ARDUINO BASED AQUARIUM MONOTORING SYSTEM

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Abstract - *In the era automation, each and everything getting automated in the world for the smooth life of human beings. Here proposed project is to help those who are having difficulties in maintaining their indoor aquariums, especially those who are frequently outstation, thus unable to constantly monitor their aquariums. Through the use of this system, users can monitor and maintain their fish aquarium regularly via internet, using devices such as smartphones and laptops. The major role of this system is to enable users to monitor and maintain their fish aquarium through a server of database, which include tasks such as feeding the fishes on time, checking the water temperature, whenever the turbidity level of the water reaches a pre–determined unsafe point for the fishes. In order to continuously check the aquarium's status, the Arduino Uno board is chosen as central board to collect data from sensors and subsequently uploads the data to the database and to the own host website. Other than that, water filter and motors for feeding the fishes, are also required.*

*Key Words***:** Automation1, Turbidity2, Host website3, Internet of Things(IOT)4, Servomotor5.

1. INTRODUCTION

Now the world is moving towards automation, everyone needs a comfort living life. Man has researched different technology for his sake of life. In today's world of connectedness, people are becoming accustomed to easy access to information. Wired network connection such as Ethernet has many limitations depending on the need and type of connection. Now a day's people prefer wireless connection because it require less time. So operating through the internet is induced in this project. The present aquarium systems are monitored manually this consumes lot of time and man power.

In existing systems one cannot feed the fish when their absence, it may bring threat to fishes, temperature of the water cannot be determined as it can be changed according to the seasons and fishes may suffer from this. Lightings cannot be monitored using the remote or switch, it is operated manually. It's not easy to monitor everything going on inside your aquarium around the clock. With regular care and maintenance, you're likely to catch problems if they occur only at your presence. Aquatic lives in the aquarium are easily affected with the changes of the aquarium condition such as temperature, feeding and the lighting. These conditions are very critical for the surviving of the aquatic lives in the aquarium. Overfeeding is one of the mistakes made by fish owners, as uneaten food will pollute the water. Such ways are not reliable supervisory is ineffective.

A person may drop too much food to kill the fish. For the large scale aquarium, human may do mistakes due to the very human nature. Gathering of data from the aquarium must be done in a timely manner and the changes need to be done to the environment. Unacceptable changes in the levels of water parameter values affect the life of aquatic animals. When no swift action is taken, this will increase the risk of affecting the aquatic life in the aquarium. In the end, this will lead to the death of the aquatic life.

In present computing real world objects communicate with each other and act intelligently. Internet of Things is an emerging technology which realizes this present nature of computing. Aquarium management needs timely gathering of water parameter value changes. These changes may affect the life of aquatic animals in the aquarium. The proposed system collects the real time data from aquarium environment using sensors, processes it and updates the temperature of water in real-time in response of any unfavorable situations through temperature probe.

The best way to combat these unexpected problems is to use the best aquarium monitoring systems and controllers. The project's audience is the group of people interested to keep fishes at their homes or offices but don't have time to take care of, or they are worried to keep on 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 Motivation

The present aquarium monitoring system, in the absence of human being it is hard to maintain aquarium frequently like feeding, sensing the temperature, man power etc. Now the world is moving towards automation, so in this world if we want to do some changes in the previous system, we have to use the new techniques. So we got motivated to turn our present aquarium monitoring into automated one.

1.2 Problem Statement

The time, man power, fish dying due to inadequate maintenance of aquarium is more. To overcome all of these issues we planned for smart aquarium to solve all of mentioned above issues.

1.3 Objective of the project

- To develop a reliable aquarium monitoring system for users this can be able to send the data about the aquarium to the users on time to time by updating the data to the server.
- The servo motor is used to feed the fishes in proper time in absence of user
- Understood and operated this project by non-technical users easily without the need for any advanced technical knowledge.
- To make it more convenient and easier for users to maintain their aquarium from anywhere around the world.

1.4 Proposed System

The main aim of this project is to develop an aquarium which can be monitored using the switches, remotes and through internet. Fish can be fed using the servo motor where it can be monitored, temperature sensor is used to keep track at the temperature of water. Water temperature and outside temperature are displayed in LCD display, it can be checked through the webpage through internet. Lighting systems can be operated using any of three ways as mentioned, it proposes to ON the light only whenever needed.

2. Literature Survey

M. Z. H. Noor, et all, conferred about the Design and Development of Automatic Fish Feeder System using PIC microcontroller This device, basically consists of pellet storage, former, stand, DC motor and microcontroller. The pellets controlled by DC motor which located under the pellet storage. A control system was then attached to this device allowing the fish to be fed at the right cycle time as required or predefined by user. Timer was employed in this device to control the motor rotation attached to sphere former, which dispense the pellets into the water. The pellets dispensed into the marking area of the pond based solely on the rotation speed of the motor itself. The controller came with a keypad giving user more option in determining the suitable speed for the motor depends on their cattle.. In the following system user cannot change the DC motor speed remotely because the microcontroller is not connected to internet. However Arduino board is reliable and allows to monitor using internet. The system developed combines mechanical and electrical system in controlling fish feeding activity. A control system is attached to the device allowing

the fish to be fed at the right cycle time as required or predefined by user.

Min-Chie Chiu, conferred about the Multi-functional Aquarium Equipped with Automated Thermal Control/Fodder-Feeding/water Treatment using a Network Remote Control System. In the product, PC (personal computer) is used as main controller to manage all the sensors. The sensors were connected to the PC controlling system via different module. The module is the ADC (Analogue to Digital) which convert the analogue signal from the sensors to digital signal so that the PC can read and classify the values. Then, via the VB interface, the client PC can communicate with server-PC to monitor and control the aquarium based on the data from sensors. In the following system, product consists of a PC as center of the system which control and managed the whole system. It is really expensive to allocate a whole PC just to manage the aquarium system. The used of PC as center part of system make it difficult to move the product from one place to another. The solution for the cost and portability issue can be solved by using a single board computer called Arduino Uno board, to replace the PC to function as main controller of the system to operate the system.

Nurliani Hidayah Ritonga, et all, conferred about the Automatic Arowana Raiser Controller Using Mobile Application Based on Android. This system is called AURORA systems consist of Raspberry pi as microcontroller which is always online and it is connected to sensors like, ultrasonic sensor, temperature sensor and actuator like servo motor to feed, light for aquarium and water pump. The measure value of different sensors will be send to raspberry pi and uploaded to the cloud so that the android based end devices can access the data and take the appropriate actions. The implementation of Internet of things (IoT) concept. Android application is used to monitor and control the sensors and actuator that are connected to the microcontroller through the cloud services. This helps the user to access the information about their aquarium and control them from anywhere in the world through internet easily.

3. Methodology

The block diagram of Arduino based aquarium monitoring system is shown in figure1 Arduino board are use as the main controller to monitor and control the sensors, lights, heater. The Arduino Uno is basically a small microcontroller. Here the power relay is used to control the aquarium lights, the dc motor is used to fish feeding purpose, temperature sensor is used to sense the water temperature and sends the notification in every 10 minutes, if the water temperature is low the heater is used to adjusts the normal temperature. The LCD display is used to display the temperature and by seeing LCD display. We can operate the lights and dc motor for feeding fishes and This project can be operate in three different modes. Internet Of Things (IOT), it sends updates in

every 10 minutes so we can monitor the aquarium temperatures when we are away from home. Using infrared sensors it can operated by remote control On-Screen menu that can be controlled by up-down buttons by seeing the LCD display.

The SG90 mini servo is lightweight, high-quality and lightning-fast. The servo is designed to work with almost all the radio control systems. The servo motor is used to feed the fishes in proper time in absence of user. The DS18B20 Digital Temperature Probe provides 9 to 12 bit (configurable)
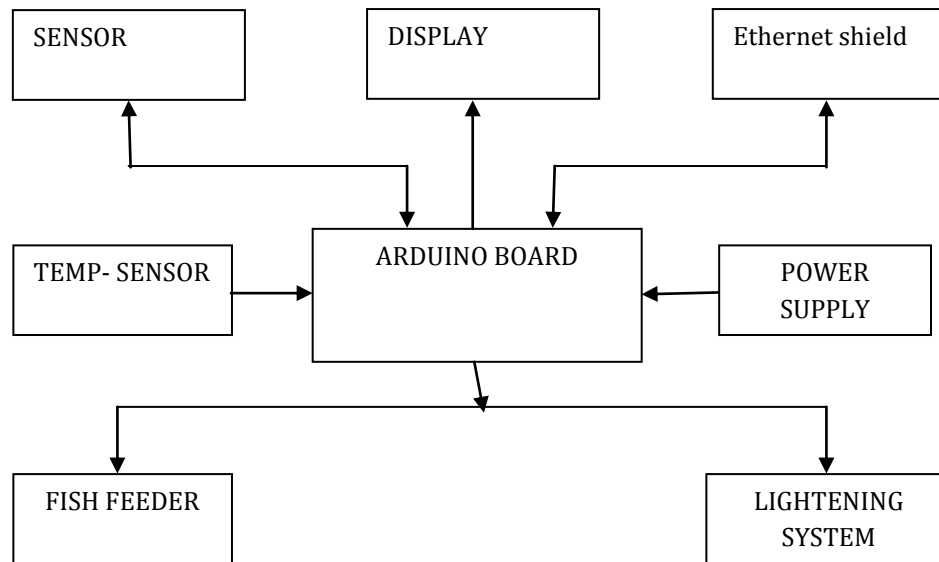

Fig-1. Block diagram of Arduino based aquarium monitoring system

4. Result

To develop a reliable aquarium monitoring system for users this can be able to send the data about the aquarium to the users on time to time by updating the data to the server. The servo motor is used to feed the fishes in proper time in absence of user. To make it more convenient and easier for users to maintain their aquarium from anywhere around the world.

Fig -2: Interfacing Remote to IR sensor

The TSOP 1738 is a member of IR remote control receiver series. This IR sensor module consists of a PIN diode and a pre amplifier which are embedded into a single package. The output of TSOP is active low and it gives +5V in off state. When IR waves, from a source, with a center frequency of 38 kHz incident on it, its output goes low.

temperature readings which indicate the temperature of the aquarium. Information is sent to/from the DS18B20 over a 1-Wire interface, so that only one wire (and ground) needs to be connected from a central microprocessor to a DS18B20. A relay is a switch that is operated by a spring or an electromagnet. Here the lighting system is controlled by relay Internet Of Things (IOT). It can monitor the aquarium temperatures when we are away from home and can feed the fish and control the lightings through IOT.

5. CONCLUSION

In the present world everything is moving towards automation to reduce work pressure of human. As per the literature review previously designed systems over not so efficient at their working and also not economically reliable in the view of usage. Particularly microcontroller based embedded systems has less memory size along with the limit in interfacing peripherals this leads to lag in the deployment of the systems. Therefore here proposed and automated Arduino based aquarium monitoring system that enables easy control over the several issues of aquarium such as temperature variations, feeding schedule, turbidity level, lighting system which contains sensors to gather the information required for desired actuation using Arduino controller. Which provides efficient automated control over the issues.

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