International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

Smart Aquarium using IoT and Digital Image Processing (DIP)

Vinayak Bhat M[1], Hrudhan M[2], Rohith N[3], Shripad[4], Theja N[5]

[1,2,3,4]Students, Dept. of Computer science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, India.
[5]Professor, Dept. of Computer science and Engineering, Vidya Vikas Institute of Engineering and Technology, Mysore, Karnataka, India,

---

Abstract - *Keeping fish as pets is much less demanding than taking care of other animals. The maintenance of fish aquariums is very difficult task. Some of the problems faced are changing the aquarium water, feeding the fish. Maintaining the temperature of Aquarium, Controlling the Lights. The idea is to minimize the problem of fish keepers or aquarists by shifting it from manual to automatic mode. Fish keepers or aquarists now would not have to watch out and keep an eye on their Aquarium and Fish again and again. In our approach, the water temperature control, lighting of aquarium environment, feeding of fishes, draining and infilling of aquarium tank are all automatically controlled by a software embedded in an intelligent controller. This system is userfriendly. This project will be more efficient than the system available nowadays in the market.*

Key Words: **Raspberry pi, Gsm module, Internet of Things (IOT).**

1.INTRODUCTION

Aquarium is man-made ecosystem that is used to preserve the aquatic life. Aquarium provides a wonderful way to appreciate the beauty and diversity of aquatic life. Commercial fish farming and ornamental fish farming has become very famous. As it is overhead to check the conditions of an aquarium manually we present an IOT connecting system which monitors and controls whole aquarium.

The project with which we came up is a Smart Aquarium. The project will be more efficient than the systems available in market, now days. In addition to the efficiency it will be of lower cost as well. The project's audience is the group of people interested to keep fishes at home or offices but don't have time to take care of, or they are worried to keep asking their neighbors to take care of the fishes in their absence. The project is an automated system to take care of fishes. It will replace the manual maintenance of fish aquarium with its automated functions.

1.1 Literature Review

The authors of [1] have implemented an IOT based system which monitor and control the whole aquarium automatically and provide real time status on user's Smartphone application. It contains water quality management in which it will monitor the physical changes in the water and will maintain it to the ideal conditions, with required changes. The aquarium will perform all the steps automatically like temperature control, turbidity level control, light monitor, feeding, water renewal etc. Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar.

The authors of [2] summarized the management process or guide for a successful fish culture. The aqua culturist monitors the pond in time domain and takes necessary action. Such actions include feeding, draining and refilling of water, water and temperature level monitoring, while feeding can be done 3-4 times a day, draining and refilling of water is based on the condition of water.

The temperature level of aquarium is critical to the survival of the fish and requires close monitoring. An embedded wireless network and water quality measurement system for large scale aqua culture is described in [3] and [4]. The developed portable water quality measurement units are installed on a floating platform to measure water quality parameters such as dissolved oxygen, temperature. All these units possess wireless communication interfaced to communicate with central unit for monitoring by using mobile app, control and data transfer. The system described in [3] and [4] are not only expensive but also not easy to maintain. It also does not specify exactly how corrective measures will be taken electronically when abnormal conditions are detected.

1.2 Objective

Main aim is to make a simple, easily controllable and cheap device which helps to make aquarium owner's life easier. The Objective of this project is to design and construct an aquarium controller that manages many aspects of the aquarium such as lighting, temperature, water flow and feeding.

2. Problem Statement

Usually Aquarium care takers face several problems in maintenance of health and vitality of Fishes along with the presentation of the Aquariums. Some of the problems faced are changing the aquarium water,feeding the fish, maintaining the temperature of Aquarium and controlling the Lights. So the idea is to minimize the problem of fish keepers or aquarists by shifting it from manual to automatic mode. Fish keepers or aquarists now would not have to watch out

and keep an eye on their Aquarium and Fish again and again. SMART aquarium will be there if any problem occurs.

Table -1: Sample Table format

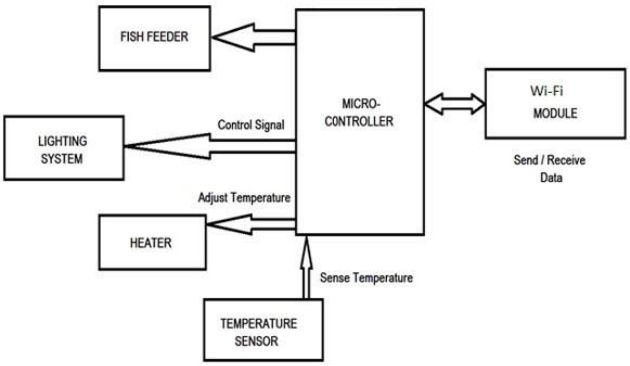

Fig -1: Illustrates block diagram of IOT automated aquarium.

2. System Architecture

HARDWARE ARCHITECTURE: The Smart Aquarium's most components are taken from a normal aquarium such as glass box, filter, heater, and aquarium lights. These components are responsible to maintain clean water, specified temperature of water and provide lighting to the aquarium. The components required to automate this process were NODEMCU, Temperature sensor, Led strip, Float switch, Servo motor and RTC module.

SOFTWARE ARCHITECTURE Arduino IDE: The Arduino integrated development environment (IDE) is a cross-platform application that is written in the programming language Java. In our project it is used to write and upload programs to NodeMCU microcontroller. The Adafruit IO Arduino Libraries can connect with Adafruit IO using NodeMcu.

We have created the Adafruit IO dashboard for the user, which enables user to control the equipment's of aquarium from any modern web browser. We have used MQTT or message queue telemetry transport protocol for device communication that Adafruit IO supports. Using a MQTT library or client we can publish and subscribe to a feed to send and receive feed data. We have also created a web mobile app for quick access to Adafruit Io dashboard through mobile.

3. CONCLUSION

In our project, the water temperature control, lighting of aquarium environment, feeding of fishes, water level sensing are all automatically controlled by Adafruit Io dashboard. We have also provided manual control of lighting system where user can turn on/off the light through Google assistant /button provided on dashboard. The basic idea proposed in this project works well and can be implemented on any aquarium. Having a Smart Aquarium, will save our time and we would not have to be worried for our fish and their aquariums for long time.

REFERENCES

[1] Dr. R.M. Rewatkar, Mr. Harish T. Mahajan, Mr. Pawan P. Mahajan, Ms. Gauri R. Dhage, Ms. Poonam A. Kapse, Ms. Sanchalika M. Dubale,Design and implementation of Automatic Aquarium System using IOT, International Journal on Future Revolution in Computer Science & Communication Engineering,2018.

[2] Dr. Chiemela F. Anyanwu, Dr. Ricardo L. Ildefonso,Assessment Of Agrochemicals Residue In Fish Ponds In Agricultural Areas Of Ifugao Province Nelson Latap, International Journal of Advanced Research,2015.

[3] Aquarium Water Parameters For A Balanced Fish TankAlgone(2016,December15).Available:Http://Www.Algone.com/Aquarium.

[4] Md.NasirUddin, Mm Rashid, Mg Mostafa, Belayet H, Sm Salam, Na Nithe, Mw Rahman & A Aziz, Development of Automatic Fish Feeder International Islamic University Malaysia 2016.

[5] AdilAthavani, Akshay Desai ,Harsha Ruthwick S , and Raviteja A, Smart Aquarium,International Journal Of Advanced Research in Engineering & Management (IJAREM),2017.

[6] YousefAtoum, Steven Srivastava, and Xiaoming Liu, Member "Automatic Feeding Control for Dense Aquaculture Fish Tanks" publis, IEEE LETTERS.