Arduino Automated Hydroponic Farming System

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Abstract:

Smart farming is seen to be the longer term of agriculture because it produces higher quality of crops by making farms more intelligent in sensing its controlling parameters. Analyzing massive amount of knowledge is often done by accessing and connecting various devices with the assistance of Internet of Things (IoT). However, it's not enough to possess an online support and self-updating readings from the sensors but also to possess a self-sustainable agricultural production with the utilization of analytics for the data to be useful. This study developed a sensible hydroponics system that's utilized in automating the growing process of the crops using exact inference in Bayesian Network (BN). This paper has an intention to develop an impact tool for the flow of nutrients of hydroponic plants automatically using Arduino microcontroller. We use an Arduino microcontroller to automatically control the flow of nutrient solution with logic if else. Sensors and actuators are installed so as to watch and control the physical events like candlepower, pH, electrical conductivity, water temperature, and ratio. The sensor esteems accumulated were wont to construct the Bayesian Network in order to surmise the ideal incentive for each parameter. A web interface is created where in the client can screen and control the ranch remotely by means of the Internet. Results have indicated that the fluctuations as far as the sensor esteems were limited inside the programmed control when contrasted with the manual control. Later on, the framework can utilize higher information examination and longer information social affair to upgrade the exactness of induction.

INTRODUCTION:

Plant care might be a daily schedule and significant action to remain plants sound and very much prepped. Plant care incorporates numerous perspectives for example watering, restoration, manure, and others.

Such a significant number of sorts of plants with various sorts of treatment are unique and each one medications are typically done physically. In spite of the fact that the sorts of plants are exceptionally different, water remains the most wellspring of life for

all plants to help the photosynthesis procedure, particularly in plants Hydroponics that lives depend on supplements from the water.

Hydroponics plants have different sorts of planting media like Rockwell, wipe, coconut and other coconut powder. In the treatment of plants, Hydroponics is critical to consider the planning of when the water ought to be included and supplanted supplements, and it may be badly arranged if the plant proprietor has Hydroponics plants with tons. To watering huge amounts of hydroponics plants, got the opportunity to do a programmed framework which will naturally to hydrate the hydroponics if essential.

With the occasion of processing particularly on microcontroller, at that point programmed watering framework for plant hydroponics is incredibly conceivable to attempt to. Base on the blueprint above, is required a transformation in farming industry. In related with this depiction, will be fabricated the venture of robotized apparatuses upheld the Arduino Uno Microcontroller and along these lines the ATmega328 board as an information sheet. The Arduino Uno as the cerebrum of the device will screen the hydroponics plants, helped by PH sensor, water level sensor and the temperature sensor. The tallness of water and the temperature room will be shown on the PC Screen.

LITERATURE SURVEY:-

Author ShaliniKumari [1] has explained in detail about the soilless cultivation of plants. The basic requirements, nutrient solvents, management of the nutrient solution are also explained by the author. In this article [2] the author gives us all the insights and history of hydroponic farming. The approaches different scientists used to develop this soilless farming is also explained by the author. Adnan Younis the author [3] gives us all the information required to growth of crops using nutrients dissolved in water. He explains that using different ratios of nutrients yields a better quality crop. In the article [4] the author has clarified the procedure of brilliant cultivating which shows the plants developed in a hydroponics framework had a higher net photosynthetic rate than the dirt grown ones. All the above mentioned papers and articles have concentrated on the different kinds of outputs like production of better crop, photosynthetic rate, etc. None of them focused on the ph values, temperature, humidity levels, and the rate of growth of roots. Our proposed methodology deals with the unfocused using different equipment like sensors.
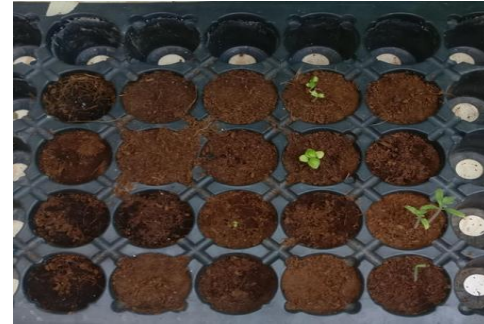
ARCHITECTURE:-

The process of growing few fruits & vegetables in Arduino Automated Hydroponic Farming System is as follows:-
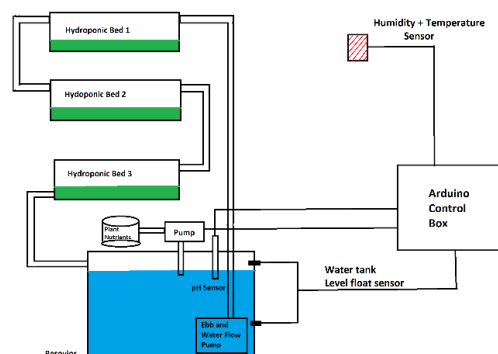
METHODOLOGY:

5.1 Growing small plant samplings:-

We grew small plant samplings by planting the seeds in the coco peat. The coco peat was put in small containers. We watered the samplings twice every day.

5.2 Reservoir & Pipe Setup:-

In this step we created a reservoir in a container and we added water and nutrients in the required proportion. The pH sensor and the water level indicator is also attached to the reservoir. Also, the pump is submerged in the reservoir, the pump does the job of sending the water at the topmost layer.
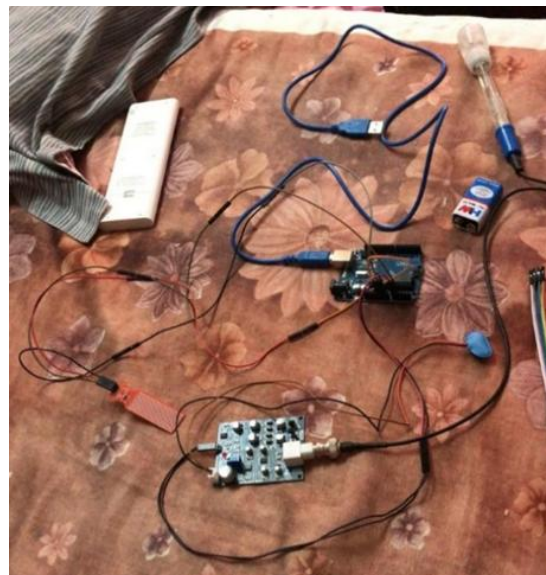

5.3 Hydroponic Bed:-

We setup the PVC pipes in such a manner that flow down the extra solution back into the reservoir. Also the small plants that were grown in 5.1 are placed in small netted cones in the PVC pipes.

5.4 Arduino Control Box:-

The pH Sensor, Water Level Indicator and the Temperature-Humidity Sensor are connected to Arduino which display the data on the screen.

```
//pseudo code
pHSensor connected to 13th pin in arduino
Serial.begin(9600);
Serial.println("Ready");

for loop that reads sensor values in array
buf[i]=analogRead(SensorPin); //read sensor values

sorting the pH sensor values

getting the pH value using the formmula
phValue=(float)avgValue*5.0/1024/6;
phValue=3.5*phValue;

printing pH values
Serial.print("  pH:");
Serial.print(phValue,2);
Serial.println("");

Water Level Indicator
Value > 13 is High
Value < 13 is Low
Attaching sensor to A1 pin
Serial.println(sensorValue); //printing sensor value
```

6. Results:-

The ph Value and Temperature & Humidity for Tomato, Cabbage, Lettuce & Basil are as follows:-

Serial No.	Vegetable Crop	pH Value	Temperature & Humidity Sensor
1	Tomato	6.0 -6.5	21°C - 24°C
2	Cabbage	6.5 - 7.0	15°C - 20°C
3	Lettuce	6.0 - 7.0	15°C - 18°C
4	Basil	5.5 - 6.5	24°C – 28°C

7. Conclusion:

The cultivating business will extend so that we will have the option to control the development of yields in a productive way. Loads of land will be spared with this innovation making cultivating easy. This propelled water system technique has likewise been demonstrated extremely valuable in sparing the water devoured by the plants. Right now water system, the ranchers reuse the water they use in the process instead of squandering it to draining and moistness on the fields. With hydroponics, the plants aren't experiencing parasites since there's appropriate administration of the water and accordingly the yield wouldn't be water-logged. The collect quality from plants developed hydroponically is furthermore acceptable in light of the fact that the size of organic products, vegetables are more prominent.

References:-

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