SMART POLY-HOUSE SYSTEM

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Abstract: In India maximum population occupation is farming. They are doing farming by using traditional methods. They are using permutations combination for crop growth. Feeding Water, Bio pesticides, fertilizer based on logical decision. Sometimes that decision goes wrong and resulting into loss in crop production. This is major problem in India. In developed country farming is done by using so many advance technologies. On other side in our country lack of resources, unplanned management, less budget and traditional methods are very crucial problem. Farmers are taking care of crop by survey in farm and analyzing those problems, regarding that problem which is time consuming and some time the disease is not correctly identify and providing suitable solution as per their knowledge. We are going to cut this methodology which is followed by farmer since so many years. We proposed a system based on technical platform. This system will provide automatic soil moisture/ water level, disease/ infection detected based on type of crop. Send notification to farmer i.e. Soil water level, temperature, Humidity, light. Also Control the water level, temperature, humidity and light. We also provide a database which contain better schedule for each type of crop. Farmer will no need to go for survey in farm to analyze problem. Farmer will get automatic alert if any changes are occurred. It will provide location wise requirement so that it will provide accuracy. It helps for proper use of water, fertilizer, Bio pesticides. It will provide schedule for different crop which helps for improving crop production.

Keywords: IOT, PHP, MYSQL, Embedded system, Sensors, Image processing.

I. Introduction

Agriculture is the foundation of Indian economy. In India, around 70% of the population gains its job from agribusiness. The current improvement in data and correspondence advances has enabled agriculturists to obtain an immense measure of site particular information for the fields. The principle exercises included are information accumulation, preparing, and variable rate of use of data sources. We can lessen a ton of manual work in the field of farming utilizing automation. The significant issue looked in numerous horticultural territories is that absence of motorization in agrarian exercises. In India farming exercises is done by difficult work, utilizing customary devices, for example, furrow, sickle and so on. Our Smart Farming System decreases the manual work and mechanizes the horticultural exercises. The ground water is contaminated because of the utilization of manufactured composts and pesticides. In smart cultivating, they are supplanted by natural composts (e.g. compost, creature excrement, green fertilizer) and by utilizing it the dirt structure is upgraded. With the proceeded with interest for nourishment with an expanding populace, decreases in arable land, environmental change and political shakiness, the agribusiness business keeps on scanning for new ways to enhance efficiency and maintainability. This has brought about specialists from various disciplines looking for approaches to fuse new innovations and accuracy into the agronomic frameworks. There is a requirement for proficient and exact systems of cultivating, empowering agriculturists to put negligible contributions for high creation. In agribusiness we use such strategies which can helps to achieve above necessity. It can help with enhancing the cultivating hones by utilizing data innovation instruments, which empowers ranchers to watch survey and control cultivating hones, for example, satisfactory composts, pesticides and water utilization. It additionally gives area particular data to the ranchers about the assets in controlling soil and condition parameters. The most important things of smart farming are temperature measurements and water management. The reason is that the environmental and water management affects plant growth. In addition, environmental measurements using wireless sensor network and water management technology are much simpler, cheaper and lower running costs. Smart farming is combination of computer science, electrical engineering, electronics and telecommunication engineering and mechanical engineering fields which can improve the productivity, quality and profit. As shown in fig 1, the smart farming system has different terminologies like sensing technology, software application, communications System, hardware and software system, data analytics solution. Smart farming/poly-house system can be monitoring and controlling automatically by using that terminologies.

Fig 1: Smart Farming System terminologies.

II. RELATED WORK

1. In [1], from this paper we can analyze an agriculture environment and intervention to maintain its acceptability. The system deals with agricultural challenges like measure the temperature &humidity from environment, pH from soil, and nutrient support. Additionally, the system deals with desert-specific challenges such as, dust, infertile sandy soil, constant wind, very low humidity, and the extreme variations in diurnal and seasonal temperatures. The system interventions are mainly intended to maintain the acceptability of the agriculture environment. For a reduced controller complexity, the adoption of fuzzy control is considered. The system implementation relies on state-of-art computer interfacing tools from National Instruments as programmed under Labview
2. In [2], this paper proposed a methodology for smart farming. It can link a smart sensing system and smart irrigation system through wireless communication technology. This system focuses on the measurement of physical parameters. Such as soil moisture content, nutrient content, and pH of the soil can play vital role in farming activities. From the essential physical and chemical parameters of the soil measured, the required quantity of green manure, compost, and water is splashed on the crops using a smart irrigation system, which is mounted on a movable overhead crane system. The detailed modeling and control strategies of a smart irrigation and smart farming system are demonstrated in this paper.
3. In [3], this paper represents a short survey on image processing techniques to help researchers and farmers to improving the agricultural practices. Image processing can used to help monitoring plant growth and plant nutrition management. This paper focuses on the future potential for image processing for different agricultural industry contexts.
4. In [4], this paper proposed an Agricultural Image Processing. It is one of the core applications of Image processing. Now days Image processing is one of the most popular research areas. Where is having participates in several application areas. Agricultural industry is one of such application area. In this application area, image processing has been utilizing in different ways which can identify the crop, plant, leaves, flower, fruits etc. as well as to identify the disease. Study diseases in agricultural field. Digital image processing is a technique used for enhancement of the image. Which can be improved the agricultural productivity.

III. SYSTEM DESIGN

The hardware unit of the prototype of the system is represented by the block diagram bellow. It contains the Arduino microcontroller as the main processing unit. It gets inputs from the temperature sensor (LM35), LDR (Light dependent resistor) and a humidity sensor(DHT11). From the data obtained from the sensors the program controls the actuator components (Led Bulbs, one cooler fan, Irrigation System) to achieve the system requirements. It also uses LCD display to display the data obtained from the sensors and the data obtained from the user. The cooler fans and light bulb will be connected to the microcontroller using a transistor array and 5V relays (The mechanism used is a normally-open relay switch) since they need an AC power supply to operate. A switch is introduced to manually switch off the light bulbs by cutting off the power supply to the light bulbs. We use camera for the image detection from poly-house. In this part we capture the images of crop in span time of capture. By using different image processing techniques detect the disease on crop/plant and also analysis the growth of crop/plant.
For operate the prototype module need 5v, 1A power supply.

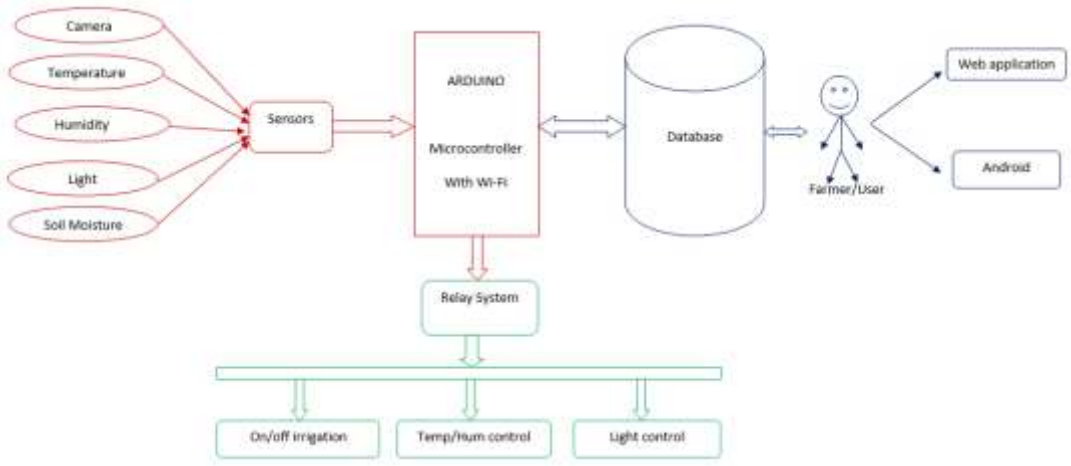

Fig 2: Architecture of System

The system is divide in two major parts like Hardware and Software which is explained in details below.

Hardware Requirements
Sensors:
A sensor is a device that can measure the temperature, light, humidity, soil moisture to automatically sense object entity. There are several sensors used in system they are Temperature sensor -LM 35. Humidity sensor - DHT 11. Light sensor - LDR. Soil Moisture sensor- NSK electronics product.

LM 35:

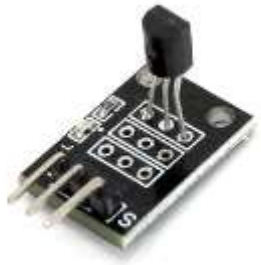

Fig 3: Temperature sensor

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor.
The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every oC rise/fall in ambient temperature, i.e., its scale factor is 0.01V/ oC.

DHT 11:
DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and an NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller

Fig 4: Humidity Sensor

LDR:

Photo resistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity. In the dark, their resistance is very high, sometimes up to 1MΩ, but when the LDR sensor is exposed to light, the resistance drops dramatically, even down to a few ohms, depending on the light intensity. LDRs have a sensitivity that varies with the wavelength of the light applied and are nonlinear devices. They are used in many applications but are sometimes made obsolete by other devices such as photodiodes and phototransistors. Some countries have banned LDRs made of lead or cadmium over environmental safety concerns.

Fig 5: Light Dependent Resistor

Soil Moisture sensor:

This is an easy to use digital soil moisture sensor. Just insert the sensor in the soil and it can measure moisture or water level content in it. It gives a digital output of 5V when moisture level is high and 0V when the moisture level is low in the soil.

The sensor includes a potentiometer to set the desired moisture threshold. When the sensor measures more moisture than the set threshold, the digital output goes high and an LED indicates the output. When the moisture in the soil is less that the set threshold, the output remains low. The digital output can be connected to a micro controller to sense the moisture level. The sensor also outputs an analog output which can be connected to the ADC of a micro controller to get the exact moisture level in the soil. This sensor is great for making water gardening projects, water sensing, etc.

Fig 6: Soil Moisture sensor

Arduino:

Fig 7: Arduino board

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE(Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

IV. SYSTEM WORKING/MEHTODOLOGY

The most important things of Smart Poly-house System are temperature measurements and water management. The reason is that the environmental and water management affects plant growth. In addition, environmental measurements using wireless sensor network and water management technology are much simpler, cheaper and lower running costs. Smart Farming is about empowering today's farmers with the decision tools and temperature measurement technologies that seamlessly integrate products, knowledge and services for better productivity, quality and profit.

Every sensors and hardware have capacity or range of working, so when the area of field is increased then the numbers of needed hardware and sensors will be increased. For the betterment and avoid the complexity of hardware & sensors installation we use the clustering techniques.

In this part we obtain the cluster of fields. Cluster are defined by the size of fields. it helps to monitoring and controlling the large playhouses in efficient way as shown in below fig. clustering for Smart Play-house System.

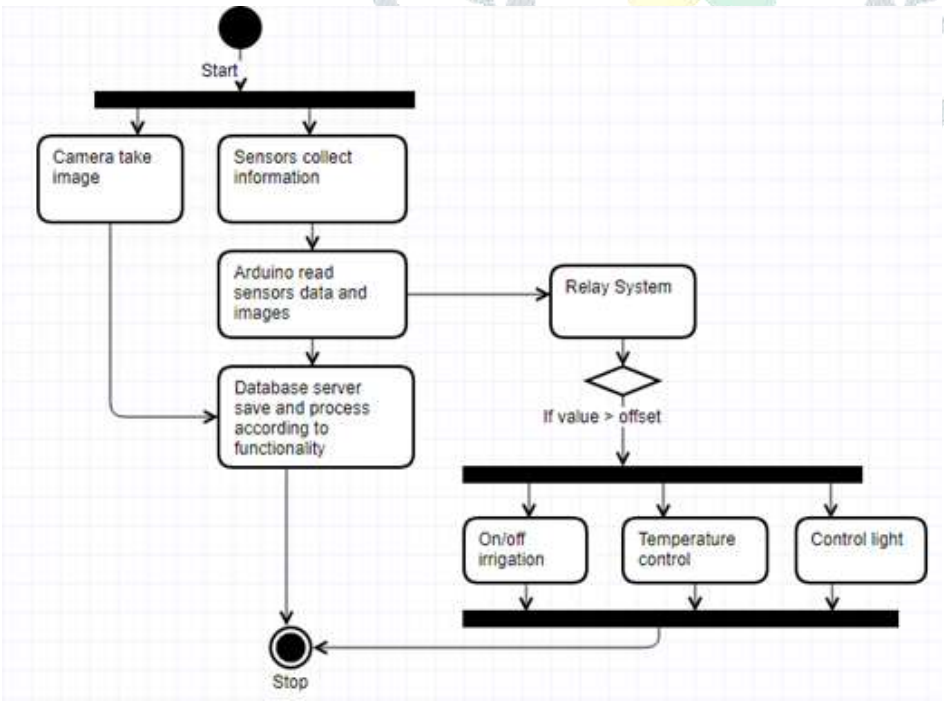

Fig 8: Activity Diagram for Smart Poly-house System

V. RESULTS AND DISCUSSION

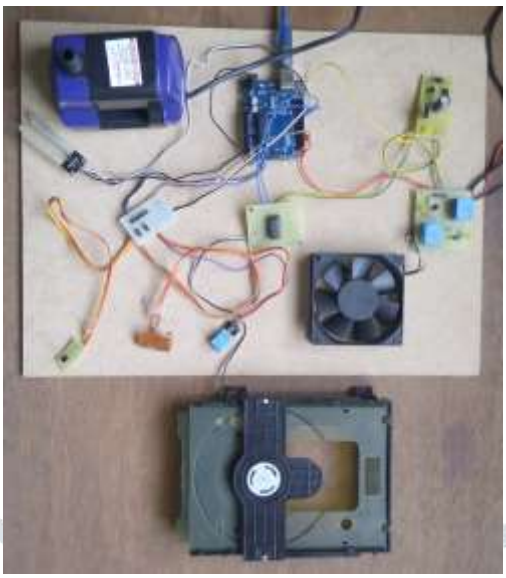

Fig 9: Final System

Fig 10: Web-App(IOT page)

VI. CONCLUSION

We proposed a system based on technical platform. This system will provide automatic soil moisture/water level, disease/ infection detected based on type of crop. Send notification to farmer i.e. Soil water level, temperature, Humidity, light. Also Control the water level, temperature, humidity and light. We also provide a database which contain better schedule for each type of crop. Farmer will no need to go for survey in farm to analyze problem. Farmer will get automatic alerts changes are occurred. It will provide location wise requirement so that it will provide accuracy. It helps for proper use of water, fertilizer, Biopesticides. It will provide schedule for different crop. Helps for improving crop production.

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