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FISH FEEDER CONTROLLED VIA SMS

Nurul Hafizah Abdul Rahim

Bachelor of Mechatronics Engineering

May 2010

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"I hereby declare that I have read through this report entitle "Fish Feeder Controlled via Short Message System (SMS)" and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Mechatronic)."

Signature : .....

Supervisor's Name : MAZREE BIN IBRAHIM

Date : 12/05/2010

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ABSTRACT

Since years ago, fish keeping has become as one of the common hobbies all over the world. Most fishes are kept in aquarium or garden pond with air pump which functioning to maintain the quality of oxygen in the water. Air pumps are very common for most fish keepers nowadays as to provide good quality of environment for the fish's growth. One of another aspect that is very important for fishes' growth is food. Some owner does not really care about fishes' food even though foods are very important for young fishes for their organ grows completely while bigger fishes need more foods. Fish feeder is normally used by owners who keep a large amount of fish such as for sales or breeding. However, to much relying on fish feeder is not very good as the owner might miss responsibility to take care of the fish and just leave the job to feed the fishes to the fish feeder. Therefore, a new system that operates semi automatically is proposed to solve the problem. This new system allows user to instruct the fish feeder by only sending a message and it will release foods anytime as wanted from any distance. In other words, the owner does not have to worry about not be able to feed fishes at the moment they remember to because the system straightly can feed the fishes even the owner is far away.

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ABSTRAK

Sejak bertahun-tahun yang lalu, memelihara ikan telah menjadi salah satu hobi yang terkenal di seluruh dunia. Kebanyakan ikan dibela di dalam akuarium mahupun kolam yang dilengkapi dengan sistem pam udara yang berfungsi untuk mengekalkan tahap kualiti oksigen di dalam air. Penggunaan pam udara telah menjadi kebiasaan di kalangan para pemilik pada masa kini sebagai langkah penyediaan kawasan yang berkualiti bagi pembesaran ikan. Salah satu aspek penting lain yang harus dititik beratkan bagi pembesaran ikan juga adalah makanannya. Terdapat juga segelintir pemilik yang tidak begitu mengambil berat dalam soal pemakanan ikan-ikan tersebut walhal makanan turut menjadi faktor penting bagi ikan kerana anak-anak ikan memerlukan makanan supaya organ mereka membesar dengan sempurna sementara ikan yang lebih dewasa turut memerlukan makanan. Alat pemeberi makan ikan secara automatik selalunya digunakan oleh para pemilik yang memiliki ikan dalam jumlah yang banyak sama ada untuk dijual mahu pun pembiakan. Walau bagaimanapun, sikap terlalu bergantung pada alat tersebut adalah tidak digalakkan kerana para pemilik mungkin menjadi kurang bertanggungjawab dan mengharapkan alat tersebut untuk memberi makanan tanpa perlu mengawasi ikan-ikan tersebut. Oleh yang demikian, sebuah sistem yang berfungsi secara separa automatik diperkenalkan unuk menyelesaikan masalah tersebut. Sistem ini membenarkan pemilik untuk member arahan kepada alat pemberi makan dengan hanya menghantar satu mesej ringkas dan alat tersebt akan melepaskan makanan pada bila-bila masa yang dikehendaki dari mana-mana sahaja. Dalam erti kata lain, para pemilik tidak lagi perlu risau kerana tidak boleh memberi makanan kepada ikan ketika mereka teringat kerana sistem ini membenarkan para pemilik untuk terus memberi makan pada masa yang sama walau pun berada pada jarak yang jauh.

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CHAPTER 1

INTRODUCTION

Over last twenty years ago, it is common for peoples for keeping animals such as buffalo and cows to help working at farm or even just for pet. According to new technological era, types of pet chosen are changing from time to time. There are many reasons that influences for the changing phenomena. As an example, a person nowadays commonly lives at condominium and it is not convenience to keep a cow as a pet at that area. Thus, a smaller and cute animal such as fishes and cats becomes hot choices to become a pet nowadays. These types of pets might be chosen due to several reasons such as easier to take care of and does not need a big space to keep it. As an example, fishes just need a little space for an aquarium which at the same time may function as decoration of the place.

Nowadays, having interest in fish keeping has been known as one of the famous hobby in the whole world. In Malaysia ourselves, there are a lot of shops which serves advices for beginner to fish keeping and of course sells aquariums, kind of fishes and anything related to fish keeping such as their foods or aquarium decoration. Not everyone knows that fish keeping is divided to three disciplines which are saltwater, freshwater and brackish keeping [1]. However the basic of the fish keeping are still same. All types of fishes still need fresh air and foods for their growth.

Since years ago it has been a common way for the owner to use air pump for the aquarium and feed fishes manually. However, feeding fishes manually is not really practical for daily use because humans are easily forget simple matters including feed the fishes. As the solution, fish feeder was invented to solve the problem. Most of the automatic fish feeders are same and designed with several advantages to the owner. It can be set up at any interval time

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of feeding time or even amount of the food will be released. Thus by using the fish feeder, the owner does not have to worry about feeding fishes anymore and may feed fishes by only setting up the timer depending on how often and how much as wanted to feed the fishes.

1.1 Problem Statement

People nowadays live in a very busy environment due to changing of lifestyle. It has been normal in daily life to be always in rush when doing something and often do not have time for exercising or paying bills. If these kind of important things are ignored or the owner does not have enough time for such thing like this, it is not possible for the fish owner could spare time to feed the fishes. If this situation continuously happened, it eventually would affect the growth of the fishes and in some cases, it might cause to death. In another situation, even the owner does have enough time to feed fishes, it may be also happen a situation where owner forget to feed fishes.

The innovation of automatic fish feeder really helps owners to solve humans' negligence problem, but from another point of view it may also contribute to another new problem. When having fish feeder to feed the fishes, it may lead the owner to start to think that it does not be a must to take care of the fishes anymore because owners are should not afraid if fishes will hungry because fish feeder will do its job. In other words, the owner leaves the job for taking care of the fishes to the fish feeder. More and less, it may affect the owner's attitude on responsibilities to take care of the fishes. Besides that, it would be a problem to the owner who always has to go for outstation because something that may help to take care of the fishes is needed. The new system is very convenience to apply the because it does not very nice to always relies on neighbours to take care of the fishes every time the owner has too go for outstation.

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1.2 Project Objectives

Fish feeder was invented to solve the problem for people who are always forgetting to feed the fishes but it may causes the owner to be lack of responsible to take care of fishes. Thus fish feeder controlled via Short Message System (SMS) is invented which is functions to feed fish every time the owner wanted to. This system is invented to be semi-automated so that it may works when the owner is outside or away from home and suddenly remember to feed the fish. Semi-automatic functioned when the owner who is far distance from home can send a signal to the fish feeder to release the food.

1.3 Scope

This project basically will focus on two different sections which are fish feeder and SMS controller. Fish feeder will be constructed as a food store while SMS controller will works as the controller of the system. The primary objective to achieve o this project is to ensure that fish feeder circuit may functions well and would be able to receive signal from SMS controller. This signal is used to turn on the fish feeder circuit to rotate the motor and release the food at the same time. Fish feeder circuit will consist of a few main components including motor driver, resistors and motor while SMS controller section need an old model of Nokia mobile phone, resistors, capacitors and a few other components.

Most of the automatic fish feeders are designed with advantages to the owner to set up the interval time of feeding time or even amount of the food will be released. Thus by using the fish feeder, the owner may feed fish by only setting up the timer depending on how often and how much as wanted to feed the fishes.

This project will focus more on a few aspects that will influence the performance of the fish feeder system. One of the aspects is the speed of the DC motor which might also affect the amount of fish food that will be released. Besides that, analyses about duration of the motor rotation are also included.

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1.4 Project Overview

Basically, this project is mainly about constructing a fish feeder which can be control from any distance so that the owner will be able to feed his fish anytime. Its concept is the fish feeder will operates after receiving instruction from the owner. This is done by the owner sends a message to the SMS controller and the SMS controller will receive the instruction. Once it receives the instruction, it will send a signal to the fish feeder to start function. The food will be released and this process will repeat each time the owner sends the instruction to the SMS controller.

This project is done according to a few phase starting from literature review until functionality testing. It starts from searching for information which related to the project and the resources would come from books or internet. It is necessary to search as much as information for references to find out any best alternative to complete the project. Finding for information process is continuously happening along completing the project.

After done with literature review, comparison for methodology becomes the next step to figure out the most suitable method to be used to complete the project. A suitable method for fish feeder circuit was chosen and proceeds with the circuit designing and testing. Designing and testing the fish feeder circuit is done by Proteus Lite software. The designing and testing process were repeated for several time until the circuit is fully tested before proceed to construct the circuit.

After that, SMS controller circuit is assembled and tested. This process also repeated until it is work. For the next step, fish feeder and SMS controller circuit were assembling up together and get tested again. These process only stops after the system really work and achieve the objectives of the project. The summary of these processes can be presented in simpler form as showed in Flowchart 1 below.

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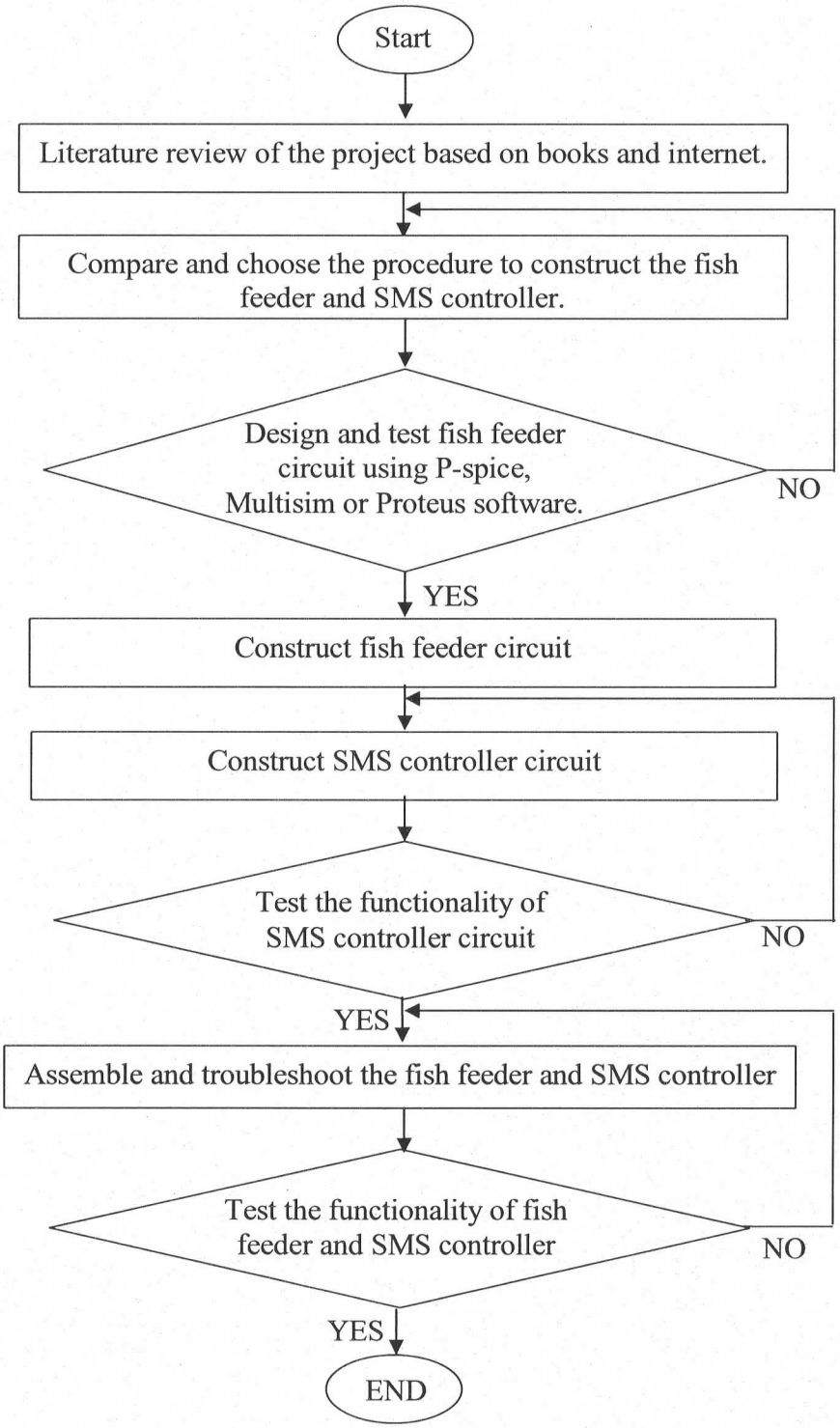
Flowchart 1: Project flowchart



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As mentioned in the scope section, a few analyses will be done after getting the result. Different programs are burned into microcontroller to identify and figure out the performance of the system. Each program varies for several speeds which can be change in the program. Besides that, program also will be change to vary the duration of motor rotation to so that the best performance of the system can be determined. Another factor that influence such as size of plastic cylinder slot cut is also analyzed.

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CHAPTER 2

LITERATURE REVIEW

As mentioned in previous chapter, fish keeping has been known as one of the common hobby all over the world. Fishes are kept as pets or as one of income sources. There are a lot of tips in keeping fish including water quality and fish feeding. Different level of ages needs different nutrients. Younger fishes need more nutrients to grow up and a missed feeding will lead to death of the fishes. Adult fishes need more quantity of foods compared to aging fishes in order to manage the required nutrients [2]. All of three conditions would be troublesome for the owner to feed at the same time. Thus a fish feeder would be as one of the best choices to solve this problem.

This project basically divided to two different main parts which are fish feeder and SMS controller. A lot of research which related to both of the parts has been found and will be clearly explained in this chapter. The first part of this chapter will explain about any related work or information found related to fish feeder followed by the second part which is SMS controller.

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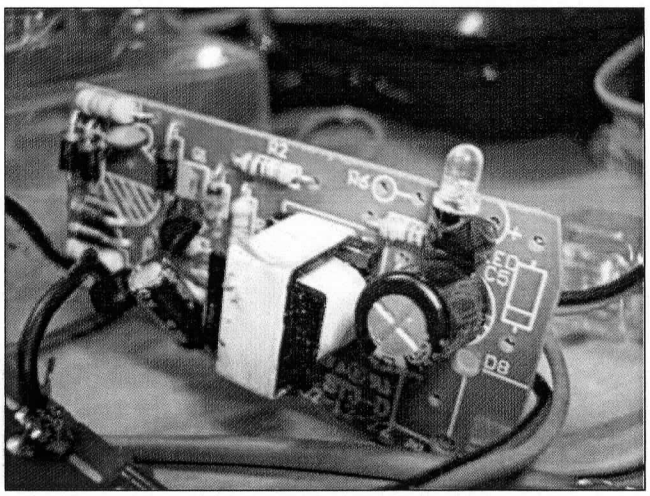
2.1 Fish Feeder

Fish feeder normally came out with automatic function. An automatic fish feeder is a feeder that operates based on electricity or a battery which automatically works to discharge a certain amount of fish food at a certain time of the day. Most of the fish feeders have an inbuilt timer device and it helps people to feed fish right on time depending on how much and how many time the owner love to. Besides that, it would also helps people who have a large quantity of fishes to be fed each time especially peoples who involves in fish breeding industry who has a lot of fish tank or fish pond. There will be no mistake unless electricity is cut off or the feeder is run out of battery. [2]

2.1.1 Automatic Aquarium Feeder

The first option is automatic aquarium feeder. This food feeder uses alarm clock as the main component and acts as the controller of the system. Its system is very simple and also uses a timer which automatically will be triggered by alarm clock to run the motor for a few second.

Figure 2.1: Automatic Aquarium Feeder Circuit



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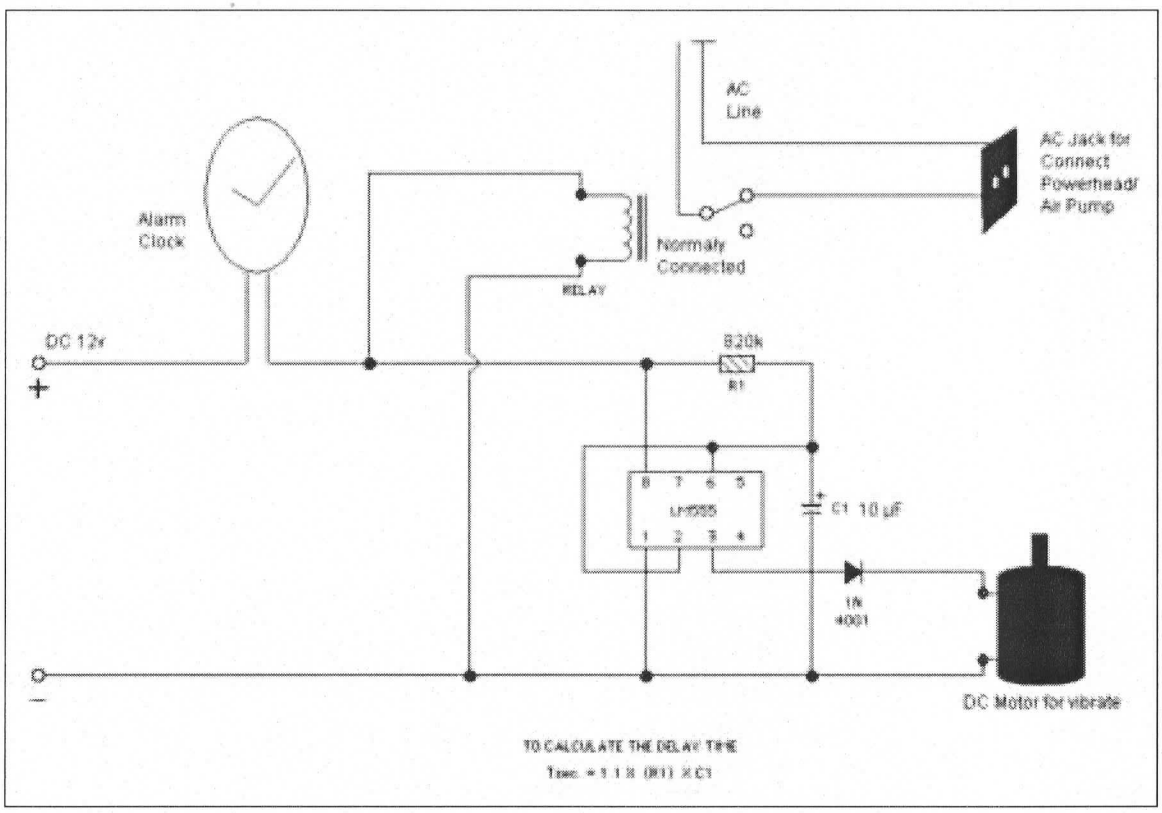
Components and materials used for this type of fish feeder are an alarm clock, a 555 IC Timer, a 620K Ohm resistor, a 10uFarad capacitor, a Direct Current (DC) motor, an Alternating to Direct Current (AC/DC) adaptor, a receptacle for food, a relay switch and a soldering iron. All of these components can be seen as showed by figure 2.1 above [3].

Figure 2.2: Automatic Aquarium Feeder Circuit Diagram



This fish feeder is constructed by referring to the circuit as showed in the Figure 2.2. It is obvious that this system use motor vibration concept when releasing food.

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2.1.1.1 How the Circuit Works

This system is mainly about setting up the alarm clock. The alarm clock is hacked by soldering the leads inside the alarm clock which connect when the alarm times up. It started to function after time set up at the alarm clock is up and it triggers the 555 IC Timer. 555 IC timer acts as the controller of the motor will turn on the motor and it will vibrate for a few second. This will result food form inside of the receptacle attached to the motor will be released as it is connected to the motor. However, the hole at the food receptacle must be small enough so that it may store the food properly as long as it does not shake or vibrate. [3]

This process will repeat continuously twice a day depending on the time set up at the alarm clock. As the example, if the owner set up the clock at 8 o'clock, fish food will be released at 8 A.M and 8 P.M daily. It means that the interval time of food releasing is depends on the alarm clock set up while 555 IC Timer functions to control the duration of motor rotation.[3]

2.1.2 Simple Automatic Fish Feeder

Another method to construct an automatic fish feeder is by using a 24 hour timer, a pill bottle, a straw, a box cutter, an extension cord and some glue to build a Simple Automatic Fish Feeder. This is a cheaper method compared to the first method and it is a simpler method too. Even it uses a Timer, it is recommend to set the timer so that the time interval will be 12 hours daily. It means that, the food will be released 2 times per day. [4]

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Figure 2.3: Simple Automatic Fish Feeder

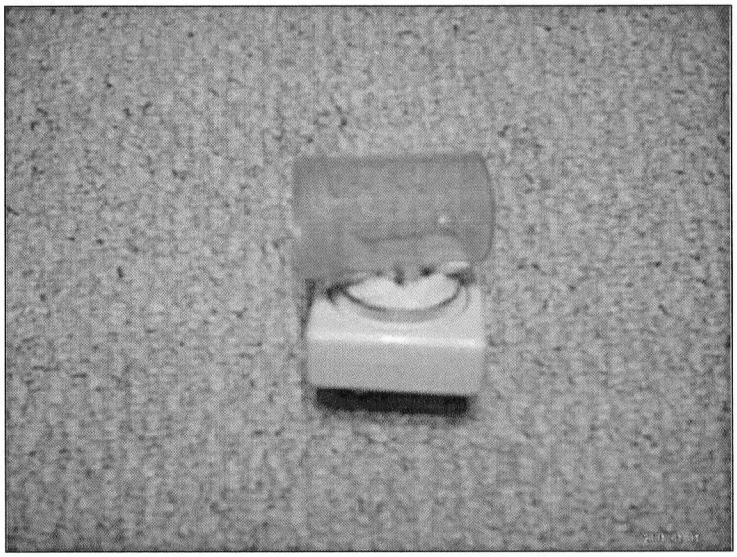

Figure 2.3 shows a pill bottle which already stick at the timer. Then, a hole with same diameter to the straw is cut out at the cap of the bottle and being attached to the straw. Before that, one end of the straw is cut a certain angle depending on the amount of owner want to release the food. More food means this step needs the owner to cut the straw at larger angle. From this, it can be known that the amount of food being released is controlled by the angle of the straw while its time interval is controlled by the 24 hour timer. The food is released through the straw thus it needed to be break into small pieces before filling it inside the bottle so that it may come out trough the straw.[4]

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