DEVELOPMENT OF SECURE WATER FILTER

KHAIRUL AMAR BIN KHAIRULLAIL

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DR. ZAMRE BIN ABD. GHANI
Pensyarah Kanan
Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Hang Tuah Jaya
76100 Durian Tunggal, Melaka

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Matrix Number : B021210110

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Name : DR ZAMRE BIN ABD GHANI

Position : Project Supervisor

Date : 10/6/2015

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"Specially dedicated to my beloved parents, brothers, sister, lecturer and friends who have encouraged, guided and inspired me throughout my journey of education"

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ABSTRACT

There are many types of water filter and water dispenser that can found in the market place. Each of the water filter was designed by have the own advantages and functions that can easy to the consumers in their life. The combinations of water filter and water dispenser that called as Secure Water Filter which has design with the safety system and adding counting cups system was produced to consumer from the upgrading the previous product in the market place. This product can help people to get the clean water thus can give healthy life for the people. Other than, this system was design with the High and Low Water Level sensor circuit which act as the secure system to detect the leaking or overflow of the water if any damages or error inside the system. Furthermore, this system also provided with counting cups system to count the available cups and also have 3 types of different temperature of water which provided to the consumer such normal water, warm water and hot water. This concept of the product is to easily the human life with keep the health of people and user friendly. Thus, the creation of this product can give have positive impact for the people beside will be a pioneer in innovative and creative in their industry and public.

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ABSTRAK

Terdapat pelbagai jenis penapis air dan jugak mesin penghasilan air (water dispenser) yang terdapat dipasaran. Setiap penapis air dihasilkan dengan mempunyai kelebihan dan juga fungsi yang dapat memudahkan kehidupan pengguna. Hasil gabungan daripada penapis air dan juga mesin penghasilan air (water dispenser) yang dikenali sebagai "Secure Water Filter" dihasilkan dengan sistem keselamatan dan ditambah dengan sistem mengira cawan diciptakan untuk pengguna hasil daripada penambahbaikkan daripada produk yang terdapat dipasaran sekarang. Produk ini juga dapat membantu pengguna dengan menyediakan bekalan air bersih, dengan itu dapat memberi jaminan kesihatan yang baik terhadap pengguna. Selain daripada itu, sistem ini dicipta dengan "High and Low Water Level Sensor Circuit' yang bertindak sebagai sistem keselamatan untuk mengesan kebocoran dan juga limpahan air sekiranya berlaku kerosakan atau ralat dalam sistem. Tambahan pula, sistem ini juga menyediakan sistem mengira cawan untuk mengesan atau mengira bilangan cawan yang masih terdapat dalam produk dan juga menyediakan 3 jenis air yang berlainan suhu iaitu air biasa, air suam dan juga air panas. Konsep produk ini adalah untuk memudahkan kehidupan pengguna dengan memastikan kesihatan pengguna terjamin serta mesra pengguna. Dengan itu, penghasilan produk ini dapat member impak positif kepada pengguna selain dapat meningkatkn inovatif dan kretiviti dalam industri dan awam.

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CHAPTER 1

INTRODUCTION

1.1 Background Project

Today, there are various types of machine and product was designed to facilitate the daily work. Either the equipment is a water dispensers and also water filter. With the existence of present product, a new idea with innovative planning to improve the product that is present in this market. Finally, one of the products was chosen from the ideas to produce a product of a combination of a water filter and water dispensers which produced with secure system to protect the system of product. So, the name of product is 'Development of Secure Water Filter'.

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Therefore, this product will make three types of production water that have a different taps of water such as hot water, warm water and normal water. Unlike product that is present in market that only produce cold water and hot water especially for water dispensers. With this product that will produce later, it starts by including water from pipe that are used as water sources which that connected directly to filter and consequently enter major tank. The water level inside the major tank will be controlled by the using the mechanical system which are called as float system. It contains clear and clean water before consumers use this water. Water from major tank that clean go to that has been divided into three small water tanks to produce the water in different temperatures. At the major tank were consists of 2 types of sensors which are functionally as the security system where are used to detect the leaking or overflow of the water. The circuit will be connected to prevent the electrical and electronic circuit from any damage that are caused by the water.

From water release, this product is use three types of water valve that were functioning to release the water when the consumers push one of the valves. The valves of water outlet are connected with the tank itself such as is a valve for hot water as connected with the hot tank. In addition, this project also developed with the system of cup counting which is operation to detect a number of cup available in this system. The cups will be provided by the person in-charge (vendors) or any consumers which can be used to take the water production. 'Secure Water Filter' this designed especially for consumers as use at home, workers in office that like to drink with ways that is safe and simplest. Through produce hot water, all users can make drink like coffee, tea and other drink easily.

1.2 Project Objectives

The objectives of this project are covered such as

- Develop safety system of water filter system to extend the life of the product
- To produce clean water and lastly.

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- To develop circuit that can determines the number of cups available inside the system.

1.3 Problem Statement

As the time moves the life style of the person has completely changed and there is no time for the people to have micro management of every issue personally. So, this is the right time to provide some space to the new technology into the live monitoring the issues which are requires the new technology development to make the life mores easier. In the market place, a lot of types of water dispenser and water filter have been sold in the marketing with the different design and structure. Each design was constructed by the company to fulfil the customer's requirements and beside follow the characteristics or criteria which are appointed by the Ministry of Health Malaysia and Ministry of Commerce and Customers Affairs Malaysia especially for water filter. Water Filter must be able to produce clean and safe water which can be drink by the human without effect the health of the human and also must be approved by SIRIM.

From a normal water filter system which is connected directly from the water source or water piping, user can't pick the temperature water that user want because it only produce the normal temperature of water which are filtered by the specification filter and from water dispenser user can see that it is hard for the consumer to refill the water in the tank, it is waste of energy and hard to the old generation to do by itself. Besides that, consumers also just waste the money to buy a lot of water bottle from the vendors and need time to waiting the stock of water from the suppliers. So from the lack of use, user has come up with an idea to combine the two items in to one. Besides that, this project was added with some circuit to make it more safety and protected. The circuits are used to detect the leaking of water or overflow of water from the tank and will be indicate or warning the consumers about the problem of the system. The safety system was provided to protect the electrical and electronics devices from any damages caused by the water.

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The high level water circuit and low level water circuit which are operation as the safety circuit contains of the sensors pad as function to detect the water leaking. This sensor will be detect if any leaking out from the tank and once the water leaking, the buzzer and LED as the indicators will turn ON and tell that there are something wrong with the system. In addition, from the water filter dispenser, user must bring the own cup for drinking. So these problems make the user to find the cup first before drink. In this project was provided the cups space which is develop with the circuit or system that can count the number of cup available. With the system, the user can know the total cups available at the 7 segment display and can be add the polystyrene or plastics cups into the space provided.

1.4 Scope of Project

In order to achieve the objectives of this project, scope of work had been divided into two parts which is software and hardware. The hardware work was covered with mechanical work, electrical work and electronic work which are combines together to design the product successfully. In electronics work, before the fabricating process, the circuit that had been designed will be simulating using the suitable software. In this project, Proteus 7 Professional software, Multisim Software and Live-Wire software had been used to simulate the circuit that has been designed and also can be used extensively in a hardware design. For the hardware part, the circuit designed will go through the fabrication process and make sure the connection between the components must be correct.

Next for the mechanical part, the structure of the project must be designed first with the correct measurements including the height, length and width of the body structure. The body must be stable to accommodate the weight of the water and not easy to rusty. The condition of the structure must be sharp and suitable because must able to stand for the water filter, water tank and circuit space. In hardware part, the design will be constructed with using the aluminium structure. The connection of piping must be tidy and must be not leaking out because it can effects the conditions of the system to operate. In electrical work, the power supply must be connected

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correctly and not exposed to any damage especially water. The wiring of circuit must be tidy and orderly to make sure the system is safe. The electrical wiring is provided for the wiring of the heater which is used to boil the water for the hot water tank.

In this project, software is analyzed using assembly to assemble 7 segment displays and sensor. The suitable coding was analyzed to be burned in Peripheral Interface Controller (PIC) by using the LD-micro software. The sensor and 7 segment displays were analyzed according to functionality of this project. Lastly, the scope of the project also must be covered by the following:

- Water source will be processed and divided into three small tanks to store water temperature in normal water, warm water and hot water.
- Water was filtered by anti-dust filter and anti-chlorine filter before supplied into the major tank water.
- Water can refill automatically into the major tank by using the float system as the mechanical concept.
- If water at major tank empty or overflow the sensor pad will be detect, so the buzzer and LED on. This system is used as the secure system to indicate the consumers about the danger and problem of the products, thus the operation of the product must be turns off immediately.
- Count the cup which are available that is able to be used from 0 to 20

1.5 Project Methodology

This project methodology was discusses the methodology used to ensure the project in a smooth and orderly manner, the methodology of the project is important. The project runs smoothly and it explains through the flow chart. In the flow chart, the work can be done by the right move. Connection can be made with care based on the materials used. There are some parts to complete the design efficiently and more stable. The flow chart will conduct how to manage and arrange the fully operation of the system which are more systematic and available to be used. The circuit condition and mechanical condition can be determined by refer to the processes flow. The

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prototype of the product also can be designed from the process besides easier to detect the problem of the system quickly if any problem happened.

1.5.1 Flow Chart of Secure Water Filter

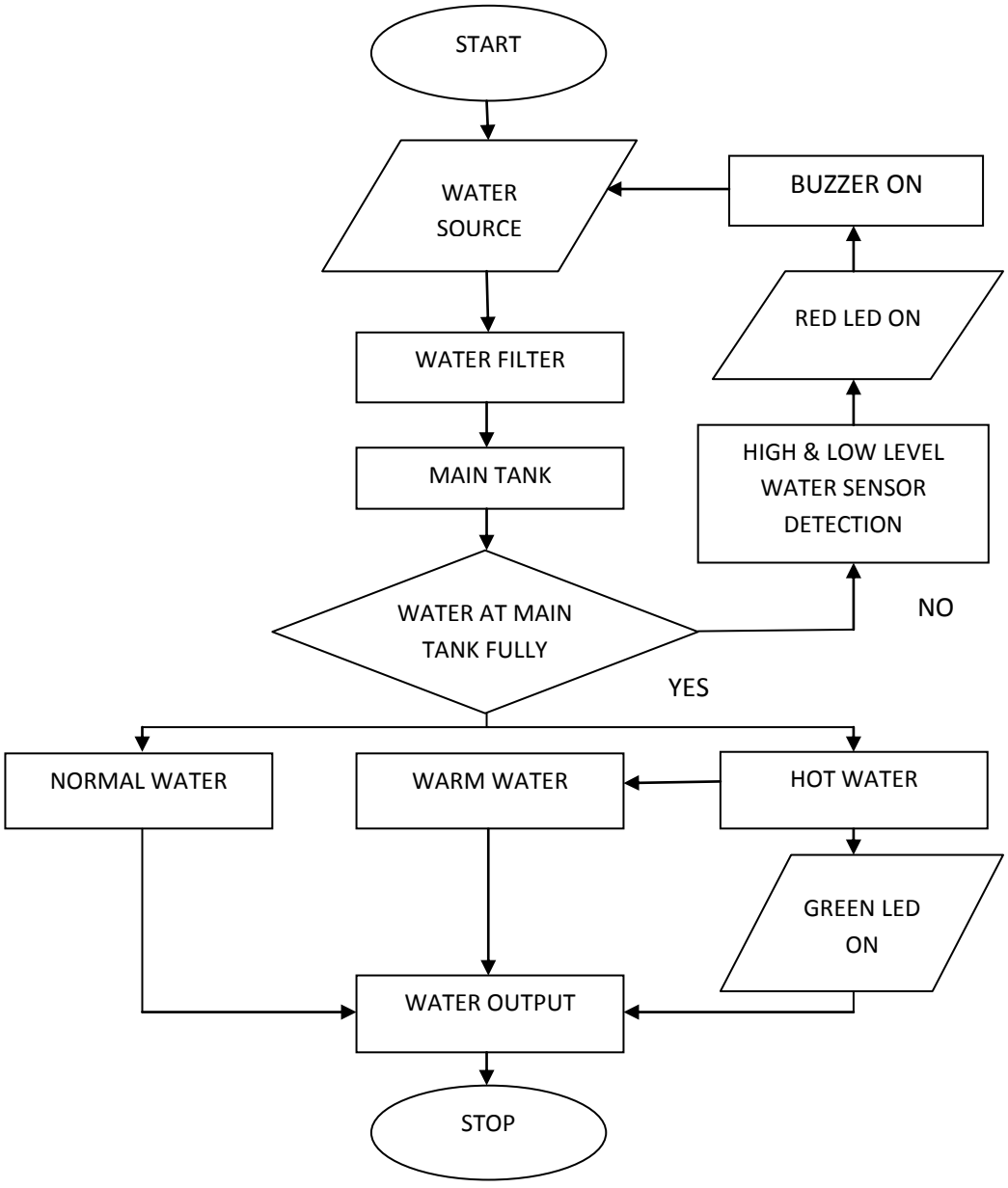

Figure 1.5.1: Flow Chart of the Secure Water Filter

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1.5.2 Project Preparation Flow Chart

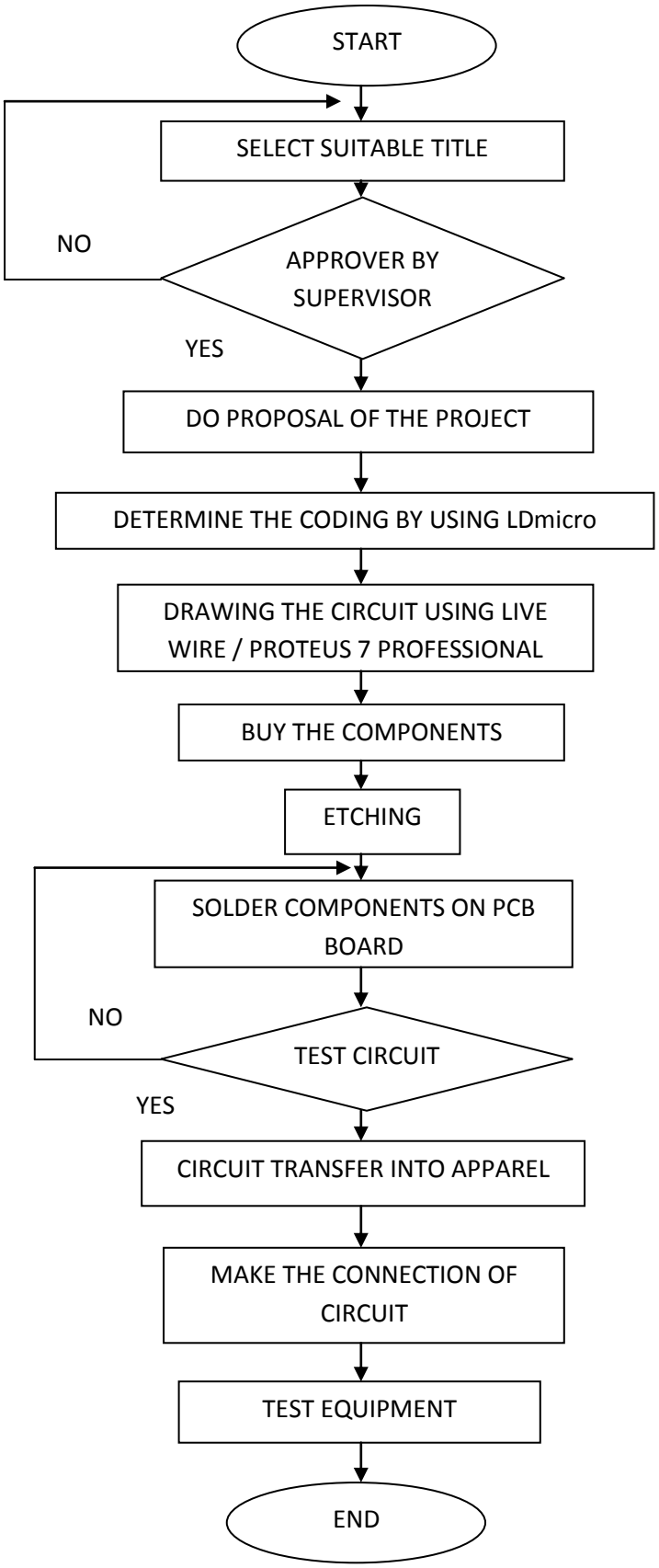

Figure 1.5.2: Project Preparation Flow Chart

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The preparation flow chart is summarized about the flow of the progressing project. Firstly, the information about the Secure Water Filter system is searching and collected to analyse the problem statements which are facing the current product before do the confirmation to select the title of the project. After received the approved form the supervisor, the proposal of the project must be prepared to determine the problem and development to implement the project clearly. After the analysis has done, the hardware component and software has been selected. Then, the related circuit that can assemble in well and the construction of the coding by using the specific software can be finished. Furthermore, the hardware and software are built must be tested. Find the source of error and finally is to solve problem.

1.6 Report Structure

This report will cover five chapters. The first chapter will be the background, introduction, problem statement, objective and scope of work. Literature review is discussed in Chapter II while for Chapter III, the project methodology is discussed. Chapter IV will cover on hardware and software implementation and last but not least the conclusions and suggestions are respectively covered in Chapter V. To obtain a successful project, there are several chapters that need to view and study nicely. The following are the main chapters and it is short descriptions.

Chapter I : Study the objective and scope of work on the project.
Chapter II : Literature review about Secure Water Filter.
Chapter III : Project methodology includes the planning, the development of the design and the management of the project.
Chapter IV : Hardware and Software implementation.
Chapter V : conclusions and suggestion on the project.

Dividing the project into various chapter is to ensure the project to work in a systematic and structural way such that the project able to be implemented smoothly.

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