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Hydroponics Using IOT

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ABSTRACT:

Hydroponic is modern-day agriculture. It does not require soil to grow plants in this system. It is a good alternative for producing healthy crops and vegetables, free from soil. Hydroponic system works well for different varieties of crops. Hydroponic system does not use soil but it uses the nutrients present in the soil and an inert growing medium to grow plants roots so they have easier access to the food and water. The nutrients are dissolved in water, it goes directly to the roots and we can grow as many plants we want with the help of hydroponic system. The effect of global warming makes it more difficult for planning in uncontrolled environment.

INTRODUCTION

The technique of growing plants without soil is Hydroponics. The mineral nutrient solution in a water solvent is used in this approach. Arduino boards are being used to control intensity of LED light, water flow, air pump, pH, and exhaust FAN in the implementation of hydroponic system. Carbon dioxide, temperature, humidity, root-zone temperature, water temperature, water flow, water level, exhaust fan and LED light can be monitored and controlled in this system. System reads temperature data , sensor data, and it sends commands to the device. In this system the pH sensor gives the pH value if the pH value is in between the 5.5 to 6.5 then it is idle. If the pH value in water solvent is greater than 6.5, the system sends commands to pump to drop the pH down solution to reduce the pH value in water solution so the pH value should be within the range of suitable pH value for plants.

PURPOSE

Hydroponic system is very flexible that can be grown anywhere. We don't need to fertile ground water can be reused so, hydroponic systems require 20 times less water than soil based gardening. And it reduces nutrient leaching into the environment and it saves money. No pesticides will attack the plants, if we provide sterile environment to the plant.

Hydroponic system needs less space .and we can have a complete control over nutrient balance and it does not require any labors hard tasks such as tilling, cultivating, fumigation and mulching are not required for hydroponic growing and we won't have season problem like we can grow in any season so crops can grow faster in hydro culture than in a soil based farming.

SCOPE

Hydroponic system is required to grow quality, higher productivity of crops which are exotic in any areas where soil has issues to grow certain types of crops. In India most as most of the vegetables supplies available are with residual chemicals which are harmful to our health. So, hydroponics has a good scope. The cost of produce coming out of hydroponics system is much higher than the cost of one coming out of traditional units. Hydroponic produce is limited to Metro's and few cities for now in the market. The constant innovation and adoption of newer techniques of growing the cost differential is reducing.

OBJECTIVES

- Vegetables and fruits are cultivated with the help of hydroponic technique.
- The designing and developing of an algorithm is done to mix proper nutrients with water for hydroponics system.
- The IoT (Internet Of Things) architecture is designed with suitable sensors for automated watering and monitoring of crops for proper growth of plants.

- The ideal nutritional environment is supplied for optimum plant performance.
- The potential productivity, efficiency and associated costs are being demonstrated in this system.
- In this system optimized components into an existing system are integrated.

METHODOLOGY

Hydroponics system is followed by the following methods:

- The right environment is selected: The best humidity for a garden should be around 40-60%. Some plants may want more while some requires less.
- Filtered water is used: The PPM (Parts Per Million) of the water is reduced by using RO (Reverse Osmosis). PH should be measured so that it is around 5.5-6.5.
- Hydroponic method is chosen: Plants are grown by using different methods of hydroponics such as Drip garden, Aeroponic, NFT (Nutrient Film Technique) and organics. So, organics is popular method which begins with the size of container, organics, fertilizer and water.
- Install lighting: Hydroponics garden has the most common type of lighting which is HID (High Density Discharge). There are some other types of lighting such as MH (Metal Halides) hold good for blue and green spectrum whereas for orange and red spectrum lamps hold good for HID.
- Testing equipment: There are different varieties of testing which are tested to check pH, to EC, PPM, temperature, CO2, light levels and humidity.

LITERATURE SURVEY

In today's agriculture system, Hydroponics brings up an approach for technical practices into the agricultural field. Traditional methods are followed in existing systems which are away from the evolving technology. Agricultural practices such as temperature sensing, humidity levels, nutrition inputs are all manually done traditionally. Hence, farming using solid medium is tedious. The growth of plant factors like nutrition, water, mineral levels of plants resulted in larger involvement of manpower to conduct the process. It is time consuming task and also consumes more resources.

Hydroponic system includes advanced concepts of IoT which is implemented in agriculture process. Hydroponics process of farming is completely automated with use of sensors for monitoring the plants for their healthy growth. It mainly involves temperature sensing to monitor the heat that plants require for their healthy growth. Humidity sensor is used to monitor the moisture present in it. LED spectrum is used to emit light on plants to replace the sun. Nutrition content is supplied to plants through liquid with the help of pH value detection sensor. Peristaltic pump is used to mix the nutrition solution into water to maintain acidity (5.5-6.5 pH) of the solution. Hence, the entire process is automated and does not involve any manual inputs for its functioning. So, Hydroponics has a very greater impact in obtaining better crop yields.

CONCLUSION

Hydroponic system has brought a change in growing plants which monitors climatic conditions frequently and also supplying adequate resources to the plants to grow properly and in a proper environment. This system has automated the process which monitors the climatic conditions and the supply of resources like water, nutrients and light to plants is controlled remotely. The use of constant feeding of nutrients and water to the hydroponic plants has grown much taller and produced more leaves quicker than the plants growing in normal soil.

The plants are grown in appropriate condition so that the supply of resources can be at an optimized level. The process of watering plants is automated in such a way that for defined time period the plants are supplied with water at regular intervals , the time interval are decided based on the results provided by water level sensor. Thus, the system is intended to create the controlled environment of the growth of plants.

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