UNIVERSITI TEKNIKAL MALAYSIA MELAKA

AUTOMATIC WATER LEVEL CONTROLLER AND DIRT DETECTOR

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industry Electronic) with Honours.

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **AUTOMATIC WATER LEVEL CONTROLLER AND DIRT DETECTOR**

SESI PENGAJIAN: **2015/16 Semester 1**

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I hereby, declared this report entitled "AUTOMATIC WATER LEVEL

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Signature   :………………………

Name   : **NURUL AINIZA BINTI MOHAMMAD**

Date   :

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 Electronic Engineering Technology (Industrial Electronic) with Honours. The member of the supervisory is as follow:

……………………………….
(Project Supervisor)

ABSTRACT

Automatic water level control is a project which is to maintain the water at the certain level. The project uses actuator to control the water, which is pump. The function of pump draws water to the water tank. When the water reach at maximum level, the pump will automatically turn off and give a signal which is buzzer and LED indicator. But when the water is less than the maximum level, the pump will on and the pump will draws the water until reach the maximum level. The buzzer will on and led indicator will show. The water tank will always full. The using of the PH sensor also is used in this project. It is used to calculate the PH value of the condition drinking water. The value of PH is indicated the condition of the water filters

ABSTRAK

Automatik kawalan paras air adalah satu projek iaitu untuk mengekalkan air pada tahap tertentu. Penggunaan projek penggerak untuk mengawal air , yang pam. Fungsi pam menarik air ke dalam tangki air. Apabila air mencapai pada tahap maksimum, pam secara automatik akan mematikan dan memberi isyarat yang buzzer dan penunjuk LED. Tetapi apabila air adalah kurang daripada tahap yang maksimum, pam akan pada dan pam kehendak cabutan air sehingga mencapai tahap maksimum. Buzzer akan pada dan penunjuk membawa akan menunjukkan. Tangki air akan sentiasa penuh. Menggunakan sensor PH juga digunakan dalam projek ini. Ia digunakan untuk mengira nilai PH air keadaan minum. Nilai PH ditunjukkan keadaan penapis air

DEDICATIONS

To my beloved family and especially my parents En Mohammad and Pn Zahrah who always support and inspired me throughout my journey in UTeM.

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Assalamualaikum and salam sejahtera,

Alhamdulillah, first of all thanks to Allah S.W.T for giving me strength, wisdom, intelligent and his blessing for me finally the Project Sarjana Muda (PSM) report is completed.

I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. In order to complete this report there is so much up and down to completely this project report. First and foremost, I would like to express my sincere appreciation to my supervisor En Tengku Mohd Faisal bin Tengku Wook who always give support, kind, patience and continuously guided me by time to time and share her time and knowledge during this project.

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PH	-	Potential of Hydrogen
PSM	-	Projek Sarjana Muda
PCB	-	Printed Circuit Board
LED	-	Light Emitting Diod
PIC	-	Programmable Integrated Circuit
LCD	-	Liquid crystal Display
RAM	-	Read Only Memory
ADC	-	Analog Digital Convertor
EEPROM	-	Electrically Erasable Programmable Read-Only Memory
USART	-	Universal Asynchronous Receiver-Transmitt
CMOS	-	Complementary Metal Oxide Silicon
SRAM	-	Static Random Access Memory

CHAPTER 1
INTRODUCTION

This chapter presents the overview for overall description for this project. Hence, in this chapter also provides brief information of the background of project, problem statement, objective and scope.

1.0   Background of the project

Water is very important in our daily life and it is also plays an important role in our everyday life. Water is one of the most common substances found in nature. It is used in our everyday activities. Sources of water include rain, river, lake and sea etc. we cannot live without water in our daily life and because of that we must not waste the water. For an example, people nowadays use the water filter. Water filter is a filter removes impurities from water by means of a fine physical barrier, a chemical process or a biological process. Filters cleanse water to different extents for purposes like irrigation, drinking water, aquariums, ponds and swimming pools. Automatic water level control is a project to maintain the water at the certain level. The project use actuator to control the water, which are pump. The function of pump draws water to the water tank. When the water reached at maximum level, the pump will automatically turn off and give a signal which is buzzer and led indicator. But when the water is less than the maximum level, the pump will on and the pump will draws the water until reach the maximum level. The buzzer will on and led indicator will show. The using of the PH sensor also is used in this project. It is used to calculate the PH value of the condition drinking water. The value of PH is indicated the condition of the water filters.

1.1 Problem statement

The current scenario is people generally switch on the pump when the tank is empty and they forget to turn off the pump and this will make the water over flowing. In addition, the problem also occurred when what is the right time to change the water filter. Usually, they will change the water filter 6 month a year based on the instruction given from the supplier.

To avoid wastage and any form of exposure to hazard that may result from overflow of water by using the automatic water level control will solve this problem and by using the PH sensor can help people to make sure what is the right time to change the water filter. Automatic water level control is a project to maintain the water at the certain level. The project use actuator to control the water, which are pump. The function of pump draws water to the water tank. When the water is higher from the maximum level, the pump will automatically turn off and give a signal which is buzzer and led indicator. But when the water is less than the maximum level, the pump will on and the pump will draws the water until reach the maximum level. The buzzer will on and led indicator will show. This project uses the PIC as the controller to control the water in and water out. The MPLAB IDE is use to run the program. MPLAB is a free integrated development environment for the development of embedded applications on PIC and dsPIC microcontrollers, and is developed by Microchip Technology. Moreover, the software of PROTUES 8 is use to stimulate the circuit whether the circuit is fully function before proceed to the next stage. The LABVIEW Software will be used to show the process of water flow in the tank controlled by motor and valve.

The main purpose of this product is to overcome the water wastage by giving signal to the users by monitoring the water using water level sensor. Besides, it is also helps people to make sure the condition of dirt of the filter what is the right time to change the filter by depends on the PH value. The PH sensor will indicate the condition of the water filter based on the PH value.

1.2 Objective

The goal or objectives of which the design device is expected to accomplish is to build an automatic water level control with automatic control system. In this project, sensor are place at different level of the tank and with the aid of this sensors, the microcontroller monitor the level of the liquid at any particular point in time. Some of the objectives are:

i. To design an automatic water monitoring system
ii. To avoid wastage of water
iii. To save the water and electricity
iv. To make people easier to detect the condition of the dirt of the filter
v. To make sure the PH sensor can read the value condition of water

Since the demand of electricity is very high, automatic water level control saves energy

1.3 Scope

The scopes of works in this project are:

i. This project focuses on the water level controller and dirt water filter
ii. Main circuit capable saves electricity and prevent from wastage of water in a long term
iii. Main circuit capable of controlling the water at the certain level and can detect the amount of the dirt water filter
iv. Can detect the value of PH of the water filter using PH sensor

1.4 Methodology

1.4.1 Methodology Flow Chart

```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
                         ▼
              ┌──────────────────────┐
              │ Identify the title of the │
              └──────────────────────┘
                         │
                         ▼
              ┌──────────────────────┐          PSM 1
              │ Understand the problem │
              └──────────────────────┘
                         │
                         ▼
              ┌──────────────────────┐
              │ Search information and idea │
              └──────────────────────┘
                         │
                         ▼
              ┌──────────────────────┐
              │  Sketch the prototype │
              └──────────────────────┘
                         │
                         ▼
              ┌──────────────────────┐
         ┌───▶│     Design circuit    │
         │    └──────────────────────┘
         │               │
      No │               ▼
         │          ◇ Test simulation
         └──────────   circuit? ◇
                         │ Yes
                         ▼
              ┌──────────────────────┐          PSM 2
         ┌───▶│    Making PCB board   │
         │    └──────────────────────┘
         │               │
      No │               ▼
         │          ◇ Test PCB
         └──────────   board ◇
                         │ Yes
                         ▼
                       ( A )
```

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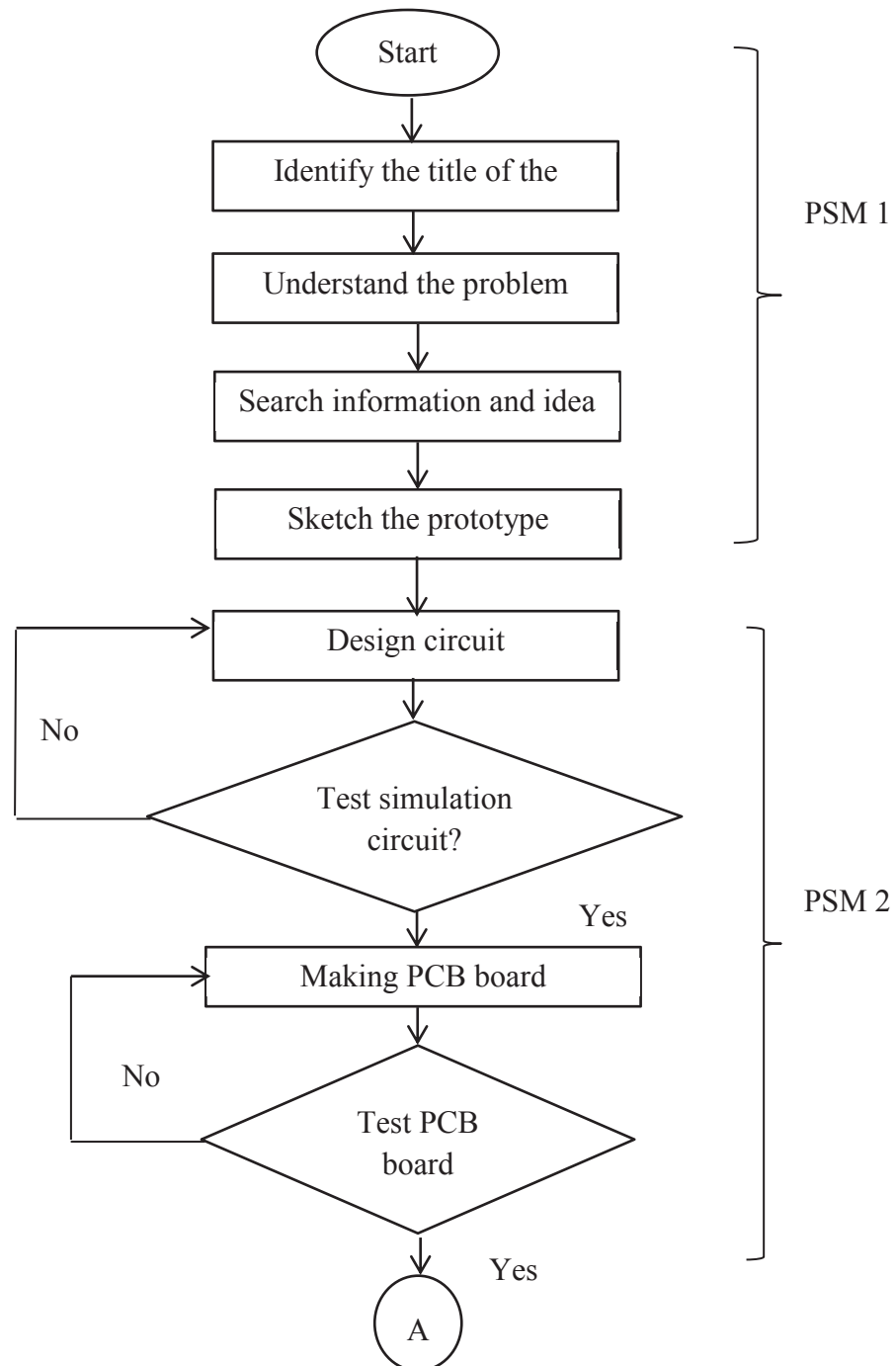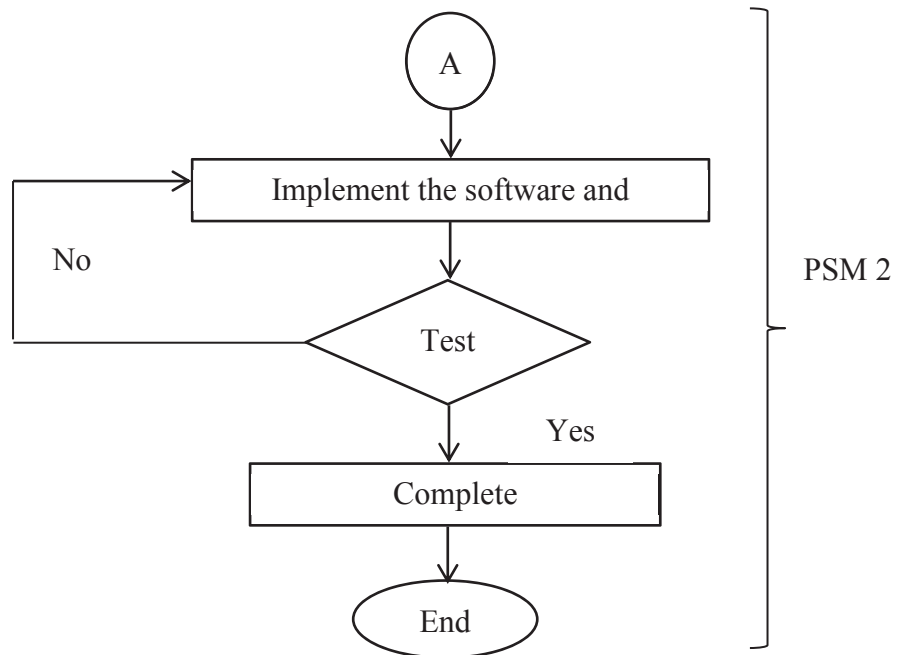
Figure 1.1: Overflow planning of project

The methods and methodology section of the research proposal provides an overall plan of how the research objectives will be achieved. It includes a description of the methods and the methodology. Methods are the techniques or procedures used to gather and analyze data or to make a piece of art. Methodology refers to the 'the strategy, plan of action, process or design lying behind the choice and use of particular methods, and linking the choice and use of methods to the desired outcomes. Methodology includes not only the practical aspects of the research such as method and action plan, but also the philosophical and theoretical perspectives of the research. For this part divided into two part which is PSM1 and PSM2. The PSM1 will describe about the current progress in completing the report meanwhile for PSM2 will explain about the future plan on how to completing this project.

1.4.2 Flow Chart PSM 1

```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
                         ▼
              ┌────────────────────┐
              │ Identify the title │
              │   of the project   │
              └────────────────────┘
                         │
                         ▼
              ┌────────────────────┐
              │  Understand the    │
              │     problem        │
              └────────────────────┘
                         │
                         ▼
              ┌────────────────────┐
              │ Search information │
              │     and idea       │
              └────────────────────┘
                         │
                         ▼
              ┌────────────────────┐
              │    Sketch the      │
              │    prototype       │
              └────────────────────┘
                         │
                         ▼
                    ┌─────────┐
                    │   End   │
                    └─────────┘
```
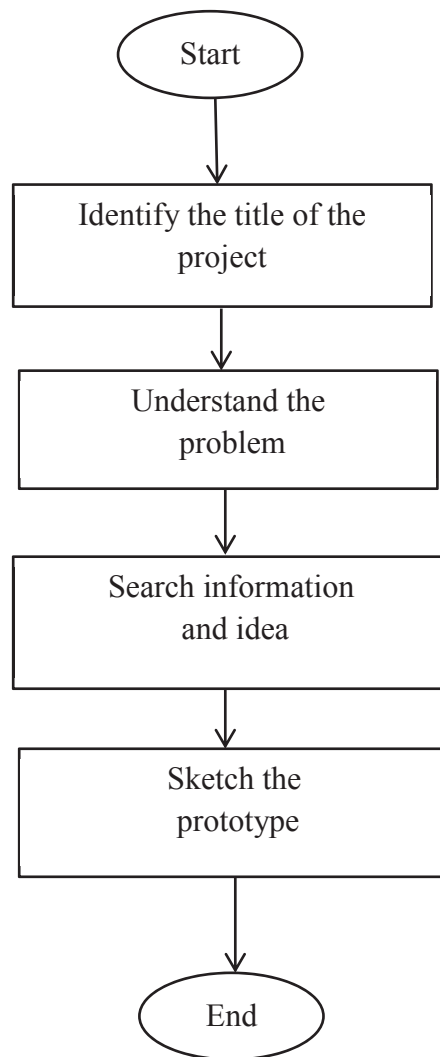
Figure 1.2: PSM 1

For the first part PSM1, the first step is to choose or identify the title of the project. This is the main thing and need to choose wisely because this project will continue to the next PSM2. The selection of the title must be the same or correspond to the course of learning or subject that taken for that semester or next semester. Next, after decided the title of the project need to study and understand the problem of the project. Understand the problem and try to find the solution to solved the problem. This method including by make a research and find information and idea from others source. Secondary data will be reviewed initially through the university library using a range of information sources such as the OPAC system, academic and commercial abstracts, bibliographic databases, and Internet search engines. To aid the search, a table of key terms will be constructed and the sources located will be correlated with this. A secondary cross-reference table will be developed so that data can be viewed from different perspectives. Next, after all the information is done the sketching of the prototype is started. The sketching of the project must simple and easy to implement and can understand by other people. The sketch of the project is just an illustration or roughly about this project.

1.4.3 Flow Chart PSM 2

```
                    ┌───────────┐
                    │   Start   │
                    └─────┬─────┘
                          │
                          ▼
      ┌─────────────────────────────────────────┐
  ┌──▶│             Design circuit              │
  │   └─────────────────────┬───────────────────┘
  │                         │
  │                         ▼
  │              ╱───────────────────╲
No│             ╱   Test simulation   ╲
  │◀───────────    circuit?            
              ╲                       ╱
               ╲─────────┬───────────╱
                         │      Yes
                         ▼
      ┌─────────────────────────────────────────┐
  ┌──▶│            Making PCB board             │
  │   └─────────────────────┬───────────────────┘
  │                         │
  │                         ▼
  │              ╱───────────────────╲
No│             ╱    Test PCB board    ╲
  │◀───────────                        
              ╲                       ╱
               ╲─────────┬───────────╱
                         │      Yes
                         ▼
      ┌─────────────────────────────────────────┐
  ┌──▶│    Implement the software and hardware  │
  │   └─────────────────────┬───────────────────┘
  │                         │
  │                         ▼
  │              ╱───────────╲
No│             ╱    Test     ╲
  │◀───────────               
              ╲             ╱
               ╲─────┬─────╱
                     │  Yes
                     ▼
      ┌─────────────────────────────┐
      │          Complete           │
      └──────────────┬──────────────┘
                     │
                     ▼
              ┌───────────┐
              │    End    │
              └───────────┘
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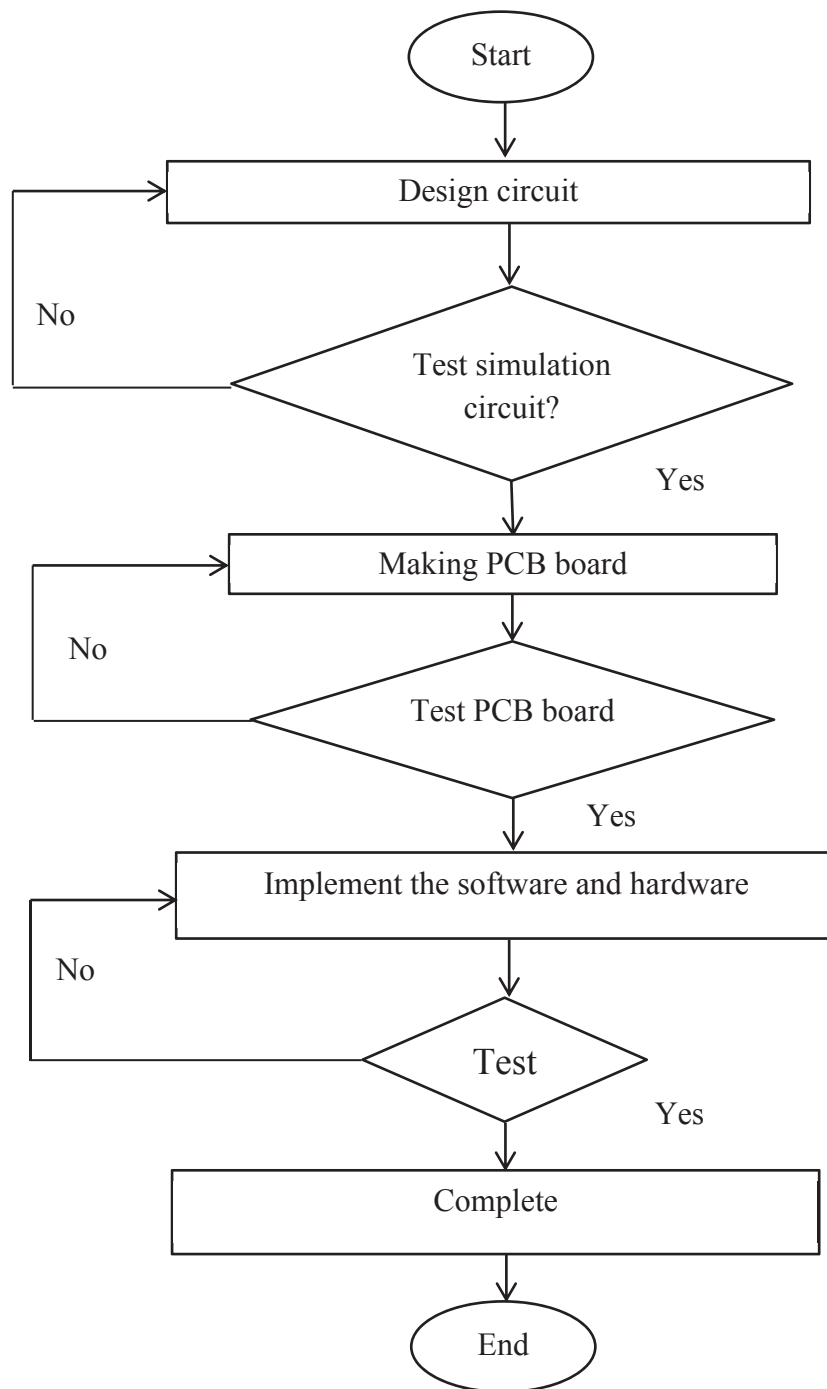
Figure 1.3: PSM 2

For the second part PSM2, the process continues from the PSM1. Next stage is make simulation circuit. The selection of the circuit is made from the PSM1. We proceed to design the circuit of power supply, input and output circuit using software PROTEUS. To make sure the project is successfully the simulation of the circuit is done. The simulation is done by using software MPLAB IDE and PROTUES 8. The MPLAB IDE is use to run the program. MPLAB is a free integrated development environment for the development of embedded applications on PIC and dsPIC microcontrollers, and is developed by Microchip Technology. Moreover, the software of PROTUES 8 is use to stimulate the circuit whether the circuit is fully function before proceed to the next stage. The LABVIEW Software also will be used to show the process of water flow in the tank controlled by motor and valve. If the simulation is unsuccessful, need to repeat the simulation but if success then proceeds to next stage which is making a Printed Circuit Board (PCB). There are several step to make PCB board such as Printed process, etching process, UV process etc. next, after completed all process need to test the PCB board whether it is function or not. If not function need to make another PCB board but if function next stage implements the software and hardware. All the data such as programming, circuit board etc will implement to the prototype. Next, test the project if not function need to implement software and hardware again. Last but not least, the project is completed.

1.5   Summary

Generally, this chapter is described on the introduction of project. Basically, the main idea to perform a task to read the speed at certain times. To design this project, there have several researches on how to implement this project in actual application. The first step is to introduce the main part that wants to be used in this project which is main controller. The second step shows the research for the disadvantages of advantages of using a PIC controller automatically applies. Last but not least is showing the overall plan of how the research objectives will be achieved.