HARDWARE DEVELOPMENT OF MIXTURE DRINKS DISPENSER

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This report is submitted in partial fulfilment of requirement for the award of Bachelor of Electronic Engineering (Industrial Electronics) with honours.

Fakulti Kejuruteraan Elektronik dan Komputer
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Dedicated to my beloved mother, families, supervisor, lecturers, technicians and fellow friends.

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ABSTRACT

The project that has been designed and develops is Automatic Mixture Drinks Dispenser to prepare drinks automatically by just pressing a push button as an input. The main objective for this project is to aid the user in preparing their desired drinks and saving time. It is a device which allows user to create their desired drinks with different ingredients. This project consists of two part which are hardware and software part. The software part is to develop a program as an instruction to make a process after received an input from push button. The hardware part will use a microcontroller to control all the circuit of the hardware system. The microcontroller been used is as a brain to the system that has been develop. Microcontroller will instruct and control the hardware system to execute the corresponding actions.

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ABSTRAK

Projek yang telah dibangunkan ini adalah sistem pembancuh air minuman automatik dengan menekan suis tekan sebagai masukan. Objektif utama bagi projek ini adalah untuk membantu pengguna di dalam menyediakan minuman kegemaran mereka dan menjimatkan masa. Ia adalah satu peralatan yang mana membolehkan pengguna menyediakan minuman kegemaran mereka dengan bahan yang berlainan. Projek ini mengandungi dua bahagian iaitu perkakasan dan perisian. Bagi bahagian perisian adalah membangunkan program untuk memberi arahan kepada sistem untuk menjalankan proses yang sepatutnya apabila menerima masukan dari suis tekan. Bahagian perkakasan akan menggunakan pengawal mikro untuk mengawal keseluruhan litar untuk sistem perkakasan. Pengawal mikro merupakan otak bg sistem perkakasan yang telah dibangunkan. Pengawal mikro akan mengarah dan mengawal sistem perkakasan untuk melakukan arahan.

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LIST OF ABBREVIATION

DC	-	DIRECT CURRENT
AC	-	ALTERNATE CURRENT
PIC	-	PERIPHERAL INTERFACE CONTROLLER
PLC	-	PROGRAMMABLE LOGIC CONTROL

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The project is all about to controlling liquid for filling and draining with PIC as a microcontroller for the system. The system that want to build is a machine that producing drinking water after pressing the push button the type of the drinking that user want as an input. The machine is consist of two parts which is ingredient container and mix container. Ingredient container here consists of 7 containers. Each containers will filled an ingredient such as Milo, Nescafe, Horlicks, hot water, ice, sugar and cream. Three containers will add as a mix container. For the mix container that has been used is refer to the type of drinking water. This is because to maintain the taste of the drinking water.

The liquid that been use here is a hot water which filled first in the container by user. When the system receive signal from user as an input, the system will operate depends to the program that has been programmed into microcontroller. User can choose Nescafe, or Milo, or horlicks. This system will prepare the drinks automatically which suitable from the signal. When the system receive signal from user, as example Nescafe, solenoid valve will flow the Nescafe, and then sugar and creamer at the same time, after that hot water. The ingredients will flow into mix container follow to the sequence that has been programmed. The system will operate when the sensor detect a cup to fill the drinks. Tank opening and closing output valve

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for each ingredient container depends on the timer which set by the programmer in the microcontroller. There are three types of menus provide by this machine which are Nescafe, milo and horlicks.

After the mix process, the drinks which prepare will flow into the cup. For mix purpose, servo motor will be use to mix the ingredients. Once the process finish, user can now obtained the output from this machine.

However, the system is build just for part of the Nescafe for the hardware. This is happen because the equipment is ordered by the faculty is delay by the supplier. In that case, the system is allowed by the supervisor to build one part of the system.

1.2 OBJECTIVES

This project is to develop a new system to human life become easier. This system is developing by using a microcontroller as a brain to choose the instruction that has been programmed. The objective for this project is:

- To build an automated mixture drinks dispenser by pressed the push button refers to the type of drinking.
- To use the microcontroller to executes the instruction in the hardware system
- To gain knowledge about control the process by using valve
- To make drinking water preparation easier
- To saving time for professional class

1.3 SCOPE OF THE PROJECT

This project will focus to develop systems that manage to prepare drinks an automatically by using voice system or by pressed push button refer to the type of drink user want:

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1) This system only capable to choose types of drinks by using a voice command or by pressed push button.
2) Microcontroller type 16F877 has used to control system.
3) This system can prepare three types of drinks for each time.
4) Only 7 of containers will used to store ingredients such as milo, horlicks, nescafe, sugar, creamer, ice and hot water and three containers to mix the drinking water.
5) This system will use a timer which will be program to the PIC to control ingredient quantity.
6) This system will use a sensor to detect a cup before draining process

1.4 PROBLEM STATEMENT

Nowadays, the drink will prepared manually, so it is wasting the time, especially for the professional class and those who shortage in time. Children also do not know how to make a drink during their parents are not at home. In rapid technology development, human activities increase of demand. Human body will dehydrate more and as a result, human body will need water to recover the losses. In doing so, some of the people prefer to make their own drinking water either make it or using instant drinking water ingredients such as 3 in 1 by manually. The problem is the professional class and those who shortages in time not have time to make it. So, the target of this system is build to the busy person, children and handicap.

An Automatic Voice Command Mixture Drinks Dispenser of this project is a solution for this problem. The machine will mix the desired drinks automatically when receive input signal by the user. User can choose the desired drinks they want with simple voice command. Three types of drinks can be choosing by user at the time.

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1.5 THESIS OUTLINE

This thesis has 5 chapters and will explain the whole of the project chapter by chapter. Chapter 1 will explain about introduction to brief about the project such as objective, scope and methodology of the project.

Chapter 2 will discuss about the study and information to be related to the project. Each facts and information is gain from different reference such as internet, journal, and books. All of the facts are discuss and conclude to choose a best technique and method for this project.

Chapter 3 will discuss about the technique and methods are choosing to finish this project as discuss in chapter two before. The technique and methods are choosing is dividing by two.

1) Hardware
2) Software

Chapter 4 is a chapter to discuss about the result and analysis. The result analysis such as data to flow the ingredient to mix container, graph, rotation of the servo motor and compare to actual result.

The last chapter is chapter 5 and will explain about the discussion, conclusion and future work. This chapter will conclude the result has gain in this project till the project succeeded. This chapter also is suggesting improving the operation of the project in the future work.

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CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Nowadays, a lot of drinking water maker available in market and we can found at industrial places, office building and event at home. For example '3 in 1 instant', 'vending machine' and 'coffee maker' where found at several home. The disadvantage of this available equipment is the taste of the drinking water is not satisfied for every individual because every person has their uniqueness of taste. Besides of that, some drinking water maker is specified in one type of drinking water only. Indeed there are machine that give a various type of drinking water, means that it can made not only one type of drinking water for example vending machine. But the problem is size of the machine is impossible to take it at home and it is not a portable type. Beside of that, if we use 3 in 1, we need to spend time to make desired drinks that want to mix the boiling water with the ingredient. The 3 in 1 also will make spend money out from our budget.

2.2 EQUIPMENT

With this machine, all the problem occurs can be eliminating, this machine is an automatically function when received signal from user to make the drinking water that user want. This machine uses a microcontroller to control the entire of the

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output, sensor use to detect a cup, motor to mix the ingredient together with the water. The valve is also used to flow the drinking water that has been mix to the cup.

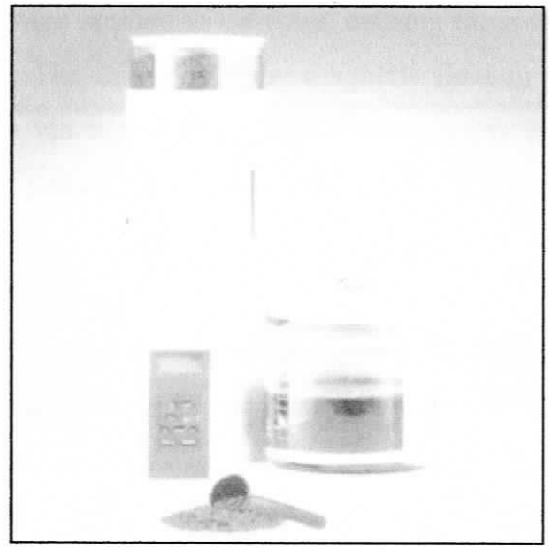

Figure 2.1: Example Drinking Water Maker In Market

2.2.1 BRUSHLESS DC MOTOR

Conventional dc motors are highly efficient and their characteristic makes them suitable for use as servomotor. However, their only drawback is that they need a commutator and brush which are subject to wear and require maintenance. When the functions of cmmutator and brush were implemented by solid state switches, maintenance-free motors were realized. These motors are now known as brushless DC motor.

Brushless DC motor (BLDC motor) is a DC motor those doses not contain brushes. DC motor has a commutator. Electrical connections are made to the commutator by means of one or more sets of brushes. The commutator reverses the polarity of the DC voltage applied to the rotor, thus causing the rotor to turn in one direction as a result of the attraction of the magnetic fields in the stator and rotor. The connection to the stator do not change, the stator always has the same magnetic polarity.

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When the DC is applied to the rotor, the rotor magnetic fields cause it to be attracted it to be attracted to the stator winding with the opposite magnetic polarity, and the rotor consequently turns in that direction. The commutator reverse the polarity of the DC voltage applied to the rotor, causing the rotor to continue rotating in the same direction. The strength of the magnetic field in the rotor controls the rotor's speed, usually via a variable resistor in the rotor circuit. To change the direction of the rotor rotation, we can reverse the DC connections either to the rotor or to the stator.

The brushless DC motor addresses two major shortcomings of the regular DC motor. The first short coming is the maintenance cost associated with brush replacement and commutator wear in regular DC motors. The second is the arcing that the brushes produce on the commutator, causing not only electrical 'noise' but also problems when such a motor is used in an explosive environment.

	AC synchronous motor	Brushless DC motor
Power supply: direct power supply, low voltage (for extension and interchangeability)	Inverter required	Direct current, low voltage (12 – 24 volt)
Adjustment of starting time	Adjustment not possible	Adjustment possible
Temperature rise	High	Low
efficiency	Low (approx 30 percent)	High (40 – 50 percent)
Output for volume ratio	Small (bad)	Large (good)
Speed control	Fixed	Feedback control
Structure or cost	Simple, low cost	Slightly complicated, control circuit is not so expensive by the use of ICs

Table 2.1: Comparison of an AC Synchronous Motor and a Brushless DC Motor

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