

## **THE DEVELOPEMENT OF AUTOMATIC FISH FEEDER SYSTEM USING ARDUINO UNO**

**Sakshi Nirwan<sup>1</sup>, Ragini Swarnakar<sup>2</sup>, Aruna Jayarajan<sup>3</sup> and Prakruti Shah<sup>4</sup>**  
*<sup>1,2,3,4</sup>Electrical engineering, Navrachana University*

**Abstract** - The increase in growth of fish farming/aquaculture has led to a lot of research work in this field. Management of food delivered plays an important role here. The purpose of this research is to reduce the manual work and save labour time through making system automated. This is related to a system device which feeds the fishes with predetermined amount of food at the decided time. The principle of the working model is based on controlling the amount of food fed in the fish tank unit at different intervals of time. The prototype which is a combination of mechanical and electrical devices, uses the concept of step wise rotation of stepper motor for giving precise amount of food output in proper time thus, saving labour time. This helps in order to get good spreading of food across the water body and by own it feeds the fishes after a day, thereby making the system reliable and accurate.

The fish feeder system prototype is the technique which can be used in the aquaculture or fish farming if implemented on large scale.

**Key Words**- Arduino, baud rate, stepper motor, time delay

### **I. INTRODUCTION**

The scope behind developing the automatic fish feeding system is to reduce the manual fish feeding system which utilises more work forces. Moreover, there are certain advantages that lead to its development which are the amount of food that will be delivered to the water body that will measure or controlled keeping aquarium clean and fishes healthy. Feeders can feed the fishes even when the owner is away in a convenient way.

Based on the capabilities and functionalities, general battery operated fish feeder devices available in the market can only accommodate food like pellets, flakes and powder, so by adding additional container for accommodating natural fish foods like worms, water fleas etc makes the device more convenient in a way. The device also finds its application on medium scale fish pond by adding a blower to spread out the food evenly in the desired area. By incorporating the above points the automated fish feeder system can feed different kinds of fishes in a defined limited area [1]. The simple automated fish feeder systems which are employed are able to dispense the fish food of the desired amount at a constant speed. Employing constant speed results in spreading of the same amount of food irrespective of the requirements. Considering this drawback a new fish feeding system which is mostly used these days employs PWM technology for the speed regulation of the motor used [2].

This particular research paper is about the design and fabrication of an “Automatic Fish Feeder System using Arduino Uno” which finds its application in the aquarium. This device will dispense fish food at certain time interval with precise amount of food. Also the timing can be programmed to ensure that the feeding schedule is consistent. The automatic fish feeder is a solution to ensure that the pet fishes are fed in healthy way and on schedule. The prototype implements the integration of hardware and software to control the fish feeding operation. The controller used for this device is Arduino Uno microcontroller board. The controller controls the feeding mechanism of the system.

## II. METHODOLOGY

In designing the fish feeder several criteria like size of water body, amount of food and time interval which form the baseline for the design. The automatic fish feeder system is implemented using Arduino and prototype hardware is designed using both hardware and software.

Firstly, the information was collected regarding development of fish feeding system. The research was then bifurcated into software and hardware. In the later stage hardware and software both were fused. The data in the program was processed using Arduino and the output of the Arduino through an interface was given to the stepper motor.

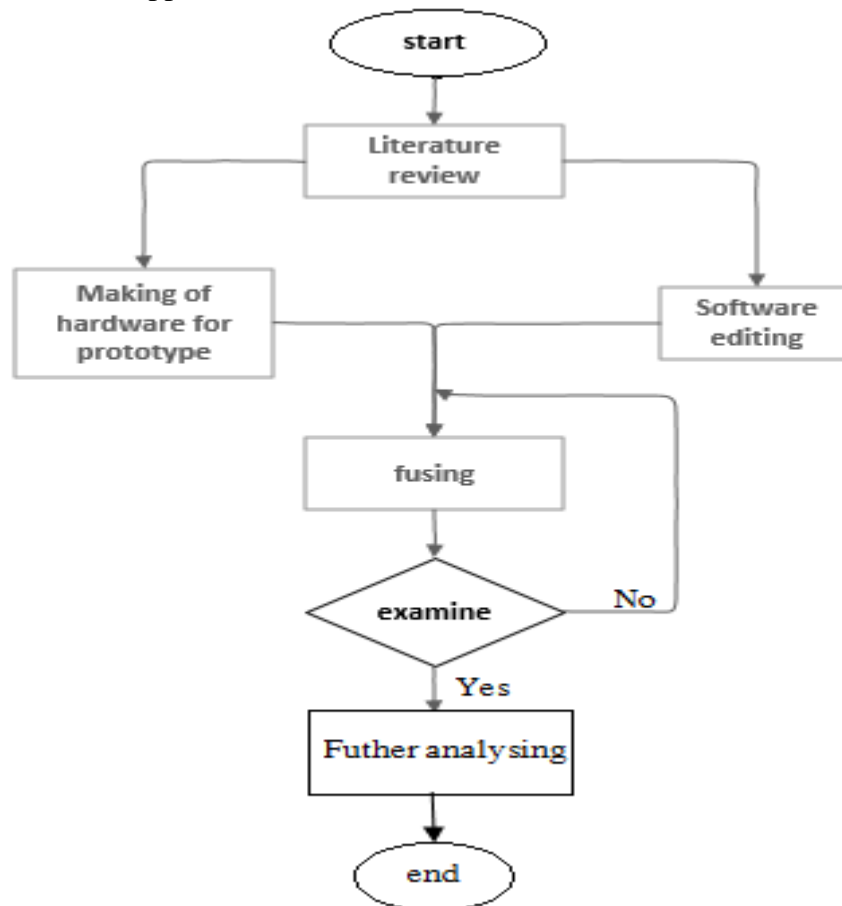


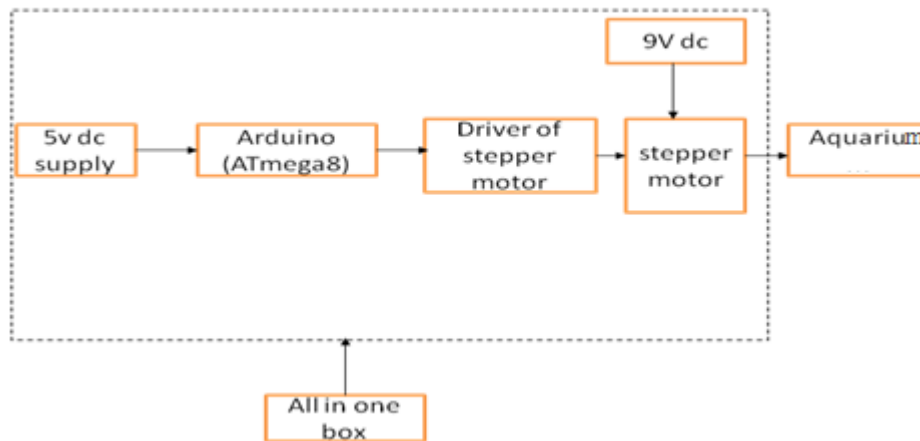
Figure 1: Flow Chart of the Automatic Fish Feeder System

### A. System Design

The design of the automatic fish feeder system ,consists of three important components that are Arduino, stepper motor andstepper motor driver .The Arduino works as the input for the design program and output for the stepper motor driver which provides the required set time and motor rotation .Apart from this, the motor driver plays an important role in delivering the output of Arduino to the stepper motor by stepping up the voltage level.

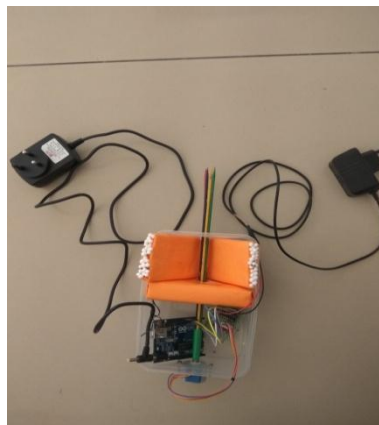
The components are:

1. Stepper motor- 28BYJ-48
2. Stepper motor driver- ULN2003
3. Arduino Uno
4. Adaptor -5v
5. Adaptor -9v



**Figure 2: Block diagram of the system**

## **B. Mechanical Design**



**Figure 3: Mechanical Design of the system**

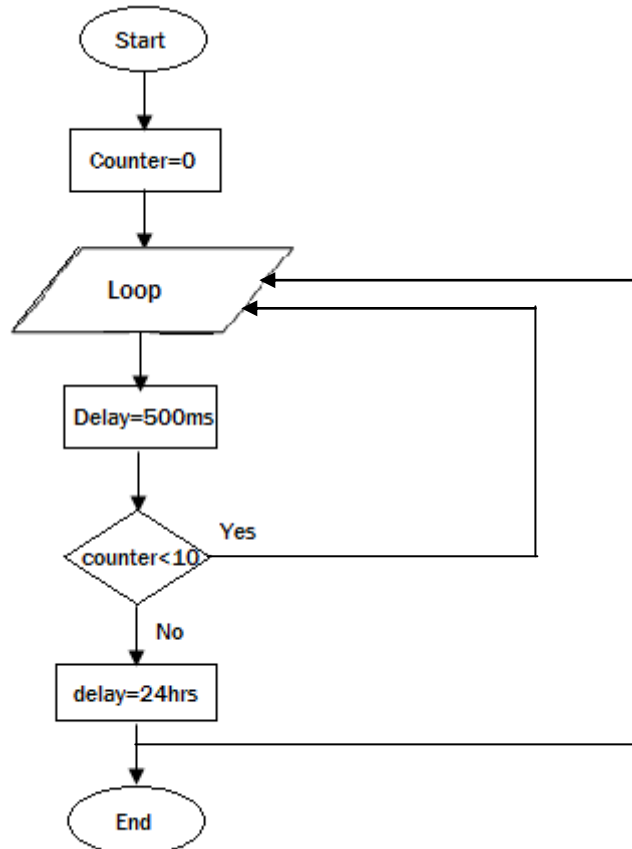
The stepper motors(24BYJ-48) are apparently widely used to control things which are automated. The fish feeder system is mounted in a box with all the hardware which are basically arduino, stepper motor with its driver . The all in one automatic fish feeder system works on the principle of the steps provided by the stepper motor in according to discrete time intervals(programming). The Arduino is loaded with the program usingArduino software. The program intended here is to rotate the stepper motor step wise giving certain time intervals or time delay. After the program is loaded in the arduino (which is supplied by 5v dc supply) the arduino is then connected to the motor driver that is motor driver ULN2003. This driver is further interfaced with the stepper motor through the pins available on the motor itself. Thus the program loaded in the arduino is then loaded to stepper motor and the step of the motor result in rotation in different time intervals. The stepper motor is mounted inside a box of required size. This arduino is kept on one part of the box , which is equally divide in to two halves. The other part of the box consists of the arrangement which has the cylindricallike structure which can rotate accordingly when connected to the rotor of the stepper motor . Now there is a hollow opening made on the other side of the all in one box with the help of a drill. The motor is fixed inside the box with the help of bolts. In short the whole box is drilled on one fixed horizontal axis. On the other end of the partition the food which is to be provided to the fishes is kept. Now when the rotor rotates the cylindricallike structure will also

rotate and through the opening on the other end the food will fall automatically depending on the steps of the stepper motor.

The program is made for stepper motor control for ten steps for demonstration. The program is coded in such a way that the motor will take ten steps after every 24 hours so for this in program delay is given for 86400000 milliseconds.

This program drives a unipolar stepper motor, The motor should take ten steps in one direction i.e.Clockwise direction.Counter is initialized to zero first. The numbers of steps are initialized to be 200 (interfaced to digital pins). Speed i.e. 60 rpm and baud rate i.e. 9600 for the serial port are defined. The loop is run with counter value comparison and with a set delay.

Thus the motor will start taking steps with the set speed of 60 when the counter starts incrementing, When the counter reaches top value 10, i.e. after ten revolutions there will be a delay of 24 hours and the program goes out of the loop. The loop is repeated again after 24 hours.



**Figure 4: Block diagram of the system**

### **III. RESULTS AND DISCUSSIONS**

As for the prototype which is a combination of both software and hardware, the outcome of the program had no discrepancy with the expected output. The program was made for the control of steps for the stepper motor. The result was that the motor took ten steps with the required delay(in milliseconds) delivering the required amount of food. C language is used for programming Arduino Uno present in the prototype. In C language, delay function is used to give delay. Delay is used to stop the execution of the program for a particular time i.e. for 24 hours. Delay which is given in the program is in milliseconds so as 1 second equal to 1000 milliseconds so therefore for 24 hours, delay is given equal to 86400000 milliseconds. Through delay in milliseconds function, delay is accurate to a millisecond. In

program even smaller delay compared to milliseconds can be given i.e. delay in microseconds where delay will be accurate to a microsecond. Moreover rotation of stepper motor was controlled in only one direction. As expected the stepper motor took 10 steps dispensing the required amount of food, in the water body. Also the steps of the motor and delay can be changed through the program.

Such delay in milliseconds or microseconds can be used for trivial programs as the program will become unresponsive during the delay time. So we can go for the option of timers too.

#### **IV. CONCLUSION**

It was observed that the motor revolved taking ten steps with delay of one whole day. The delay could also be extended to several hours as per the requirements. If this concept is implemented on large scale than we can use in pond management , fish farming ,aquaculture etc. This automatic fish feeder system can be used other pets other than fishes for example birds, turtles etc.

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