

**SMART AQUARIUM
(AUTOMATIC FEEDING MACHINE)**


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Dedicated to my beloved family especially my mother and father

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ABSTRACT

A microcontroller is a high technology that can store and running the program. This project is about a food container that can feed the fish twice a day without human observation by using the microcontroller PIC 16F877 software which can control the size of the automatic feeding machine's door. The time for the door to open had been program earlier in the microcontroller. However the time also depending at the number of fish that is enter by the user using the keypad. The automatic feeding machine contains three adjuster which can suit with the size of the fish that contain in the aquarium by the user. The adjusters are small, medium and large. The automatic feeding machine is used to feed the fish that contain in the aquarium without human observation and the fish can live happily mean while the fish hobbies can live their fish with no worries anymore.

ABSTRAK

Pengawal mikro merupakan cip yang berteknologi tinggi yang mampu menyimpan dan melaksanakan sesuatu aturcara program. Projek ini adalah tentang alat yang boleh mengawal pemakanan ikan dua kali sehari secara automatik yang menggunakan pengawal mikro PIC 16F877. Perisian 'Peripheral Interface Controller' (PIC) digunakan untuk mengawal bukaan pada alat pemakanan ikan secara automatic. Tempoh masa untuk bukaan telah ditetapkan. Walau bagaimana pun masa bukaan pada alat pemakanan ikan ini bergantung dengan jumlah bilangan ikan yang dimasukkan melalui papan kekunci. Alat pemakanan ikan ini mempunyai tiga penyelarasan untuk di sesuaikan pada saiz ikan yang dipelihara oleh penggemar ikan. Penyelarasan yang dimaksudkan terdiri daripada kecil, sederhana dan juga besar. Alat ini berfungsi untuk memberi ikan di dalam akuarium makan secara dua kali sehari tanpa mengawasan manusia. Selain itu alat ini memudahkan para penggemar pemeliharaan ikan menjalankan tugas seharian tanpa bimbang akan binatang pemeliharaan yang ditinggalkan di rumah akan menjadi sihat.

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ABBREVIATION

AC	-	Alternate Current
DC	-	Direct Current
GDT	-	Gate Drive Transformer
IC	-	Integrated Circuit
LED	-	Light Emitter Diode
PIC	-	Peripheral Interface Controller
PSU	-	Power Supply Unit

CHAPTER I

INTRODUCTION

1.0 Introduction

The project is design a smart aquarium that will enable to feed all the fish without human observation. In spite of this, my project will be combined with the other project that will filter and monitor the water condition in an aquarium. The aquarium is a friendly user and made from a recycle material. The automatic feeding machine will feed the fish twice a day. In this feeding machine, timer circuit will be used to set a time for feeding the fish. This timer can be adjusted the automatic feeding machine as you wish according to fish's needs. Besides that, the programmable integrated controller will be used to control the wideness of the automatic feeding machine's area.

1.1 Objective of Project.

The objective of this project is to create a automatic feeding machine. Nowadays, everyone can have a pet at home without giving their full

commitment to have a healthy pet. For those who are very fussy to do all the maintenance works for the fish in the aquarium are also helpful.

However this project will be combined with the other student's project that is in charge for the water condition. While changing the water manually, it may cost dirty, messy and wet condition around the place. Some people who have fish as a pet do not know the water condition and when it needs to change. This project will be designed to fulfill the requirement of the fish hobbyist. This smart aquarium will change the water and feed the fish according with the amount automatically without human observation.

1.2 Scope of Project

The scope of the project is to study about the fish in the aquarium and its habitat. It is include the eating habit that suitable for different size of fish. The programmable integrated controller is used in this project to get a different shape the size of the container's door to open according the fish amount that contain in the aquarium. In spite of that, the automatic feeding machine is build. As a result, this project will be combined with the other project for make sure the test is done properly.

1.3 Problem Statement

Nowadays, a lot of people are busy with their own commitment. However they wish to have a pet like fish at home. Besides that, some people are very fussy to do all the maintenance work for the fish in the aquarium.

While changing the water manually, it may cost dirty, messy and wet condition around the place. Some people who have fish as a pet do not know the water condition and when it needs to change.

The design of this project to detect the cleanest of the water condition. It will change the water and feed the fish automatically without human observation.

CHAPTER II

LITERATURE REVIEW

2.0 Literature Review

An aquarium usually contained in a clear-sided container. It is typically constructed by glass or high-strength plastic in which water-dwelling plants and animals such as fish, and sometimes invertebrates, and reptiles are kept in captivity that is used for public display.

Aquarium is a popular hobby around the world, with about 60 million enthusiasts worldwide [5]. From the 1850s, when the predecessor of the modern aquarium was first developed as a novelty, the ranks of aquarists have increased as more sophisticated systems including lighting and filtration systems were developed to keep aquarium fish healthy.

A wide variety of aquaria are now kept by hobbyists, ranging from a simple bowl housing a single fish to complex simulated ecosystems with carefully engineered support systems. Aquaria are usually classified as containing fresh or salt water, at tropical or cold water temperatures. These

characteristics, and others, determine the type of fish and other inhabitants that can survive in the aquarium.

Controlling water quality includes managing the inflow and outflow of nutrients, most notably the management of waste produced by tank inhabitants. The nitrogen cycle describes the flow of nitrogen from input of the food, through toxic nitrogenous waste produced by tank inhabitants, to metabolism to less toxic compounds by beneficial bacteria populations.

The larger fish, eating the smaller one is the most common, but consider aquatic insect life, amphibians, and reptiles. They take their share of the species also. Disease is another quality control aspect of the natural aquatic system. Without these combinations, one species soon would overtake and destroy the entire Eco system.

However in the natural habitat, only the strong species of fish can survive to carry on the excellent genetic qualities of the species. Inbreeding is very common from the genetic standpoint, to improve fin, color and other genetic traits.

2.1 Daily Care

2.1.1 Lighting

If the aquarium contains live plants, the aquarium light does not need to be on except while feeding or observing the fish. Room light is generally

sufficient to keep the fish active during the day and leaving the aquarium light on for too long can cause unsightly algae growth. Most hobbyists, however, don't want to be bothered with turning the lights on and off several times each day and choose instead to simply leave it on continuously for 6 to 10 hours each day. An inexpensive electrical timer can be installed to provide the fish with a consistent light or dark cycle and compensate for the forgetful aquarist.

2.1.2 Feeding

After the tank's 'break- in cycle' is completed, most common aquarium fish should be fed two or three times per day, but each feeding should consist of only as much as is consumed in two or three minutes. This takes a little practice, and the careful aquarist will actually time his feedings occasionally, to be certain that the proper amount of food is given. Overfeeding is feeding too much at a time, rather than too often.

Fish could probably be fed 10 times a day without problem, but one overly generous portion every two days could cause problems. Uneaten food contributes to poor water quality, which causes water cloudiness, rapid algae growth and often leads to fish disease. Alternating feedings among flake, frozen, freeze-dried and pelleted foods will provide a well balanced diet for fishes of various feeding habits.

2.1.3 Observing

This is important to take a few moments each day to simply look at the aquarium fish. Perhaps some are picky about the type of food they will accept or maybe others are being intimidated by the tank bully at mealtimes. It takes some experience to determine what is normal for each type of fish, but daily observation will provide that experience. Even a tank full of so-called community fish can have compatibility problems, and fish that have gotten along just fine for months or years might suddenly begin to harass one another. If there are any signs of torn fins, discoloration, white spots, red blotches or other signals of disease, treatments are most successful if the infection is caught early.

2.1.4 Checking Equipment

The various pumps, filters and heaters typically installed on aquariums might well be referred to the Life Support System. A quick glance at the thermometer should be made a daily habit, perhaps at feeding time. Fluctuations in temperature cause stress that often leads to disease outbreaks. Checking is to make sure all other equipment is also plugged in, turned on and operating properly.

2.2 Choosing the Right Food for Our Fish

One of the keys to any successful aquarium is food supply. Without an adequate food supply, growth rates will fall below normal levels and the overall

balance of your aquarium can be put in jeopardy. For this reason we should give the supplement food for our fish with a commercial feed. Any time if we give the additional food supply to our aquarium all of our fish will reap the rewards.

To begin the feeding program, we should know and ask to your local feed store about the types of feed they have available. Most aquarium have a variety of different size fish, therefore pellet type is the best. This pellet is small enough for most young fish to consume, but large enough to satisfy your adult fish.

In spite of that, we must always purchase floating pellets. Floating pellets will enable you to monitor the exact amount of feed that is being consumed. It is very difficult to determine how much sinking food is being wasted. The wasted feed will reap havoc on your water quality and over a period of time could contribute to algae problems.

2.3 Function of Nutrients

2.3.1 Protein and Energy

Protein is the major nutrient required for growth of fish, and on a dry-weight basis, makes up most of the body structure. The importance of proper protein nutrition cannot be overemphasized. The essential components of proteins are amino acids, which are used by fish to synthesize new body tissue and enzymes. Proteins are also a significant source of dietary energy.

Fishes are especially efficient at converting food to body tissues, so they need less food to grow than do many other animals. The diet of fish contains relatively little carbohydrate matter and the amount of protein is high as a percentage of the diet. It is important to feed the right amount and type for best growth, excessive dietary protein is ultimately excreted as ammonia by the fish.

The amount of protein required in the diet of fish, depends on a few variables including the species of fish, growth rate, and the amount of natural food available. The protein requirements of fish decreases as the fish grow larger. Protein requirements are dramatically affected by water temperature. When fish are held at cool temperatures, their growth rate falls, and so lower dietary protein levels may be appropriate.

2.3.2 Fats and Essential Fatty Acids

Fats can supply energy for normal body needs and sparing proteins for growth. Carbohydrates can also serve this function. Fish which are tank raised are especially prone to fattiness because they expend little energy searching for food, but dry commercial feeds are usually balanced for level and type of fat. Reproductive success of some fish is reduced when nonessential saturated animal fats or vegetable oils make up too much of the diet. Several carnivorous species require a source of fish oil in their diet to supply essential polyunsaturated fatty acids of the linolenic group.

The fat soluble carotenoid pigments: (carotenes and xanthophylls) are responsible for the red, orange, yellow and green colors in the skin, flesh or eggs of many fish and crustaceans. The brilliant blue colors of fish have other origins. Some foods that are rich in pigments are: krill, brine shrimp and other species of

zooplankton. Bright red, orange, or yellow roe from fish are sometimes sold in fish markets. Roe is also rich in essential oils. Commercial sources of xanthophyll pigments include red fish oil, extracts or meals of fish roe and crustaceans (shrimp, krill, etc) algae, corn gluten, annatto, paprika, alfalfa, marigold petals, and others.

2.3.3 Carbohydrates

These make up 20-40% of most commercial foods, such as starch and sugars. They are apparently not essential for growth, but are inexpensive sources for energy. Most fish tolerate 30-40% of carbohydrate in their diet, but a condition similar to diabetes results when unbalanced foods are fed [10].

Too much carbohydrate in the diet of young fish can prevent them from obtaining enough of other essential nutrients. High levels of raw starch like those in cereal grains are digested incompletely by fish. They can even interfere with the digestion of other nutrients. Floating foods usually contain high levels of carbohydrates to facilitate processing.

2.3.4 Vitamins

Vitamins are organic compounds that serve as catalysts for many biochemical reactions in body tissues. Deficiency of almost any vitamin can result in increased susceptibility to disease and retarded growth. The feed

industry is working to improve the shelf life of foods by developing stabilized forms of vitamins and by modifying processing and packaging methods.

But overall, the best way to protect against vitamin deficiency is to vary the diet regularly and buy foods in small quantities that can be used up within a couple of months. The vitamin content will be prolonged by storing extra food in the freezer. Feeding fresh or frozen vegetables and live foods can serve to supplement the diet of aquarium fish.

2.3.5 Minerals

These are required in the body for teeth, bones, scales and tissue fluids. They also serve a variety of supporting functions in body chemistry. For example the iron in the hemoglobin molecule enables blood to carry oxygen to the cells. Calcium and phosphorus are the major minerals most likely to be lacking in the diets of fish.

Fish extract some calcium from hard water, but fish kept in soft water need calcium in their food. If an aquarium is left unplanted, then natural forms of phosphorus from the plants are unavailable for fish to eat. Bone from fish or meat meal is an excellent source of both calcium and phosphorus.

Many minerals are poisonous if they are present in excess, so mineral supplements should not be added to the food indiscriminately. Some fish may fail to prosper when denied their regular foods required of that species