Fabrication of Solar Operated Smart Hydrophonics System For Fodder Feed Growing

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College ***:*** *KNS Institute of Technology*
Branch ***:*** *Department of Mechanical Engineering*
Guide(s) ***:*** *Mr.Tabareez Ahmed*
Mr . Azeem pasha
Student(S) ***:*** *Mr. Sumanth S*
Mr. Manoj Baakrishna Bhat
Mr. Jayanth Gowda Y R
Mr. Mohammed Umair S

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Introduction:

Competition for water sources, lagging of energy resources, increases the costs of labours, tremendous growth of world population, competition for international markets, climate changes, environmental pollution and uncertainties in the effectiveness of the current international policies and regulations as regards adaptation strategies.

Controlling of environments becomes an important tool in agriculture cultivation and study chains. Hydroponics is an assuring technology and becomes very attractive in the area of agriculture, especially in urban and city side farming. Hydroponic cultivation systems have found a suitable solution for fast development and widespread use in current years.

In hydroponics cultivation method, the monitoring and recording of various parameters helps cultivators to develop optimal solutions for the growth of plants. In this proposed system, we are designed a less-cost, high-reliability hardware model for solar powered hydroponics cultivation in real-time measurements.

Objectives:

The main objective of the system is to grow a plant without a soil by using solar supply. Hydroponics is an assuring technology and becomes very attractive in the area of agriculture, especially in urban and city side farming. Hydroponic cultivation systems have found a suitable solution for fast development and widespread use in current years. In hydroponics cultivation method, the monitoring and recording of various parameters helps cultivators to develop optimal solutions for the growth of plants

Methodology:

This system can be a sustainable solution for livestock feeding. It hydroponically grows grain sprouts like barley and turns them into animal feed in less than a week. Livestock can eat the whole stuff including the nutritious root mat. This means there's almost no waste in the growing process. The system provides fresh feed regardless of weather conditions. Operators can control the temperature, watering rates and light sequences. According to fodder group, the company behind this system. The sprouted fodder can feed a wide range of farm animals such as dairy cattle, sheep, horses, pigs and most poultry species.

The proposed methodology is implemented according to the block diagram as shown in Fig.1. As the device powers up, the following operations takes place. The reservoir tank is supplied with required amount of water and nutrients using DC motor, their flowrate is monitored using flow rate sensor. The water and nutrient solution are mixed in the reservoir tank and the solution thus obtained is measured for its pH. The user can set value of reference pH using Blynk app, set value will be stored in the Blynk cloud. The connection between the controller and the server is established using Wi-Fi module (NodeMCU). The measured pH is compared with reference pH value. If the pH of the solution in reservoir tank is same as the reference pH then, the solution is flowed into the hydroponics tank using DC motor. Otherwise, the pH of the solution is adjusted by adding water or nutrients from the respective tanks. Now, the solution with desired pH value is flowed into the hydroponics tank with controlled flow rate, using DC motor.

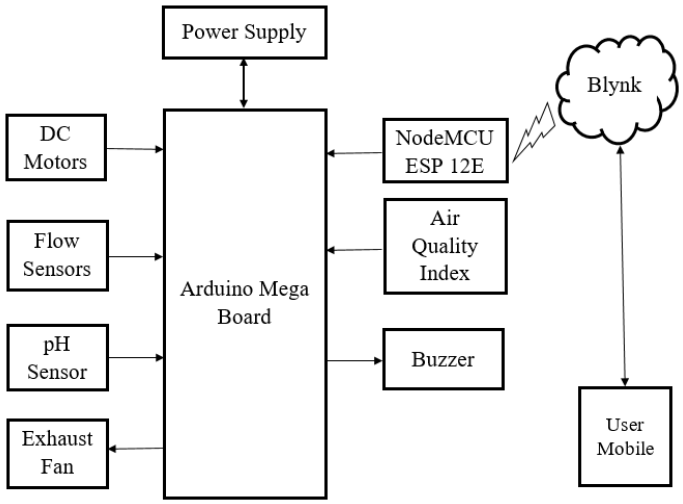

Fig.1. Block diagram of Hydroponics System

After certain iterations if the pH of the solution in the reservoir tank continues to be acidic then, the solution is drained out, the process terminates and the cycle begins from the initial step. After certain delay, the solution from the hydroponics tank is flowed back to reservoir tank through DC motor.

Conclusion:

We are able to demonstrate the scenario to show how to maintain pH level in a reservoir by regulation of flow rate of nutrients and water, parallelly monitoring the air quality of the environment by even accounting sudden disruption to ensure preferable environment for plant growth. In proposed system, the measured pH value always tries to cope up with the reference pH value by considering calibrations of pH sensor as a prime factor. The values obtained from flow sensors, pH sensor and air quality index sensor are sent to the app through a Wi-Fi module, to enable the user to track performance remotely. Designed system is able to monitor and control pH and air quality, rest of the factors such as temperature, humidity and EC are not considered. These might play a vital role in promoting efficient plant growth. To overcome this the controller needs to be interfaced and calibrated with various sensors supporting the above said factors. The motors used in the system can be replaced by PWM for more precision. Air quality index sensors can be along with the formaldehyde sensor to detect accurate variations in air quality. Further artificial intelligence can be used to make the system self reliant so that it can analyze the conditions, requirements and act accordingly

Scope for Future Work

With hydroponic farming method, the arable space problem in India will be solved in the future. More cultivars of staple crops can be grown, and consumption of soil and water will be reduced, or just not required. Finally, the hydroponic farming will reduce pests and weed production on alarming levels and can be used in urban at everyone's houses and implementing camera view in the hydroponics.

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