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IOT BASED SMART AQUAPONICSYSTEM

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ABSTRACT

Getting appropriate water source for fish and plant cultivation seems difficult. Moreover, the agricultural production is decreasing due to narrower lands so that land- and water-saving technology combined with a variety of vegetable is important to produce maximum yield.

INTRODUCTION

Aquaponics is the integration of recirculating aquaculture and hydroponics in one production system. In an aquaponic unit, water from the fish tank cycles through filters, plant grow beds and then back to the fish. In the aquaponics system, bacteria are responsible for converting ammonia to viable nitrate for biofilm plants on all hardsurfaces throughout the system basins, tubes and all system vehicles that are in constant contact with water.

METHODOLOGY

Smart aquaponics system is the development concept of bio-integrated farming system combined with internet of things-based electronic technology. This technology is designed to utilize water containing excess feed nutrients from aquaculture ponds or containers as a source of nutrition or hydroponic growing medium. Thus, the efficiency and effectiveness of feed and plant nutrition canbe conducted[9]. Plant used in this present research was lettuce (Lactuca Sativa L.) and tilapia as the fish. This research used aquariums and pipes that had been modified as a place to plant.

MODELING AND ANALYSIS

2.2 Internet of Things Internet of Things (IoT) can be divided into some layer architectures. The first layer is the perception layer, which functions to read and collect information from the physical environment. Then, the data will be used in the application layer. The perception layer is responsible for converting data into signals sent through the network so that it can be read by the application layer, for instance, the use of barcodes by minimarkets. In the barcode, there are data such as name, price, and stock of goods[10]. 2.3 Quality of Service (QoS) Quality of Service (QoS) is a method measuring how well the network and attempted to define the characteristics and properties of a service. In QoS, there are several parameters namely throughput, packet loss, and latency .

Figure 1: system design

RESULTS AND DISCUSSION

The aquarium tank required for the system was built of dimension (30 inch *15 inch *15 inch) with minimal cost and expenses. After that preparation of frame out of the PVC pipes in order to create a space for the plants to grow into the system. Then after that, the proper setup of the tank along with the frame was done by fixing upon a table. The water was filled and the tank was left as it is for some days. When the cycle got ready, 2 pairs of Koi-Carp fishes were kept into the tank for a few weeks.

Figure 2: Aquarium setup of the system

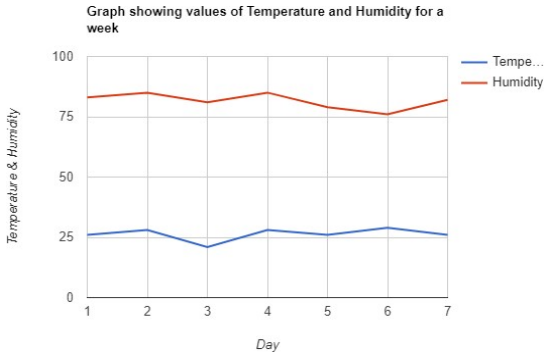

Figure 3: Graph showing Temperature &Humidity of the system

The suitable range of temperature for the growth and survival of plants and fishes inside the system is in between (15-35) degree Celsius.

CONCLUSION

The existing problems seen in the traditional aquaponics system can be detached by the introduction of electronic approach in the system. And this can encourage people to produce organic and healthy plants for daily use or consumption in their own household. For this project, the setup of an aquaponics system consisting of fish tank and grow bed for plants was done. Then, a monitoring section was established in order to detect the water level, pH value, temperature and humidity of aquaponics system by the use of Ultrasonic sensor, pH sensor module and Temperature and Humidity sensor (DHT11) respectively. All these sensors were interfaced to the Raspberry Pi microcontroller. Then finally the system parameters were displayed through Liquid Crystal Display and Internet of Things successfully

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