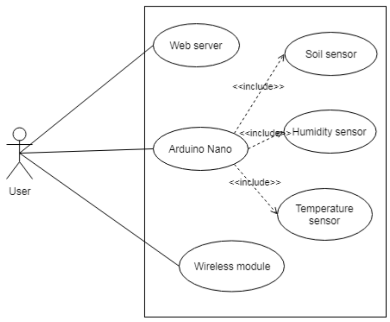

Fig 6.1

6.2 Sequence Diagram.

Sequence diagram display the time sequence of the objects participating in the interaction. Sequence diagram are used to visualize and explore the interaction between the users, screens and the object instances within the system. They provide an ordered sequential map of messages passing between objects over time. The sequence diagram is typically represented by a horizontally deployed set of the actors and object instances, each having a verified life span bar.

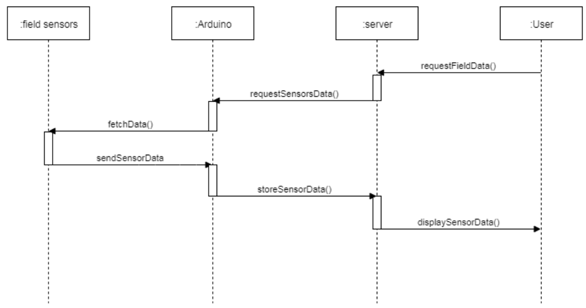

Fig 6.2

VII. Project Design.

7.1 Class Diagram.

A class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects. The class diagram is the main building block of object-oriented modeling. It is used for general conceptual modeling of the systematic of the application, and for detailed modeling translating the models into programming code. Class diagrams can also be used for data modeling.

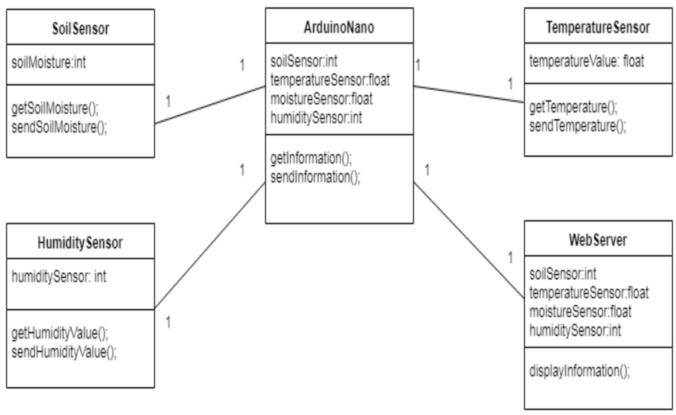

Fig 7.1

VIII. Algorithm.

Step1: Start.

Step2: Reset all the component.

Step3: Measure the load value.

Step4: The load value is converted from analog to digital.

Step5: The sensor value load on Arduino nano.

Step6: Threshold value exceed alert message to farmer Through GSM.

Step7: Load the value in Wi-Fi module.

Step8: Display the data on Web page.

Step9: Stop

IX. Flow Chart

1. First establish the connection between the sensor and
 The main controller
2. Now reading the value to the actual value.
3. Now, compare both the value if exceed last step.
4. sending the message via cell phone or web.
5. Upload the data on the webpage.
6. if value exceed then alert to the farmer.

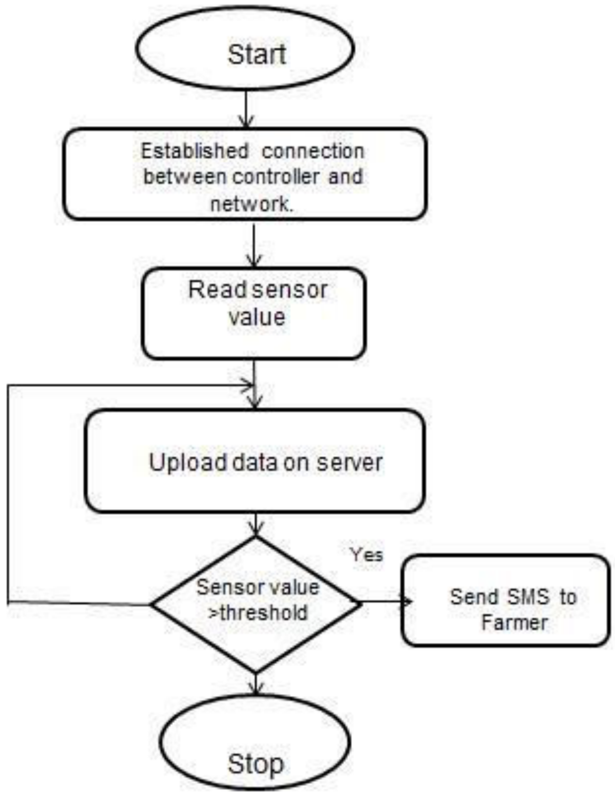

Fig . 9.1 Flow Chart

X. ADVANTAGES AND FUTURE SCOPE.

Every prototype designed has its own advantages and future scope. In this chapter we have discussed about the advantages and future scope.

10.1 Advantages.

1. The farmer will be able to monitor the field condition
 At any time and anywhere.
2. To maximize the productivity of farming.
3. Easily access through the website

10.2 Future Scope

1. The WSN application combine an simulating new area of explore that will really develope value in farming manufacturing, accuracy irrigation and will have impres-sive decline in cost need. By using the future style, ending the sensor topology of inferior implementation cost.

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11. Conclusion

Smart sensors based monitoring system for agriculture have been used to increase the yield of plants by monitoring the environmental conditions (parameters) and thus providing the necessary information to the clients (farmers). The This system is mainly developed for the betterment of farmers. The use wireless sensor network over the wired one helps for deploying it in any type of environment for monitoring, making it exhibit and robust. The use of iot and sensors element facilitates the system for re-congurability and re-programmability according to different environmental conditions.

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