UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT AUTO FILLING WATER SYSTEM USING PIC16F877A

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours

by

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation and Robotics) with Honours. The member of the supervisory is as follow:

…….

(Khalil Azha Bin Mohd Annuar)

ABSTRACT

Nowadays auto filling water system is used in the industry. Every company or industry using this auto filling water system to make sure the water can fill with accurate filling. It is also to reduce the manpower in the industry to fill the water. The machine in industry have a high price, it also require a lot of hardware and complex component in the hardware to program configuration if varied water volume is required to fill in the bottle. Almost machine in the industry is not fully automatic. The purpose of this project is to developed auto filling water system with the accurate filling. The main system that handle of this project is microcontroller PIC16F877A. Microcontroller used as to control the program system and control the operation to the machine. The machine controller will operate by using conveyor system and have the filling system that can fill volume of water accurately. This system required with accurate flow control pump to make sure the volume water fill in the bottle will accurately. Beside that the auto filling water system is developed to reduced cost price of machine compare to other filling water machine in market which is expensive. The machine is also easy to handle and operate and it is user friendly then other water machine. This develop can to be portable and can be left standalone during operation. It is also require GSM (Global System Mobile) to tell the user how many bottle is done to fill.

ABSTRAK

Pada masa kini, sistem pengisian air berautomatik banyak digunakan dalam industri. Setiap syarikat atau industri menggunakan sistem pengisian air berautomatik adalah untuk memastikan air boleh diisi dengan ukuran yang tepat. Ia juga boleh mengurangkan tenaga kerja dalam proses pengisian air di industri. Mesin di dalam industri mempunyai harga yang sangat tinggi, ia juga memerlukan banyak perkakasan dan komponen yang kompleks untuk konfigurasi program jika isi padu air dan ketinggian botol air berubah. Sebahagian mesin dalam industri tidak beroperasi secara automatik. Tujuan projek ini dijalankan adalah untuk menambah baik sistem pengisian air berautomatik dengan pengisian yang tepat. Sistem utama yang mengendalikan projek ini adalah mikrocontroller PIC16F877A. Mikrocontroller adalah pengawal mikro yang digunakan untuk mengawal sistem program dan mengawal semua operasi mesin. Pengawal mesin akan beroperasi dengan menggunakan sistem penghantar dan mempunyai sistem pengisian yang boleh mengisi isipadu air dengan tepat. Sistem ini memerlukan ketepatan untuk mengawal aliran pam dan memastikan jumlah isi padu air yang diisi adalah tepat. Selain itu sistem air pengisian automatik dibangunkan adalah untuk mengurangkan harga kos sesebuah mesin berbanding dengan mesin-mesin air yang berada dipasaran iaitu sangat mahal. Mesin ini juga mudah untuk dikendalikan dan sesuai beroperasi untuk mesra pengguna daripada mesin air yang lain. Projek ini boleh menjadi mudah alih dan boleh dibiarkan beroperasi sendiri semasa operasi. Ia juga memerlukan GSM (Sistem Global Mobile) untuk memberitahu pengguna berapa banyak botol yang dapat diisi.

DEDICATIONS

To my beloved parents

To my kind lectures

And not forgetting to all friends

Love, Sacrifice, Encouragement, and Best Wishes

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Usually, auto filling water system is a system used in industries as to beverage in the bottle on fill the water in the container. In this machine will have a few step which is volume water to fill in the bottle or container, quantity of bottle or container, and system that can tell the user how many bottle that finish filling with water. The difficulty problem in this machine or project is when have many type of container or bottle. The result will have a different volume of water in the bottle or container. So to solve the problem made the machine structure and have suitable programming that can detect the size of bottle or container. Normally, in the industries application, the auto filling water system already used at the reverse osmosis machine. This machine commercialize user with system that user must using coin or money to filling the water. Besides that, vending machine also one of the machine that developed in industries to easy the user and friendly use when using this machine.

The important thing in this project is to controlling volume of water that can automatically filling in the bottle or container with the accurate volume. This project develop to fill the water without human intervention and to made the machine automatically operate to fill the water in the bottle or container. This project is using accurate control pump to make sure the volume of water accurately filling in the bottle or container. In addition, this project be control by microcontroller as a mean system that can operate the project. It is also contain conveyor to easy handle the bottle or container to move and make the operation become smoothly.

The planning way that has been decided in this project have a few step. The first step is to detect the bottle or container at the conveyor. The operation will start when have bottle or container in the conveyor. The second step is to set the volume or quantity of water by the user with using suitable programming that have been done. After that the conveyor move to the filling station. The third step is the bottle or container will stop at the filler to fill the water that have been set by user before. After finish fill the water in the bottle or container by accurately volume, the conveyor move again with to the next station which is collecting bay. In this step, GSM(Global System Monitoring) system will tell the user how many bottle or container that finish filling with water .

1.2 Problem Statement

Problem statement of this project is some machine are not fully automatic to fill the water accurately. Mostly auto filling water system used human to make sure the volume of water that fill in the bottle or container have correctly volume. So the machine needs to be guarded every time from human to make sure the operation system will operate smoothly. Besides that, the obstacle of the machine is costing to buy the machine. The machines that already have in the industries were very expensive. Only a few industries affordable to use this machine. Moreover the size of machine in industries is bigger. Another obstacle is lack of system or data that can tell the user how many bottle or container that have been done filling with water. Lastly, difficulty to filling the water when the quantity or height the bottle or container is different.

1.3 Project Objective

The objective of the project is to:

a) Design the auto filling water system with ultrasonic sensor HC-SR04.
b) Develop a program that can fill water into the bottle or container with accurately scale with set by the user.
c) Create and design suitable conveyor system controlled to operate the operation.

.

1.4 Project Scope

a) Use microcontroller PIC16F877A to control the operation of auto filling water system.
b) Use Global System Mobile (GSM) to detect bottle that finish fill with water and give the data to the user.
c) Use ultrasonic sensor to detect bottle and start filling the water.
d) Do simulation of the system by using Proteus to make sure the program work as desired and to detect any problem.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This chapter explains about the previous project that related and the research theories that have discussed. In the previous project, journal or thesis give a lot of addition knowledge about this project. The literature review has been done to give more information and clear vision about this project. This chapter is the fundamental and contain theories of the component that be use in this project.

2.2 Literature Review

2.2.1 Research on System of Automatic Water Filling

In this topic represent about researched automatic water filling or liquid filling system. The previous thesis or project it have different type to filling the water. According to the Ejiofor Virgina Ebere et al 2013, this paper aimed to presenting project in embedding a control system into an automatic water pump controller. One of the motivations for this research was the need to bring a solution to the problem of water shortage in various places eliminating the major culprit; waste of water during pumping and dispensing into overhead thanks. Beside that this project can creating a barrier to wastage will not only provide more financial gains and energy saving, it is also give benefit to the environment and water cycle which in turn ensures that we save water for our future. In addition this project aimed to provide automatic irrigation to the plants with a system that operates with less manpower. This programmed using 8051 microcontroller as giving the input signal

to the sprinkler and to control all program. For this project it use temperature sensor and humidity sensor were connected to internal ports of the microcontroller via comparator. The sprinkler activated whenever there is a change in temperature and humidity of the surroundings. The sensors senses the change in humidity and the temperature.

However according to the Mallaradhya et al 2013, this project is using PLC as the programmed. It is different ways programmed to compare with this two project. The project Ejiofor Virgina Ebere et al 2013 using PIC 8051 as the main program but project Mallaradhya et al 2013 used PLC (Programmable Logic Circuit) as the main program. The aimed for this project is to develop a filling machine which can fill liquid or water with different sizes of containers which can be used in different industries like medicine, oil and vending machine. The problem of this project is existing in the present machines that can fill the water or the liquid with the certain height. It must be guarded from the operator to fill water or liquid every time. If the machine have to fill different type (size) of container, then again the operator has to set the filling amount for each container.

This two of the thesis report, it give idea to do project which is "Auto Filling Water System". According to project it use PIC 8051 as the interrupt signal and the main program, with this idea, project "Auto Filling Water System" is using PIC 16F877A as the input main program. The project is about filling water ,so it must have a container to fill the water or liquid. Related with the project, it use a container such as bottle to fill the water or liquid. So it give the idea to do water filling with different height of bottle to do the project. Furthermore to move container (bottle) for this project, it must have a something ways to move the container. The idea for this project is used conveyor to move the container according the project PLC project. The PLC not used for this project but PIC 16F877A used for the main project. The combination from both of the thesis produce project " Auto Filling Water System".

2.3 Water Level

In this topic is discussed about the water level that research in different place. According Mallaradhya et al 2013, it is used timing to fill the water with accurate height. The problem from this project was present the machine that can fill water with the several type of container and with certain height. The capacitive sensor is used to sensing the container or the bottle. It was depending with output of sensor to detect the container and to switch on the valve. If not have present of container or bottle the valve automatically turn off. The operator or the user will set the button of filling water, so it can fill with accurate amount of water and not wastage the water. This project used timing process to fill water into the bottle with the desire height. So it can control the level of water with the suitable height of container.

However according N.Kapuhungkui et al 2014, it use the water level in the overhead tank due to overflow and prevents the motor from running continuously. The system operate the off chance that this wastage can be spared by fitting checking with a basic circuit then shortage and deficiency of water can be counteracted to some degree. The circuit will constantly check the two water level the top level and the base level of the overhead tank. At the point when the water level achieve the top level the engine will quit filling the water from the source and keep the flood of water from the tank. The engine will stay in off state condition until it comes down to the base level. At the point when the water level goes underneath the base level of engine will run again and begin topping off the overhead tank. With basic presentation gadgets the level of water can likewise be check.

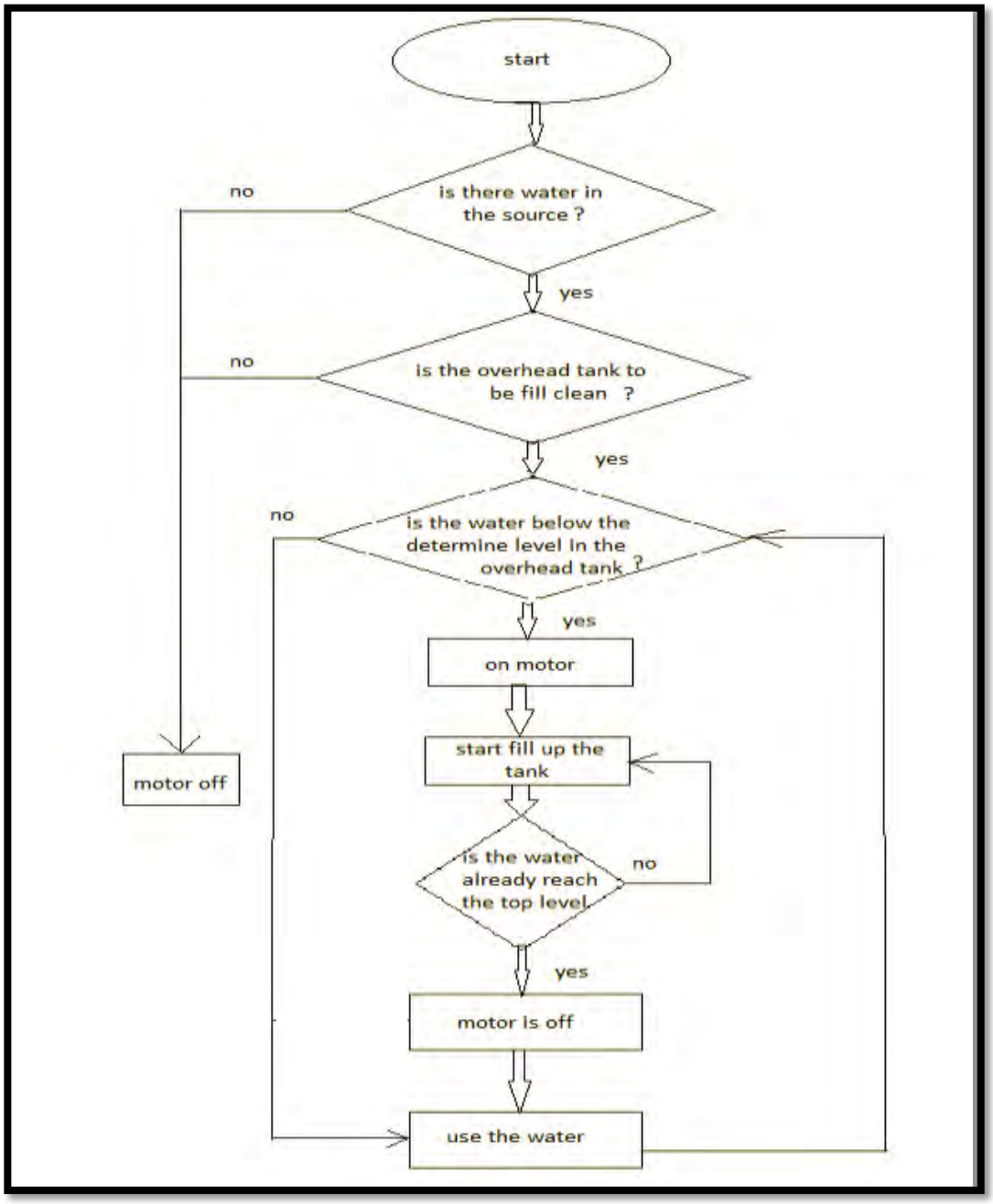

Figure 2.1 : Figure 1 is Algoritm of Water Level Controller

According thesis V.Kerremans et al 2011 which is "Automatic Bottle Filling, Capping and Embossing using PLC" used water pump to control the water level. Initially, when the power is switch On, conveyor start to move, the bottle are placed on the conveyor, when the sensor was activated, the clamping cylinder gets activated and hold the bottle activating the nozzle. The nozzle be activated and the sensor will activated opening the valve and water will be filled in the bottle with accurate level. When done specified liquid level reaches in the bottle, the sensor will get activated and the valve is closed, the nozzle is moving away and the clamper