AUTOMATIC FISH FEEDER AND WATER CHECKER

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled "**Automatic fish feeder and water checker**", submitted by **Minhaaz ahmmed rafsaan** to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on

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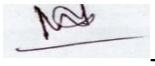

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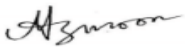

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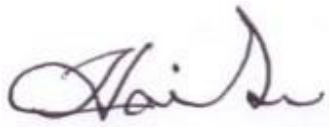

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ABSTRACT

Ornamental fish are a hobby that is very old in our country. Not too long in the past, this hobby was very expensive. But in the last few years, many fish farms have come up, in this sector too give us home raised fish. These fishes are hardier than the old exported fish, coz they are farmed here in this country. They are in many ways becoming more suitable, for our climate. Even if these fish farms are going at full force to make, this hobby more accessible for the vast majority of people. They still are facing a big problem in the upkeep of the tanks of these fishes. Some of these fishes require a very strict water temperature and purity, PH balance. To maintain this strict regime is to take on a monumental task. My projects try to lessen the load on these men and somewhat lessen the cost of, farming these fishes.

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CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

aquarium fish farming is one of the most growing businesses In Bangladesh. as this is a growing sector if we add technology to this sector, this business will change. Our economical system. is why I have developed a project, through which the aquarium fish farming will be monitored and the device will provide necessary foods time to time.

1.2 MOTIVATION

Fish farming occupies a large part of the food production sector in Bangladesh. At present, fish is not just for meeting food needs, Many people are farming fish as a hobby in aquariums. However, there are some problems in fish farming in aquariums. Since these fish are somewhat weak and not suitable for direct cultivation in our climate, they are cultivated with special care. This is why I created this device that will work to maintain their proper environment in the aquarium. It will always monitor the temperature of the water, warn of any contamination in the water and provide fish feed at regular intervals.

1.3 OBJECTIVE

The main objectives of this project are:
Always monitor the temperature of aquarium. Always monitor if there is any contamination in the water. Provide fish feed at regular intervals.

1.4 EXPECTED OUTCOME

The device will be connected to the aquarium. the power consumption of this device will be very low. the device will run 24/7. It will always monitor the temperature of the water, give a warning message of any kind of contamination, and feed the fishes continuously from time to time.

1.5 REPORT LAYOUT

The report is compounded with six chapters in total. The first two are introductory and necessary explanations of the technical terms that we need to have our concept clear to gather a sound understanding in the latter part of the report. The third chapter is mainly on the required and specified elements., The fourth chapter of the report contains the research methodology of system design and implementation, it contains-

- Front-end design. It's been described with examples and figures that explain-
- Setup and implementation of all the components.
- Back-end design.
- Completed machine model (beta version).

Afterward, we will discuss the result that we obtained from the model along with the report. We'll also present a final outcome. Finally, we drew a conclusion on our project and discuss on the future scope.

CHAPTER 2
BACKGROUND ANALYSIS

2.1 INTRODUCTION

Arduino and the embedded system have made DIY projects easier. This project is mainly focused on aquarium-based fish farming, basically, it is called biofloc fish farming. In this farming project, fishes need extra care, Especially fishes that are not used to living in our regular fishing environment. They need proper temperature control and perfect water purity. Also, they need to be fed from time to time. This project is mainly focused on this specific fish farming process. It Monitors the temperature and pollution in water. It gives a warning signal if found any unusual reading in the system. As these fishes need extra care and food in perfect time. My device will provide food from time to time.

2.2 RELATED WORK

There are several devices for biofloc/aquarium fish farming. Like “Water Heating Machine”[1]. What this device does is, if the temperature falls, it will heat the water. “Osmosia Automatic Fish Feeder Machine”[2], will feed the fish. But to feed the fish, the machine needs to be triggered. Again, air-pump[3] are being used to keep the water clean, but can’t monitor the water purity. All these machines are individual, need to be set up individually. But my device is completely different from these existing devices and also works on three features combined in a single device.

2.3 COMPERATIVE STUDIES

As this Aquarium fish farming is a totally new concept in our country, there’s less to study. I had to learn about the nature of water in fish farming. Also have to learn about different types of fishes, in which condition of water they can grow comfortably. After that, I had to learn microcontrollers and embedded systems deeply. Needed to research different components and sensors and finally select the suitable components. I found a “water

turbidity Sensor"[4]. It will be used to measure water purity. I had to go through its reading and collect the data on different types of water

2.4 SCOPE

There is a huge scope of this project. As this type of fish farming is growing, farmers will have to suffer less in cultivation with this project. Also, this device is compact and has low power consumption. So, there will be less production cost. If the device is commercially produced, it will take a strong place in the market.

2.5 CHALLENGES

I have faced some challenges while developing this project. As I have used the embedded systems and different components to develop the project, challenges I have faced:

- Study embedded systems and microcontrollers deeply to find the suitable component.
- All of the components are not available in our local market
- Components of the different companies use different libraries, had to find the suitable library function.
- It was tough to manage a farming aquarium to study.
- As farming aquariums and fishes are being farmed are costly and sensitive, had to take the risk to implement the project.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 BUSINESS PROCESS MODEL

This device will be connected to the aquarium. The device will be powered with a 5v power supply unit and will be on 24/7. The device will have three working functions. It will monitor the water purity and display on LCD whether the water status is pure or polluted. Always display the water temperature. And the last function will be, controlling the feeder machine. It will feed fish from time to time.

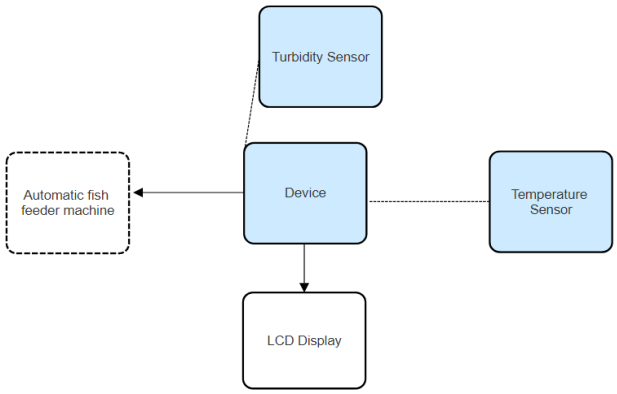

Figure 3.1: Business process model

3.2 USE-CASE MODELING & DESCRIPTION

Here the device will be automated. It will react with the aquarium environment and display the water condition. Also, the feeder machine will be activated from time to time.

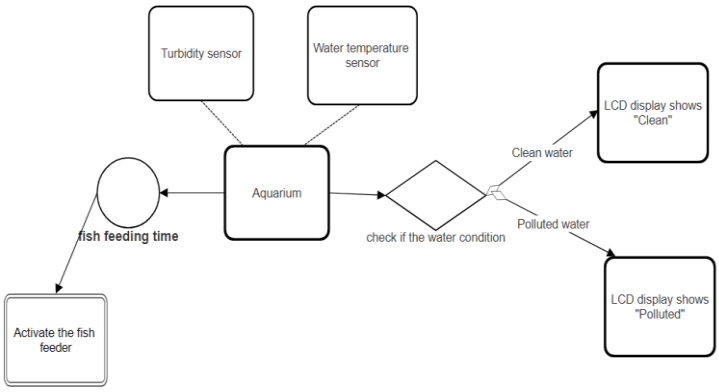

Figure 3.2 : Use case model

3.3 REQUIRMENT COLLECTION & ANALYSIS

I have to use the following pieces of equipment to develop this project:

- Arduino uno R3
- Water Turbidity Sensor
- Waterproof temperature sensor
- Servo motor
- LCD Display with i2c
- Jumper wire
- 5v DC power supply
- Fish aquarium.

3.3.1 ARDUINO UNO R3:

Arduino uno R3 is the basic development board for DIY proto-type projects. This is a small but effective microcontroller to develop such projects. It is programmed with "Arduino IDE" and the language is "Embedded C"

Figure 3.3: Arduino UNO R3

3.3.2 Water Turbidity Sensor:

Turbidity is the unit of the obscurity of a liquid. When light passes through water, due to some nanoparticles mixed in water, light gets scattered. The turbidity sensor has two parts. Transmitter and receiver. It works with this basic principle of light. Monitor the scatter of light and output the dat**a** as a digital signal.

Figure 3.4 : Water Turbidity Sensor

3.3.3 Waterproof temperature Sensor:

It is a sensor to measure the temperature and is waterproof. It runs on 5v power supply and provides an analog output.

Figure 3.5 : Waterproof temperature Sensor

3.3.4 Servo Motor:

Servo motor is a motor with arms. It's arm can be programmed and move from 0 degree

to 360 degree.

Figure 3.6: Servo Motor

3.3.5 LCD display with i2c:

This is a 16x2 LCD display screen with I2C interface. It is able to display 16x2 characters on 2 lines, white characters on blue background. Usually, Arduino LCD display projects will run out of pin resources easily, especially with Arduino Uno.

I have used 16x2 LCD display. It can display 32 ASCII characters in two lines with 16 characters in each line.

Figure 3.7 : LCD display with i2c

3.3.6 Jumper wire:

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are used to connect the components with arduino without any soldering.

Figure 3.8: Jumper wire

3.3.7 5v DC power supply:

5V power supplies or 5VDC power supplies are one of the most common power supplies in use today. Linear regulated 5VDC power supplies regulate the output using a dissipative regulating circuit.

Figure 3.9: power supply

3.3.8 Fish Aquarium:

Breeding tank, a fish aquarium is a small unit of the pond. It is a transparent structure, where the movement of fishes is visible.

Figure 3.10: fish aquarium

CHAPTER 4

SYSTEM DESIGN AND IMPLEMENTATION

4.1 Front-End design

Front end design:

- Front end design includes:
- Setting up the “Water Turbidity Sensor”
- Setting up the “Waterproof Temperature Sensor”
- Setting up the servo motor
- Setting up the LCD display.

4.1.1 Setting up the water Turbidity Sensor:

The turbidity sensor has 3 wires. VCC, GND, and AO(Analog output). We have to connect the VCC pin with Arduino’s 5v pin, GND pin with Arduino’s ground pin, and AO pin with Arduino’s analog A pin.

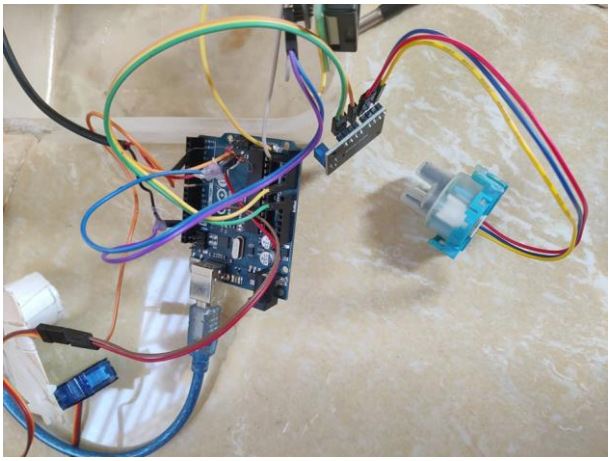

figure 4.1: Aurduino uno with water turbidity sensor

4.1.2 Setting up the waterproof temperature sensor:

The waterproof temperature sensor has 3 pins. VCC, GND, and O. We have to connect the VCC pin with Arduino's 5v pin, GND pin with Arduino's ground pin and O pin with Arduino's any data pin to get data.

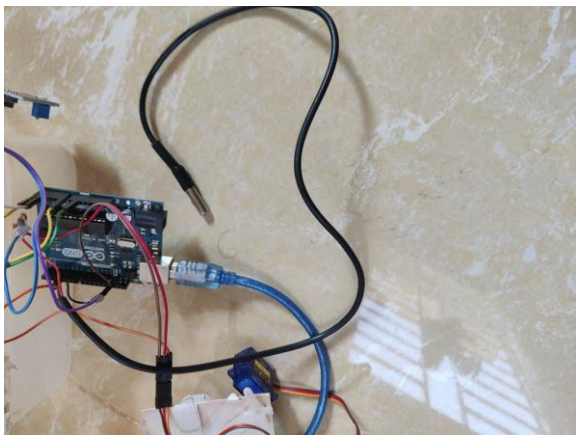

figure 4.2: Arduino uno with waterproof temperature sensor

4.1.3 Setting up the Servo Motor:

Servo motor also has 3 pins. VCC, GND, and D. We have to connect the VCC pin with Arduino's 5v pin, GND pin with Arduino's ground pin, and D pin with any data pin to provide input value.

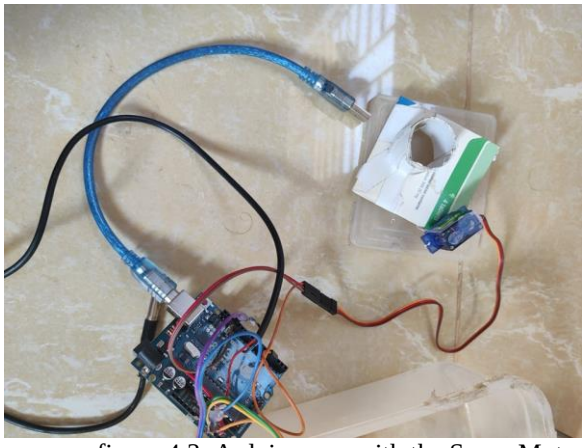

figure 4.3: Arduino uno with the Servo Motor

4.2 Setting up the LCD display

LCD display with i2c has 4 pinouts. VCC, GND, SDA, and SCL pin. We have to connect the VCC pin with Arduino's 5v pin, GND pin with Arduino's ground pin. SDA is a serial data pin and SCL is a serial clock pin, we have to connect SDA with Arduino's SCL pin, and SCL pin with Arduino's SDA pin[6].

figure 4.4: Arduino uno with the LCD display

4.3 Back-End Design

For the design of the back end, I have used "Arduino IDE", as I am using Arduino UNO R3 as the primary development board.

- Set up water turbidity sensor:

```
void setup() {
  Serial.begin(9600);

}
void loop() {
  int sensorValue = analogRead(A0);
  float voltage = sensorValue * (5.0 / 1024.0);

  Serial.println ("Sensor Output (V):");
  Serial.println (voltage);
  Serial.println();
  delay(1000);
}
```

figure 4.5: Set up water turbidity sensor

- Set up waterproof temperature sensor

```
#include <OneWire.h>
#include <DallasTemperature.h>

```

```
void loop(void)
{
  sensors.requestTemperatures();
  Celcius=sensors.getTempCByIndex(0);
  Fahrenheit=sensors.toFahrenheit(Celcius);
  Serial.print(" C  ");
  Serial.print(Celcius);
  Serial.print(" F  ");
  Serial.println(Fahrenheit);
  delay(1000);
}
```

figure 4.6: Set up waterproof temperature sensor

- Set up servo motor

```
#include <Servo.h>

Servo myservo;  //
```

```
void loop(){
   // Make servo go to 0 degrees
   Servo1.write(0);
   delay(1000);
   // Make servo go to 90 degrees
   Servo1.write(90);
   delay(1000);
```

figure 4.7: Setting up the Servo Motor

- Set up LCD display

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27,20,4);
```

figure 4.8: Setting up the LCD display

4.4 Complete setup of the project

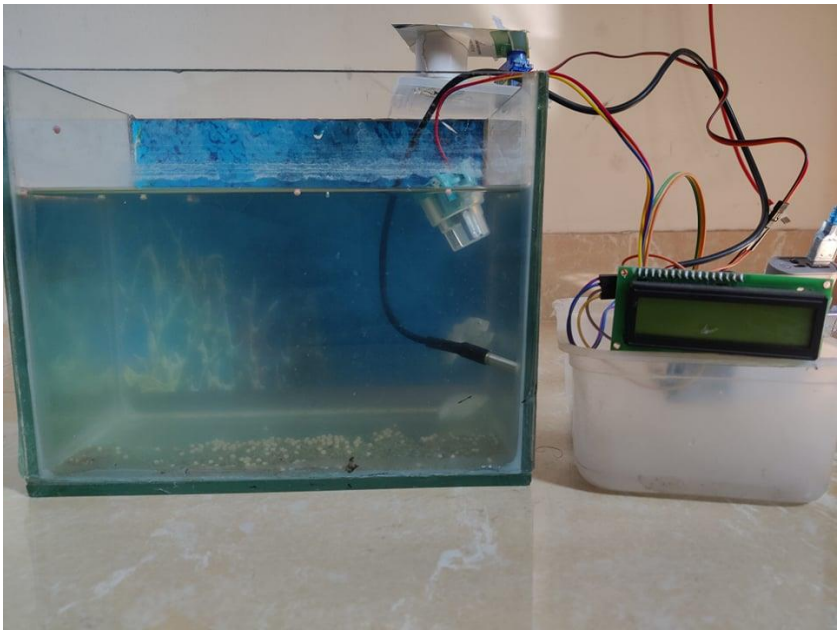

figure 4.9: complete set up of the project

CHAPTER 5

TESTING AND DISCUSSION

5.1 Testing & Discussion:

Implementation of front end design
All the components are connected with Arduino. The turbidity sensor is powered up, the temperature sensor is also providing data. The servo motor is also activating the feeder machine.

5.2 Test Result and Reports:

Test Case	Resul	Comment
Mix impurity in water	LCD shows “Pure”	Turbidity sensor not working
Mix impurity in water	LCD shows “Pure”	The turbidity sensor is working
Mix slight warm water	LCD shows temperature change	The temperature sensor is working
Load the feeder	Servo moves in every 5 sec	Servo motor is working

5.3 Final output

The turbidity sensor is working perfectly. Also the temperature sensor. The LCD display is working and showing all the sensor data. The servo is working perfectly, activating the feeder from time to time.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and Conclusion:

My device is working as per implementation. It is monitoring the water purity 24/7 and shows the results on the LCD display. If the water is pure, it shows “Clean water” and if not, it shows “Polluted” on the LCD display. The automatic feeder is also working perfectly. As this is a prototype project, it can’t be implemented on a large aquarium, but it has scopes for development. If this project is produced commercially, it would be a very helpfull device for biofloc fish farmers.

6.2 Scope for Further Developments

Different fuctions can be added to this project. As this device only shows the water purity, it can be develpoed with actuators to remove the dirts. Also it only monitors water temperature. A water heater function can be added, so that it can heat water during winter.

Appendix

Appendix -A

List of the equipment with their basic use:

Arduino UNO R3: Embedded system development board

Water turbidity sensor: Monitors the water purity

Temperature sensor: Monitors temperature

Servo motor: Motor with programmable arm

LCD display: Displays ASCII characters

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