

IOT BASED ENABLED SMART FARMING APPLICATION

ABSTRACT

Aeroponics is the modern agricultural conception in which the plants are grown without soil using a nutrient solution sprayed in the roots and is more efficient than traditional farming. This aeroponic farming is superior in terms of excellent aeration, water use efficiency, less time and space requirement, seasonal independence, disease free plant propagation, and large scale plant production than the conventional methods of propagation. It is the low-cost Arduino-based system with an Internet of Things (IOT) tool for remote monitoring variables by connecting to a web server.

- It is the promising soilless farming method for solving future food crisis and is relatively a new way of growing plants that is getting increasingly popular with many people because of the speed, cost and novelty.
- This farming system empowered the producer to precisely control root nutrients, water regimens, and environment condition and have complete access to the roots throughout the life of the crop.
- Aeroponic techniques have proven to be commercially successful for propagation, seed germination, seed potato producers, tomato production, leaf crops and micro-germs, commercially cultivated in aeroponic system.
- It is appeared to be highly feasible method for the production of both aerial parts and roots and it is a form of hydroponic technique and a type of vertical farming.

INTRODUCTION

This project introduces the concept of Internet of Things (IOT) and discusses the role of image processing in agricultural disease detection and automatic fertilizer control of plant. The sensors integrated helps in detecting the water level in aeroponics. These factors help in identifying the leaf conditions where the plant grows and the disease that can be attacked for the plant. In this work we develop a user-friendly IOT and image processing to provide on-field disease detection and spraying of recommended pesticides. With the current global and local economic crisis the word diversification is in everyone's mind and even though we are

aware of the important role the agriculture sector played in our economy in the past, it has been difficult to really get the sector to grow as fast as the economy requires. Fortunately on a scientific basis the sector is just beginning to be explored with methods and possibilities. One of the most recent discoveries is Aeroponics a technology that proves plants do not require soil to grow, not only that but that soil may even inhibit swift and healthy growth of plants. Aeroponics is the growing of plants in air or misty conditions without using soil or any other medium. This is similar to hydroponics (growing of plants in water) just that air substitutes water in this cultivation.

OBJECTIVES

The Objective of this project is to design and implementation of IOT based leaf disease detection and fertilizer system for aeroponics. Agriculture is the important source of every country. The production of agriculture will play an important role in the development of the country. The farmers face lot of problems in the crops due to diseases. Major problem in the agriculture include Water problem, Climate change, Pests and Diseases in the agriculture. In this work we develop an IOT based userfriendly system to detect leaf diseases and to spray recommended fertilizers

- i. Make farming easier to manage.
- ii. Eliminate waste of vegetables during harvest caused by pathogens (algae and mold).
- iii. Increase speed of plant growth which increases frequency of harvest as well as profit (growth increases between 45% and 70% in certain cases).
- iv. Increased profit allows for re investment and expansion.
Substantial expansion creates more jobs and raises the Nigerian standard of living.
- v. Aeroponics reduces cost of maintenance requirements such as fertilizer, chemical, insect fumigation, soil, staff and more.
- vi. Aeroponics drastically reduces the amount of water required due to recycle water structure put in place.
- vii. Aeroponics can be applied on a small, medium and industrial large scale.

NOVELTY/INNOVATION

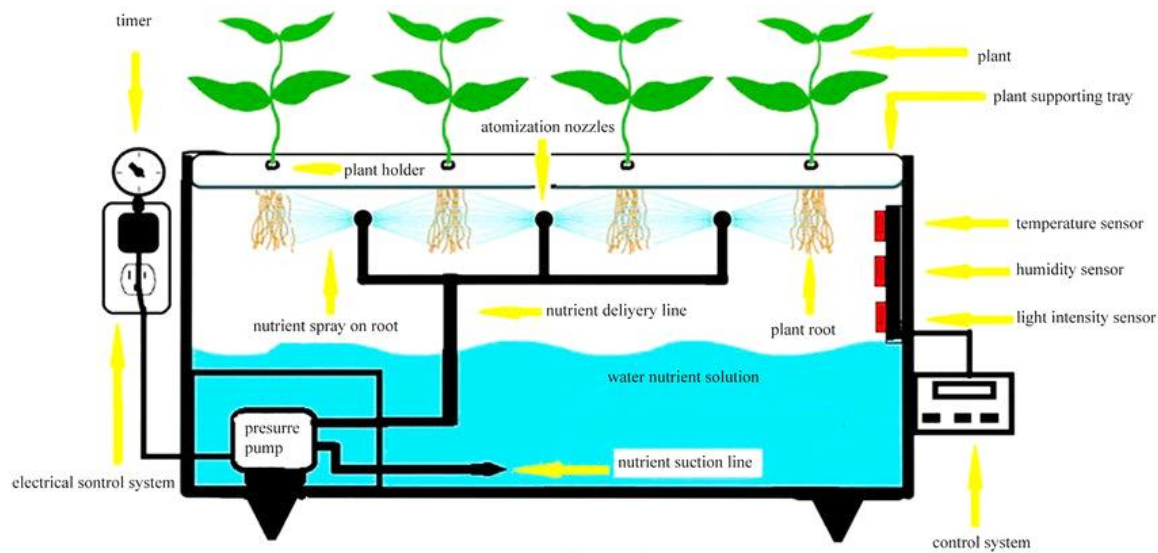
- Arduino Uno
- LCD Display

- Level sensor
- RTC
- PC
- Relay
- Pump
- IOT technology

METHODOLOGY

The proposed system with IOT based system using Image processing techniques. First the images are acquired using python stored in the database. The image acquired from the camera image and from the database will be preprocessed. Crop disease detection is done by using image processing. The camera is placed near crop so that image of leaf is taken by the camera. Captured image is send to the arduino controller and using image processing techniques leaf diseases is detected. Status of a leaf is send back to the farmer on the server and mobile phone on the app. Leaf disease is compare with preprocessed images and type of disease and the fertilizer and the recommended will be displayed on the user interface. Microcontroller which controls hardware, which supplies power for microcontroller and other parts, Sensors, Relay isconnected to a pump which is used for sprinkling of water and pesticides. Once the diseases is detected by the software, it will suggest the fertilizers and it will send results to LCD display and the pump will sprinkle the fertilizer on the disease leaf.

Growing in the air nutrient is supplied adequately, no pathogens, every plant as equal access to nutrient, not affected by weather, no need for pesticides, access to enough oxygen and no need to compete with fellow plants for food neither is there a need to ward off competition from weeds nor heal from injuries resulting from weeding.



ARDUINO UNO-MICROCONTROLLER

The Arduino Uno is one of the most popular microcontrollers in the industry. It is user convenient and easier to handle. The coding or programming of this controller is also easy. The program is deemed volatile due to the flash memory technology. The microcontroller has a wide range of applications used in many huge industries. It is used in security, remote sensors, home appliances and industrial automation. The device has capabilities to be connected to the Internet and act as a server too, this way the handling of information and data.

Aeroponics technique has the following **crucial** benefits:

- Faster and healthier growth since it has enough oxygen (in the root region)
- This will increase the cycle period with about 45 - 70%
- Automated system, no dirt produced, no herbicide or pesticide needed
- There is also scientific proof of increase flavonoids in vegetable.

CONCLUSION

Aeroponics growing allows plants and crops to grow without the use of pesticide and thus it will be disease free. The crops will grow in a natural healthy manner as the aeroponic system is very similar to natural environmental conditions. Aeroponics is conducted in air combined with micro-droplets of water, almost any plant can grow to maturity in air with a plentiful supply of carbon dioxide, water and nutrients. Aeroponics helps conserve water, land and nutrients, so the aeroponic system is the way of the future, making cultivation of crops

easier. Aeroponics appeared to be highly feasible method for the production of both aerial parts and roots as raw materials for the herbal dietary supplement and phyto pharmaceutical industries.

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