


Smart and Systematic Aquarium

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Abstract: Fish keepers often have problems feeding their pet fish when they are not at home and the difficulty of changing the water in a dirty aquarium with fresh water. This is because the work of changing water is complicated and tiring. When the fish are not fed routinely and air cleanliness is not maintained, it is bad for the health of the fish. Good fish health care factors are in terms of feeding and air cleanliness. Therefore, to solve this problem, the Smart and Systematic Aquarium project was developed to ensure that the fish continue to be fed regularly and the air cleanliness in the aquarium is maintained. The Smart and Systematic Aquarium was developed to make it easier for users to feed the fish and maintain the air quality in the aquarium automatically. Smart and Systematic Aquarium uses WeMos D1 microcontroller, I2C 16X2 LCD Display component, 12V solenoid valve, 2 channel relay module, pH water sensor, SG-90 servo motor and ultrasonic sensor as well as Blynk IoT application.

Keywords: Smart and Systematic Aquarium; feed the fish; maintain the air quality



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1. INTRODUCTION

The fish lovers who keep their fish in the aquarium, should be concerned about keeping the fish healthy. Good fish health care factors are in terms of feeding and water cleanliness. Therefore, fish should be fed on time and not excessively. Next, fish keepers need to clean the aquarium by changing the water in the aquarium periodically or when the water is found to be dirty. This project aims to help those who keep fish so that they can feed the fish according to the schedule automatically and make it easier for the keepers. This project can also help fish owners to replace the water in the aquarium systematically. Fans of fish keeping are calmer and can do daily chores other than fish. Their maintenance is also awake and healthy with clean water in the aquarium.

2. METHOD & MATERIAL

Smart and Systematic Aquarium uses WeMos D1 micromicrocontroller, I2C 16X2 LCD Display component, 12V solenoid valve, 2 channel relay module, pH water sensor, SG-90 servo motor and ultrasonic sensor as well as Blynk IoT application.

3. FINDINGS

3.1 *"Smart Aquarium Management System"*

A researcher from R.M.D Engineering College namely Aakash Ram S has developed a Smart Aquarium Management System project in 2020. The researcher experienced problems in changing water quality and feeding fish. So, their project proposes a system equipped with sensors. It performs pH level detection and water renewal operations. An IoT-based system is implemented to monitor and communicate the status of the aquarium to the user's mobile application. Therefore, intelligent aquarium management has been implemented so that the fish do not run out or underfed and thus reduce the manual effort required in aquarium maintenance.

3.2 *"Design of Aquaponics Water Monitoring System Using Arduino Microcontroller"*

A group of students from the School of Microelectronic Engineering, Universiti Malaysia Perlis, in September 2017 developed a joint project which is the Design of Aquaponics Water Monitoring System Using Arduino Microcontroller project. The students are S. A. Z Murad, A Harun, S N Mohyar, R Sapawi and S Y Ten. Their project describes the design of an aquaponic water monitoring system using an Arduino microcontroller. The Arduino Development Environment (IDE) software is used to develop programs for the microcontroller to communicate with various sensors and other hardware. The pH sensor circuit, servo, Liquid Crystal Display (LCD), peristaltic pump and Global System for Mobile Communication (GSM) are built and connected to the system. When the water pH result is out of range, a notification message will be sent to the mobile phone via GSM. If the pH of the water is out of range, the peristaltic pump turns on automatically to maintain the pH value of the water. In addition, a servo is used to automatically feed the fish every 12 hours. Meanwhile, the LCD shows the pH level of the water.

3.3 *"Automatic Fish Feeder"*

Sovanth (2021), has made an automatic fish feeder project using an Arduino Uno program and a servo motor. This project also uses an ultrasonic sensor that will detect if the food is finished and this project can also set a time for the food to be given. This project works in a way that a servo motor is placed under the food container and the coding entered in the arduino will move the motor so that the food will fall into the aquarium.

4. DISCUSSION

The Smart and Systematic Aquarium uses the WeMos D1 microcontroller as a command processor and it also has a WiFi module for internet connection use. The I2C 16X2 LCD Display Component is used to display the time and pH value of the water. The 12V solenoid valve is used to remove dirty water in the aquarium and replace it with fresh water. A 2-channel relay module is used to control the movement of the solenoid valve. pH water sensor is used to detect the pH of the water in the aquarium. an SG-90 servo motor is used to release food into the water and an ultrasonic sensor to detect running out of food in the container while the Blynk IoT application is used in the smartphone to receive notifications that the fish have been fed and that the water has been changed.



Figure 1. Prototype of “Smart and Systematic Aquarium”

5. CONCLUSION

A questionnaire survey was made to fish keepers, finding that 85% of them agreed that this Smart and Systematic Aquarium can help them manage and keep fish easily. Researchers see the marketability of this Smart and Systematic Aquarium for those who want to keep fish well.

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