



Development of Three Output Automatic Aquaponic System - Review Paper

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Abstract - In agriculture because of increased population the crops are cultivated by using chemical fertilizers and pesticides. This has caused the different diseases like cancer to human being. The future of agriculture field is organic farming. The proposed work contributes to resolve soil and natural food issues together and bring the natural era because years before everything was natural, the proposed system called aquaponics, which is combination of aquaculture and hydroponics. Aquaculture deals with growing of fish and hydroponics deals with growing of plants without soil by providing necessary nutrients.

Key Words: Aquaponics, Hydroponics, aquaculture, farming

1. INTRODUCTION

In aquaponic system the extra fish feed can generate Ammonia. This ammonia is dangerous to fish growth; this ammonia is broken down by bacteria and converted into nitrates. This will be used as a fertilizer for the plants. Hens will also be used as a by-product and their waste is used as a fertilizer for plants. Hence there is no need to add extra iron in the fish tank. This system will automatically monitor. The Surrounding temperature, humidity, PH Factor, total dissolved solids, dissolved oxygen and water level can be monitored using sensors along with IOT domain. Sun / Artificial Light, feeding controllers and water pumps will be automatically turn on or off. All parameters will be displayed on LCD and mobile app will be developed for the same. Whole system is developed by using arduino microcontroller. Hence it not only provides organic vegetables but at low fertilizers and water it gives three types of yields like fish, vegetables and hens (eggs).

2. LITERATURE REVIEW

In this paper Modern aquaponic systems can be used. RP provides a back office for all data within an enterprise as well as an integrated and continuously update-to-date view of key business activities. cloud- based IoT provided by Without data analytics and the adaptability, ERP is used transaction data. root causes and ground for actions to proceed forward can provide insights into the IoT . ERP with real-time agility, flexibility, and predictability Cloud-based IoT provides.[1]

The disadvantages of traditional farming are being dependent on soil quality, climate conditions, chemical fertilizers and pesticides water. Aquaponics is used to overcome the problems of traditional farming .The combination of aquaculture and hydroponics is called Aquaponics. Aquaculture deals with growing of fish and hydroponics deals with growing of soilless plants by providing with needed nutrients. To provide natural food for the country by using Aquaponics system. to provide fish as well as plants for humans by using aquaponics system. By aquaponics system technique water is reused, it requires less space, and user gets natural food. By using IOT technology with the help of sensors like pH, temperature and humidity, dissolved solvents, water level sensors Aquaponics can be automatically managed and controlled. for monitoring purpose Node MCU and Arduino UNO is used. This technique can be built indoor as well as outdoor system. In this system Sump Tank, Fish tank and Growbed all 3 carters are placed one above the other. All three

carters are connected with pipes in vertical way. For growbox fitting the sunmica sheet is placed above the last growbed with holes. The plant seeds are put in a sponge with some water for growing into sapling.

The fishes in the fish tank, will be fed with fish food for fish growth. with help of pipes Fishes will leave some extract which will settle down the tank and this wastewater will come into the sump tank by using motor to circulate the water to the plants in the growbed. The clay plates in sump tank will help storing some amount of water. [2]

In this paper a good alternative against the food and environmental problem the world is facing of farming method is solved by Aquaponics. Aquaponics consist of aquaculture (farming of fish) and hydroponics (growing plants without soil), being a technique to grow plants with the aquaculture effluent.

By using Aquaponics farmer does not use pesticides so minimize the use of fertilizers, that's why it makes green and sustainable. the major challenge like feasible and reliable at commercial scale is done by Aquaponics. The precision farming usually applied in the traditional farming, it need to adopt sensing, smart and for monitoring and control, automated processes IoT systems is used. semi-automated systems in small- scale aquaponics systems by automation and manufacturing experts is introduced for valuable contributions. aquaponics is used for identifying, listing, and providing an in-depth explanation of each of the parameters sensed in aquaponics, and the smart systems and IoT technologies in the reviewed literature.

Research contributions in the topics of aquaculture and hydroponics are increasing and attracting attention from researchers and practitioners. The final purpose of this work is to gain knowledge between biological and electrical engineering to enable aquaponic development as a sustainable source of food. aquaponics experts' technical knowledge about automation, IoT and smart systems; and automation expert's knowledge regarding the biological processes happening in aquaponic systems is given by author. Creating a bridge towards scaled up aquaponics systems will accelerate contributions in the area and enable viability in commercial solution.[3]

Due to narrower lands the agricultural production is decreasing so that land and water-saving technology combined with a variety of vegetable is important to produce maximum yield. Aquaponics is a sustainable agriculture system in an environment by containing aquaculture and hydroponics. By using this water planting medium plants get the nutrients, while the water can be filtered properly by the medium. In aquaponics system, to retrieve data, there were sensor installed. with the help of real time internet network data can be transmitted to Ubuntu IoT Cloud server. Results showed that the success rate of measurement for ultrasonic sensor was 99.94%, pH sensor of 92.35%, and temperature sensor of 97.91%. Growth of plants and fish on the smart aquaponic system ranges from 25 C to 30 oC and pond water pH between 7-7.5 with the intensity of fish feeding 3 times a day.[4]

In this paper agriculture industry in our country India is still working on the traditional ways. With the help of the new technology it can be modernized. With the help of Aquaponics technology it will be easier to monitor farming productivity and also increase the benefits in farming. In the next few coming years IoT will be used for connectivity in the farming field. for crop controlling, automation water pump & pesticide spraying is easy with the help of IOT. There are so many advantages of network farming. Aquaponics consist of farming monitoring system with the help of IoT, Mobile computing (Application), different sensors, WIFI Module, GSM Module. aquaponics system is consist of hydroponics and aquaculture concerning vertical farming. For fish and plant growth aquaponics system is used. In this system, the bacteria in water of fish tank is used for the plant growth. It will act as fertilizer to plant as the same plant water will be filtered and transferred. This fish tank makes reusing of water which will become less cost. Aquaponics farming can be done anywhere as it doesn't have any size or place limit. Aquaponics increase the revenue of both fish and plant farming. Aquaponics system is very easy as it can be managed by anyone in a small place with the help of technology.

This also encourages the young farmer as well as common people for doing this farming and Producing organic and healthy food. With Aquaponics model farmers will be able to monitor their aquaponic farming from anywhere. This will also increase their revenue and there would be a change in their livelihood. Aquaponic farming is easy. Microcontroller is detected the value and is displayed on 16x2 LCD. By using aquaculture and hydroponics farming together this will increase efficiency, development and productivity and profitability. This same can be used by the rural area farmer where they can be informed regarding fish and plants through an SMS system.[5]

Aquaponics is an eco-friendly system for food production utilizing aquaculture and hydroponics to cultivate fish and crop without soil. The cycle between the fish and plant is an inexpensive symbiotic. Fish waste (ammonia) is fed into the plant bed which acts as a bio-filter and takes the nitrate which is essential to grow vegetation this is used in an aquaponic system, to restart the cycle the fresh new water is then returned to the fish enclosure. conserving water more effectively compared to traditional irrigation systems is unique advantage of an aquaponic system. Recirculating water between the plant bed and the fish habitat continuously is the Conservation of water. Organic the other benefit of aquaponics is fertilization of plants using dissolved fish waste. Utilizing plants as a natural alternative to other filters, requires less monitoring of water quality. The future scope of Aquaponics system is to produce food and save water more efficiently and eco-friendly.[6]

In this paper Aquaponics is the integration of aquaculture and hydroponics. Aquaponics is used for urban centers to produce food closer. For both the hydroponics and aquaculture industries Commercial aquaponics uses methods and equipment. Even very poor, landless or near landless people practice gardening on small patches of homestead land, vacant lots, roadsides or edges of a field, or in containers. no economic resources, traditional farming may be done with virtually using locally available planting materials, green manures, "live" fencing and indigenous methods of pest control. To provide a better understanding of business of aquaponics which may enhance future commercial operations.[7]

In Singapore Food security and sustainability is a major concern due to its rapid urbanization, land scarcity, and low local food productions of fish and leafy vegetables. Author to design and develop a smart aquaponics system that can synergize fish farming and plant growing. aquaponics system consist of various sensors, actuators, microcontroller, and microprocessor were employed in the system. With the help of this component aquaponics system is monitor and control water quality, light intensity, and fish feed. For fish and plant, to ensure healthy growing environment early warnings in form of email, SMS and push notification are automatically sent to the user when the sensor detects any abnormal condition. Without human interference the respective actuator will intervene and rectify the abnormal condition. Cloud storage is used to store all system activities and live sensor measurements for data analysis. To provide graphical user interfaces between the aquaponics system and the user-friendly web and mobile applications were also created. Urban farming that can attract commercial farmers and home gardeners due to Cost-effective, and eco-friendly for this aquaponics system .[8]

3. CONCLUSIONS

Aquaponic is a concept which is especially happening to those seeking to promote more sustainable food production system. Aquaponics involves the production of both vegetables and fish using a single nutrient source fish feed and ensure that most of the waste that would normally be released from intensive fish culture are instead used to grow vegetable, also a lot of nutrients produced by fish the concept of which requires a large amount of plant production.

Hence we are going to design a automatic aquaponic system using iot, which is to create a sustainable solution to grow and supply locally grown 100% organic and nutrition food and to extract a real time information to control. Hence will also be used as a by product and their waste is used as fertilizer for plant.

From this system we can generate 4 types of output that is 100% organic vegetables best quality fish, Hence and slurry which is used as a fertilizer to normal plants which are grown in soil.

4. REFERENCES

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