

IoT Based Automated Hydroponics System

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Abstract: Good yielding crops are important in this modern-day agriculture, hence by using automated hydroponic system which can be said as smart farming, we can achieve good grade of crops. This hydroponic system is basically automated; with or without mechanical support one can grow plants. By using sensors, it controls environmental event like electrical conductivity, pH, and temperature basically IOT is used to transfer and retrieve data to the app which is connected to the system. Traditional farming takes longer time to grow plants compared to this automated system hence one can prefer the hydroponic system to grow the plants with high nutrient crops. The main aim of the automated hydroponic system is to grow plants without soil and to save water, time and time. Mainly this project focuses on controlling the humidity, temperature around the plant to give good result in growing plants.

Keywords: Hydroponics, IoT, Sensor.

1. Introduction

The most basic need for human to survive is food, water and living space. As everyone knows human population is increasing day by day, these results in need of more food, space and water. Hence the method of automated hydroponic system has been introduced. Hydroponic is growing rapidly in this modern world, as it helps to grow plant with less time and space. it is a developing automated system, it providing the opportunity to grow high grade crops with rich nutrients. The most advantage thing is the production of the crop can be increased 4 to 10 times in the same place. Most of the crops can be grown twice as fast in a hydroponic system. there are different types of hydroponic system, to get more knowledge about this smart farming many authors have researched and published many papers about hydroponic, as per the research the NFT (nutrient film technique) is the most popular method in hydroponic. In this NFT method, the root of the plant will be in contact with flowing nutrient solution. To grow the small plants the water required is around ½ gallon and large plant requires around 2 gallons.

Hydroponic is the process of growing plants with enriched nutrients with or without soil by saving time and space and also the water. It uses internet of things to transfer the data to the system about the condition of the plant. India is encouraging the hydroponic method; there is no need of growing plants or crop using soil. Earlier due to less knowledge on hydroponics many countries didn't encourage this smart farming, after a lot of research people got to know the value and importance of the

hydroponic system.

2. Methodology

The automated hydroponic includes sensor which helps to transfer the data and retrieve the data collected by sensing the condition of the growing plant. The IOT has a major role in hydroponics system; here sensors and actuators are used to automate the hydroponic system. The sensor collects the data and send it to the cloud base, here the user gets the information about the plant condition.

The main components used in the hydroponic system are Arduino, heater, IR sensor, LDR, buzzers and sensors, relay, pesticide pump and conductivity etc. as before mentioned hydroponic method has different methods, in this method firstly Arduino, relay acts as input and the pesticide pump, IR sensor, LDR acts as output. The temperature around the plant is high, and then the humidity sensor sends the information to the relay, after receiving the information from the humidity sensor, relay which acts as switch will turn on the fan, by this the humidity or the temperature of the plant can be reduced. Here the IR sensor is used to detect any kind of birds or animals, and LDR (light dependent resistors) is used, as the connected led turns on during night.

This LDR works basically on the principle of photoconductivity. As it reduces the resistance by taking the reference of light on the components surface

3. Requirements

A. Hardware Requirements

- Microcontroller
- Humidity sensor
- LDR
- IR sensor
- Power supply
- Temperature sensor
- Conductivity

B. Software Requirements

- Keil software
- Embedded c

The keil software is designed to solve the problems which are complex and also to solve the problem facing embedded software developers. This software advantages are USB device

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and host.

Embedded C is software used in hydroponic system which is a set of language extension for C programming; it is the most popular programming language in software field.

Humidity measurement indicates the concentration of water vapor presented in the air. And also, it is referred to hygrometers, as it provides the accurate or actual humidity condition within the air.

Light dependent resistor: LDR is also known as a photo resistor, which is made up of semiconductor material used to sense the presence of light and absence of light. These are mainly used as light sensor. The application of this sensor is street lights, alarm clock etc.

Temperature sensor: temperature sensor is an electronic device which is used to measure the temperature. Basically, these sensors are used in medical devices, environmental control etc.

PH sensor: pH sensor is the important tool used for water measurements. This pH sensor is able to measure acidity in water. It is an electrical device used to measure alkalinity in water

4. Implementation

In the hydroponic system, the plants grown in water yields high grade crops, instead of giving nutrients to the plant from the soil, the nutrients are given through water. The person who is using this smart farming, he gets the information about the hydroponic system with the help of the mobile application. The condition of the plant is monitored by the sensors used in hydroponic and the data is sent to the user through the mobile application. Hence hydroponic system can be used in any environmental condition.

5. Results



Fig. 1. Hardware setup



Fig. 2.

6. Conclusion and Future Scope

The aim of this paper is to show how the plants are grown without soil by saving water and time through automated hydroponics system; here the system is monitored continuously through the mobile application by sending the data to the user. after monitoring if there is any error, it can be corrected through the same mobile application and also, we are aiming to implement the pest detection and Wi-Fi module to make the system easier to use and also in this modern generation the hydroponic system helps to save and improve the basic needs of human.

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