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SMART AGRICULTURE MONITORING SYSTEM USING IOT

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Abstract

In our agricultural monitoring system, we create an application that has the features of automated water detection, soil moisture, ph level and detect intruders using ultrasonic sensors. Implementing GPRS' based controlled monitoring farming solutions composed of sensors is a gateway to help farmers from a remote location. The goal of this project is to integrate IoTs awareness and communication technology into a smart agriculture platform. Based on the combination of IoT and Cloud, they develop agricultural modernization and help us to provide a solution to many agro-based problems. It uses a pH sensor to measure the water quality and an Ultrasonic sensor to detect the intruders. Based on the soil moisture, the total amount of water is calculated and sent to the field. The sensed parameters are automatically sent to the farmer's application.

Key words: IoT, Sensors, GPS, Microcontroller

Introduction

Because the world is trending into new technologies and implementations it's a necessary goal to trend up in agriculture also.Many researches are wiped out the sector of agriculture.Most projects signify the utilization of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the knowledge about the varied environmental factors.Monitoring the environmental factors isn't the entire solution to extend the yield of crops.There are number of other factors that decrease the productivity to a greater extent.Hence automation must be implemented in agriculture to beat these problems. So,in order to supply solutions to all or any such problems, it's necessary to develop an integrated system which can lookout of all factors affecting productivity in every stage. But complete automation in agriculture isn't achieved thanks to various issues.Though it's implemented within the research level it's 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.

Literature Survey

The existing method and one among the oldest ways in agriculture is that the manual method of checking theparameters.In this method the farmers they themselves verify all the parameters and calculate the readings.[1]It focuses on developing devices and tools to manage, display and alert theusers using the benefits of a wireless sensor network system. [2]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]Thecloud computing devices which will create an entire computer system from sensors to tools that observe data from agricultural field images and from human actors on the ground and accurately feed the info into the repositories alongside the situation as GPScoordinates.[4]This idea proposes a completely unique methodology for smart farming by linking smart sensing system and smart irrigation system through wireless communication technology.[5]It proposes a coffee cost and efficient wireless sensor network technique to acquire the soil moisture and temperature from various location of farm and as per the need of crop controller to require the choice whether the irrigation is enabled or not.[6]It Proposes a thought about how automated irrigation system was developed to optimize water use for agricultural crops. additionally, a gateway unit handles sensor information.[7]The atmospheric conditions are monitored and controlled online by usingEthernet IEEE 802.3.The partial root zone drying process are often implemented to maximum extent.[8]It is meant for IoT based monitoring system to research cropenvironment and therefore the method to enhance the efficiency of deciding by analyzing harvest

statistics.[9]In this paper image processing is employed as a tool to watch the diseases on fruits during farming, right from plantation to harvesting.The variations are seen in color, texture and morphology. [10]In this paper, a greenhouse is a building during which plants are grown in a closed environment. it's wont to maintain the optimal conditions of the environment, greenhouse management and data acquisition.

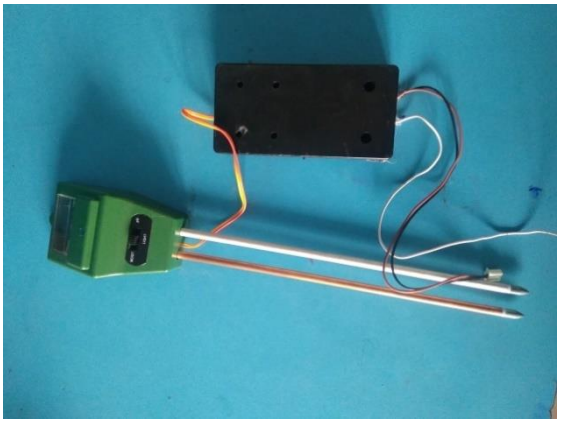
Proposed Work

Acc. to our proposed system, we create an application that has the existing features alongside the automated water detection, soilmoisture, ph sensors.The Evolution of smart agricultural solutions has become a recent trend in our day- to -activities.There are many issues associated with farmers which always hampers the course of evolution .One of the simplest solutions to tackle such issues is to encourage farmers to use the advanced technologies with sufficient resource.Implementing IOT based precision farming solution comprised of sensors may be a gateway to assist farmers from a remotelocation.The main of any precision agriculture remote sensing is to Detect something in time to make a correction which helps farmers to use only required quantity of water,fertilizers and pesticides.The goal of this work is to integrate IoTs awareness and communication technology into an smart agriculture platform. it's designed for IoT based monitoring system to research crop environment and therefore the method to enhance the efficiency of decision making by analyzing harvest supported combination of IOT and cloud technologies they develop agricultural modernization and helps us to supply solution to many agro based problems.We have already got many wireless protocols like wi-fi ,cellular, BLE,Etc.. although this automation ,not optimal for cultivation sensor nodes,there is a requirement to send information to a distance with an online connection. It's designed for an IOT based monitoring system to research crop environments and therefore the method to enhance the efficiency of deciding by analyzing harvest for the higher quality of crop andsolve agro based problems.

Hardware Components

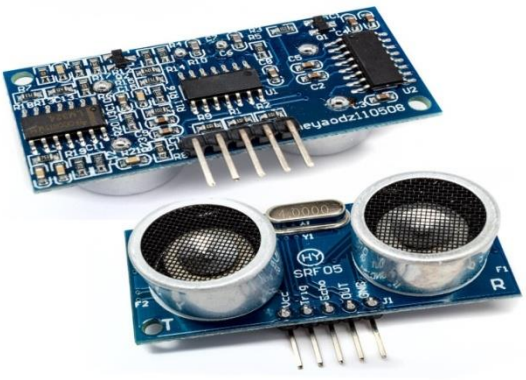
1. pH SENSOR

The overall working rule of pH sensor and pH meter depends upon the exchange of ions from sample solution to the inner solution (pH 7 buffer) of glass electrode through the glass membrane. The porosity of the glass membrane decreases with the continuous use that decreases the performance of the probe.FEATURES: Heating voltage: 5±0.2V (AC -• DC) Working current: 5-10mA The detection concentration range: PH0-14 The detection range of temperature: 0-80 centigrade The Response time: = 5S Stability time: = 60S /



2. ULTRASONIC SENSOR MODULE -HC - SR04

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm.The modules includes ultrasonic transmitters, receiver and negative feedback circuit. Features: (1)Using IO trigger for a minimum of 10us high level signal. (2) The Module automatically sendseight 40 kHz and detects whether there's a pulse signal back. (3) IF the signal back,through high level , time of high output IO duration is that the time from sending ultrasonic to returning.Test distance = (high level time×velocity of sound (340M/S) / 2, /



3. SOIL MOISTURE SENSOR

The soil moisture sensor may be a device to live volumetric water content in the soil. The sensor measures volumetric water content indirectly, without removing moisture, by using other parameters of soil like electric resistance or conductance,dielectric constant and interaction with other neutrons.The result may vary counting on environmental factors like soil type, temperature, and conductivity, so it must be calibrated. Specification Voltage supply: 3.3-5V Output mode:dual-mode, Analog (more accurate) and digital Comparator IC: LM393 Indicator type:Red: power indicator Digital switching output indicator .

4. BUZZER

A buzzer or beeper is an audio signalling device, which can be mechanical, electromechanical, piezoelectric.Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input like a click or keystroke. It generates consistent single tone sound just by applying D.C voltage. employing a suitably designed resonant system, this sort can be used where large sound volumes are needed. FEATURES:• Input supply: 5 VDC• Current consumption: 9.0mA max.• Oscillating frequency: 3.0 ±0.5 KHz• instantaneous sound pressure Level: 85dB min.APPLICATIONS

- Novelty-uses
- Security-alarms
- Judging-Panels
- Annunciator panels

5. GPRS IOT MODULE

Internet of Things (IoT) is an environment in which objects, animals or people are given unique identifiers and therefore the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.IoT board featured with SIM900 GPRS modem to activate internet connection also equipped with a controller to process all input UART data to GPRS based online data.Data could also be updated to a selected site or a social network by which the user can able to access the info.FEATURES: • Power Supply: DC +12v 1Amp• Auto data updating: 30sec• Digital Output port Pins: +5V DC• given 3 links .

6. DC MOTOR

A motor is an electrical machine which converts electricity into mechanical energy. The principle of working of a DC motor is that "whenever a current carrying conductor is placed during a magnetic flux, it experiences a mechanical force". The Direction of this force is given by Fleming's left rule and its magnitude is given byF = BIL.Where, B = magnetic flux, I = current and L = length of the conductor within the magnetic field

7. RELAY

A relay is an electrically operated switch. It consists of a group of input terminals for one or multiple control signals, and a group of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.Features: RW Series Relay covers switching capacity by 10A in spite of miniature size to comply with the user's big choice. RWH is approved by the C-UL & TÜV safety standard. The Employment of suitable plastic materials is applied under heat conditions and various chemical solutions.

Experimentation & Results

In the field section, various sensors are deployed in the field like ph level sensor,soil moisture sensor(soil npk) and ultrasonic sensor(where the if there is any insects or animals in the farm it give beep sound in the field and notification to the app stating the distance of the insect or animals.The data collected from these sensors are connected to the microcontroller through ARDUINO-node mcu. The data are collected and verified from the microcontroller and sent to the internet of things module where all the data is stored in the cloud and verified and sent to the farmers. In this method the water is controlled by the trip irigation method ,where it decides the amount of water sent to the field is determined by the farmer. If the water exceeds the threshold value the buzzer is switched ON and notification is sent to mobile application . This alarm is sent as a message to the farmer and automatically the power is switched OFF after sensing. The values are generated in the mobile page and the farmer gets the detailed description of the values and can be conscious about the land and the updated all the time via appplication.In this method the litre of water is calculated based on the above details and says how many litre is needed for the particular land via the mobile application. The motor is also controlled by the app in stating the how many minutes the motor should be on and off.The main purpose of any precision agriculture remote sensing is to detect something in time to make a correction which helps farmers to use only required quantities of water ,fertilizers and pesticides.. The Internet of Things and cloud computing collectively makes a system that controls the agriculture sector effectively. This system will sense all the environmental parameters and send the data to the user via cloud. User will take controlling action according to that this will be done by using actuator. This asset allows the farmer to improve the cultivation in a way the plant needs. It leads to higher crop yield, prolonged production period, better quality and less use of protective chemicals.

Future Work & Conclusion

For future developments it can be enhanced by developing this system for large acres of land. Also the system can be integrated to check the quality of the soil and the growth of crops in each soil. The sensors and microcontroller are successfully interfaced and wireless communication is achieved between various nodes. All observations and experimental tests prove that this project is a complete solution to field activities and irrigation problems. Implementation of such a system in the field can definitely help to improve the yield of the crops and overall production.

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