

A Novel Approach for Automating & Analysing Hydroponic farms Using Internet of Things

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ABSTRACT

This paper presents intelligent plant care hydroponic box (IPCH-Box) that exercises environment driven control methods through an internet-of-things(IoT). The management tool called IoTtalk.IoT talk provides a scalable and configurable software for users to easily and quickly add/remove/exchange the sensors and actuators and program their interactions. From the experimental measurement results of IPCH-Box, the developed environment driven control methods include LED lightning, water spray and water pump which can effectively lower the co2 concentration, the temperature and increase water level, respectively. Specifically, the time of co2 concentration reduction in IPCH-Box is 38.54% faster than that with the plant system without our mechanism.

Keywords : Air Quality, Hydroponic, Intelligent Plant Care, LED lighting System, Sensor.

I. INTRODUCTION

The purpose of this project was to design, install, and maintain hydroponic containing different types of varieties. The development and learning of how to properly grow hydroponic greens is important for future project ventures. Once growing quality on a smaller scale is achieved expansion can be easier. Designing and testing smaller systems will also allow you to test different techniques and decide which works the best. There have been large shifts toward locally grown fresh and healthy produce. Hydroponic systems can accomplish this by allowing crop production in urban environments not available for conventional farming. Hydroponic grow located in urban environments can help with maximization of crops per acre. Instead of expanding horizontally increasing the acreage of a farm a hydroponic can expand upwards and maximize the use of urban land. Included in this project will be the steps taken to design, construct, and grow varieties in the

hydroponic, the challenges I faced during the grow cycle, results, cost analysis, and recommendations for future designs and growth cycles.

II. LITERATURE SURVEY

Optimization and Control of Hydroponics Agriculture using IOT

In a developing country like India, where agriculture is the backbone of the country, agriculture is plagued by several problems like small and fragmented land holdings, manures, pesticides, chemicals used for agriculture etc. consumers also increasingly demand for the healthy diet that is rich in quality and free of agricultural chemicals and pesticides. Our project fills in the above said difficulties and demands using hydroponics we can go organic. Since it is done in the controlled environment, it can be done anywhere like room terrace, balcony etc. also large amount of plants can be planted in a less place. This type of agriculture could be high yielding if

monitored and controlled efficiently. We propose a project that controls the necessary conditions required for the plant to grow hydroponically and also cultivators may control the agriculture remotely using IoT.

Internet of Things for Planting in Smart Farm Hydroponics Style

Recently, the farmers gain more profits by producing the quality product. The effects of the global warming make more difficult planning in uncontrolled environment. On the other hand, the yield does not match customers' needs. For these reasons, planting in a greenhouse is easy to maintain and to control important factors such as light, temperature, and humidity. Using of sensors coming in a greenhouse as Wireless Sensor Networks System are one efficiency of technology used in agricultural development by sending data to the cloud and controlling values such as temperature, light, etc. The results of this study will be useful for the farmer and related organizations applying in the farm.

Environmental Smart Agriculture Monitoring System Using Internet Of Things

This paper braces the importance of the soilless agricultural technique, as expansion of the habitable zones has led to the depletion of agricultural lands and increased food demand. So, to withstand this situation, one of the prominent techniques applied is Hydroponics, where plants are grown using nutrient solutions in a water solvent. Further, integrating hydroponics with the IOT technology [1] escalated the yield profoundly by automating the collection of sporadic data of targeted factors for proper nurturing of crop. This paper proposed a monitoring unit for Controlled Environment Agriculture (CEA) that is designed using the state-of-art hardware specifications and multiple sensors. The proposed device can be readily used in practice in the Hydroponics environment and has great potential for other applications like green house agriculture, vertical farming etc. In addition, the device has been

specifically designed to analyse the environment and report to the farmer, round-the-clock, using the Wi-Fi connectivity integrated into it. Further, the readings from the device has been plotted for various regions of India over the four seasons and has been proven reliable for the conditions of Indian agriculture. Summing up the results, the system demonstrates ubiquitous as it can be monitored distantly, analysed and displayed as needed.

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III. PROPOSED SYSTEM

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Hydroponic systems can accomplish this by allowing crop production in urban environments not available for conventional farming. Hydroponic grow located in urban environments can help with maximization of crops per acre. Instead of expanding horizontally increasing the acreage of a farm a hydroponic can expand upwards and maximize the use of urban land. Included in this project will be the steps taken to design, construct, and grow varieties in the hydroponic, the challenges I faced during the grow cycle, results, cost analysis, and recommendations for future designs and growth cycles.

ARDUINOMICROCONTROLLER

Arduino is a single-board microcontroller meant to make the application more accessible which are interactive objects and its surroundings. The hardware features with an open-source hardware board designed around an 8-bit Atmel AVR microcontroller or a 32-bit Atmel ARM. Current models consists a USB interface, 6 analog input pins and 14 digital I/O pins that allows the user to attach various extension boards

BLOCK DIAGRAM

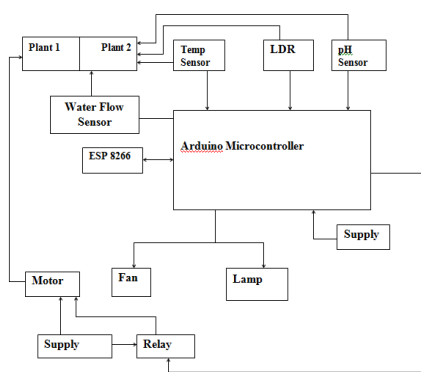


Figure1. Overall block diagram

FEATURES OF ARDUINOUNO BOARD

It is an easy USB interface. This allows interface with USB as this is like a serial device. The chip on the board plugs straight into your USB port and supports on your computer as a virtual serial port. The benefit of this setup is that serial communication is an extremely easy protocol which is time-tested and

USB makes connection with modern computers and makes it comfortable. It is easy-to-find the microcontroller brain which is the ATmega328 chip. It has more number of hardware features like timers, external and internal interrupts, PWM pins and multiple sleep modes.

ESP 8266

ESP8266 offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor. When ESP8266 hosts the application, and when it is the only application processor in the device.

PROTEUS 8

Proteus is a simulation and design software tool developed by Lab center Electronics for Electrical and Electronic circuit design. It also possess 2D CAD drawing feature. It deserves to bear the tagline “From concept to completion”.

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IV. RESULTS AND DISCUSSION

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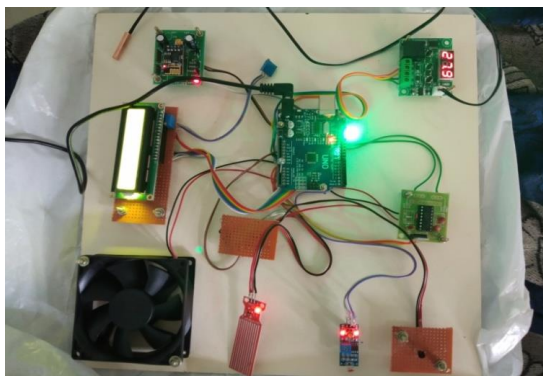


Figure 2.Snapshot of our designed module

And the plants grown in this farm are grown 90% faster than the normal farm, but the difficult process is balancing the pH value of the water. And non-seasonal plants can also be grown in this farm. Thus the hydroponic plants in this farm can be automated and monitored using IoT.

V. CONCLUSION

Today, hydroponics is an established branch of farming. Progress has been on a large scale and results obtained in various countries in the world have proved that this technology is thoroughly practical and has very definite advantages over conventional methods of crop production. The two main advantages of this type of system are soil-less cultivation and hydroponics can be used in places where gardening is not possible. Thus not only is it a profitable undertaking, but one which has proved of great benefit to humanity.

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