SWE3999 - Technical Answers to Real World Problems (TARP)

Project Report

Automatic Fish Feeder

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M.Tech Software Engineering
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Submitted to

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(Deemed to be University under section 3 of UGC Act, 1956)

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DECLARATION

I hereby declare that the report titled "**Automatic Fish Feeder"** submitted by me to VIT Chennai is a record of bona-fide work undertaken by me under the supervision of **Dr.Geetha S**, School of Computer Science and Engineering, Vellore Institute of Technology, Chennai.

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Certified that this project report entitled "**Automatic Fish Feeder"** is a bonafide work of **Sneha Priya RN(18MIS1002), Sandhiya S(18MIS1017), Raksha S(18MIS1090), Aishwariya Subakkar(18MIS1108), CM Yuktha Sri(18MIS1110)** and they carried out the Project work under my supervision and guidance for SWE3999 - Technical Answers to Real World Problems (TARP).

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ABSTRACT

Over the years automatic fish feeder has gained huge attention and has grown in popularity. Automatic fish feeders are electronic devices capable of dispensing fish food automatically. They consist of timing circuitry to keep track of time and a trigger or switch to activate the dispensing mechanism which usually employs a motor. The amount of food dispensed is controlled by user depending on the slit size Automatic fish feeders helps the owners when they busy out of house and often come in handy. We need to ensure there is enough feed in the tank. This paper talk about the design and construction of an automatic fish feeder from readily available materials.

CONTENTS

Automatic Fish Feeder

Abstract— Over the years automatic fish feeder has gained huge attention and has grown in popularity. Automatic fish feeders are electronic devices capable of dispensing fish food automatically. They consist of timing circuitry to keep track of time and a trigger or switch to activate the dispensing mechanism which usually employs a motor. The amount of food dispensed is controlled by user depending on the slit size Automatic fish feeders helps the owners when they busy out of house and often come in handy. We need to ensure there is enough feed in the tank. This paper talk about the design and construction of an automatic fish feeder from readily available materials.

Keywords— Arduino UNO, automatic fish feeder; aquarium; fish ponds; feeding)

1.Introduction:

This report gives a detailed processing of design, build, and test an automated used for automatic fish feeder.Later we have described the process of specification followed by design, system design,and Implementation.

Over the last few decades Pet ownership in India has increased by 14 percentage.Before the extended peroid it is not feasible for fish owners to leave extra food in their fish's tank and fish fatality is due to overfeeding. There are many feeding devices for cats and dogs, but we have limited devices for fish. Natural food is already available in the pond. It may include detritus, bacteria, plankton.How much artificial food should be distributed regularly to each pond is highly diffcult to determine. To obtain the best results the quality of water in that pond plays an important role. During long vacation it is also not feasible for fish owners to feed them in a properly .The flow of water fish ponds discusses on how every day should be monitored. Food is the important element for growth and production. The management of feeding is one of the main challenges for aquaculture development. Fish have a feeding schedule of once per day, making it as simple as that for the fish owner when they are away from home. Thus, there is a need for an automated device that can reliably feed a fish. Thus, an automatic fish feeder might be used which provides proper timely feeding at predetermined time and at the same time environment is monitored and maintained appropriately.

1.1 Objective and goal of the project:

Feeding a fish daily on a reagular basis is quite diffculty for fish owners away from home, whether

it be for school, work, or leisure. So,this is where the need for automatic feed fisher comes into play.This system feed the fish effectively based on time. The main objective of this project is to ensure proper food is fed to the fish effectively based on time.Our goal is to design and develop automatic fish feeder especially during the owner's abesences.

1.2 Problem Statement :

In this fast moving phase, there are many type of automatic fish feeder available on the market.This help people who leads a busy life especially those who are away on business or vacation. For busy people away from home it is often difficult to maintain a regular feeding schedule. However, for the fish survival, the fish require regular care in order to remain healthy. At regular intervals are not feed properly then it may die due to starvation.On the other hand feeding too much of food can easliy clog up the tank and cause the owners to spend more time cleaning the aquarium tank. By which Automatic fish feeder comes into play. The system of the device must be able to be controlled or adjusted by user according to their demand and needs. As referring to "automatic" word itself, the device or more appropriate, the feeder should be able to be operated without supervision of human at least at certain interval of time.In this project we have worked with automatic fish feeder which will help the pet owner free from feeding.

2.Literature Survey:

There are various kinds of automated fish feeders available on the market. We aim to design a feeder in a cost effective manner upon the current systems. Below are three products currently on the market. The first system is the eBoTrade Aquarium Auto Fish Food Timer. This device is shown in Figure 1 below.

Figure1: The eBoTrade Aquarium Auto Fish Feeder

This feeder has a timer that can feed one and four times per day, the available functionalities of the feeder are manual and automatic capabilities, an adjustable serving size, in order to keep the food dry a ventilation system is used.This system has a rotator on the bottom will open to allow the proper amount of food to be released into the tank (Fish feeder, automatic fish feeder, eBoTrade aquarium tank auto fish food timer.). This system has mixed reviews on Amazon. The main disadvantage of this system is that the mounting system is not very stable so the user must be careful not to bump it, and the door would not open when expected. The second system is the EHEIM Automatic Feeding Unit. This device, rotates the food tank to feed the food. The system is pictured in Figure 2 below. The EHEIM Automatic Feeding Unit features an adjustable opening for different serving sizes a manual snack option, a food reservoir large enough to feed for six weeks, and up to eight feedings per day (EHEIM automatic feeding

unit.). The system has many customer reviews on both Amazon and the Petco website; some of the negative reviews were that it was difficult to get the appropriate amount of food to 4 come out and that as the device rotates it dumps some food onto the tank's cover resulting in both a mess and waste.

Figure 2: The EHEIM Automatic Feeding Unit

The final system that we will discuss is the Hydor Ekomixo Digital Aquarium Feeder. An image of the system is shown in Figure 3 below. The system features the versatility of dispensing flakes, pellets, and tablets, vibrations to prevent clumping, and 10 different dosage settings 5 (Hydor ekomixo digital aquarium feeder.). User reviews are less for the Hydor Ekomixo Digital, but the one provided are not very positive. The system appears to clog easily, and allow moisture into the food reservoir if left for more than a long weekend.

Development and Performance Evaluation of an Automatic Fish Feeder .The System is cost effective and operation of the feeder does not require high level knowledge. The feeder evaluation is based on feed conversion ratio (FCR) and feeding efficiency (FE).

Figure 3: The Hydor Ekomixo Digital

Design and Construction of Automatic Fish Feeder using Atmel 8052 Microcontroller. A pre-set time is required by user followed by a control system is attached to the device allowing the fish to be fed at. The machine perfectly manages and preserves feed under conditions.

3.Requriment Specification:

The following components are used in this project:

3.1 Hardware:

Node MCU

Servo Motor

Jumper Wires

3.2 Software :

The Arduino code written in C++ is uploaded to the Arduino so that the information received from the sensors is processed to get the desired output.

4. System Design:

4.1 Components

4.1.1 Servomotor

A servomotor is a device or an actuator which creates a rotatory motion or the linear motion based on the requirement of the user i.e., the based on the program written and then create acceleration and

velocity which also depends on the code which is written. This servo motor also has the sensor which helps in giving the feedback of the position to which the rotation or the linear motion has taken place. This feedback can be seen on the serial monitor which shows the position of the motion in our case we are using rotatory motion to move the slit to-and-fro for the fish food to fall down.

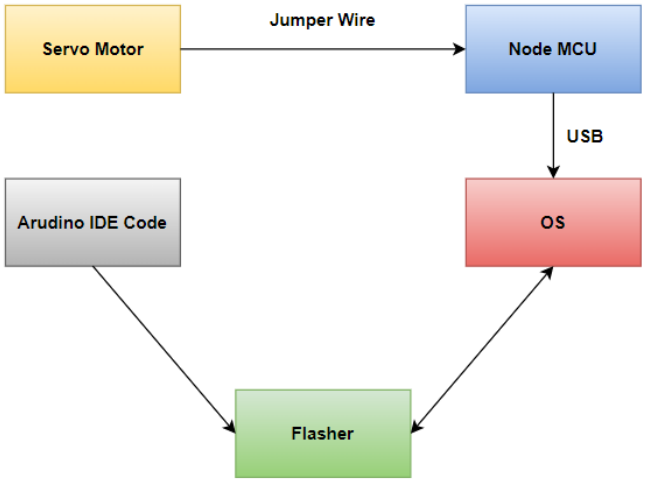
4.1.2 NodeMCU ESP8266 Wi-Fi Module

This NodeMCU is a development board which is developed open source. This has the firmware which consists of the ESP8266 module which can be programmed using the Arduino IDE. By programming the logic which is just a few lines of code, the connection can be easily established for a Wi-Fi connection and the input and the output pins can be defines correctly according to the use case and application where the NodeMCU is used. One can easily have a webserver based on the Wi-Fi modules for different functionalities to be performed based on user needs. With the help of the Wi-Fi module, we can easily use and navigate anything from any distance.

4.1.3 Jumper Wires

These are the wires with connecter pins in both the ends of it. This enables the ability to connect the pin to two different points without having it to solder it which is very hectic to both solder and to remove it back if there are any changes which has to be done. This are mostly used in cases like connecting small electric and mechanical items and other prototyping tools in order to make the process of connecting easy. The circuit can also be modified if required. Jumper wires are known for their simplicity of the usage.

4.2 Architecture



- Initially the servo motor is connected to the NodeMCU ESP8266 Wi-Fi module using the jumper wires.
- The NodeMCU ESP8266 Wi-Fi module is then connected to the computer OS with the help of the USB cable from Type A to Type C cable through which the communication between the program written in the Arduino IDE are reached the NodeMCU ESP8266 Wi-Fi module board.
- The code is written in the Arduino IDE and then with the help of inbuilt driver and flasher via the OS it reaches the NodeMCU ESP8266 Wi-Fi module board. This process continues for every small change in the code

and after the successful compilation of the code which has been changed.

- In our case the operating system used is Windows 11 which basically helps in communication of the Arduino IDE Code with the NodeMCU ESP8266 Wi-Fi module.

4.3 Modules in the project:

Programming (both servomotor control and html page)

Embedding code into MCU

Assembling the components

4.3.1 Programming the servomotor motion

In this module, the code is written for the moment of the servomotor i.e., the rotatory motion of the servomotor for the food to fall down into the tank and to close when the enough amount of food is fed to the fish. This moment should be done with the association of the NodeMCU ESP8266 Wi-Fi board which defines the angle at which the rotatory motion is done which is basically is the moment. All these parameters are defined in the code which is written for the servomotor controlling process. The program is then embedded into the NodeMCU ESP8266 Wi-Fi board.

4.3.2 Programming the HTML web server page

In this module the code for the web server which connects with the NodeMCU ESP8266 Wi-Fi. This code consists of a small toggle which ranges from zero to 180 where zero is the closed condition of the slit and 180 is the full open condition of the slit. The changes in the web server are then reflected back to the NodeMCU ESP8266 Wi-Fi which then controls the motion of the servo motor.

4.3.3 Embedding the Code into NodeMCU

Once the code is written in the Arduino IDE, it is then compiled and then checked for the errors. If there are no compilation errors, it can be then loaded into the NodeMCU with the help of the drivers and flashers which are present in the Arduino IDE which performs with the help of the OS. Once the code is the embedded in the NodeMCU ESP8266 Wi-Fi successfully we can move on the next module. If there are any errors in the embedding, we can proceed to the next step.

4.3.4 Assembling the parts

Assembling of the parts means the connecting all the components in the required configuration. In our cases we are trying to assemble the NodeMCU ESP8266 Wi-Fi module, Servomotor, Jumper Wires with each other.

5. Implementation:

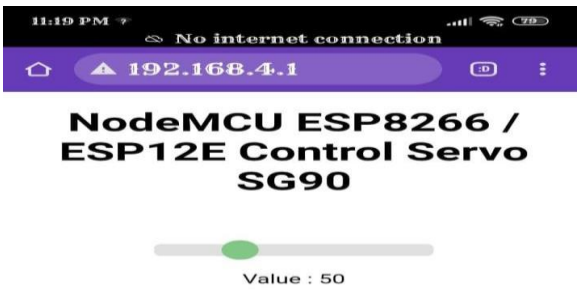
5.1 Process Step:

There are a series of processes and configuration which are done for the implementation. They are,

- Initially, from the board menu, the board manager is selected from which the ESP8266 is being selected. From the ESP8266 we select NodeMCU 1.0.
- The next setting is to select the COM port. In this the COM 4 is selected.
- Then after the code is being developed in the Arduino IDE, it is then compiled to check if

there are any error with respect to syntax before it can be loaded into the NodeMCU ESP8266.

- In the newer versions of the NodeMCU the CH34X driver is not included. So, that has to downloaded and has to be installed on the local system on which the Arduino IDE is running.
- Once there are no compilations error found in the code it can now be loaded into the NodeMCU ESP8266 with the help of simple USB cable with Type-A connected to computer and Type-B connected to the NodeMCU board.
- Once the code is successfully embedded in the board, the NodeMCU now has the servomotor controlling code and the web server code which helps in controlling the servomotor with the Wi-Fi module of the NodeMCU ESP8266.
- Now the NodeMCU ESP8266 is now connected to the servomotor with the help of the jumper wires. i.e., the D1 pin of the NodeMCU ESP8266 is connected to the one side of the jumper wire where the other side is connected to the ground of the servomotor.



- Now the servomotor has to be attached with a small slit which basically moves and helps in controlling the food flow into the aquarium.
- For the ease of both functionality and cost taking into consideration, we have used funnel to hold the fish food. So, the end of the funnel is placed on the top of the slit. So, when the slit tilts according the user input, the food falls down, and when the slit comes back to the original place it will stop.
- The IP config address of the global IP address to connect and to control the servomotor is 192.168.4.1 in our case.
- In that IP address there is a small toggle which ranges from 0 to 180 where in 0 is the closed position of the funnel and 180 is the total open position of the funnel which is determined by the slit i.e., when the slit is at 0 then the funnel is closed and when slit is at 180 it is totally opened.
- So, according to the number of fishes present, the slit can be opened at any angle between 0 to 180 using the toggle in the IP address. This position of the slit can be seen by the serial motor which is basically like the feedback from the sensor present in the motor.
- SO, when the user is going away on vacation, then they should initially fill the funnel before they leave and can control the flow of food from the far distances.
- Result:

5.2 Experimental Approach

- The approach which we basically followed is, using the NodeMCU ESP8266 which is a Wi-Fi module can be controllable from anywhere with the IP Address. This can be achieved by a web server from which the NodeMCU can be controlled to perform activities in the servo motor according to the user need.
- Servo motor is connected with a slit which basically moves to any position ranging from 0 to 180 according to user need which depends on the number of the fishes present in the tank.
- This slit is tightly placed below the end of the funnel which has the fish food. So, the greater the angle of the slit, the greater will be the amount of the food falling into the tank.
- This approach is both hassle free to implement and very cost effective to launch this in the market.

5.3 Experimental setup:

5.3.1 Web server of NodeMCU ESP8266 Wi-Fi module to control the server motor motion which in turn control the slit motion:

5.3.2: Total Setup of the automatic fish feeder:

6.Conclusion and Future Work:

The above describe work is one of the best and easy ways to feed the fish at the right cycle time. Nowadays, the entire fish owners have to buy more equipped products which costs more to handle any kind of work dealing with the feeding fish. So this research can reduce the owner's time and also automatically feeds the fish based on the time. The objectives of this research were successfully achieved. It is not easy to create an automatic fish feeder device. We also considered the balancing optimum cost with it practical usage as, in terms of selling the product, so the customer can buy an effective product at low cost. We already quoted some literature review to get the analysis on the component used in order to build a product. We also already have my design and also the initial idea on how everything will be put together. We already select the possible components and the project will continue with the creation of the devices.

We are about to work on how to use the GMS900 and connect it with the Arduino. We are about to create a temperature sensor and analyse the basic algorithm to be carried out and code it based on the requirement. At the same time, also need to make sure the device is stable and somewhat robust

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