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Automated Self Charging Fish Pool Cleaning Aquaponics Enhancement System

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Abstract

The paper proposes a moving automated cleaning system to enhance the efficiency of aquaponics and health of the fish in the tank. The proposed system is self-recharging and eco-friendly.

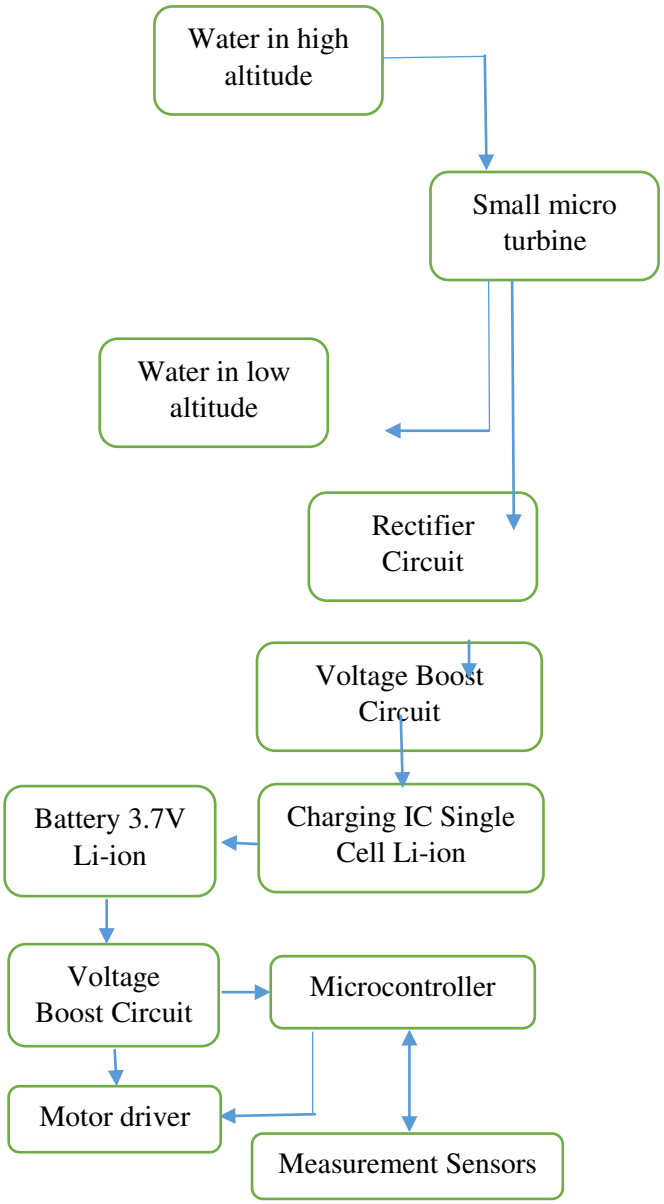
I. Introduction

Aquaponics is the farming method in which the biological waste produced from the fish tank, is used as fertiliser to grow food. The method is natural and involves no use of chemicals. The fish grows healthy in a cleaner tank. The cleaner tank required better removal of the wastes from the tank. Current method involves sucking the waste from only one corner of the fish tank(1). This decreases the amount of fertiliser available, and thereby reduces the efficiency of aquaponics. The proposed system introduces a moving automated self-charging method for efficiently improving the method of aquaponics.

II. Principles used

The proposed system uses the principle used in hydroelectric power generators. When the water, which possess potential energy, flows down to another location, which is physically lower than its current location, where the potential energy is lower, the difference in this energy, is converted into kinetic energy in its flow. This kinetic energy is used to turn a turbine, which may be used to turn a rotor connected to a magnet or a magnetic coil. The change in magnetic field experienced by the conductive copper coil induces a flow of current in the coil, which is then converted into current to be used.

III. Block diagram



IV. Working principle

The water in the higher altitude has potential energy. This energy is converted into kinetic energy when it flows down into the farm section of aquaponics. This flow is used to turn a turbine, which is small. (2)This small current can be used to charge the battery after being boosted to the required voltage using an efficient voltage booster.(3)

A wide area of suction is placed close to the ground level of fish tank. This is then connected to the pipe which holds the turbine. The suction area sucks the waste at bottom of the fish tank.

The voltage booster boosts the voltage to a level which is used to charge the lithium ion cell. The charged cell is used to create a boosted voltage of 5V for the microcontroller to work. This voltage also powers the motor driver and sensors.

The motor is used to move the system around the fish tank.(4) This movement enables the suction area to move about in the tank. This means that the whole tank is cleaned at the bottom. This enables a cleaner tank for the fish.(5)

The microcontroller is also measuring the water quality using the sensors attached to it. This enables the user to identify the nutrients present and the pH level of the water. (6)This improves the health of the fish, and also gives an idea about the lack of nutrients required for the plants to grow better.

V. Improvements

The system currently being used, uses stationary pipes to suck the water out. This does not ensure a clean environment for the fish. Also, the plants don't get the complete nutrients which it needs.

The proposed system ensures that the moving system collects the waste at the bottom of the tank almost completely. This ensures that the fishes live in cleaner environments. The plants also get more nutrients than the conventional system. This increases yield and also enhances plant growth.(7)

The measurement of nutrients present and the pH level of the water ensures better analysis of the plant growth conditions. This also enables prevention of fish diseases due to increase in acidity or the presence of unhealthy gases such as excess ammonia.

VI. Conclusion

The proposed system ensures a better yield for the farmer and also a healthier environment for the aquatic life when compared to the conventional system currently in use. The proposed system ensures better efficiency in farming methods by improving yield.

VII. References

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