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Hydroponic Farming Model Using Arduino

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ABSTRACT:

This paper demonstrates hydroponic drip irrigation system with integrated multiple sensors like temperature & moisture sensors. This project is best suited for indoor drip irrigation technique. Arduino technology is used here. The design is created can monitor important parameters in the hydroponic cultivation system such as Room temperature & humidity. The prototype is designed using Arduino that connects directly with sensors. This therefore is easily to monitor, manage data, and setting online. The evaluated results show that the system can decide the results from multi-sensor grouping as the setting correctly.

Keywords: Hydroponic, soil-less farming, nutrient rich water, perlite, Rockwool, clay pellets. Hydroponic Cultivation

Introduction:

To describe the base term of hydroponics, hydroponics is the practice of growing plants using only water, nutrients, and a growing medium. The word hydroponics comes from the roots “hydro”, meaning water, and “ponos”, meaning labor, this method of gardening which does not use soil. Hydroponics is the practice of growing plants using only water, nutrients, and a growing medium. The needs of supply chain of food grains and other farming products as an average with populations of all consumers could be compensated by hydroponics- growing agriculture output.

Various methods in hydroponics are

1. Aeroponics
2. Drip System
3. N.F.T-Nutrient Film technique
4. Ebb Flow
5. Water Culture
6. Wick Culture

Literature Survey:

Optimization and Control of Hydroponics Indoor Farming System with Live Data Monitoring [1] :In this paper they have used ebb and flow technique of hydroponics. Ebb & Flow technique is also called as Flood & Drain method in which nutrients containing solution is flodded to the plants and later drained once the plants are immersed completely.This system is low cost and ebb & flow is abundant in nutrients for the plants but Removal of harvested plants and damaged plants can be somewhat problematic

A Hydroponic System For Indoor Plant Growth [2] :Continuous flow solution culture method is used which contains a solution that is constantly passing through the roots. These roots are not submerged in water. So,We can save a lot of time and there are low risks of faults to occur. But,if the flow of nutrient solution stops, the roots will dry out and become stressed quickly and Pump failure can cause the death of crops in a few hours, particularly in hot weather.

Automatic *Control Of Hydroponic Cultivation Using IoT[3]:*Wi-Fi based IOT technology is used with multiple sensors like LDR, Temperature, pH and air flow sensors. IoT systems have proven to be efficient and more productive but the drawback is Internet connectivity issues might occur and it is not cost efficient.

Indoor Garden Development using Hydroponic Agricultural Farming and Automation[4]:PIC 16F877A microcontroller is used which is designed using RISC(reduced instruction set computer) architecture which is easy to program. Due to the architecture having a set of instructions, this allows high level language compilers to produce more efficient code. This RISC architecture allows simplicity, which therefore means that it allows developers the freedom to utilise the space on the microprocessor. Since warm white light is used as artificial sunlight which may not be helpful if the LDR gets damaged**.**

IoT Based Hydroponics Approach for Soil-less Farming [5]:Drip and NFT(Nutrient Film Technique) are the methods used to grow the plants where drip system uses a pump to feed the plants with nutrients and water regularly and NFT system is a technique where a shallow stream of water

containing all dissolved nutrients is circulated across the channels.Drip hydroponics is a very flexible system and installation is very cheap and in NFT hydroponics, it is easy to inspect roots for a sign of disease but the drawback is clogging might happen in the drip hydroponic system and in NFT method a failed pump can ruin the entire system**.**

An IoT Driven Approach for Hydroponic Farming [6]:Drones can be used for monitoring the plants and the different layers of IoT have been mentioned. The 5 layers in IoT are Perception, Transport, Processing, Application and Business layer.Hydroponics allow plants to grow up to 50 percent faster than in the field by offering consistent, readily available nutrients. Fresh produce can also be harvested during the year from a hydroponic system. Hydroponic gardening is great for the environment and• for the cultivated product; in comparison to traditional soil gardening it almost removes the need for herbicides and pesticides. We cannot rely on this as only an approach is only made but no working procedures have implemented.

Iot Based Hydroponic System [7]: Usage of ESP8266 is done for the wireless communication of the sensors. Usage of NFT hydroponics is done.In NFT identifying a problem in a plant is easier with the help of IoT but the usage of many sensors make this system unreliable.

Iot Based Smart Hydroponics [8]:This method uses a lumen sensor which is a computerized Ambient Light Sensor IC for I2C transport interface. Luminance is an estimation how much measure of glowing transition is spread over a given region. One can consider radiant motion as a proportion of the absolute "sum" of obvious light present, and the luminance as a proportion of the power of enlightenment on a surface. This system can be applied for vegetation and also in buildings too but the system is cost inefficient.

Development of Automated Hydroponic System for Smart Agriculture [9]:This system uses foggers.Fogging is a technique used for killing insects that involves using a fine pesticide spray (aerosol) which is directed by a blower. In some cases, a hot vapour may be used to carry the spray and keep it airborne for longer. Fast-acting pesticides like pyrethroids are typically used.Pest control is done easily through this model but the usage of 2 water tanks make it an unreliable system.

A Survey On Iot Based Hydroponic System [10]:This system uses the NFT(Nutrient Film Technique) and Deep Flow technique for growing the plants controlled by IoT.In the deep flow technique, plants are always submerged in a solution so no plant will loose nutrients at any given point of time. The drawback is just a survey is done but no implementations have been mentioned

PROPOSED METHOD & CONCLUSION:

The A rectangular pot is taken and we grow a suitable number of plants by keeping the temperature sensor at one end and the moisture sensor at the other end.
Once the temperature goes down below the threshold value, we try to increase it by the help of an incandescent bulb and if the temperature exceeds the threshold value we reduce it by turning on the fans to the temperature sensor.
Coming to the moisture conditions, we increase the moisture content with the help of a water pump that is controlled by the relay and in order to reduce it we can use fans at the moisture sensor.
The drip hydroponic system uses a pump to feed your plants with nutrients and water regularly. Instead of spraying or running water to the plants, the emitters secrete the liquid in a slow dripping action. This ensures that the system uses very less water.
We have a high level of control over the amount of water and nutrients supplied to the plants. The system uses a network of feeder lines to deliver the water to the plants.This kind of setup is best suited for large growing operations. This is the reason for commercial operations preferring drip hydroponics over other systems.

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List all the material used from various sources for making this project proposal

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