' AUTOMATED WATER POURING SYSTEM USING 68000 MICROPROCESSOR CONTROLLER '

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MAY 2009

AUTOMATED WATER POURING SYSTEM USING 68000 MICROPROCESSOR CONTROLLER

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This Report Is Submitted In Partial Fulfillment Of Requirements For The Degree of Bachelor In Electrical Engineering (Power Electronics and Drives)

Faculty of Electrical Engineering
University Technical Malaysia Melaka

May 2009

"I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Power Electronic and Drives)"

Signature : .....

Supervisor's Name : Mazree bin Ibrahim

Date : 6/8/2009

"I hereby declared that this report is a result of my own work except for the excepts that have been cited clearly in the references."

Signature : .....

Name : HADIFNAFICA BINTI SELAMAT

Date : 7/5/2009

APPRECIATION

Grace be upon to ALLAH the Almighty, with HIS blessings, the Final Year Project II report for project ' Automated Water Pouring System Using 68000 Microprocessor is ready for sending this report to fulfill the requirement of project's scope and it is suitable to being awarded the Bachelor of Electrical Engineering majoring in Power Electronic and Actuator.

I am as the author of this technical report are grateful to many peoples who have helped me in give the information, so that I can complete this report. I would like to thank you especially to my project's supervisor, Mr Mazree bin Ibrahim. He has support me in gave his information and advices during this project is done.

Beside that, I also want to thank to my beloved parents who gives me supports and advices during this project is done. Other than that, I want to thank to all of my friends who are helping me in share their information and give supports especially to Mohamad Al Faiz Bin Selamat and Mohamad Faizal Bin Baharom.

Lastly I hope that this technical report can be a reference for anyone who is interest in learning about the application project which is controlled by 68000 Microprocessor and can get more advantages to anyone who read this technical report. This technical report is completely by April 2009.

Thank you.

ABSTRACT

'**Automated Water Pouring System Using 68000 Microprocessor Controller**' is a system based on water filling machine which is controlled by microprocessor 68000. It is a suitable system to use with any size of water container that in range of 100ml to 2 liters. This system can be functioning when users press the start button. The motor is used to move the 'base container', up and down refer to the type of running process. However, the motor will start to be functioning when a using container is sensed by a sensor at base container. The movement distance of base container and the time required for filling or pouring process to the container is based on it size. Liquid valve is used to control the water pouring process. After complete the water pouring process, another same process cannot be allowed if the container is not removed by the users. Then, another water container can be replaced for the same process .This process will be functioning continuously until the users press the stop button for ending process.

ABSTRAK

'Automated Water pouring System Using 68000 Microprocessor Controller' merupakan sistem berdasarkan mesin pengisian air yang dikawal oleh Pemprosesmikro 68000. Ia merupakan satu sistem yang sesuai digunakan untuk sebarang saiz bekas yang mana dapat memenuhi air dalan julat 100 ml sehingga 2 liter. Sistem ini mula berfungsi apabila pengguna menekan suis 'MULA'. Motor juga digunakan dalam projek ini untuk menggerakkan 'tapak bekas' ke atas dan ke bawah mengikut jenis proses yang sedang dijalankan. Walaubagaimanapun, motor ini akan mula berfungsi apabila sensor mengesan bekas pada tapak bekas. Jarak pergerakan tapak bekas dan masa yang diperlukan untuk mengisi air di dalam bekas bergantung pada saiz bekas yang pengguna gunakan. Injap air pula digunakan untul mengawal pengaliran air. Selepas proses pengisian air dilengkapkan, proses yang lain tidak akan dibenarkan selagi pengguna tidak mengambil bekas yang telah berisi air. Kemudian, bekas air yang lain boleh digunakan untuk mengisi air ke dalam bekas sekali lagi. Proses ini akan berulang selagi pengguna tidak menekan suis 'BERHENTI' untuk menamatkan proses.

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CHAPTER 1

INTRODUCTION

1.1 Background

A water pouring system is a system that can fully pour the water into the user's container. Usually this system is known as water filling system in industrial sector or in public used. The example systems that have been used by users are "R.O Vending Machine", and "Load Cell Based Filling Machine", and "Filling Machine For Small and Medium Sized of operation" for industrial used. This system can be controlled with any suitable software such as Programmable Logic Controller (PLC), Visual Basic, Micro Computer Manage, 68000 Microprocessor Software and others. The application of this project is widely used by the public users. Commonly, the users have to control the machine in pouring the water into their container by pressed the start button or stop button. In this project, an Automated Water Pouring System will be construct which is controlled by 68000 Microprocessor Software.

An Automated Water Pouring System is a suitable system to use with any size of water container that in range of 100ml to 2 liters. This system can be functioning automatically when users press the start button. The motor is used to move the 'base container', up and down refer to the type of running process. When the user put their container at the base container, the sensor will sense the container so that the motor will start to be functioning to up motion. The movement distance of base container and the time required for filling or pouring process to the container is based on it size. Liquid valve is used to control the water pouring process. After completing the water pouring process, the motor will turn down until at the origin place. Another same process cannot be allowed if the container is not removed by the user. Then, another water container can be replaced for the same process .This process will be functioning continuously until the user press the stop button for ending process.

In this system, it can sense or detect any size of water container. What is the system's method? And how this system can detect either the water has been fully poured into the container or not? One sensor is located at the main frame (mast of the device) nearby the liquid valve. The base container will stop to move when the sensor senses the top of container. This is the method in detecting the container's position. In pouring process, the water will flow towards the same point and smoothly because near to the valve. Water sensor is used to detect the water level which is located below of the top of container for ± 5% of 15 mm. After detecting the water level, the liquid valve will stop to operate which is not allowed the water to the container. It means, the water pouring process is completed and continues to an origin position for looping the process.

1.2 Objective of Project

There are four objectives of this project:

i. To build an Automated Water Pouring System by developing the project programming using 68k Microprocessor software as a controller and hardware implementation.

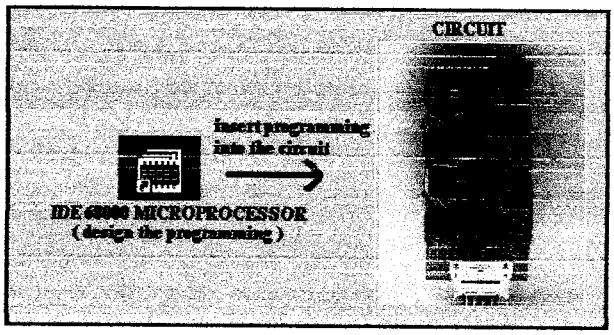
ii. To develop an automatic system that is suitable to use with any size of water container in range of 100 ml to 2 liters which makes the users more comfortable.

iii. To know deeply about the interface with input and output devices with microprocessor for implementing this project.

iv. To design and build a lower cost for automated water pouring system.

1.3 Scope of Project

Software :



Combination between software and hardware

Hardware :

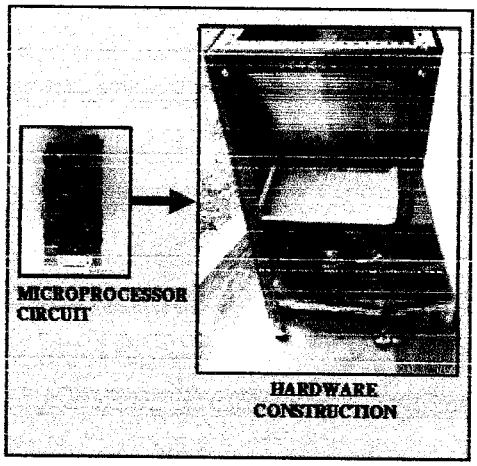


Figure 1.01 : Block Diagram of Scope

In implementing this project, it consists of two parts that are hardware and 68000 Microprocessor software as a controller. The hardware is the construction of this project including the circuit. The important devices that in used are motor, liquid valve, several of sensors, water tank, including the components in circuit are MC68000, RAM, ROM, buffer, and latch.

As a controller, 68000 Microprocessor software is used for this project. By the way, the programming has to be design so that it can control the water pouring system to be an automated operation. In addition, if there are any interruptions during process, it can be solved efficiently. So that the programmer has to think any problems that maybe occur during the process and solve the problems effected the water pouring system can be functioning completely as desired and success.

After completing the programming, it will be burning into the circuit using Microprocessor tools. Then, the combination between hardware and software need to be done to find out the result. An automated water pouring system can function well depending on the programming that has been developed.

1.4 Problem Statement

This project is suitable to use for public user which is the automated system will become the users easy than before. There are three main problems that currently exist:

1) Manual operation

Currently, water machine is used as a manual operation in public users and it only requires the same size of water container. For other water machine, they can use different size water container but the user have to hold the container either it is heavy or light of water. So, this project's system will build an easy system for public used, which can sense the size of container in fully pouring the water into their container, automatically.

2) Cannot solve the interruption.

The water machine is not comfortable to use because, if any interruption occurs while in pouring process, the water will continuously pour the water even the water container is removed by someone. In this project, any interruption will be detected by the system and the system will be setup again at the origin place to make it better.

3) High cost

As usual, the water machine is built using Programmable Logic Controller or Micro- Manage Computer which needs a high cost for the construction. So, in using 68000 Microprocessor the cost will reduce in used the components and also the maintenance.

1.5 Project Flowchart

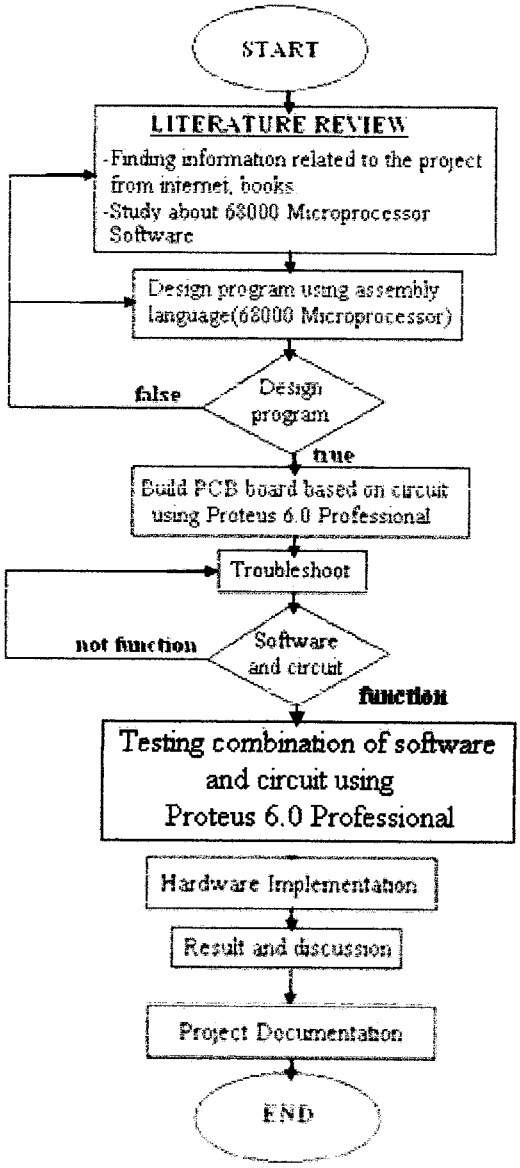


Figure 1.02 : Flowchart of project.

In doing a project, the flowchart of project is important to know about every step that has been done for completing a project. First step is researching any information about the project and find out the literature review that is related to this project through an internet, books, journals, newspapers, and others.

Besides that, the application or operation of this project can used in designing a program using IDE 68000 Microprocessor software. In this process, all matters that maybe faced must be considered at all.

Next, the simulation must be done on the circuit of project using Proteus 6.0 Professional in build a PCB Board. It is starting with *ISIS Schematic Capture* as a circuit simulator and *ARES PCB layout program* as a PCB layout tools in implementing the PCB Board.

The hardware implementation is constructed based on the research and information. It takes for a several time in completing this process and make sure that it is suitable to use, hard, easy to use and low cost. Then, the combination between hardware and software will become a complete project when it is achieved the target.

1.6 Literature Review

This part places the current study into the context of previous which is related research to the "Automated Water Pouring System". From literature reviews that have done before, it is familiarized with the points of agreement and disagreement among the previous studies, as well as with the theoretical and empirical relevance of each to the research. Of central importance, the literature review provides a thematic narrative which guides the formulation of the topic and suggests strategies for making operational the independent and dependent variables considered in the study. It means, from this process the information on the technology available and the methodologies can be obtained, that used by the other researches on the same topic around the world.

Recently, there is a various type of water pouring system either in automated or manual operation. Usually, it is called as 'Water Filling Machine' and there is variety of application either at industrial or at public used. These types of product appeared with much kind of features and character, but with the same task that is to fill the water into the water container. This part will discuss about the 'Automated Water Pouring System' that exist in the market, with their specifications and how it functions.

1.6.1 Example Water Pouring System

1.6.1.1 Load Cell Based Filling Machine

The Load Cell Based Filling Machine is designed to fill the water into the user's container. There are two operation which is needed by the users, automatic operation and manual operation. When user put their container on the base container, it will move up to the desired position. In manual operation, the user will push a button so that the water will flow to their container. Then, after the water reaching at a desired level of water, user has to push the stop button. The water will stop to flow into the container. For automatic operation, the water will flow out automatically until it fully the container. Next, the base container will turn down to the origin place. All operation can be shown using the LED located above part of Load Cell Based Filling Machine [3].

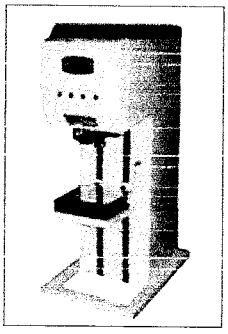


Figure 1.03 : Load Cell Based Filling Machine

Load Cell specifications [3]:

a) Microprocessor Based Filling System
b) Two Stage Valve System for High Accuracy
c) Bright LED Display
d) Pneumatically Operated
e) All Contact Parts in Stainless Steel 304/316
f) Filling Range 200gms to 20kg (standard)
g) Different Capacity Available On Demand
h) Barrel Filler Load Cell Based Available
i) Having Auto/manual, Gross/net Fill Option
j) Intelligent Correction for Accuracy
k) No Jar No Fill System if in Auto Mode
l) Volumetric Display also Available On Demand
m) Speed 3 to 4 Jars of 15 Kg. per Minute
n) Material Can Be Filled: Oil, Ink, Adhesive, Milk, Chemical, Lubricants Etc
o) Flame Proof Model Available

1.6.1.2 Filling Machine For Small and Medium Sized of Operation

This type of filler is perhaps the most widely used machine in small bottle filling operations because it handles a wide range of thin, free flowing liquids as well as liquids with medium viscosity. This machine is also commonly referred to as a "fill to level" filling machine or cosmetic height filler. This means that machine fills to a target fill height in the container rather than volumetrically. But it can also be shown that as long as the container specification do not vary greatly, the volumetric accuracy of this machine is excellent.