IoT Based Agriculture and Transportation Surveillance

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Abstract

This paper gives details about monitoring the different parameters of a greenhouse farming namely temperature, soil moisture & humidity and it also describes how transportation surveillance is important for a proper business through internet of things (IOT). Majority farmers can not accurately detect the level of temperature, humidity, light and water level of the field. The monitoring is observed through the website. The proposed system is an embedded system which is used for microclimatic parameters of a greenhouse which helps in improving of quality of crops or specific plant species results maximum production over crop growth. It also diminishes the difficulties involved in the system by reducing human interrupt to the best possible level. The sensor like DHT11 sense the changing parameters and sends it to the digital pin of the Arduino microcontroller. From the Arduino the sensed parameters such as humidity and temperature values are uploaded to the website at regular interval of time through ESP8266 Wi-Fi module. The sensed parameters can be graphically or virtually made available to monitor by the website which results in becoming the system user friendly, fast in speed, reliable and low cost which eliminates existing setup drawbacks. The transport surveillance system uses GPS & GSM modules which enables the farmer to know the exact location of the vehicle carrying produce from the farm.

Keywords- IoT, Arduino, DHT11, ESP8266, GPS, GSM

I. INTRODUCTION

The rising demand for crop production and quality has significantly increased the utilization of high quality farming. The increased population demands for large amount of crop production. Farming forms a base aspect for an economical corridor of a nation. Any irresponsible decisions regarding this sector may to lead to a huge suffering. There are various aspects in an agriculture sector to be observed and needed to be fixed. In other words, farmers face various challenges to grow their crops with the changing weather conditions. They need to use and respect the resources carefully. They need to use the water precise way. They also need to know about the rising temperature conditions. Just growing is not enough for the farmers, they need to know about how and when to deliver the produce to the customer. So, in this the produce is needed to be transferred to cold storage, pack house or market as early as possible to avoid the damages.

This paper displays the design and implementation of a sensor networks for farming environment monitoring. The Sensor Network is one of the most significant technologies in this century. In this paper we will present an overview of the IOT phenomena as well as its applications in farming. IOT (internet of things) is a vision of a world in which most objects are connected transmitting updates about their performance so the people who use them to do things more intelligently. The basic concept behind the IOT is that virtually every physical thing in this world becomes a computer that is connected to the internet. In this paper the sensor will sense the vital parameters of the environment. The sensed values will be displayed on a LCD display. The sensors are connected to the Arduino microcontroller. Arduino continuously sends the sensed value to the ESP8266 which is connected to the local access point Wi-Fi network. And these sensed values will be viewed on the website which is accessible by the farmer and by the persons authorized by him. The username and password will be provided to them so that they can also access the system and know about the conditions.

Another parameter in this paper is about the transport surveillance. With the use of this parameter we will track the product which will be grown in the green house and delivered to the packing house or the cold storages. The transporting vehicles will be featured with GPS module and this module will be connected to the controller. So, via GPS module network the location of the vehicle will be seen on the website. It's the same website which will be used for displaying parameters related to greenhouse. By

using surveillance system, we will be getting exact information regarding product carrying vehicle and we will come to know about the any negative incident happening like the vehicle not reaching the pack house because of the driver wasting the time. Ultimately, the workers at the pack house will not have to wait because of no product to work on. So, the work flow will be carried out smoothly and continuously. So, ultimately wages provided to workers will be returned in terms of working efficiently. And productivity of pack house will increase. Thus, fulfilling the orders to be exported

Another important technology used is IOT. Using the IOT in homes and work place has made possible to control and monitor any physical parameter using electronic equipment like Arduino interfaced to various sensors.

II. LITERATURE SURVEY

S.V. Devika developed "Arduino Based Automatic Plant Watering system". This system functions by a technique named Internet of things. The main and foremost advantage of this system is that system halts by its own and the inhibiter like water pumps turns off. But the main disadvantage of the mentioned system is that it can only be used for the general-purpose plant [1] and not for applications like Green House.

Vishwanath Naik's system named "IOT based greenhouse monitoring system." This system functions by a technique named Internet of things. The main and foremost advantage of this system is that it is very simple and very efficient to implement. Main disadvantage of the mentioned system is that it monitors the data for a fixed interval of time only [2].

Ruchika Taneja developed "smart agriculture monitoring Through IOT" This system functions by a technique named Internet of things. Main and foremost advantage of this system is that the members have implemented their system using API techniques main disadvantage of the mentioned system is that it has been implemented by considering sugarcane as main plant [3]. Prof. C. R. Dongarsane developed a system named "Greenhouse Automation using IOT" This system functions by a technique named Internet of things. Main and foremost advantage of this system is that they created their own web server which functions for both monitoring and showing the result for the implemented parameters [4].

Sayali P. Shelar developed a system named "A survey- Smart Green House Android Apps" This system functions by android application and simple WIFI module. Main and foremost disadvantage of this system is due to the use of PIC microcontroller an external ADC is to be interface. [5].

III. METHODOLOGY AND ALGORITHM

A. Arduino Based Automatic Plant Watering system

As discussed in literature the author has implemented this system. The basic block diagram of implemented system is as shown in figure bellow.

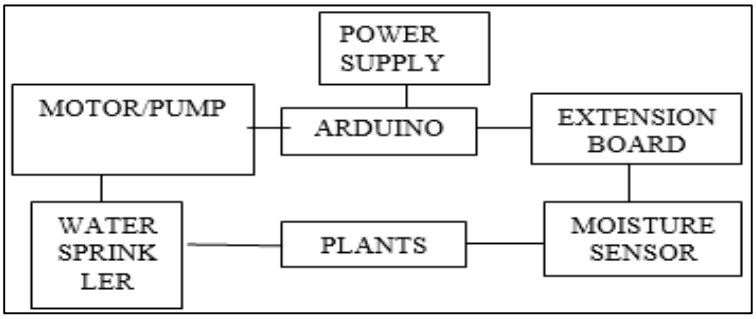


Fig. 1: Block diagram

Unfortunately the main disadvantage of the mentioned system is that it can only be used for the general-purpose plants.

B. Smart Agriculture Monitoring Through IoT

As discussed in literature the author has implemented this system. The basic block diagram of implemented system is as shown in figure below.

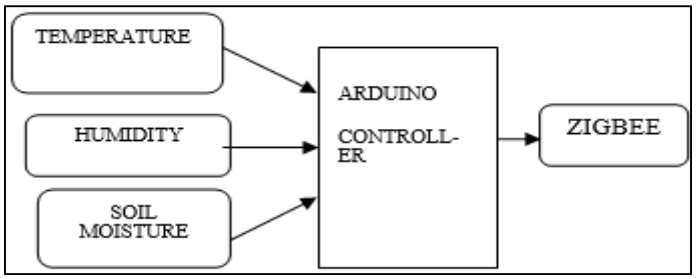


Fig. 2: Block diagram

The main disadvantage of the mentioned system is that it has been implemented by considering sugarcane as main plant and it is not suitable for all types of seasonal plants.

C. Green House Automation using IoT

As discussed in literature the author has implemented this system. The basic block diagram of implemented system is as shown in figure below.

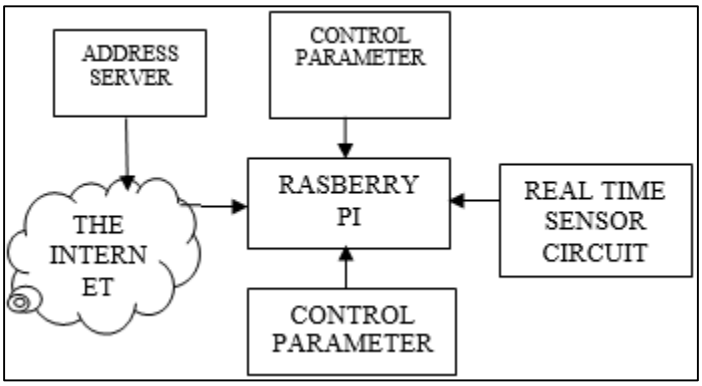


Fig. 3: Block diagram

D. IoT Based Agriculture and Transportation Surveillance

To overcome the drawbacks of all the above discussed systems we tried to design a new system using IOT. The new system consists of greenhouse parameter monitoring and the vehicle surveillance.

As discussed earlier the system will use microcontroller ESP8266 module which will work as WIFI module and microcontroller. The microcontroller gets the various parameters like temperature, humidity, soil moisture, light intensity as a sensed analog value from the respective sensors, this sensed value is updated to the web-server at every interval of time. An OLED display is included in this system to view this parameter at spot and make or control manually if possible.

On the secondary basis, the vehicle surveillance is observed using GPS and GSM module restively. The GPS module fetches the longitude and latitude of the vehicle to the Arduino. This data is fetched to GSM module using GPRS setting this data is again forwarded to the web server. The total data from monitoring system and vehicle surveillance system is observed on the web server.

E. Green House Monitoring

To develop a monitoring system which will accurately monitor the parameters related to greenhouse so that the farmer will be able to maintain the natural conditions needed for the plants to grow and produce efficiently.

The aim of this paper is to design a simple, easy to install, Arduino-based system to monitor and record the values of temperature, humidity, soil moisture and sunlight of the natural environment that are monitored in order to achieve maximum plant growth and yield.

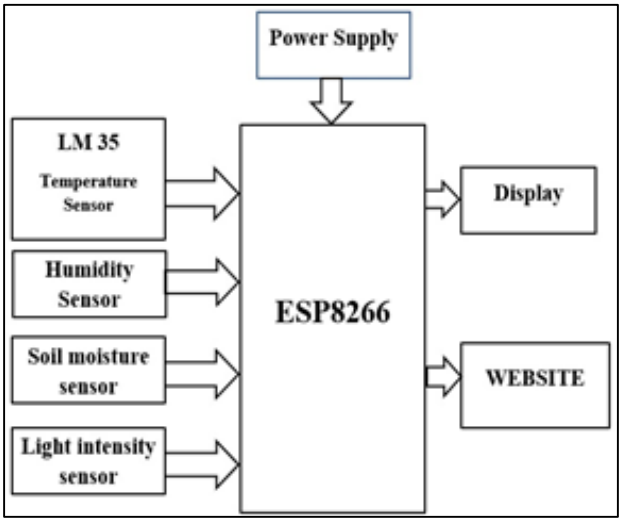


Fig. 4: Block Diagram of Monitoring

In the block diagram, we have provided inputs to Arduino in the form of sensors. This microcontroller has inbuilt ADC. Wi-Fi protocol ESP 8266 is used for communication of microcontroller and Web site. Values of all parameters are recorded and

display it on the display. The system is 7easy to operate and accurate. The system is designed to find out the exact location of any vehicle and intimate the position to the concerned authority about through a website.

This system includes a GPS modem which retrieves the location of a vehicle in terms of its longitude and latitude. This Data is fed to the Arduino microcontroller which is interfaced with an ESP8266 Wi-Fi modem. Microcontroller retrieves the location details from the GPS and sends it to the concerned authority in the form of a website over Wi-Fi modem on periodical intervals so set by the user.

1) Temperature Sensor

The temperature sensor is used here is LM35 sensor. The operating temperature range is from -55°C to 150°C. [5]

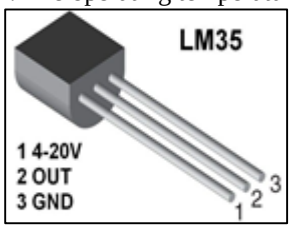


Fig. 5: Temperature Sensor

2) Humidity Sensor

DHT11 Temperature & Humidity Sensor highlights a temperature & stickiness sensor complex with a calibrated digital signal input. By utilizing the selective computerized sign securing system and temperature & dampness sensing innovation, it ensures high reliability and excellent long-term stability. This sensor incorporates a resistive-sort moistness estimation segment and a NTC temperature estimation part, and associate with a high- execution 8-bit microcontroller, offering fabulous quality, quick reaction, hostile to obstruction capacity and expense adequacy.

F. Technical Specification

Measurement Range 20-90% RH 0-50℃
Humidity Accuracy ± 5% RH
Temperature Accuracy ± 2℃
Resolution 1
Package 3 pin single row

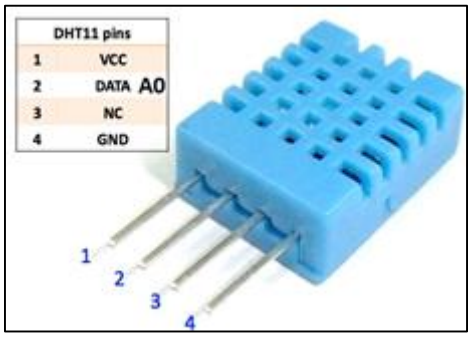


Fig. 6: Humidity Sensor

3) Light Sensor

A simple LDR with proper light arrangement can be used to operate as a light sensor. A photo resistor or light dependent resistor or cadmium sulphide cell is a resistor whose resistance decreases with increasing incident light intensity. It can also refer as a photo conductor. A high resistance semiconductor is used to make a photo resistor.

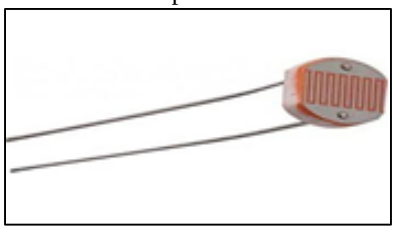


Fig. 7: Light Sensor

4) Soil Moisture Sensor

In green house soil moisture sensor is used to determine the level of water in soil. In the circuit designed of this sensors 5v supply is, 100-ohm fixed resister,10 K Ω variable resister,2N222N transistor, and main two copper leads as the sensor probes are used.

Hence, it gives output voltage to conductivity of the soil. Conductivity of soil depends on the moisture of soil. Variable resister is used for adjust the sensitivity of sensors which connected to transmitter.

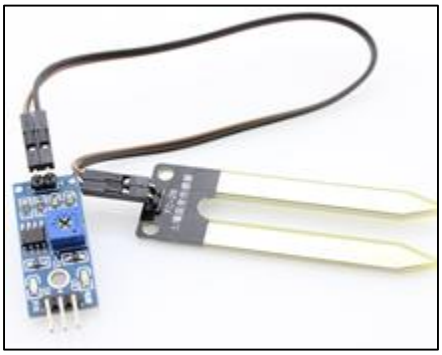


Fig. 8: Soil Moisture Sensor

G. Transport Surveillance System

Transport surveillance system is designed in order to minimize vehicle investment risks, reduce transportation and staff costs, improve transport efficiency and increase productivity. This results in an overall optimization of the company's transport management process.

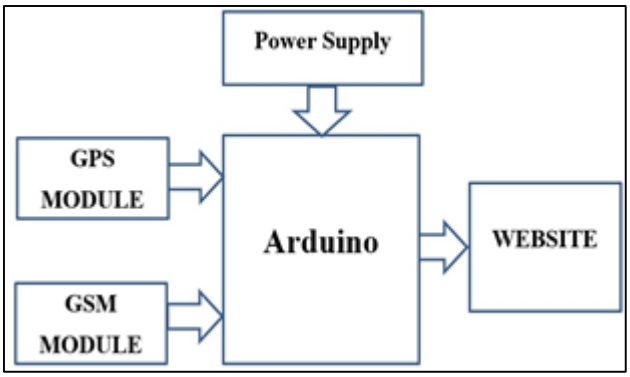


Fig. 9: Block Diagram of Transport Surveillance

The above block diagram is relating the working of transport surveillance model. It describes basically working of model. For the tracking the tracking the location GPS module is used. Then this data is sent to Arduino microcontroller. Then ESP8266 module is used to access the internet network to transmit the location information via Arduino.

The vehicle tracking system as a subpart in our paper which is to be installed in a vehicle to be tracked to enable the farmer to track the location. In this paper it is proposed to design part of system that is based on IOT technology and works using GPS and GSM technology. The task to track the vehicle is done by interfacing the microcontroller with a GSM modem and GPS. The GSM modem sends the vehicle position that is latitudes and longitudes of the vehicle from a remote place to the web server.

5) GPS Module

Fig. 10: GPS Module

The data to a GSM is obtained by Arduino microcontroller which incorporates the data from GPS. To the web server the data along with the parameter of greenhouse parameter are watched and it is updated at certain precise interval of time.

IV. EXPERIMENTATION

For implementation we will consider separate system i.e. green house monitoring and transport surveillance, for the greenhouse monitoring the system is based on the WIFI module ESP8266 as a microcontroller. And in case of vehicle surveillance we used

Arduino & GPS module. For tracking the co-ordinates and mentioning its positions at a particular interval mentioned in the code on the server.

V. EXPECTED RESULTS

As a part of result we will consider different parameter as Temperature, Humidity and Light intensity readings in greenhouse. The reason for this experiment is to make sure that the system that was design is functioning well and the data can record correctly.

A. Temperature Measurement

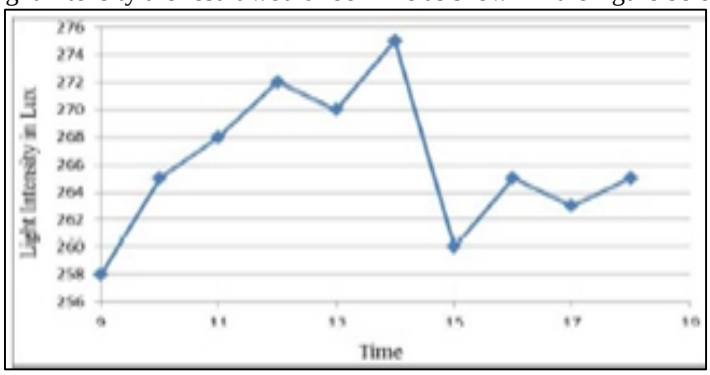
According to the system flow it is expected that temperature increases initially and becomes constant after certain interval of time.

B. Humidity Measurement

According to the system flow it is expected that Humidity decreases initially and becomes constant in the middle interval and again increases with respect to time.

C. Light Intensity

Likewise we can conclude for light intensity the result would look like as shown in the figure below.



Graph III Graph of Time vs. Light Intensity

From the above graph III, indicates that in a day position depending on solar radiations the light intensity readings are different at different time. In between 12 PM-14 PM light intensity is highest [25].

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