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AQUA-TRONICS

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Abstract - *This paper presents the design and implementation of a universal intelligent control system that automates the operation of an aquarium system called as AQUATRONICS. 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 user-friendly. This project will be more efficient than the system available nowadays in the market. Essentially the cloudiness of the water is detected automatically using the dirty water detector enabling the controller to drain and refill the tank. The prototype aquarium is stimulated using Proteus development tool before the building of the physical system*

***Key Words*: Efficient, Aquarium, Universal, Dirty Water Detector, User-Friendly, Cloudiness, Intelligent Controller.**

INTRODUCTION

Pet ownership has been increasing at a steady pace in the last 20 years. After cats and dogs, the most popular pet is now the freshwater fish. The maintenance of fish aquarium is a very difficult task itself. Whenever you have to clean up your aquarium or you have to feed, you have to do a lot of things. You have to turn off your aquarium's power head/air pump and feed manually and project with which we came up is an Automated Fish Aquarium. Aquarium Caretakers suffer difficulty in changing the aquarium water, difficulty in maintaining the pH of the water in an aquarium, in feeding the fish, difficulty in controlling the turbidity of the water in an aquarium, in figuring out when the water is to be filtered, in maintaining the temperature of the 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 on asking their neighbours 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. It will monitor the physical changes in the water and will maintain it to the ideal conditions, with required changes. In this project, SMART AQUARIUM has been designed by keeping in mind, the problem of those who cannot take care of their aquarium every day. It does the feeding itself every day, keeps the temperature of the aquarium under control, and also keeps the turbidity level under control.

LITERATURE REVIEW

The authors of [1] 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 [2] and [3]. The developed portable water quality measurement units are installed on a floating

platform to measure water quality parameters such as dissolved oxygen, temperature, environmental pressures. All these units possess wireless communication interfaced to communicate with central unit for remote monitoring, control and data transfer. The system described in [2] and [3] 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. Smart electronic system for pond management in fresh water aqua culture is presented in [4]. The system continuously measures and control several hydro biological parameters responsible for growth of fishes. However it does not explain how dirty water can be detected and drained. This work includes automatic detection and removal of dirty water in aquarium system.

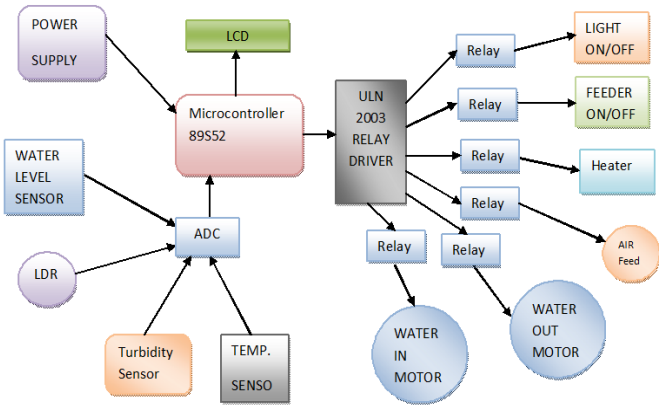
OBJECTIVE

The Objective of this project is to design and construct an automatic aquarium for those who cannot take care and keep an eye on their fish and aquarium daily and minimize the manual factor as much as possible. The aquarium will perform all the steps automatically like temperature control, feeding, water changing, air feeder, LCD display.

PROBLEM DEFINATION

Usually aquarium care takers face several problems in maintenance the vitality and health of fishes along with the presentation of the aquarium. Common Problems Faced by Aquarium Caretakers Difficulty in changing the aquarium water, Difficulty in feeding the fish, Difficulty in controlling the purity of the water in an aquarium ,Difficulty in figuring out when the water is to be filtered Difficulty in maintaining the temperature of the aquarium.

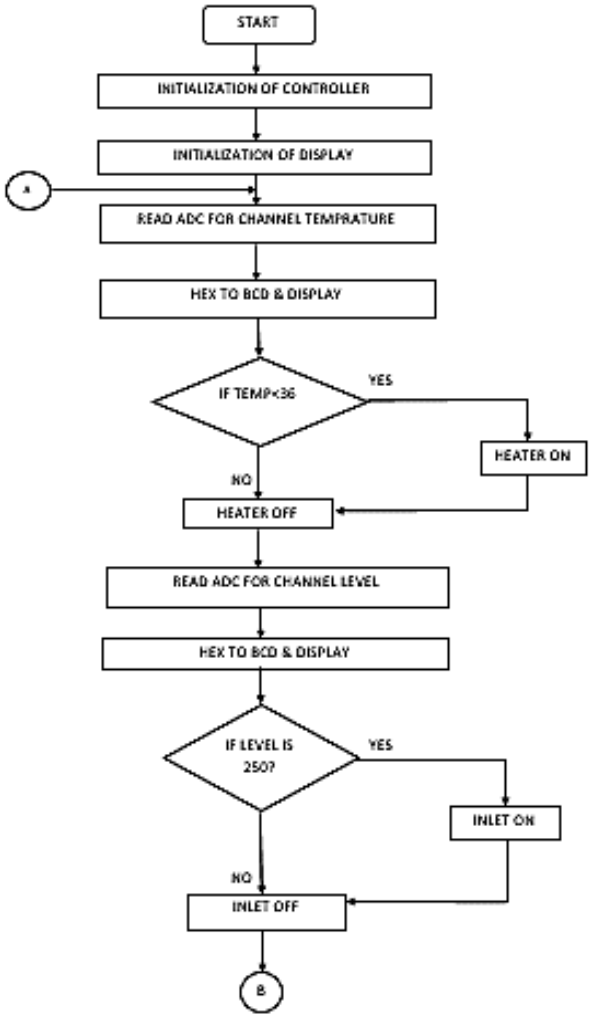
BLOCK DIAGRAM

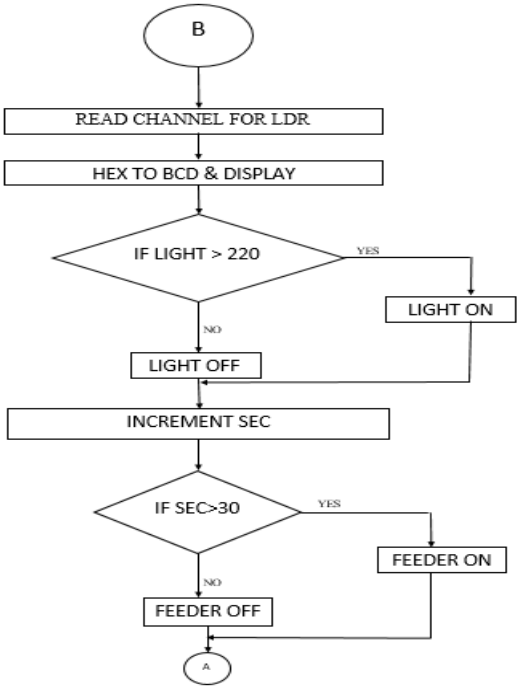


The aim of this project has been chosen to minimize the problems of fish keepers or aquarists by shifting it from manual to the automatic mode. Fish keepers or aquarists now would not have to watch outlands keep an eye on their aquarium and fish again and again. **SMARTAQUARIUM** would be there for all the problems. The project is an automated system to take care of fishes. It will replace the manual maintenance of fish aquarium with its automated functions. It will monitor the physical changes in the water and will maintain it to the ideal conditions, with required changes. The main Moto of this project is to build a low cost aquarium for house to make the work easier and automatic. The basic functionality and main principle of the system is to sense the changes via sensors. These changes will be then processed by the Controller. The PIC microcontroller installed in the circuit will be performing the main task of controlling. Controller will send commands to the actuators where the output part will be observed working to sustain the ideal conditions. There will be a temperature sensor, water level sensor, heater, feeder, an LCD and a inlet-outlet pump for water alteration. They all will be interfaced with the controller. If anything happens or changes, the controller will start working to reach back to the ideal state. The normal temperature of fresh water aquarium is considered to be 28-30 degree Celsius. If temperature exceeds, the

controller would start the fan till the desired temperature is not achieved. If the temperature goes down, the heater will be on until the temperature does not reach to the normal temperature. After every 24 hours the controller would turn on the feeder for feeding purpose. If the turbidity level has increased beyond the normal then controller will change the water. Half of the water will be flushed through valves so that the temperature would not change rapidly which could harm the fish. The ongoing process and situation like temperature, feeding, changing water etc will be shown on the LCD.

FLOWCHART





RESULTS

Fig. Inlet &outlet of water

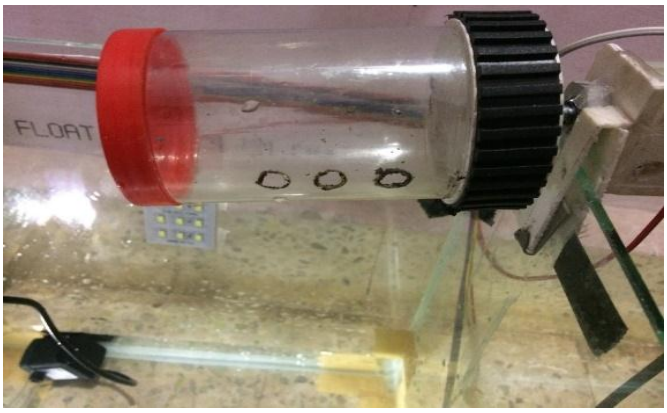


Fig. Feeder system

FIG. LCD Readings

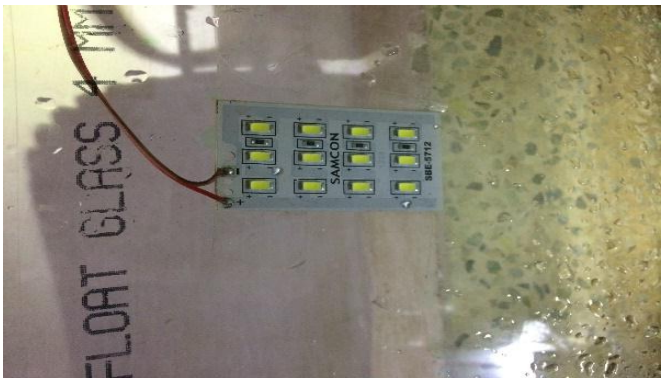


FIG. Light System

CONCLUSION

An intelligent user-friendly aquarium control system for efficient fish production has been described and implemented in this work using a prototype aquarium system. This is referred to as AQUA-TRONICS. The concept described can be explored for both domestic and commercial fish production particularly in both rural and urban regions.

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