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Hydroponic cultivation using PH level controlling

Heenal Shah , Pratiksha Taware, Ashwini bhalerao
Project guide: Prof .Dr .Ms.A.J.Vyavahare

Department of electronics and telecommunication engineering.
PES Modern college of engineering ,shivanjinagar,Pune
Maharashtra ,India.

Abstract: -

This project is based on technique which grows plants without soil. In this method we see to it that plants get all the nutrients that are required for its growth from water itself. Nowadays different methods are used for hydrophonic cultivation. DWC(Deep water cultivation) is a technique which grows plants by providing water and other nutrients directly to the roots of the plants . The plants roots will always be submerged in water which ensures that they get proper water and nutrients from water. In this project the pH level of the water is adjusted by PIC 18 microcontroller such that it is suitable for the growth of plants. Moreover we are also focussing on other parameters like light and temperature . The pH level of the water is automatically adjusted using microcontroller.

Key words: hydroponic, pH level, PIC 18 microcontroller, deep water cultivation(DWC)

Introduction

Nowadays due to increase in population ,the demand for food has increased tremendously. Moreover the vegetation land area is also decreasing due to construction of new multiplexes and buildings which results in reduction in crop grown areas. The other problems that are faced by the conventional method is that it requires more manpower and continuous monitoring [3].

But as we know that every system is becoming automatic and smarter,hence we need to bring a revolution in the agricultural field also . Vegetable farming in top of building, inside areas and in poly-houses is an approach to address this concern[7]. In that circumstances Hydroponics is one of the best alternatives of conventional cultivation. Hydroponics is a method of growing crops and vegetables without soil with the help of nutrient solution[1]. It is the way to grow the fruits and vegetables for the year around in such places where the soil is not present or it is contaminated.

Conventional agriculture

In conventional agriculture method the farmer has to go to farm regularly to keep a check on the growth of plants. He has to consider all the parameters that are required for the growth of plants like temperature, light etc[4]. which means that if the temperature is not favourable or the climatic conditions are not favourable then the farmer will take the help of his men to do some changes in the farm areas. Similarly if there is not enough light for the crops then he has to manually provide some light so that the plants will grow without any difficulty.

Hydroponics cultivation

In this project, the pH level in water solution will be automatically maintained by microcontroller and measured by sensor[1] . Basically there will be 2 tanks; 1 contains normal water and the 2nd is the hydroponic tank, the pH value of the normal water will be measured using pH meter and the required pH of the plant will be entered through keypad. These 2 values will be compared by the microcontroller and accordingly it will be adjusted. Then this water will be transferred to the Hydroponic tank which consists of the plants, using DC motor. Thus the roots of the plants will use this water for their growth. The main advantage of this project is that the water can be recycled and can also be conserved. The controller will constantly report the pH value of the water. The user can set limits on the pH levels and it will also be displayed on the main screen if the pH level fluctuates outside of the predefined level.

Literature survey

When you are first introduced to hydroponics, you may assume that is a new concept. That assumption is incorrect. The First Hydroponic Gardens... 600 BC Plants have grown in our lakes and oceans from the beginning of time but, as a farming practice, many believe it started in the ancient city of Babylon[1]. The Hanging Gardens of Babylon are believed to be the first successful attempts to grow plants hydroponically.

Most commercial hydroponic growers combine hydroponic technology with a controlled environment to achieve the highest quality produce. In a traditional garden, plant roots are in the soil. They support the plant and search for food and water. In hydroponics, we often use a growing medium in place of soil. The roots of a hydroponic plant do not work as hard as those of a plant grown in soil because their needs are readily met by the nutrient [2].

Title Of Paper/Year Of Publication	**Remark**
Design and Implementation of Automatic **Hydroponics** System using ARM Processor	The designed prototype ensures of high rate of production. This system effectively makes the rural and urban household self sustained in vegetable consumption.
Advances in control of agriculture and environment	The fruits promised by this research include improved basic understanding of physiological processes and enhancements of our ability to apply this knowledge in efficient production control systems.

Proposed work:

Plants Name	**PH Level**
Tomato	Low(6-6.8)
Green chilly	Low(6)
Brinjal	Low(6.5-7)
Cabbage	Low(6-6.5)
Cucumber	Low(5.8-6)

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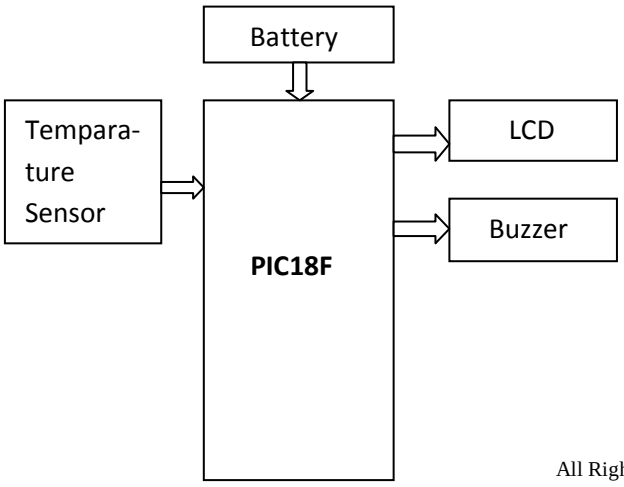
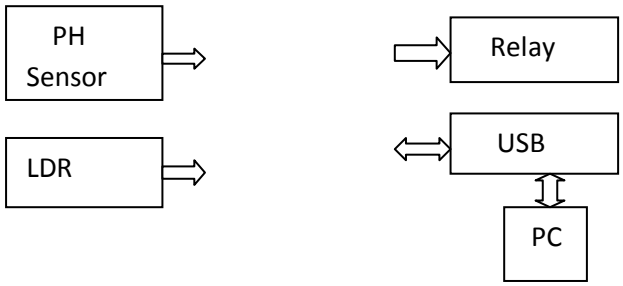
Software implementation:

Basically in our project we are using PIC 18 microcontroller .The pH Value that is measured by the sensor and the required value are compared together by the microcontroller and it automatically turns on relay and the solution to increase or decrease ph value is added to the water in which plants are kept. Also it data logs all the readings about the temperature as measured by the temperature sensor. We can also change the mode of operation between manual mode and automatic mode. If we change it to manual mode then all the task is done manually. And in automatic mode the software automatically does all the work.

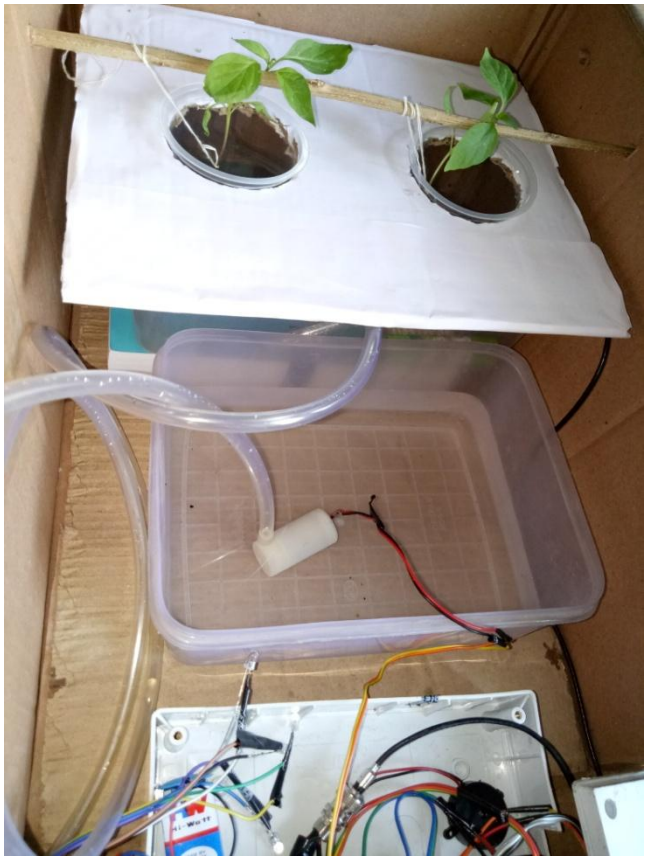
Hardware implementation:

block dagram:





conclusion:



The goal of our group is to compare the growth rate of plants in hydrophonics system to the growth rate of plants grown in soil. Our thinking is that plants grown in hydrophonics system, will grow and develop at a faster rate than they are grown in soil. When growing plants using the method of hydrophonics ,many parameters that are required for the plant growth should be considered and monitored. If the user is not careful and does not give proper attention to the plant, then the results would not be satisfactory.

The system will successfully drop the pH solution (Up/Down) into water solution in case to maintain the pH value . This system also successfully ensures the level of water solution would be transferred to the hydroponics container at a desired level. There are still many things that can be learned from this.

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