# SMART HYDROPONICS SYSTEM USING NFT TECHNIQUE

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**Abstract:***Currently traditional agriculture soil-based method is facing various factors such as urbanization,climate change,natural disaster,water scarcity, indiscriminate use of chemicals and pesticides which is depleting the land fertility.To overcome this and knowing the importance of agriculture in day to day life IoT is playing a vital role for improving yield and the production of the crops. The soil- less method of cultivating crops is being introduced and gaining popularity all over the world using Hydroponics technique. By using this technique, we can produce 5 times higher than the normal method of producing crops. Hydroponics helps in efficient resources management and quality of food; it requires low cost techniques which are easy to operate and maintain; requires less labour and lower overall setup.The NFT technique has been used throughout the world for successful production of leafy as well as other vegetables with 70 to 90% savings of water.*

**Keywords**: Hydroponics, Arduino,automated,Sensor, Mobileapp, web interface

## INTRODUCTION

Hydroponics is a subset of hydroculture in which plants can grow without the use of the soil. In this method the plants grow in a mineral nutrient solution in water with the correct proportion.Hydroponic gardening involves growing plants in a nutrient solution.The significance of hydroponics is providing a way for an average person to grow their own food without the need of soil, especially for those people who are living in flats and inner-cityareas. The advantage of hydroponics is that you can avoid many of the problems that affect soil grown plants such as cutworms and soil-borne diseases that ruin the crop. Hydroponic gardening involves growing plants in a nutrient solution rather than soil. Due to rapid urbanization and industrialization the cultivable land is decreasing, so the overall agriculture is reduced recently. Leading countries in hydroponic technology are Netherland, Australia, France, England, Canada and

USA. Plants commonly grown hydroponically on inert media include tomatoes, peppers, lettuce, cucumbers, and modern plants like Arabidopsis thaliana. Hydroponics offer many advantages, one of them is being a decrease in water usage for agriculture. We are facing water scarcity in day to day life. In the future due to water scarcity and harsh environments we will not have much accessible water to grow your own food. To grow 1 kilogram of tomatoes in conventional farming requires 400 litres of water, but in hydroponics

technique only 70 litres of water is needed. Conventional farming causes increased greenhouse gas emissions, soil erosion, water pollution and leads to some side effects in human health. Organic farming is based on growing and nurturing crops without the use of synthetic fertilizers and pesticides. Production costs are higher in these farming because farmers need more workers. As the fertilizers like nitrogen, and some usage of pesticides reduces the enhancement of soil fertility and requires more water. Hydroponic users found that yield increases many times greater when they switch from conventional methods. In hydroponic the plants dip their root directly into the nutrient solution, so they get what they need much more easily than plants growing in soil. With smaller roots more number of plants can grow in the same area and produce more yield when compared to the same amount of area in soil. Hydroponicplants grow three times faster than the normal plants. Soil contain many pests that may damage the plant which leads to less yield in production. By using automated system, we can monitor the plant with correct pH level and water level supply to the plant. The goal of this project is to design and construct a hydroponic system which is fully automatic that can be integrated into agriculture while developing business.

## METHODOLOGYUSED

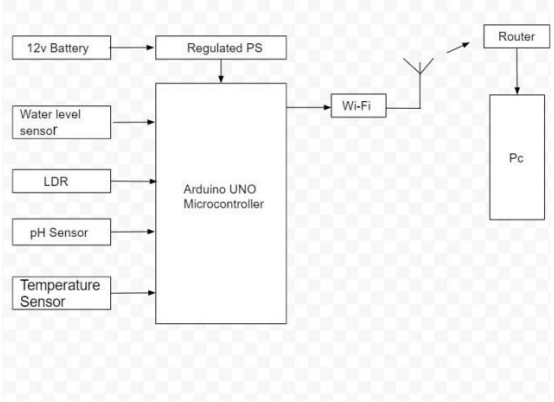



Fig.1 The General View of the hardware system

In this project, IOT based data collection scheme for agricultural usage are a new trend to increase agricultural production simply implemented by Arduino processors. Above the diagram contains a power supply unit, temperature sensor, pH sensor, water level sensor, LDR, Arduino, Wi-Fi esp8266, router and personal computer. The sensors collect information about the hydroponic system and give it to the Arduino controller. Arduino controller sends data to the router via Wi-Fi. The router sends data to pc.

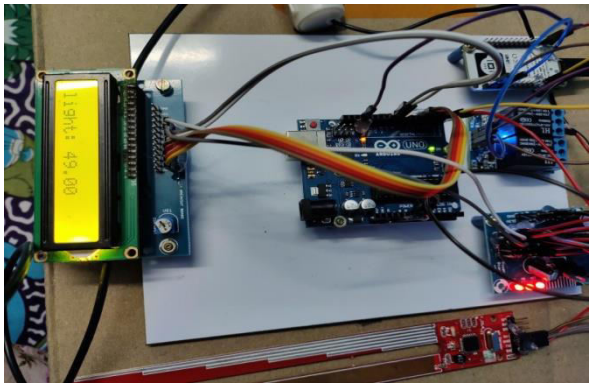
## PROPOSED SYSTEM

Hydroponics is seen as a promising strategy for growing short duration crops such as vegetables all year round with less labour. The hydroponic system may initially be established with small setup. They can be grown in the area where space is available according to our convenience. Nutrient Film technique is most commonly used by the many new beginners, as the plant is directly placed inside the nutrient solution and the solution is set to flow continuously during the day time and some particular limit interval is set to flow during the night time. The interval is based on what type of plant is grown.

Asa greater number of plants are planted in small area, so the yield produced by this technique is higher than the normal conventional agriculture. NFT uses less amount of water compared to soil grown plants. In NFT the hydroponic solution is continuously made to flow, as the solution circulates fully to the entire system plant gets the enough nutrients what they want. The NFT has advantages like, the nutrients will not get clogged in one place whereas in other method the plant may undergo root rot. Nutrient Film Technique helps in more yield in the production as the plant takes less time to grow.Here the hydroponic plant is developed with NFT technique and are implemented with the help of automated integration system. To monitor the plant many sensors are fixed to maintain the growth of the plant.

**IMPLEMENTATIONANDTESTING**

Initially we setup the hydroponic system with Arduino uno, relay, Node MCU, LCD display and with sensors. The node MCU is connected to the relay and water pump. The node MCU is given power supply using USB that keeps the water pump to circulates the water to the entire system.The sensor which is connected to the Arduino and power supply sense and measures the values of pH, Light, Temperature and water.



The values which are collected from sensors are in serial which is then separated and stored in the fire-base. Using fire-base we create a mobile application and the values from the fire-base are sent to the mobile application which is created.

Fig.2 Arduino kit

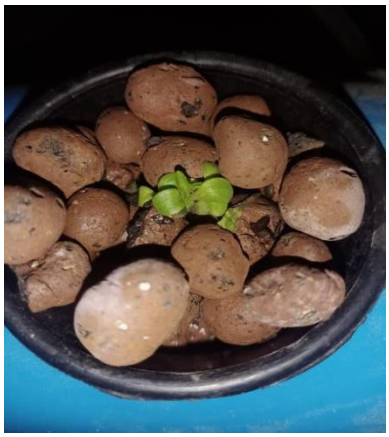


Fig.3 Hydroponic plant

In figure 3 By using the nutrient solution the grand rapid lettuce plant has been grown hydroponically.

Fig.4 plant setup

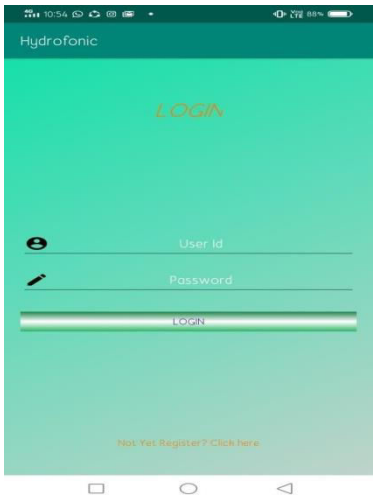



Fig.5 Mobile app

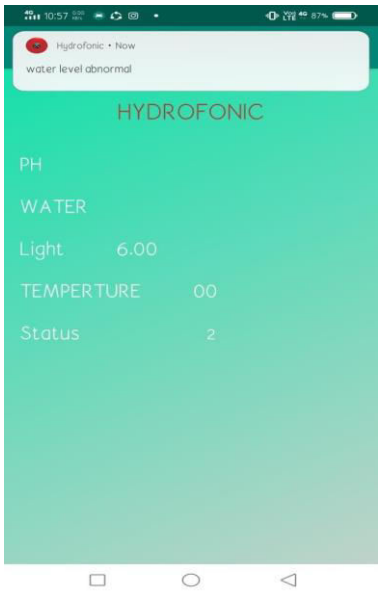



Fig.6 Values in mobile app

**CONCLUSION:**

The proposed hydroponic system has different types of sensors which control the device and produce higher yield of crops. The shortcomings of the existing system like manually providing nutrient solution have been overcome by automating it. A methodological approach has been used to regulate the system. This paper also helps the farmers who are new to hydroponic farming to manage the plant and make it easy for them to learn and how to do hydroponic farming. The plants grown here are analysed and has been found that they grow a lot quicker compared to traditional farming and the yield is also three times higher than traditional farming. The plants are also exposed directly to the nutrients which in-turn increases the yield of the crop and soil-borne diseases are prevented. Hence this model is considered to be eco-friendly and efficient in comparison with other techniques.

There-fore this model encourages the growth of plants hydroponically.

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