LOW MAINTENANCE AQUARIUM: AUTOMATIC CONTROLLER SYSTEM FOR LIGHTING, OXYGEN AND FILTER SYSTEM

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Sesi Pengajian	:	2010/ 2011

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Signature : ……...
Supervisor's Name : Engr Zarina Binti Mohd Noh
Date : ……...

To my beloved father, mother, and all my siblings and friends.

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ABSTRACT

LOMAQ (Low Maintenance Aquarium) project is built for fish farming with less human interface. The project is based on a microcontroller circuit to control the circuit of equipment used on fish farming. The microcontroller (PIC) has a keypad to act as input made to set the timer to control the equipment. All equipment used is controlled by timer. Equipments controlled are light, water pump and food dispenser. There is a timer sensor to show the temperature of the environment and the data is shown on LCD screen. The system would supply the oxygen and food according to the need of the aquarium and cleans the aquarium periodically. The cutting edge of this system is that human can always give the input according to the needs. There would be input interface in the system where it could be altered according to the current needs. Where else the lighting would be pre set to operate in the given timing. The main idea is to make it as a selling product using PIC as the controller .The advantage of this project is that it's very versatile and very flexible. The system could be integrated with on the market appliance without regarding the brand, type or size. It's also flexible via its need of use. It can be used for large scale or small scale. The project would be done in small scale as a prototype. Main purpose of this project is reducing human interference in maintaining an aquarium. Besides that it would also help to cut cost of electricity usage.

ABSTRAK

Projek LOMAQ (Low Maintainance Aquarium) adalah untuk penternakan ikan dengan kurang pendedahan manusia iaitu separa automatic.Projek ini dicipta berasaskan mikropengawal untuk mengendalikan litar serta peralatan dalam penternakan ikan.Litar mikropengawal PIC mempunyai keypad sebagai input masa untuk mengedalikan peralatan.Kesemua peralatan yang gunakan dikawalkan menggunakan pemasa (timer).Peralatan yang dikawal adalah lampu neon,pam air/oksigen dan kotak pengagihan makanan.Selain itu,terdapat sensor suhu untuk menunjukkan suhu sekitar dan kesemua data akan dipaparkan pada skrin LCD. Bagi pengagihan makanan,sela masa yang diperlukan perlu disetkan menggunakan keypad yang telah disediakan.Apabila sudah disetkan,pengagihan makanan sudah menjadi aktif.Maka ia akan mula aktif dan menyalurkan makanan pada sela masa yang telah disetkan dalam tempoh minit. Had operasi pengeluaran makanan adalah 10 saat sahaja. Maksudnya motor didalam pengagih makanan akan berfungsi selama 10 saat sahaja dan makanan akan keluar dalam 10 saat sahaja. Bagi pembekal oksigen dan penapis oksigen, prosesnya juga sama. Sela masa yang diperlukan disetkan menggunakan keypad yang disediakan. Prosesnya akan aktif mengikut sela masa yang talah ditetapkan. Oksigen akan dibekalkan dan air juga akan mula ditapiskan. Sela masa yang ditetapkan adalah dalam minit.

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ADC	ANALOG TO DIGITAL CONVERTER
ALU	ARITHMETIC LOGIC UNIT
BCD	BINARY CODED DECIMAL
CCW	CONTER CLOCKWISE
CH	CLOCK HERTZ
CP	CODE PROTECTION
CW	CLOCKWISE
GND	GROUND
IC	INTEGRATED CIRCUIT
ICSP	IN CIRCUIT SERIAL POGRAMMING
INDF	INDIRECT FILE
LED	LIGHT EMMITING DIODE
PC	PROGRAM COUNTER
PWRT	POWER UP TIMER
RTC	REAL TIME CLOCK
SQW	SQUARE WAVE

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CHAPTER 1

1.0 INTRODUCTION

1.1 Introduction:

Basically the low maintenance aquarium is focused mainly for four tasks. It should take care of the oxygen supply, food supply, dirt filtering process and also the lightings.

The main idea is to make it as a selling product using PIC as the controller .The advantage of this project is that it‟s very versatile and very flexible. The system could be integrated with on the market appliance without regarding the brand, type or size. It‟s also flexible via its need of use. It can be used for large scale or small scale. The project would be done in small scale as a prototype. Main purpose of this project is reducing human interference in maintaining an aquarium. Besides that it would also help to cut cost of electricity usage.

The system would supply the oxygen and food according to the need of the aquarium and cleans the aquarium periodically. The cutting edge of this system is that human can always give the input according to the needs. There would be input interface in the system where it could be altered according to the current needs. Where else the lighting would be pre set to operate in the given timing.

LOMAQ (Low Maintenance Aquarium) project is built for fish farming with less human interface. The project is based on a microprocessor circuit to control the circuit of equipment used on fish farming. The microprocessor (PIC) has a keypad to act as input made to set the timer to control the equipment. All equipment we used is

controlled by timer. Equipments controlled are light, water pump and food dispenser. There is a timer sensor to show the temperature of the environment and the data is shown on LCD screen

1.2 Problem Statements:

Human is needed to maintain the aquarium where the maintenance could be neglected if human forget about it or busy with other chores. Besides that, the electricity cost would increase if the aquarium appliances keep on running without any usage. The aquarium environment won‟t be healthy if the dirt filter does not operate accordingly. Besides that, there‟s no system at the market that could integrate on the market appliance into a single system. An aquarium beauty only could be seen during the night, and if the lights are not active when is should be, it‟s a waste. And light source could keep the water temperature high during the cold season and gives good energy from the light ray to optimize the aquarium environment and healthiness.

1.3 Objective:

- To integrate the controller system with the appliance on the market thus creates a system that is very flexible and user friendly.
- To save time and cost by supplying the oxygen and filter system periodically, and humans have not to worry about it.
- To reduce human interference in maintaining a fish aquarium.
- To preset the lighting timing so it will be operating automatically.

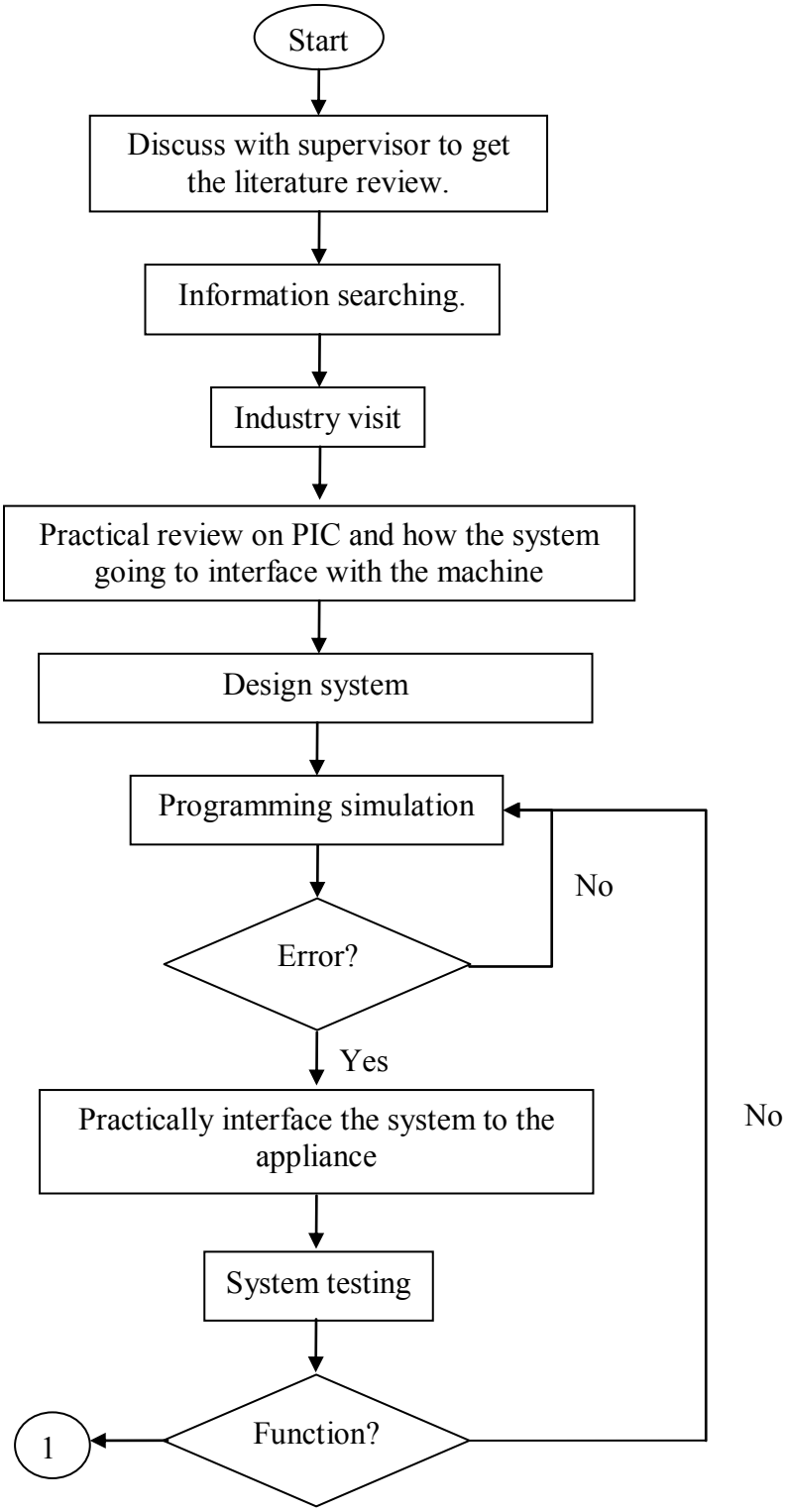
1.4 Scope:

This project is to design a system to maintain an aquarium with minimum human interference. Currently the system is designed for 2 feet to 4 feet aquarium, where the output of system could be used to the maximum. Currently the system is for fresh water habitats such as goldfish, koi fish and any decorative fishes. Can be adapted to rare other fresh water habitats such as crabs, eel and much more.

1.5 Expected outcome of the project:

A system that is able to monitor and carry out the maintenance of an aquarium automatically with less human interference. Where human could key in the data or settings required through an interface. A system that is so flexible and user friendly where it‟s easy to use and able to change the configuration as user defines.

1.6 Methodology:



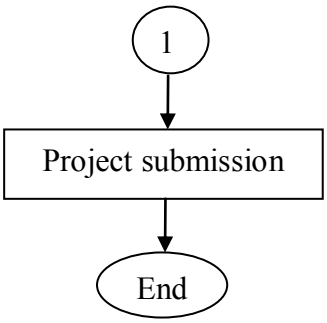


Figure 1.6: Flow chart of project implementation. This shows how the project implemented from the beginning stage till the project submission.

1.7 Thesis outline:

Chapter 1, explain about the introduction, problem statement, objective of the project, scope of the project and problem that must be solve while doing this project.

Chapter 2, explain more towards the literature review on types of fish keeping systems, aquarium maintenance, microcontroller and PIC16F877 in more detail.

Chapter 3 explanations are more towards methodology of the project. The explanation is about hardware connection, software implementation and programming development.

Chapters 4 explain about the results from the complete project. Explanations about circuit diagram, circuit layout and software programs.

Chapter 5, the last chapter explains about the discussion, conclusion and recommendation.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction:

Fish keeping is a popular hobby concerned with keeping fish in a home aquarium or garden pond. There is also a fish keeping industry, as a branch of agriculture. Fish have been raised as food in pools and ponds for thousands of years. Brightly colored or tame specimens of fish in these pools have sometimes been valued as pets rather than food. Many other cultures kept fish for both functional and decorative purposes.

Ancient Sumerians were known to keep wild-caught fish in ponds, before preparing them for meals. Depictions of the sacred fish of Oxyrhynchus kept in captivity in rectangular temple pools have been found in ancient Egyptian art. Similarly, throughout Asia has experienced a long history of stocking rice paddies with freshwater fish suitable for eating, including various types of catfish and cyprinid. Selective breeding of carp into today's popular and completely domesticated koi and goldfish is believed to have begun over 2,000 years ago in Japan and China, respectively [2].

The Chinese brought goldfish indoors during the Song Dynasty to enjoy them in large ceramic vessels. In Medieval Europe, carp pools were a standard feature of estates and monasteries, providing an alternative to meat on feast days when meat could not be eaten for religious reasons. Marine fish have been similarly valued for centuries.

2.2 Types of fish keeping systems:

Fish keepers are often known as "aquarists", since many of them are not solely interested in keeping fish. The hobby can be broadly divided into three specific disciplines according to the type of fish: freshwater, brackish, and marine (also called saltwater) fish keeping.

2.2.1 Freshwater:

Freshwater fish keeping is by far the most popular branch of the hobby, with even small pet stores often selling a variety of freshwater fish, such as goldfish, guppies, and angelfish. While most freshwater aquaria are set up as community tanks containing a variety of peaceful species, single-species breeding aquaria are also popular. Live bearing fish such as mollies and guppies are among the species that are most easily raised in captivity, but aquarists also regularly breed numerous other species, including many types of cichlid, catfish, characin, and killifish.

Many fish keepers create freshwater aquacades where the focus is on aquatic plants as well as on the fish. These aquariums include the "Dutch Aquarium", in reference to the pioneering work carried out by European aquarists in designing these sorts of tanks. In recent years, one of the most active advocates of the heavily planted aquarium is the Japanese aquarist Takashi Amano.

Garden ponds are in some ways similar to freshwater aquaria, but are usually much larger and exposed to the ambient climatic conditions. In the tropics, tropical fish can be kept in garden ponds, but in the cooler regions temperate zone species such as goldfish, koi, and orfe are kept instead.