**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 population growth, urbanization, indiscrimination due to use of the freshwater, climatic change and demand for nutritional food has led to the era of water scarcity problems worldwide. In agricultural activities, water plays a major role for plant growth. Due to shortage of water, the reuse of wastewater in irrigation is highly recommended as an alternative solution. The hydroponic technique is a soilless farming in which NFT is one of the method where the nutrient solution is circulated in the system continuously which is absorbed by plants roots directly. The kitchen wastewater have high rich nutrients like Nitrogen, Phosphorous, Potassium, Calcium, Magnesium, Sulphur, Iron and Chorine which are responsible for plant growth and photosynthesis process. Hence, in this research work the performance of Nutrient Film Technique (NFT) was studied by replacing nutrient solution with kitchen wastewater (organic nutrient solution) to grow plants in most economical manner. The wastewater after circulation in NFT gets purified which is reused by maintaining water level in supply tank and circulating in NFT achieving conservation of water. The amount of nutrient uptake from kitchen wastewater as a solvent by cherry tomato plant was checked by laboratory analysis for every 7 days. Research revealed that 98% germination was achieved in 22 days. The average stem height and thickness were 22.5cm and 0.5cm, respectively for crop duration of 56 days. The maximum percentage increase in pH and EC values are 13.79% and 19.23% respectively during growth period. The maximum percentage decrease of N, P and K values in wastewater was 87.46%, 91.63%, 34.76% respectively. The N: P: K values observed in plants were 2: 1: 0.02 respectively. From the above observation, it can be concluded that the performance of NFT was good and economical achieving 77% harvest with high percentage of nutrient absorption from kitchen wastewater. 23% plants got aborted due to injury in plant root and breakage of pump. The DO values were increasing after irrigation representing purification of water and good rate of photosynthesis.

**Introduction :**

1.1 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 lead 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:**

2.1 Type of Hydroponics Mamta D Sardare et al., (2013), has conducted a research on “A Review on Plant without Soil – Hydroponics”. In 1960 with 3 billion population over the World, per capita land was 0.5 ha but presently, with 6 billion people it is only 0.25 ha and by 2050, it will reach at 0.16 ha. Due to rapid urbanization and industrialization as well as melting of icebergs (as an obvious impact of global warming), arable land under cultivation is further going to decrease. Again, soil fertility status has attained a saturation level and productivity is not increasing further with increased level of fertilizer application. Besides, poor soil fertility in some of the cultivable areas, less chance of natural soil fertility build-up by microbes due to continuous cultivation, frequent drought conditions and unpredictability of climate and weather patterns, rise in temperature, river pollution, poor water management and wastage of huge amount of water, decline in ground water level, etc. are threatening food production under conventional soil-based agriculture. Under such circumstances, in near future it will become impossible to feed the entire population using open field system of agricultural production only. Naturally, soil-less culture is becoming more relevant in the present scenario, to cope-up with these challenges. The author concluded that country like India, where urban concrete conglomerate is growing each day; there is no option but adopting soil-less culture to help improve the yield and quality of the produce so that we can ensure food security of our country. However, Government intervention and Research Institute interest can propel the use of the present technology. 4 Hydroponics is a technology for growing plants in nutrient solutions with or without the use of artificial medium to provide mechanical support. Major problems for hydroponic cultivation are higher operational cost and the causing of pollution due to discharge of waste nutrient solution. The nutrient effluent released into the environment can have negative impacts on the surrounding ecosystems as well as the potential to contaminate the groundwater utilized by humans for drinking purposes. The reuse of non-recycled, nutrient-rich hydroponic waste solution (HWS) for growing plants in greenhouses is the possible way to control environmental pollution. Many researchers have successfully grown several plant species in hydroponic waste solution with high yield. Hence in the present paper “Reuse of hydroponic waste solution” by Ramasamy Rajesh Kumar et al., (2014), review addresses the problems associated with the release of hydroponic waste solution into the environment and possible reuse of hydroponic waste solution as an alternative. Recharge and reuse of HWS may be valuable as economic, control environmental pollution and could contribute to reduce the consumption of irrigation water. The driving force of future agricultural industry is to provide sufficient yield that satisfy the needs of consumers and meet their interests in terms of quality. Soilless cultivation is intensively used in protected agriculture to improve control over the growing environment and to avoid uncertainties in the water and nutrient status of the soil. Recently the type of soilless culture transformed from open to close-loop system is known for better result in water use efficiency, while maintaining the quality of the yield. In the present study “Soilless Culture System to Support Water Use Efficiency and Product Quality: a Review” by Agung Putra P et al., (2015), concluded that Soilless culture can be the effective tool to increase the crop yield and, if closed irrigation systems are adopted could increase the water-use efficiency, also reduce the environmental impact of greenhouses and nurseries. Author concerns in determining the soilless cultivation system is an understanding of its benefits, which is a flexible growing method that lets the grower have full control over the growing environment, including the active root zone. These systems, which can increase the efficiency of water-usage while maintaining its quality, should be more intensively implemented in any scale to support eco-agriculture.

**Project Objective :**

The main objective of this project work is to assess the performance of hydroponic irrigation system using and telling advantages of it over Agricultural farming.

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

**Name of SPOC:**

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**Date:**

**Guide Project Coordinator Head**

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