**BE Fourth Year Computer Engineering**

**PROJECT SYNOPSIS**

**ON**

IoT Based Hydroponic System

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## DEPARTMENT OF COMPUTER ENGINEERING

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**Abstract :**

The trend towards tunnel farming and hydroponic systems is increasing owing to the climatic changes as well as the need to increase crop yield. Hydroponic is a technique of growing plants without soil. Hydroponic system requires controlled environmental parameters like temperature, humidity and soil moisture for better production of crops. Hydroponic System presents an effective method or scheme that monitor and controls environmental parameters using sensors and controller. Hydroponic Agriculture provides better environmental control over traditional manual monitoring and controlling, thus yield high-quality crops. Sensor based monitoring and control system regulates the temperature and humidity of the tunnel to yield better. For the sake of saving water, an efficient method of drip irrigation is implemented which delivers water directly to the plants rather than being sprayed on as in conventional farming method. The proposed system here is based on controlled environment and observations recorded for crop analysis purpose. This makes an effective solution to growing highly efficient, good quality and disease free crop production.

**Introduction :**

General Conventional agricultural practices can cause a wide range of negative impacts on the environment. “Conventional agriculture” has been historically defined as the practice of growing crops in soil with proper irrigation technique is used. Some of the negative impacts of conventional agriculture include the high and inefficient use of water, large land requirements, high concentrations of nutrients and pesticides in runoff and soil degradation accompanied by erosion. However, approximately 38.6% of the ice-free land and 70% of withdrawn freshwater is already devoted to agriculture. Conventional agricultural systems use large quantity of irrigation fresh water and fertilizers with relatively marginal returns. Soil-based agriculture is facing some major challenges with the advent of civilization all over the world such as decrease per capita land availability due to rapid urbanization and industrialization. The uncertainties in rainfall pattern have led to challenges in the conventional irrigation techniques. In order to meet food demand and cater the needs of sufficient water for irrigation, new technologies are to be adopted. Many alternative methods are available nowadays which would make it easier for society to grow crops either for personal needs or for economic purposes. Hydroponics, aeroponics and aquaponics are modern agriculture systems that utilize nutrient-rich water rather than soil for plant nourishment. Because it does not require fertile land in order to be effective, those new modern agriculture systems require less water and space compared with the conventional agricultural systems, one more advantage of those technologies is the ability to practice the vertical farming production which increase the yield of the area unit. The benefits of the new modern agriculture systems are numerous. In addition to higher yields and water efficiency, when practiced in a controlled environment, those new modern systems can be designed to support continuous production throughout the year.

**Related work:**

Although the IoT technology is still immature in the agriculture field, there are several studies conducted in the application of IoT in the agriculture field. Karim et. al. proposes a prototype of precision agriculture using a wireless sensor network, using ubidots [18] as the IoT cloud platform. Popovic et. al. [19] proposed an architecture of IoT platform for agriculture and ecological monitoring and has been tested to use with a heterogeneous type of hardware (Arduino, Raspberry Pi, PC) as the IoT nodes. There is a fewer paper published in the hydroponic-specific field. Wu, et. al. use various sensors and actuators along with IoT in their Intelligent Plant Care Hydroponic Box (IPCH-Box). Triawan et. al. use publish-subscribe method as their middleware architecture in their Nutrient Film Technique (NFT) hydroponic IoT system. They use MQTT as the protocol of communication between the nodes, middleware, and application. They also use the information from the sensors to control electrical conductivity and pH in their hydroponic system using fuzzy logic as the method. Several studies on challenges on the application of IoT in smart farming has been published. One biggest challenge is to find a suitable architecture of the IoT, especially the middleware technologies. The heterogeneous and the quantity of data collected by the sensors become another challenge, as the collected data will become a big data. Wolfert et. al. conducted a review on this challenge, providing an overview of the challenges and the key issues in this matter. Finding a suitable database for IoT data storage can also be tricky, as stated by Ahn Mai et. al. in their study of database comparison for IoT data storage. Another challenge is how to get the benefit of these big data, the challenges can be in form analytics method, or how to reduce the data dimensionality of the big data produced from smart farming.

**Project Objective :**

The main objective of this project work is to assess the performance of hydroponic irrigation system by supplying the ideal nutritional environment for optimum plant performance and telling advantages of it over Conventional Agricultural farming.

**If sponsored then name and address of sponsorer :**

**Name of SPOC:**

**Name of Organization:**

**Address of Organization:**

**Date: 05/10/2021**

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