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Aquarium Monitoring System Using Sensors

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ABSTRACT

Fish keeping is a popular trend worldwide. Fish keeping is a difficult job. We always need an aquarium or a pond for that; freshwater is considered to be the most popular hobby of keeping fish because it is easy to handle with freshwater fish and aquariums. It has always been difficult to take care of the fish and aquariums. We have to feed the fish on time, we have to maintain the temperature and also control the, heater and filter of the aquarium. All these steps are done manually. The project, Smart aquarium has been designed by keeping in mind, the problem of those who cannot take care of their aquarium every day. The feeder is powered by Arduino Uno and a servo motor which can be set on different timings for feeding fish automatically, heater keeps the temperature of the aquarium under control, and a water system using PVC pipes which will help circulate water which can help distribute temperature equally.

Keywords: Arduino UNO, Feeding System, Fan, Heater, PVC Pipes, LED Display, Sensors, Servo Motor.

1. 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 fresh-water fish. The maintenance of fish aquariums 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 turn on the air again after an hour. In the Current system all equipment's such as heater, and filter are to be controlled manually using electrical switches for this the person needs to come near the aquarium and manually control the electrical switches to turn on /off the equipment's. The fishes needs to be fed twice a day even this requires the owner to walk up to fish tank and feed the fish manually which makes the task of maintaining an aquarium much more difficult. At times when the owner is on vacation he has no control over the aquarium and also can't feed the fish. The project with which we came up is a Smart Aquarium using sensors. 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. people who are 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. It will monitor the physical changes in the water and will maintain it to the ideal conditions, with required changes.

Temperature Sensing

Now you can check the temperature of water 24/7. Temperature of water changes every second we can check the temperature anytime automatically. It won't need any manual check it will be checked every second and the results will be displayed on the LCD screen. You can even set the temperature level to a certain level when the temperature goes above the level the fan will automatically switch on helping to maintain the temperature.

Fish Feeder

People who leave early and may not have time to feed fish in the morning, or they might not get time feeding fish. Automatic fish feeder will help feed fish automatically as per the timings set. It can feed fish as per your

requirements your requirements can be anything for example feeding time, you can feed fish many times in a day.

Water Circulating System with Heater

Most of the time when adding a heater to water will cause water to overheat. This will result in fish being burned, lack of breathing, makes it hard for fish to survive under water. This system will help water heat more efficiently, circulates heated water, no chance of breaking heater, no chance of fish being burned.

The science behind water power is called Pascal's standard. Basically, in light of the fact that the fluid in the pipe is incompressible, the weight must remain consistent right through it, notwithstanding when you're pushing it hard toward one side or the other. Presently weight is characterized as the power acting per unit of region. So in the event that we press down with a little power on a little zone, at the limited finish of the cylinder on the left, there must be huge power acting upward on the bigger region cylinder on the privilege to keep the weight equivalent. That is the manner by which the power winds up amplified.

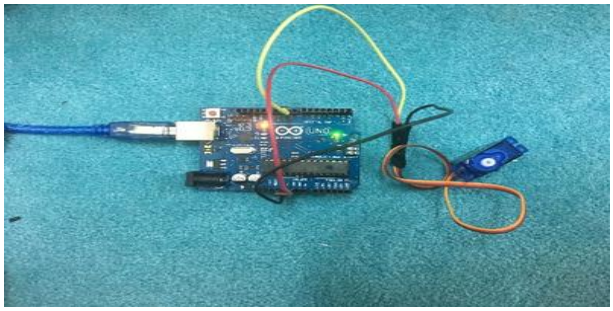
2. METHODOLOGY

2.1 DESIGN CONCEPTS AND CONSIDERATIONS

Fish Feeder

Wire using an empty small bottle and your drill, drill a small hole on both sides of the bottle. This is where the food will fall out, so you should test if food falls out by filling it up, and rotating it while holding it horizontally. Drill a hole small enough so only 1-5 pellets fall out, depending on the size or number of fish you have. Wire the servo with Arduino Uno Connect Yellow or data to PIN 9, Connect Black to GND, Connect Red to +5V on Arduino board. You can set timings on Arduino board by programing it using a computer. Once Arduino is programed it will work as per your requirements. If the set timing is (long FISHFEEDER = 43200000; long end time; long no) this means that your fish will be given food every 12 hours. Timings should always be given in milliseconds when coding Arduino.

The motor will spin every 12 hours. And if you want you can even spin a motor at any degree. The motor is used to drive the feeder element. First Cut a square just big enough to add your servo through, it should be very tight next get your hot glue gun and glue both the binder clips to the back of your case. Try to line them up as best as you can, they will clip to the back of your aquarium. Next take some hot glue and glue a servo horn to the bottom of your shampoo bottle. Put the servo horn back onto the servo. imply fit all the electronics into the case, and wedge the servo in last.

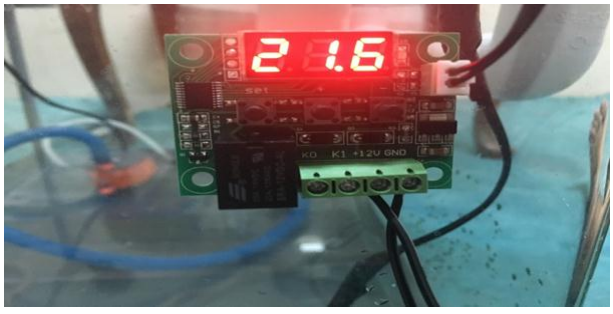


Temperature Controlling

The main purpose of Temperature Controller is to control the temperature of an Aquarium whose temperature keeps fluctuating and thus requires a constant watch on the Aquarium. The use of this system eliminates constant watching on the aquarium by self-controlling the temperature of the system.

LCD display is used to display the temperature and when the temperature exceeds the set limit, the fan is switched on in order to control the temperature.

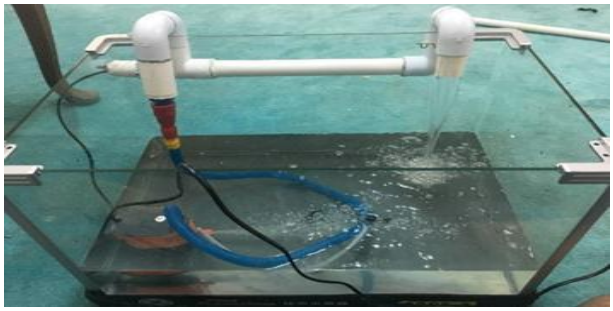
After the Fan is switched ON, it remains ON until the temperature reaches below the exceed limit. Thus the system keeps on switching ON/OFF the Fan for automatically controlling the temperature of the system. The system uses a temperature sensor in order to detect temperature and pass on the data to the microcontroller. Microcontroller processes data and sends the temperature to be displayed on LCD screen. It consists of 3 push buttons for setting, high and low temperatures. Pressing set button allows user to increment and decrement high and low temperatures. After that the system detects temperature and switches the load when it goes beyond set limits.



Water Circulating System with Heater

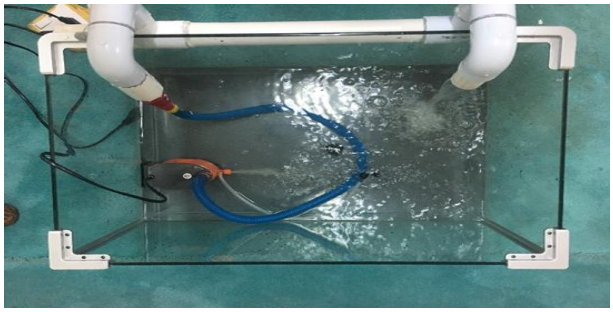
Water pump is used to pump water from aquarium to pipes which were fitted for circulation. Heater inside pipe will heat the water as its pumped form aquarium by water pump the water goes through heater inside pipe and then is

given out back to aquarium. This way water will stay at a constant temperature, the heat will be distributed equally inside water, and no fishes will be burned, no risk of breaking heater.



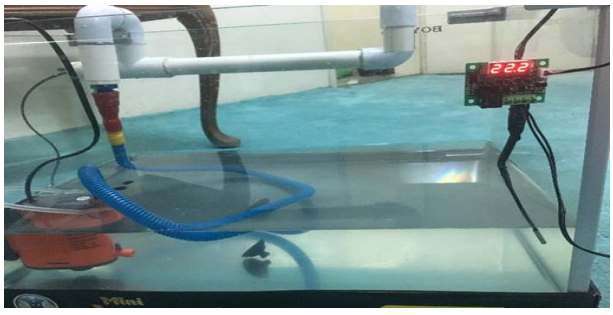
3. RESULTS AND DISCUSSION

We have developed an automated aquarium which controls parameters such as temperature; we have incorporated an automatic feeder. LCD module is used to display the values of the temperature. We have made water circulation system with a heater which will help water heat more efficiently, and no chance of fish being burned.



4. CONCLUSION

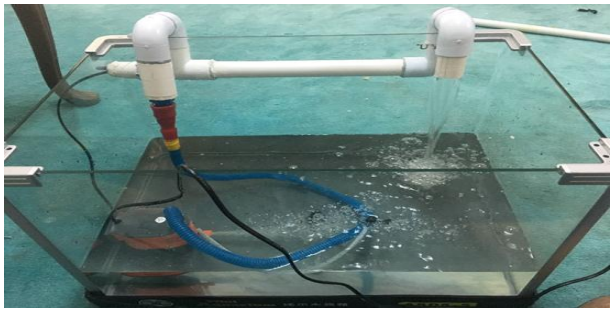
We started off the project with the aim to accomplish the simple looking task of designing an automatic aquarium. The basic idea proposed in this project works well and can be implemented on large scale industries like fish cultivation, commercial fisheries etc. Having a Smart Aquarium will save our time and we would not have to be worried for our fish and their aquariums for long time. Since PLC is used as the controller, many aquariums can be automated using a single PLC. Though we are able to achieve all the goals of our project but still we think that lots of advancement can be done on this project. For advancements, we need more time, money and hard work.



5. FUTURE WORKS

As the aquarium needs 24/7 constant power to work, lots of power is consumed. So in order to reduce this, solar cells or panels can be used to get the constant power, which in case of any power failure doesn't stop the working of

the aquarium. GSM module can be used for sending the report on the aquarist's cell number. Dead fish removal can be accomplished with the help of a robotic arm. It can be applied in the field of aquaponics, where water from an aquaculture system is fed to a hydroponic system and the by-products are broken down by nitrifying bacteria into nitrates and nitrites, which are utilized by the plants as nutrients, and the water is then re- circulated back to the aquaculture system.



REFERENCES

[1] https://www.ukaps.org/forum/threads/how-to-use-a-plc-to-control-your-fish-tank.42993/

[2] https://www.circuito.io/blog/arduino-code/

[3] https://www.instructables.com/id/Temperature-Sensor-With-Arduino-UNO/

[4] https://www.instructables.com/id/Automatic-Fish-Food-Feeder-using-Arduino-Uno/

[5] https://www.arduino.cc/en/Guide/ArduinoUno

[6] www.ijarem.org/papers/v3-i6/8.IJAREM-B236.pdf

[7] https://globaljournals.org/GJRE_Volume16/3-Development-of-Automatic-Fish.pdf

[8] http://engineering.nyu.edu/mechatronics/projects/projects/aquarium/Smart%20Aquarium%20System.pdf

[9] https://www.hackster.io/gut/aquarium-automation-deac12

[10] https://www.instructables.com/id/Program-Arduino-Uno-in-C-Language/

[11] https://howtomechatronics.com/tutorials/arduino/lcd-tutorial/

[12] http://www.circuitbasics.com/how-to-set-up-an-lcd-display-on-an-arduino/

[13] https://www.makerspaces.com/arduino-uno-tutorial-beginners/

[14] https://www.instructables.com/id/Automated-FARM-Arduino-fanlightswater-Pump/

[15] https://www.instructables.com/id/Breadboards-for-Beginners/