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Usns integrated hydroponic irrigation system and crops protection using image capturing technique

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ABSTRACT

Agriculture is the heart of India's monetary action and our experience amid the most recent 70 years has shown the solid connection between rural development and financial riches. The present agricultural framework is a blend of extraordinary accomplishments and missed open doors in India. In the event that India need to wind up plainly capable monetarily on the planet, our agrarian efficiency ought to be equivalent to those nations, which are right now appraised as financial energy of the world. We require another and rising innovation which can enhance persistently the efficiency, productivity, nature of our significant cultivating frameworks. One such innovation utilized as a part of India is the nursery innovation. In spite of the fact that it is hundreds of years old, it is new to India. This project discusses about the development of hardware system which can be used to detect the birds from the video processing chase away from the farm using an image based embedded technology by high frequency ultrasound is generated. To increase the productivity of Agri-food, hydroponics irrigation system is used.Communication through the underground soil network will be used for agriculture. The final goal is the integration of the developed sensors and circuits into a full control greenhouse system for a simple, easy to use and low cost soilless culture platform.

Keywords: Hydroponics,Atmega8 Microcontroller,MATLAB,HOG, Minimum Distance Classifier.

INTRODUCTION

Agriculture is a very important piece of life for the human species which is the fundamental necessary wellspring of sustenance grains what's more compare to other fundamental materials required for human being. It plays vital role in the development of nation's economy, modernization and improvement. It also acts as a very big option for business to the general population. Development in agriculture filed is fundamental for the improvement of financial state of the nation. Tragically, numerous farmers still utilize the conventional methods of cultivating which brings about low yielding of harvests, natural products and money too. Be that as it may, wherever automation had been actualized and human creatures had been supplanted via programmed apparatuses, the yield has been enhanced and less work needed. The greater part of the papers means the utilization of remote sensor organize which gathers the information from various sorts of sensors and after that send it to principle server utilizing remote convention for agriculture system. The collected information can be used to decide irrigation, harvesting parameters of that plant. Observing natural parameters are insufficient and finishes answer for enhance the yield of the harvests. Require automation to make strides the yield of the harvests. In this particular paper our system does automation of hydroponics farming for tomato plant completely. In which, Automation of water supply along with nutrient solution, maintenance of tomato farm temperature & solution temperature at

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required level, maintenance of nutrients pH level and EC (Electrical conductivity) at required level, automation providing sufficient light for proper tomato plant growth. Also it displays values of different parameters like pH, Temperature, EC etc. on display panel and related info will be send to owner mobile through GSM.

LITERATURE REVIEW

Hydroponics by department of agriculture Sri-Lanka proposes different methods of hydroponics farming for different plant in which they have mention different reliable operating conditions for tomato plant in hydroponics along with basic requirements of nutrient solution at different stages of growth. They have also proposes How time to time pH and EC monitoring of nutrient solution affect the growth of plant but that is to be done here in manual method. [1]

Hydroponic Lettuce Handbook by Dr. Melissa Brechner & Dr. A.J. Both propose hydroponic greenhouse production system was designed for small operations to provide local production of head lettuce as well as employment to the proprietors. Their research groups have experimented with many forms of hydroponics but have found this floating system to be the most robust and forgiving of the available systems. Their system is built around consistent production 365 days of the year. Their system quires a high degree of environmental control including supplemental lighting and moveable shade to provide a target amount of light which, in turn, results in a predictable amount of daily growth. [2]

Field Monitoring and Automation utilizing IOT in Agriculture Area proposes the upsides of having Information and Correspondence Technology (ICT) in Indian agrarian area, which demonstrates the way for provincial ranchers to supplant a portion of the ordinary systems. Observing modules are exhibited utilizing different sensors for which the data sources are nourished from Knowledge base. A model of the system is done utilizing TI CC3200 Launchpad interconnected sensors modules with other vital electron

ic devices. The framework conquers confinements of customary farming strategies by using water asset productively and furthermore diminishing work cost. [3]

In our paper how one can do automation of Tomato plant hydroponics farming is explain completely. In which, Automation of water supply, maintenance of farms temperature at required level, maintenance of nutrients pH level and EC (Electrical conductivity) of nutrient solution at required level, provide required light for farm along with displaying all required parameter value on display panel and related info will be send to owners mobile through sms.

HYDROPONICS

Why hydroponics?

Soil is generally the most accessible developing medium and plants ordinarily develop in it. It gives dock, supplements, air, water, and so forth for fruitful plant development. Change of a soil another developing medium has a tendency to be costly. Notwithstanding, soils do posture genuine constraints for plant development, at times. Nearness of sickness bringing on life forms and nematodes, inadmissible soil response, ominous soil compaction, poor seepage, debasement because of disintegration, and so forth are some of them. Further, ceaseless development of harvests has brought about poor soil fruitfulness, which thus has diminished the open doors for normal soil ripeness develops by organisms. This circumstance has prompted poor yield and quality.

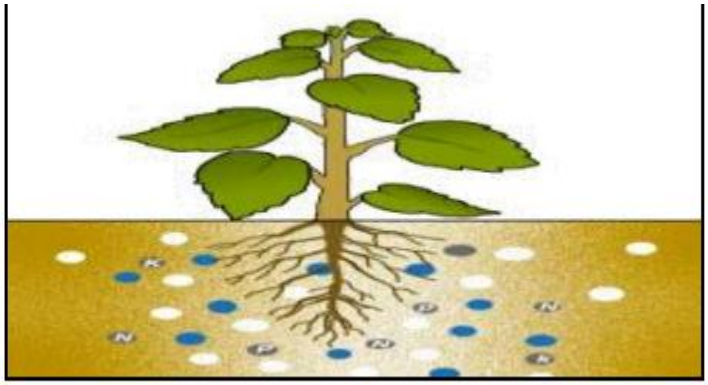


Fig.1. Soil based culture

Also, traditional yield developing in soil (Open Field Agriculture) is troublesome as it includes expansive space, parcel of work and extensive volume of water. Furthermore, in a few spots like metropolitan regions, soil is most certainly not accessible for yield developing. Another significant issue experienced since generally is the trouble to contract work for ordinary open field agriculture. Hydroponics or soil-less culture is an arrangement of developing plants which decreases a portion of the previously mentioned issues experienced in ordinary harvest development Hydroponics offers chances to give ideal conditions for plant development and along these lines; higher yields can be acquired contrasted with open field farming. Hydroponics or soil less culture offers methods for control over soil-borne maladies and nuisances, which is particularly alluring in the tropics where the life cycles of these living beings proceeds continuous thus does the danger of invasion. In this way the expensive and tedious undertakings of soil cleansing, soil improvement, and so on can be maintained a strategic distance from with hydroponics arrangement of development. It offers a perfect working condition and in this way enlisting work is simple.

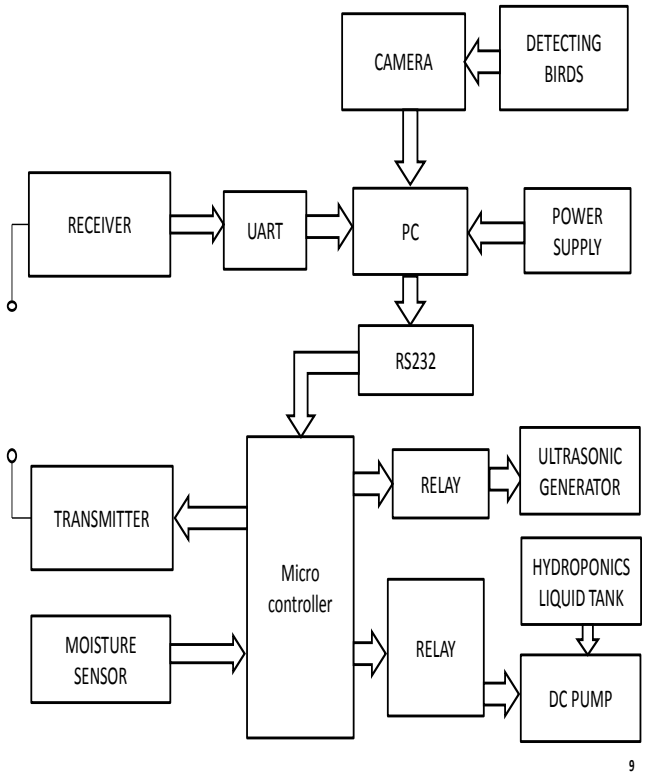
EXISTING METHOD

Hydroponics is part of the systems classified as soilless culture. In these systems, the medium contributes in a variable rate to the growing of the crops, which can be composed by substances of different origins and characteristics (i.e. organic, inorganic and inert) [1]. In general, hydroponics allows high quality crops with an efficient use of water and fertilizer [2]. Within hydroponics techniques, Nutrient Film Technique (NFT) allows high quality agricultural products in a shorter period of time as compared with other systems. The NFT is based in the continuous movement of a nutritious solution trough the roots of the plants [3]. This operation allows shorter culture period and reduction of hydric stress by continuously supplying mineral elements and water [4]

- ✓ In existing method implementing only wired system for agriculture.
- ✓ There is no system to protect crops from birds.
- ✓ It operates based on sensor only.
- ✓ Hydroponic technology is not used.

PROPOSED METHOD

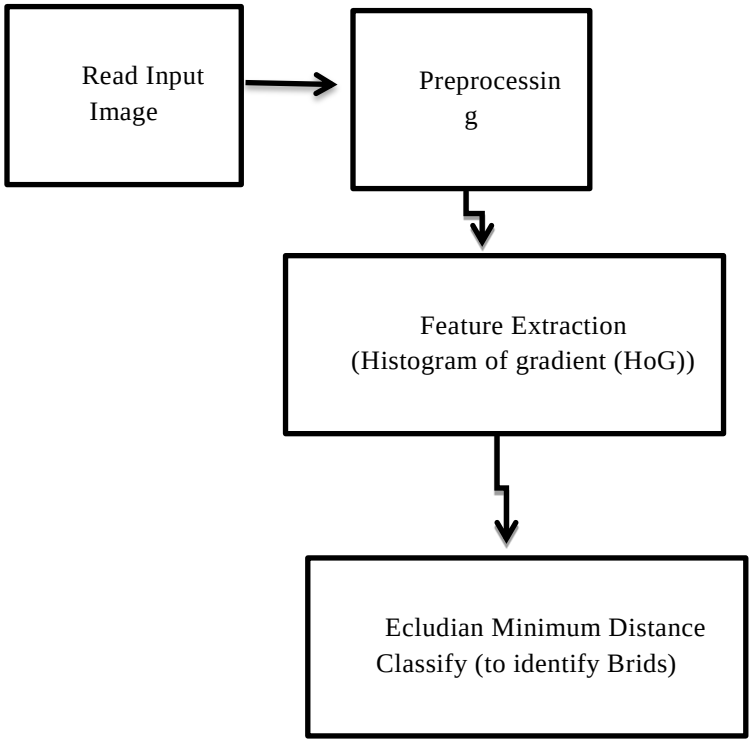
The proposed system has to a complete the bird frightening system by incorporating the video processing algorithm method that detects birds in large landscape images.Hydroponic irrigation systems in high-tech commercial greenhouses utilize drip irrigation with less expense of water.In order to monitor the soil condition without creating any disturbance for the above ground devices .WUSNs, which have components, i.e. the sensors, that are buried underground and that communicate through soil.



It consists of ATMEGA 8,, Temperature sensor, moisture , for nutrients, EC(Electrical conductivity) sensor for nutrients solution, LED strip, LCD display, Fan for cooling, Dc pump for water , ultrasonic generator for to avoid Brids.

SOFTWARE

This paper provides efficient and accurate plant disease detection and classification technique by using MATLAB image processing . The proposed methodology in this paper depends Ecludian Minimum Distance Classify techniques which are configured birds detection. The MATLAB software is ideal for digital image processing. HOG and Minimum distance classifier algorithm provides high accuracy and consumes very less time for entire processing. In future work, we will extend our database for more birds identification.



HARDWARE REQUIREMENTS

Atmega 8

Atmega 8 microcontroller used here which is nothing but the heart of system which collects sensor output data; process it and controlling functionality of system with 6 analog input pins and 14 digital input pins with TX, RX included.

Temperature sensor

To sense the temperature of water & farm temperature sensors are used. After sensing temperature data given to Arduino.LM35 used here as an Air temperature sensor and DS18B20 Water temperature sensor shown in Fig.8.b).

Water/Nutrient solution level sensor

Used to sense the level of water/nutrient solution inside PVC pipe and gives out respective data to Arduino. For sensing water level in PVC pipe which is to be maintain in such a way that roots of plant goes under water. Float sensor used which detect required level of water/nutrient solution.

LCD

To display pH level, Temperature of farm and water, EC level of nutrient solution LCD display is used.16x2 LCD display used here.

LED strip

When light inside farm goes below required level sense by LDR in that case LED strip turns on under control of Arduino.12V operated LED strip used.

Fan for cooling

When the temperature of Farm goes above required level sense by temperature sensor then Fan turns on for cooling under control of Arduino.12V DC fan used here.

Motor for Water and nutrients supply

When water/nutrient solution level in PVC pipe goes below required level and also when EC level of nutrient solution goes below or above required range then motor on to supply water and nutrients to plants under control of Arduino.12V DC operated pump used here for water and nutrients supply. 12V operated relay used here for isolation and switching.

Advantages

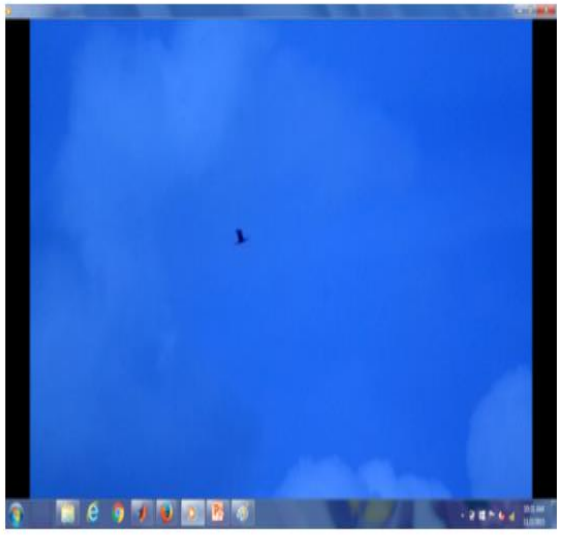
- Hydroponics saving serious money on labour, fertilizer & water expense.
- To protect the crops from birds at anytime.
- Avoidance of possible collisions of the sensors with landscaping equipment such as tractors.
- real-time protection of crops and information.

Hardware Requirements

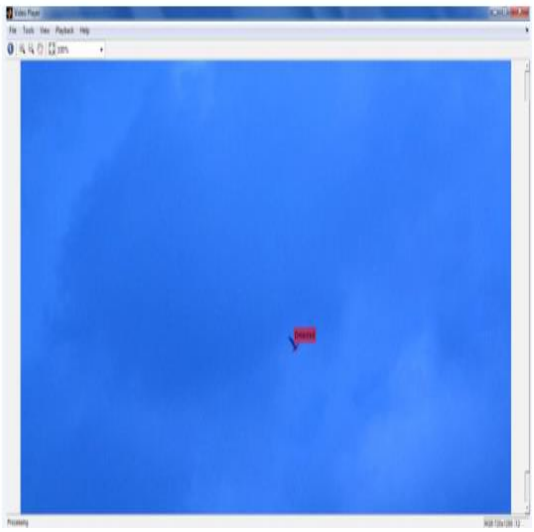
Processor	: Intel Pentium P4 or above
Clock speed	: 500 MHZ
System bus	: 32 bits
RAM	: 512MB of RAM
HDD	: 40 GB or higher
Monitor	: LCD Monitor
Keyboard	: 108 keys
Mouse	: 2 button mouse
Camera	:720 HD LogiTec

RESULT

Input Video



Segmented Birds



CONCLUSION

In this work, the recent advances in AGRICULTURE and related areas WUSNs, HYDROPONICS have been reviewed. The advances in the birds detection provide an important insight into the typical problems of agriculture protection system.More over this system protect evenly birds and crops. That can be done here using Arduino based automation of water and nutrient solution with proper management of temperature. It also shows indicators and alarm system in unusual conditions. Also inform to farm owner about happenings of hydroponics farm. In this way proposed system has many advantages over conventional manual hydroponics.

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