

AIR SHOWER CLEANING ROOM

MUHAMAD SHUKRI BIN KAMARUZZAMAN

This report is submitted in partial fulfillment of the requirements for the award of Bachelor of
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BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : **AIR SHOWER CLEANING ROOM**

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Supervisor's name : MDM. AZDIANA BINTI MD YUSOP

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DEDICATION

*Dedicated to my parents, **Kamaruzzaman b. Masbah** and **faridah bt. Kamso**, my siblings,
and all my beloved persons.*

This book is dedicated to my parents, family members and friends. Last but not least, to my lovely supervisor and all the UTeM lecturers.

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Thank you very much.

ABSTRACT

Air Shower Cleaning Rooms is a importance facilities that mostly been designed to researcher or manufacturing sector who that require extremely clean air environments. Typically, Air Shower Cleaning Rooms employ a broad range of techniques to prevent air particles, bacteria, and other contaminants from entering the workspace, often by means of employee dress code and washing, pass-thru lockers and chambers, and intensive detail to cleaning. However, one of the major forces keeping a Air Shower Cleaning Rooms particle free is the air filter system. Air Shower Cleaning Rooms employ many different types of filters, including HEPA and ULPA filters, but there are two standard air flow patterns that are consistently used which are the laminar flow and turbulent flow.

The reason why people often work in Air Shower Cleaning Rooms is because they are required to follow dress and behavior guidelines to limit the amount of particles they will bring into a Air Shower Cleaning Rooms or particles they will shed while working in the environment. Workers must change from street clothes into specially designed outfits, often with full hood coverings, gloves, and breathing masks. Workers must also enter through an air shower to eliminate remaining particles on the cleaning room suit, and then pass items into the cleaning room through a small chamber that prevents outside air from entering the clean environment.

So, in order to fulfill PSM course knowledge, I'm should gain an idea to develop a principle into a smart system that can run through P.I.C concept. PICs are popular in many industrial developers because the concept can cut cost, wide availability, large user base, and extensive collection of application notes, availability of low cost or free development tools, and serial programming and re-programming by using flash memory capability.

ABSTRAK

Pembersih Bilik mandi udara adalah kemudahan yang direka untuk melakukan kajian atau produk pembuatan di mana ia memerlukan persekitaran yang sangat bersih. Kebiasaannya, teknik pancutan udara kering digunakan untuk mencegah zarah-zarah udara, bakteria, dan kandungan udara kotor lain dari memasuki ruang kerja berserta dengan cara pekerja berpakaian dan mencuci kepada sesuatu ruang untuk pembersihan. Namun, salah satu kekuatan utama menjaga pancuran Air Pembersihan bilik udara ini ia, tidak zarah udara sistem penapis. Membersihkan udara bilik pancuran menggaji pelbagai jenis penapis, termasuk penapis HEPA dan ULPA, tetapi ada dua pola aliran udara standard yang secara konsisten digunakan iaitu aliran laminar dan aliran corong.

Ini kerana pekerja yang sering masuk ke dalam Pembersih Bilik mandi udara, mereka diwajibkan untuk mengikuti pedoman berpakaian dan perilaku untuk menyekat jumlah zarah-zarah yang akan membawa ke pancuran udara bilik pembersihan dan habuk kotor mereka akan diasingkan daripada tubuh untuk berkerja di persekitaran yang bersih. Pekerja harus menukar pakaian biasa menjadi pakaian yang direka khas dengan penutup penuh, sarung tangan, dan masker pernafasan. Pekerja perlu memasukkan melalui bilik pancuran udara untuk menghilangkan zarah yang tertinggal di bilik pancitan udara kering tersebut, dan kemudian pada tahap yang sesuai untuk menghalang udara luar masuk ke lingkungan yang bersih.

Jadi, dalam rangka untuk memenuhi kotha projek saujana muda kengetahuan, saya memperoleh idea untuk meningkatkan tahap projek ini dengan membuat satu system pintar yang dijalankan dalam konsep PIC. PICs popular dikalangan banyak pemaju industri kerana rendah kos, penggunaan yang menyeluruh, dan penyediaan kos yang rendah, perkakas pembangunan tidak, dan pengaturcaraan bersiri dan pengaturcaraan semula dengan kemampuan memori flash.

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CHAPTER I

INTRODUCTION

1.1 Project Introduction

Cleanroom Air Shower is a facility whereby is needed to clean a certain workspace sector. It use air as the medium to make the cleaning and requiring a certain time to blow the air process in special specification. Nowadays this project has existed and has been produced by many types, but most of them use control design via PLC or hardwire as the controller. The existing product needed long to time install, maintain and it require huge budget to build this facility.

Regarding this problem and constraint, I decided to develop a new concept control which is modify the previous product to PIC whereby it can minimize the budget, time operations, power required and wiring installation. In additional, there are any advantages and special convenience included.

On top of that, mostly this project is hugely implemented to researching and manufacturing sectors. Which is it need a good air environment to create a best production because of the product in that sector are principally need very sensitive and easy to constraint with a tiny hair or little piece of dust. Usually our air environment in human eye is clean and good however it's not. Because of the truth is our eye can't determine actually our air are contaminate many dust and bacteria where bad to our production and health.

As the solution, how about build the same product but changed it with using the PIC16F877A as the controller circuit to trigger the problem. On theory, the inputs are at both entrance and exit of the door cabin and a motion sensor whereby it has a

sensor that can detect human movement inside the cabin thus it has indicator fixture for give a attention and instructor to the personnel. The main component of the project is the fan blower which it uses 12VDC to blowing air through human body in certain wind velocity. Usually this facility is necessary to wear the one sort of cloth to prevent the dust sticking on human body.

As the result, this project is good to develop and it is important to the sectors. The end of the result, this project is really can help organization regarding to upgrade the sector standard and make good expression to another country for invest and increase our economy and technology development.

1.2 Project Objectives

The objectives of this project are as stated below:

To develop and upgrade new concept the cleanroom from P.L.C to P.I.C which is it requiring to program coding through integrated circuit.

1.3 Problem Statement

Initially, there are many type of air shower cleanroom exist in the market but most of them are using hard wire which known that the controller system use many wire and load of construction process. Certainly, the deployment needed comprise for instance the relay, cable, magnetic contactor, conduit, and timer. Thus, its takes mach time mostly on connecting part of components from one part to another and the contrasting should be right in order not having misconnection. Furthermore, the PLC technician must have knowledge in ladder diagram concept as the result to joining cable into the controller instance like relay and timer contract.

Secondly, to organize the system need so much time regarding through the process. Conversely it does require many times to be done mostly the contractor should build whole air shower of the factory. Compromise to the situation inside of

the location and contracting process, it may be wasting time. However, it can be avoided with the PIC system whereby just attaching the circuit controller to the cabin components that entail for be connected.

Next, good project management process should contain the cost or budget element strategy perhaps any contractor or company want to capture this job as their occupation. Undoubtedly, if any method or technique that we can minimize the cost, that is the good ideas that we should considered. The cost can be decreased for instance cost of project and labor cost. Thus, it is one of the concepts that can increase the profit of the company.

Then, the existing PIC controller requires a big space to install the circuit into the air shower cabin. For information the commissioning process, the circuit terminal space was too small and not anybody can capable to assign for. Because usually the client will request to build the air shower worker space more maximum that it can. Hence, effect of this requested to locate the circuit board should be too smaller as it can. Perhaps, using just approximate 15cm X 15cm of circuit may be able soft the problem.

Furthermore, the power supply also can be minimized because usually these facilities are working too many times rapidly for this reason the existing cleanroom was using fully voltage supply to the circuit board thus it need high voltage demand every day. Meanwhile, this new upgrading development circuit supply just need maximum 12V power input as a requirement to operate.

1.4 Scope of Work

1.4.1 Software

C Programming

Getting the information and requirement needed in term to attempt the PIC programming. Learn the steps and necessary format in C compiler software. Thus, taking extra short-course classes regarding have been annually do by faculty in order to enchant the actual experiences.

C compiler simulation

First requirement is to download the software from the internet and register as the member to there forum discussion to gaining some information about the programming. Then, learn how to avoid coding mistake and learn how to keep the important data's during programming.

Design circuit simulation

Try to simulate with the Proteus software in order to synchronizing to the coding program whereby the circuit function are correct or wrong before applying the next activities.

Hardware

- On the Body

First design how many blower fan required to attach onto the body box. Second, what adjustment needed to be done regarding the components and equipment that want to be attached? Then, list down what the modification in progress activities should to be complete next after.

- **Components and equipments**

Blower fan

Design how much the blower fan compulsory base on the body size. After that, design the air ventilation formation insert and exhaust respectively in line to circulate the air.

EM lock

Try to think how to hang the heavy equipments on to the plastic body. Then, calculate the fit dimension requirement on the body side. Finally imagine the wiring termination needed for overall components.

Light indicator

This pilot light as a sign to show the human what the present situation now are. First, green pilot light represent OK means the cabin is not using. Second, red pilot light symbolize as BUSY means the cabin is been used. Third, yellow pilot light signs as the buzzer indicator.

Timer

Estimate how much time duration necessary for air blowing process.

Controller circuit

Design a simple controller circuit with just using the transistor, diode and relay to trigger the signal to the hardware. Regarding this progress, determine the designed circuit from any sources to verify the functional before startup to the hardware.

CHAPTER II

LITERATURE REVIEW

2.1 Control System

2.1.1 Elements of Control System

2.1.1.1 Relay

A relay is an electromechanical switch. More importantly, relays are used in virtually every type of electronic device to switch voltages and electronic signals. The most common electromechanical switch is a simple wall switch used to control the lights in your home. The difference with this type of switch is that wall switches require a human to perform the switching between on and off. Relays operate differently. Relays require no human interaction in order for the switching to occur. In fact, electronic pulses actually perform the switching. Relays are very powerful devices in the fact they can be used in virtually every industry.

A relay operates based on the principals of electromagnetic. Inside a relay is an inductor (a wire coil) that, when energized with an electric pulse, will generate a magnetic field. The second part of a relay is a system of metallic arms which make up the physical contacts of the switch. When the relay is off, or no electric pulse is given to the relay, the arms of the switch are in one position. When the relay is on, or an electric pulse is sent to the relay, the swing or switching arm of the switch moves to another contact of the switch.

When the relay is in the “off” position, the swing arm is in contact with the normally closed contact. This means that when the relay is in the “off” position, the normally closed contact is also conducting to the main contact. When the relay is activated, the magnetic field created by the inductor coil pulls the swing arm until it makes contact with the normally open contact connecting the circuit connected to the normally open contact to the circuit connected to the main contact. The arm moves as the generated magnetic field pulls the swinging arm toward the inductor or wire coil. There are many different configurations of relays but this is the simplest form of the internal switching. Relays can have as few as 1 moving arm up to many inside of a single relay box.

2.1.1.2 Timer

Timer in this project will be contract at blower fan which is should to set how much time necessary needs to air blowing. The timer usage is same concept on regular relay that has coil, swing arm and contactor but it has timer setting contact where we requested to setting the time in second. The reason why this timer necessary in this control circuit, is for time limitation to the ventilation cabin. Regarding on this project, we can't determine how much time will be set because it have reconsider many other aspects.

2.1.1.3 Blower fan

Blower fans will have permanent indication of correct rotation direction attached the blower housing. Unfortunately the blower fan in this prototype will be select in basic fan shall operate a small ventilate system to air circulating.