IOT BASED DATA ACQUISITION FOR TERRACE GARDENING

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ABSTRACT

The Internet of Things is used in current age of creative computing and it's providing opportunities to communicate around the world. IoT describes a system where items in the real world, and also sensors within or attached to these items, are connected to the Internet via wireless and wired connections. M2M communications and intelligence drawn from the devices and therefore the network can enable businesses to alter bound basic tasks while not looking at central or cloud-based applications and services. The Aim of this paper is to monitor the environment of the plants in terrace garden. This can be done by measuring parameters such as temperature, humidity, soil moisture and light intensity of the garden. Here in this paper, the data of these parameters are collected and viewed in the form of graph by using thing speak website (online platform, in which data is represented graphically). The data displayed as an output can be observed and forecasted. Now a day's terrace gardening is developing in cities. The terrace garden is helpful for a family to meetup at least some of the vegetable needs. Thus, this project is used for monitoring environmental data of the plants in order to improve the effectiveness of terrace gardening.

Keywords: *IoT – Internet of Things, M2M – Machine to Machine*

1. INTRODUCTION

Technology has changed our lives day by day. The system that was done manually is now developed into an automated system that can save time and energy. In this system, temperature, humidity, soil moisture and light intensity values of the environment will be monitored, stored and displayed on the Cloud web via the Internet. The stored old values can also be used for predictions. An article on the automated water supply system for urban residential areas showed that their system can be used to effectively manage water resource. The physical factors that are required, are hard to control manually inside a greenhouse so there is a need for the automated system. Many smart irrigation systems have been proposed and devised through Evapotranspiration, thermal imaging, capacitive methods, and neutron scattering method and gypsum blocks are some of the technologies that enable moisture sensing.

The prototype we used comprises of moisture sensor, temperature & humidity sensor, LDR sensor and NodeMCU. Soil moisture sensor (YL 69) is installed near the roots and temperature & humidity (DHT11) sensor is installed further away to detect the temperature and humidity (Tanu Saha & Ashok Verma, 2017). A changing climate is leading to more occurrences of extreme events such as droughts and floods, which have a negative impact on crop growth and yields. Plants require an optimum soil-water-air environment in the root zone to maintain

physiological response to growth, photosynthetic functions, and productive vegetative capacity for high yield response (D.Veera Vanitha et al., 2017)

Rising air temperatures also have a deleterious effect on crop production, as heat stress limits the optimum productive capability of our current commercial plant species on which the population depends for food security. A changing climate is also affecting other aspects of crop production such as increased pests and disease in some situations, changes and even losses in biodiversity. Greenhouses are controlled area environment to grow plants. As the limitation of existing greenhouse plants is that it is not operated automatically and has to be operated manually with different records. In order to achieve the optimum growth of plants, the continuous monitoring and controlling of environmental parameters such as temperature, humidity, soil moisture, light intensity etc. are necessary for our greenhouse system. This paper demonstrates a checking and control system for nursery through Internet of Things (IOT).

The combination of IoT and embedded technology has helped in bringing solutions to many of the existing practical problems over the years. The sensors used here are YL69 moisture sensor and DHT11 sensor and LDR sensor (F. S. Zazueta & J. Xin, 2004).

The recorded temperature and humidity are stored in a cloud database (ThingSpeak), and the results are displayed in a webpage, from where the user can view them directly. The system will screen the undeniable common conditions, for instance, moistness, soil immersion, temperature, closeness of fire, etc. All the environment parameters data are send to cloud using WiFi module NodeMCU esp8266. If any condition crosses certain limits related actuator will be turned ON. The microcontroller will as such turn on the motor if the earth stickiness isn't generally a particular worth. The user can screen and control parameters through mobile and computer. The model was attempted under various blends of obligations to our examination office and the test outcomes were found as expected.

2. EXISTING SYSTEM

It consists of Manual Monitoring of the agricultural field parameters and the use of the GSM technology, which will take more time to get the required results. So in order to overcome that we have proposed more organized and automated monitoring of the crops by controlling different parameters inside the greenhouse. The Internet of Things is regarded as the third wave of information technology after Internet and mobile communication network (www.wplawinc.com).

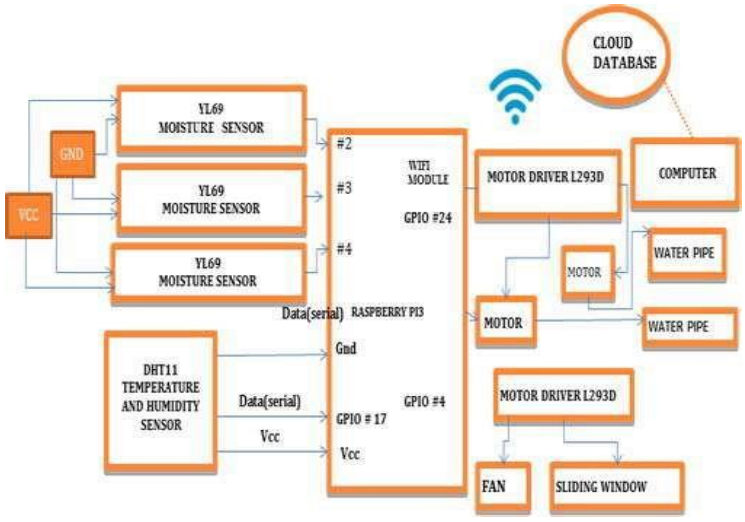

Figure 1. Block Diagram for Existing Monitoring Model

DISADVANTAGES

The controlling section leads to misbehave while there was a network error.

3. PROPOSED SYSTEM

Our proposed system is mainly for Monitoring the plants condition which involves temperature and humidity of the environment, moisture level of the soil and the amount of light present in the garden (www.pwc.com).

These three parameters are received from the sensors and stores these values in the cloud database enabling them to be accessed from anywhere, anytime. The prototype we used comprises of moisture sensor, temperature & humidity sensor, and LDR sensor. Moisture sensors (YL 69) are installed near the roots. Temperature & humidity (DHT11) and LDR sensor is installed further away to detect the temperature & humidity and Light. These sensors send their data to the NodeMCU to analyze the results (Rawal, 2017).

With the help of ThinkSpeak web application, the analysed result can be shown/ viewed in the form of Graph. Thus, the graph will clearly states the condition of the plants present in the garden.

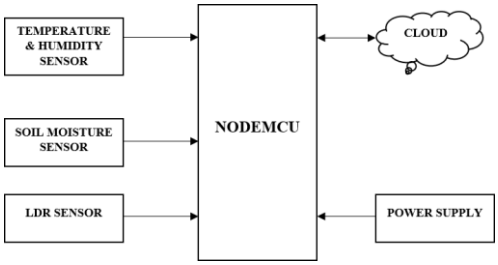

Figure 2. Block Diagram for Proposed Model

3.1 METODOLOGY

To always sustain a suitable climate inside the Terrace garden and to retain appropriate moisture content in the soil we have to frequently monitor them first. So, we have designed a system for monitoring the parameters such as temperature, humidity, soil moisture content and the light intensity using the temperature & humidity sensor (DHT11), moisture sensor (YL69) and LDR sensor respectively. These parameters are sent to thinspeak website using NodeMCU with the help of internet connection.

3.1.1 REMOTE MONITORING

Internet of things is a concept where each device is assigned an IP address and through that address, anyone makes that device identifiable on the internet.

The major element of IoT based monitoring systems is NodeMCU. This removes human interaction with machines and makes it technically possible and desirable in various domestic processes by replacing it with programmed electronic systems.

3.1.2 COMMUNICATION WITH THING SPEAK

With the help of inbuilt Wi-Fi module, the data collected are uploaded to the ThingSpeak cloud platform. We can visualize the data in the form of charts which features real-time updates. Using ThingSpeak IoT platform, we can continuously upload and monitor real- time data which will be very useful.

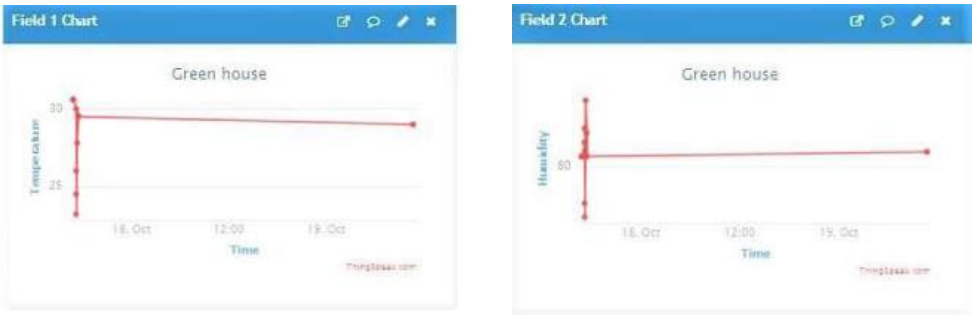

Figure 3. Results from THINKSPEAK site

3.1.3 THINGSPEAK CLOUD

It is an IoT platform that is designed to enable meaningful connections between people and things. It features real-time data collection, data analysis, data processing, data visualization using a connected Social Networking Service (SNS) via an open source API to support various platforms (thingspeak.com).

Figure 4. Current results from THINKSPEAK cloud

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Humidity: 82.00%
MOISTURE LEVEL : 42.82
INTENSITY : 0.00
Temperature: 29.50 degrees Celcius
Humidity: 82.00%
MOISTURE LEVEL : 42.91
INTENSITY : 0.00
Temperature: 29.50 degrees Celcius
Humidity: 81.00%
MOISTURE LEVEL : 42.82
INTENSITY : 0.00
Temperature: 29.30 degrees Celcius
Humidity: 79.00%
MOISTURE LEVEL : 42.82
INTENSITY : 0.00
Temperature: 28.80 degrees Celcius
Humidity: 76.00%
MOISTURE LEVEL : 42.72
INTENSITY : 0.00
Temperature: 27.80 degrees Celcius
Humidity: 74.00%
MOISTURE LEVEL : 42.72
INTENSITY : 0.00
Temperature: 27.20 degrees Celcius
Humidity: 74.00%
MOISTURE LEVEL : 42.72
INTENSITY : 0.00
Temperature: 26.80 degrees Celcius
Humidity: 75.00%
MOISTURE LEVEL : 43.11
INTENSITY : 0.00
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Figure 5. Previously obtained results from THINKSPEAK cloud

4. CIRCUIT DESCRIPTION

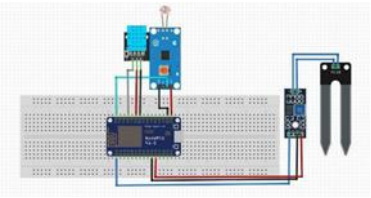

Figure 6. Circuit Diagram for Proposed Model

4.1 EXPLANATION

The components are connected to form a circuit as per the circuit diagram.

- In which the pins of soil moisture sensor namely A0, Vcc and GND are connected to A0,3.3V and GND pins of NodeMCU respectively.
- Then the pins -output, Vcc and GND of LDR sensor is connected to NodeMCU pins- D0,3V3 and GND respectively.
- Finally, in case of DHT11, its output, Vcc and GND pins are connected to D3, 3V3 and GND pins of NodeMCU respectively.

5. CONCLUSION

Here, proposed design is implemented with NodeMCU platform for monitoring temperature, humidity, soil moisture and light intensity with the help of Web server using IOT in terrace garden. It does not require any human intervention. This is particularly an important factor because the presence and availability of the human cannot always be trusted on. we need a more dependable and reliable way for its management which is easily achieved by this project.

They are very important as they are responsible for the efficient growth of crops that are either necessary to feed the population or necessary for the economic growth of any country.The Future Scopes of this paper are,

- As a next step, we are planning to control the temperature, humidity, soil moisture and light intensity of the plants.
- By controlling, we can make sure that plants grow in a healthy way.

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Thingspeak : https:// thingspeak.com