

IMPLEMENTATION OF SMART AQUARIUM MONITORING SYSTEM

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Abstract— Fishkeeping is a popular fad; almost people from all the age groups like to keep fish in their homes, offices, etc., for decoration purposes or as a hobby. Fishkeeping is itself an industry that comes in agriculture. Fishkeeping is not an easy job; we always need an aquarium or a pond for that. It has always been a headache to take care of the fish and aquariums because, during periodic intervals, water needs to be changed, the fish needs to be fed on time, the temperature, pH level and water level of the aquarium needs to be maintained. The project, “SMART AQUARIUM MONITORING SYSTEM” has been designed by keeping in mind, the problem of those who cannot take care of their aquarium every day. The aquarium will perform all the steps automatically like temperature control, light monitor, feeding, water level monitor and control, lightening control, etc., It will reduce the manual effort required in the maintenance of aquariums by automating the aquarium management process. Also, an automatic food feeding system operated by a servo motor mechanism which used to feed fishes on regular time intervals. To continuously check the aquarium’s status, the Arduino Mega board is chosen as a central board to collect data from sensors, process the data and declare whether the values are safe or exceeded the limit range indicating danger situation. Our project aims to replace manual maintenance of a fish aquarium with an Automated system by using Arduino.

Keywords— Embedded Systems, Smart Aquarium, technology.

I. 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 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.

The project with which we came up is an Automated Fish 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 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.

II. DESCRIPTION OF COMPONENTS

A. Hardware Components

SNo	Name of Component
1	ARDUINO MEGA 2560
2	pH Sensor
3	ds18b20 TEMPERATURE SENSOR
4	FLOAT SWITCH
5	SERVO MOTOR
6	WATER PUMP

7	LCD DISPLAY
8	LED
9	LDR
10	HEATER
11	DS1307 RTC
12	RELAY
13	Buzzer
14	GSM
15	SMPS

B. Software

Ardino IDE: The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.^[6]

Get the latest version from the download page. One can choose between the Installer (.exe) and the Zip packages. Installing the one that has software and Arduino Software (IDE), including the drivers is recommended. With the Zip package you need to install the drivers manually. The Zip file is also useful if you want to create a portable installation.

When the download finishes, proceed with the installation and please allow the driver installation process when you get a warning from the operating system.

The structure of Arduino program is pretty simple. Arduino programs have a minimum of 2 blocks,

Preparation & Execution

Each block has a set of statements enclosed in curly braces:

```
void setup( )
```

```
{
```

```
statements-1;
```

```
.
```

```
.
```

```
.
```

```
statement-n;
```

```
}
```

```
void loop ( )
```

```
{
```

```
statement-1;
```

```
.
```

```
statement-n;
```

```
}
```

III. WORKING

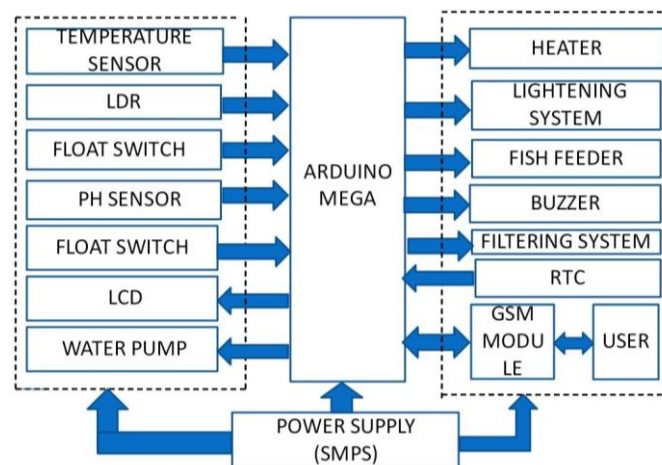


Fig. 1. Block Diagram

All the connections are given as per the circuit diagram. SMPS is chosen as a power supply because it takes 230 v ac input and gives 12V, 5A DC output. Some of the components like water

pumps, temperature sensor, servo motor require 5 V DC, and ph sensor requires 9 volts, and lightening system and 12V DC water pump requires 12 V DC INPUT where directly from SMPS it can be provided. Other components will get their respective voltage with the help of regulators, SMPS input given to the respective components. When the power supply is given, all the components get activated, the Arduino starts to collect data from various sensors and process them and says whether the values are in the permissible limits or not, if not in permissible limits buzzer gets activated indicating danger and Arduino sends commands to output devices like water pump gets on for specific amount of time until the water level reaches to the safe point, and if the temperature gets low, heater gets on, and if ph values go low or high, some of the water from the aquarium is taken out and freshwater is filled until the ph gets balanced, continuously aquarium water is pumped to the filtering system to remove any toxins and chemicals or bacteria and to make the environment safe for the fished . the LDR will continuously monitor the light intensity and sends its values to the Arduino, if the light intensity is low that is during the dark Arduino sends the commands to lightening system and the lightening system gets turned on, meanwhile all the data from components will be displayed on the LCD respectively and data values are sent to the user as well with the help of GSM .

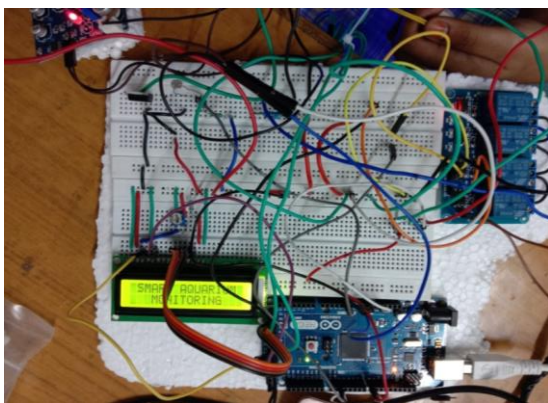
help of Ph monitoring , whenever the ph levels goes high or low , we can change the water and add certain chemicals to maintain the ph.

- With the help of fish feeder, we can replace the manual maintenance with automatic system.
- In this way, with the help of “SMART AQUARIUM MONITORING SYSTEM” can maintain the ideal conditions of the aquarium required for a healthy and happy fish.

IV. APPLICATIONS

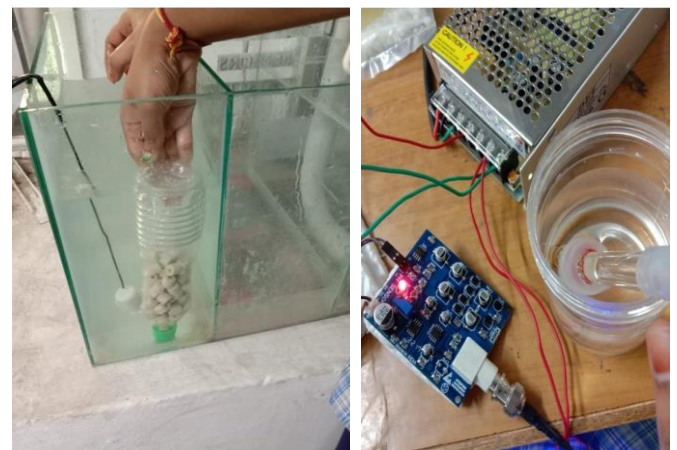
- Home
- Aquarium shops
- Ponds
- Lakes
- Seas
- Oceans

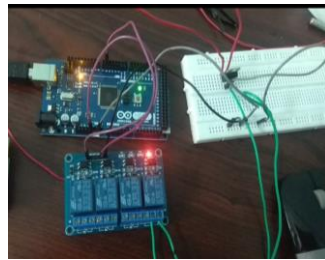
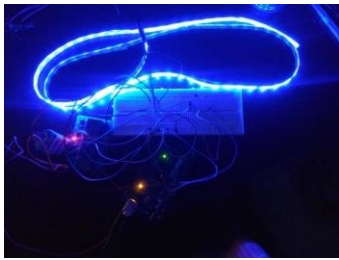
V. RESULTS



IV. ADVANTAGES

- If the temperature goes high , the metabolism of the fishes increases ,oxygen levels decreases and fishes get suffocated and if the temperature goes low their metabolism goes low and they become inactive. So with the help of temperature sensor, we can continuously monitor the aquarium temperature, and do necessary changes.
- If the ph goes high or low , the toxins gets accumulated in the aquarium and fishes gills gets effected , face respiratory problems , get prone to severe diseases and finally die .with the





VI. CONCLUSION

We started off the project with aim to accomplish the simple looking task of designing an automatic aquarium (SMART Aquarium). But with time and experiences it was learnt that this was not at all an easy task, specially interfacing the sensors and GSM Mobile with the controller.

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. We have provided the platform and the platform is ready for everyone to work on it. For advancements, we need more time, money and hard work. Money would remain the critical issue cause in order to upgrade the project many of the stuff would need an up gradation.

Nevertheless this project has been a success as far as learning and practical implementation of Electronics concepts is concerned. The basic idea proposed in this project works well and can be implemented on large scale industries like agriculture etc. Having a SMART AQUARIUM MONITORING SYSTEM, will save our time and we would not have to be worried for our fish and their aquariums for long time.

VII. FUTURE SCOPE

Air Cooler:

Sometime the temperature of inside the aquarium or we can say the temperature of water increases in summers that's why fish die because of the sudden increase in the temperature. As there is nothing in the aquarium that could reduce the temperature when it has increased so a small air cooler or a fan can be used to decrease the temperature in case the temperature increases up.

Solar Cell:

As the aquarium needs 24/7 constant power in order to work so lots of power is consumed, GSM mobile also needs a separate constant power. Lots of power is utilized and it can be a burden on your pocket so in order to reduce this, solar cells or panels can be used to get the constant power. So that there will be no issue of over billing and burden on your pocket. If in se of power failure, the aquarium would not stop its work.

VIII. REFERENCES

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