iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** VII **Month of publication:** July 2020

DOI: https://doi.org/10.22214/ijraset.2020.30457

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VII July 2020- Available at www.ijraset.com

IoT based Monitoring & Controlling of Hydroponics

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Abstract: ***Hydroponics is a subset of hydro culture and is a method of growing plants using mineral nutrient solution, in water, without soil. Nutrients for the plants are supplied to the roots in the form of solution that can be either in the form of static or flowing. Hydroponics can be cultivated both in green house and glass house environment. The limitation in green house environment is to maintain the temperature, pressure, humidity value at a particular level. In addition to that, monitoring on PH value and electrical conductivity in hydroponics is another challenge that has to be monitored and maintained. Manual monitoring is in practice which is a very trivial task else the plants may die out. This praper focuses on automate the green house environment monitoring. The subsequent is automation of PH level and electrical conductivity maintenance. IOT is used to transfer the retrieved data to the internet and mobile app is used to communicate the current status to the user through the use of internet to their mobile phones, so that monitoring and maintenance will be easier.***

Keywords: Hydroponics, IOT, PH level, mobile app.

I. INTRODUCTION

Hydroponics [1] is often defined as the cultivation of plants in water. Growers all over the world are using hydroponic techniques due to the lack of a large water supply or fertile farmland. Soilless gardening offers many advantages to the home gardener. Since a sterile medium [2] is used, there are no weeds to remove, and soil-borne pests and diseases are minimized, if not eliminated completely. Properly grown hydroponic plants [3] also are healthier and more vigorous because all of the necessary growth elements are readily available.

II. OBJECTIVES

The system shall also be able to power all of the electrical components with solar power, so that it could be used in places where electricity is not easily supplied. The system [4] shall require low maintenance and produce better results than traditional soil based farming techniques. The system as a whole shall be durable and weather resistant. Each sensor [5] shall interface with the main microcontroller and be easily applied to different hydroponics buckets as a function of portability [6]. In the event that user action is required, the user shall be notified via text message or email.

III. PROBLEM STATEMENT

Now days, as population is growing widely it becomes difficult for the cultivation of plants in the land.
There are different types of soil present on the earth, it is not possible to cultivate all types of plants everywhere.
Due to scarcity of water, it becomes difficult for the farmers to cultivate the plant in the soil.
In conventional method [7], farmers need to monitor the plants frequently for the good yield. the effects of the global warming, and the plants are affected with UV rays. For this reason, it is more difficult to planting in uncontrolled environment.
To overcome all the above problems, we implement the cultivation of plant in water without soil

IV. METHODOLOGY

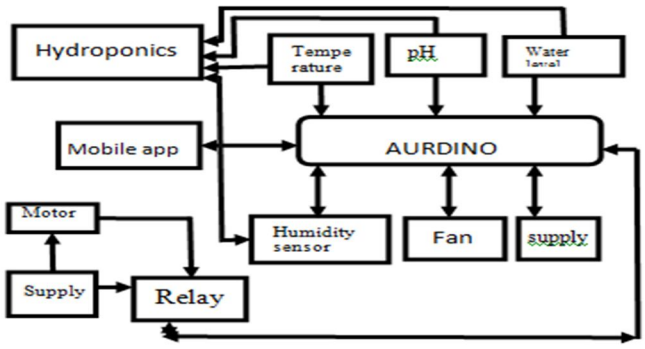


Figure: 1. Block Diagram

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The above block diagram shows the basic representation of hydroponics system. There is an array of various sensors which are used, they include pH[5], temperature, water level sensor. These sensors have different functionalities which will sense and detects the various conditions i.e., the temperature sensor senses the temperature of water, the pH sensor senses the pH level[6] in the water and water level sensor detects the water level in a container. DC motor is used to supply the water. Power will be provided through an electrical power supply. The nutrient flow technique (NFT) is the technique that we use here. Nutrient solution is pumped up from the reservoir. A PVC[7] tube is used as a container. Each one of these smaller tubes runs nutrient solution to one side of each one of the growing channels with the plants in it. A thin layer (film) of the nutrient solution flows through each of the channels with the plants in it to the other side, passing by each plant and wetting the roots on the bottom of the channel as it does. Arduino UNO is the microcontroller used here, it is used to obtain values from the various sensors, feed it to the system and react to the plant as required.

V. METHODS OF HYDROPONICS

A. Wick System

The wick system is the simplest of all six types of hydroponic systems. That's because classically it doesn't have any moving parts, thus it doesn't require any pumps or electricity. However some people still like use an optional air pump in the reservoir. Because it dosent need electricity to work, it's also quite useful in situation where electricity cant be uses, or is unreliable.

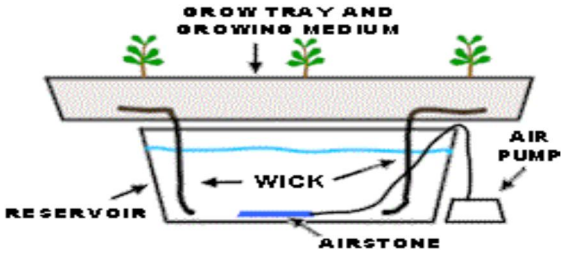


Figure: 2. Wick System

B. Water Culture System

The Water Culture System is an easiest of all active hydroponic systems. The plan that grasp the plants is usually made up of Styrofoam also it floats directly to the nutrient solution. The air pump furnishes air to the air stone that bubbles the nutrient solution and also provides oxygen to the roots of the plants. It is technically simple, they are still very efficient for growing plants hydroponically. Not only lot of home hydroponic planters really like using water culture systems

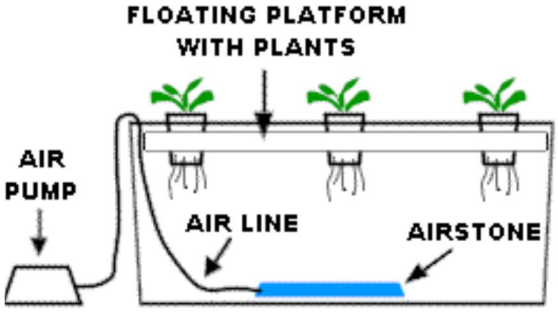


Figure: 3.Water culture system

VI. ADVANTAGES

A. It can grow anywhere.
B. Uses 20 times less water than the soil based gardening.
C. Its environment is sterile, which means no pesticides.
D. It will use 20% less space for growing.
E. The system water can be re-used, allowing you to conserve water.
F. It can have complete control over nutrient balance by using Dyna-Gro Nutrition Solutions.
G. No soil setup and testing hassles.
H. It can grow year if indoors.

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VII. DISADVANTAGES

A. Putting together a hydroponic system isn't cheap.
B. Growing a hydroponic garden demands technical expertise.
C. Production is limited compared to field conditions.

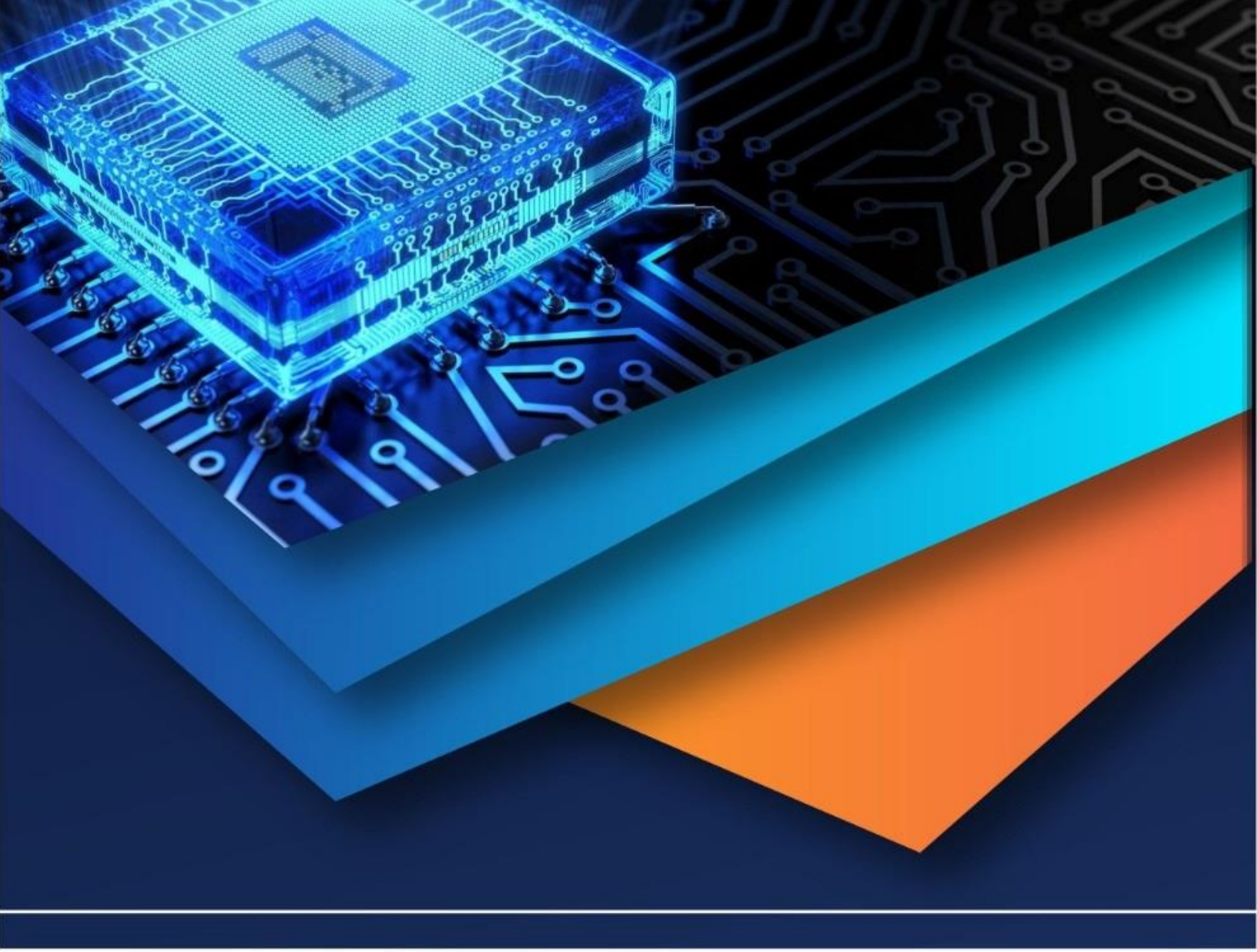
VIII. CONCLUSION

Cultivation of plats without soil was grown and monitored continuously. Ph level, water, temperature etc are monitored and controlled by using IOT module. Technical persons are required to monitor.

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