UNIVERSITI TEKNIKAL MALAYSIA MELAKA

"Development of Home Automation by Using Hand Gesture for Physically Disable People"

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electronics Engineering Technology (Industrial Electronics) (Hons.)

by

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FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING TECHNOLOGY

2018

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: "Development of Home Automation by Using Hand Gesture for Physically Disable People"

Sesi Pengajian: 2019

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DECLARATION

I hereby, declared this report entitled “Development of Home Automation System for Disable People” is the results of my own research except as cited in the references.

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APPROVAL

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

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ABSTRAK

Pada masa kini, di dunia perindustrian, perdagangan dan domestik, automasi menganggap bahagian penting; ia merancang pelbagai komponen untuk mengawal, mengatur dan mengarahkan dirinya untuk mencapai hasil yang dikehendaki. Matlamat saya adalah untuk mewujudkan sistem automasi rumah berdasarkan isyarat tangan terutama untuk orang kurang upaya. Jadi, "automasi rumah dengan menggunakan isyarat tangan untuk orang kurang upaya" yang dibuat dengan sarung tangan dan beberapa unsur penting lain yang dikawal oleh mikrokontroler. Sistem ini adalah kos efektif, mempunyai penggunaan yang luas, yang boleh membuahkan hasil yang berkesan. Saya mencipta sistem automasi rumah ini menggunakan sensor flex yang mengukur jumlah pesongan atau lenturan. Biasanya, sensor itu terletak di permukaan sarung tangan, dan rintangan elemen sensor diubah dengan membongkok permukaan. Rintangan ini berkadar terus dengan jumlah bengkok. automasi rumah berasaskan tangan juga dapat memaparkan status semasa peralatan elektrik pada LCD untuk mengelakkan kekeliruan. Selain itu, sebaik sahaja tanda tangan tertentu dilakukan LCD dengan memaparkan status mengenai peranti yang berinteraksi dengan pengguna pada masa ini dan peranti masing-masing akan melaksanakan perintah dari pengawal. Pada masa yang sama akan menjadi bunyi bip untuk menunjukkan tindakan itu. Ini bermakna untuk menyenangkan aktiviti seharian dunia sebenar automasi rumah.

ABSTRACT

Nowadays, in industrial, commercial and domestic world, automation assumes an essential part; it is really a planning of various components so as to control, sense, regulate and instruct itself to accomplish a wanted result. My aim is to create a hand gesture based home automation system especially for disable people. So, “home automation by using hand gesture for disable people” created with a glove and some other important elements which controlled by a microcontroller. The system is cost effective, has an extensive use, which can present effective and good outcome during execution. It can be utilized purposely for physically disable people. I create this home automation system utilizing flex sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface of the glove, and resistance of sensor element is varied by bending the surface. The resistance is directly proportional to the amount of bend. Hand gesture based home automation also able to display the current status of electrical appliances on the LCD to avoid any confusion. Besides that, once a specific hand gesture was performed the LCD with display the status regarding which device are interacting with the user currently and the respective device will perform the order from the controller. At the same the will be a beep sound to indicate the action. This is mean to simulate the actual world process of home automation.

DEDICATIONS

To my parents,

All my lectures, especially, Mr. Wan Nurhisyam Bin Abd Rashid
All my friends and relatives

Thousands of thanks and appreciates for their supports, encouragements and understands.

ACKNOWLEDGMENTS

In the first place I want to express my thankfulness to the god concerning the blessing given which I could finish my final year project. During making this paper, I have been collaborating with several people in helping me to finish this project.

I want to express my genuine appreciation to my supervisor Mr.Wan Nurhisyam Bin Abd Rashid, to the significant guidance, primary thoughts, continuous assistance and inspiration to make sure this project achievable. I respect his reliable assistance from the earlier until the end of this project. Thanks to staff and members of Universiti Teknikal Malaysia Melaka and also all my lab mates who guide me in various perspectives throughout the project.

I acknowledge my sincere appreciation to my parents for their sacrifice, love, and dream in my life. I can't find the suitable words that may appropriately portray my gratefulness for their assistance, commitment and confidence in my capacity to accomplish my aims. Special thanks must be given to my group mates. I like to appreciate their ideas and comments that were significant for the effective accomplishment of this final year project.

The following category is the individuals who aid me to influence besides raise further in my project and constantly help me in order to finish this project. I truly welcome the information and thought given.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

A/D	-	Analog to Digital
AC	-	Alternating Current
ADC	-	Analog to Digital Converter
ARES	-	Advanced Routing and Editing Software
AVR	-	Advanced Virtual RISC
BLDC	-	Brushless DC
CCP	-	Capture/Compare/PWM
CH	-	Channel
cm	-	Centimeter
CMOS	-	Complementary Metal-Oxide Semiconductor
CO	-	Carbon Monoxide
CO2	-	Carbon Dioxide
CPU	-	Central Processing Unit
DC	-	Direct Current
ECCP	-	Enhanced CCP
Ee	-	Irradiance
ft	-	Feet
GSM	-	Global System for Mobile communications
GUI	-	Graphical User Interface
I/O	-	Input Output
IC	-	Integrated Circuit
IDE	-	Integrated Development Environment
IR	-	Infrared
KB	-	Kilobyte
L	-	Length
LD	-	Laser Diodes
LDR	-	Light Dependent Resistor
LED	-	Light Emitting Diode
Li-Po	-	Lithium polymer

m	-	Meter
MHz	-	Megahertz
MSL	-	Mars Science Laboratory
nm	-	Nanometer
PC	-	Personal Computer
PCB	-	Printed Circuit Board
PDIP	-	Plastic Dual In-line Package
PIC	-	Peripheral Interface Controller
PIR	-	Passive Infrared Sensor
PSD	-	Position Sensing Detectors
RAM	-	Random Access Memory
RISC	-	Reduced Instruction Set Computing
ROM	-	Read Only Memory
RPM	-	Revolutions per Minute
SABOT	-	Semi-Autonomous Mobile Robot
SISO	-	Single Input Single Output
SPICE	-	Simulation Program with Integrated Circuit Emphasis
V	-	Voltage
VSM	-	Virtual System Modelling
Wi-Fi	-	Wireless Fid

CHAPTER 1
INTRODUCTION

1.0 INTRODUCTION

The principle ideas and development of the home automation system by using hand gesture for physically disabled people have given in this section. There four parts in this chapter. Such as, the explanation of the project background, problem statement, objectives and project scope. Additionally, clarification about the current project system and how the project is working will be clarify in this part. Other than that, the absolute starting point of the early preparation for this home automation system for physically disable people will beings serves also in chapter one. This part is also plays an important role as a guidelines for the users. The developer also can achieve the desired goals based on the sections included in this chapter with the clearly specified statement stated.

1.1 PROJECT BACKGROUND

An electronic system is an electronic circuit and parts are intended for finish either simple or complex capacity for the home automation design. Telecommunication system, computer system and automation system are the examples of electronic systems. Various control system that can be helpful to save human energy and involvement of human tasks are complete by the automatic control. This is because automatic system utilizes the technique of self-moving processes to complete a task.

Home automation is the most interesting project when one thinks about easy life style, comfort and saving human energy at home since it is using controller and managing the home devices such as light plus fan. Similarly, Home automation system by using hand gesture for disable people will make a sense when a system is making

physically disable people possible to control the basic home appliances by their own-self. This system considered as a domestic need for physically disable people. This is because physical incapacities, for example, minor stroke patient can enormously restrict the self-governance of patients regarding home living. Apart from that, patients endure with loss of motion with some type of spinal string damage (SCI) Patients with SCI can experiences remarkable challenges performing everyday exercises inside the home and frequently need outer support or indeed, even a progress to a helped living office. Patients sent to help living offices can spend a lot of money in human services costs alone. A large number of the patients sent to private homes cannot live self-governing and require a guardian (home medical attendant or relative) to help the persistent with different assignments all through the home.

Furthermore, there are lot of home automation systems are popular in the market and having a heavy competition among other vendors. Hand gesture is one of the latest and popular communication protocol for the product that uses in the home automation system because it requires minimal cable usage. Wired technologies can support the communication between the systems to working. The hand gesture protocol is design especially for physically challenged people to reduce the power consumption and the comparison of the Bluetooth technology permitted to evaluate if the hand gesture is good alternative, due to its low power usage, cheaper and its large application, which can easily can control and monitor the electrical system.

This presents a project of controlling home appliances such as lamp and fan with an intention of to design a simple, low cost system and widely use in future for physically disable people. The function of home automation from the view of a disabled person would be to help the disable to control the electrical appliances with depending on others. This system that intended to be implement will solves one of the problem face by physically disabled people, where they suppose not to depend on peoples help to do a simple need like operating basic electrical appliances at home.

Moreover, with the combination of software and hardware, we can control the home devices such as light and fan by using hand gesture. The Arduino are a series of kits, which combines of software and hardware, which help to turn ON and turn OFF the home appliances. The signal converted from hand gesture is use to control the home

appliances and a series of programming will be applied to the Arduino board that will activate the lamp and the fan to turn ON or OFF. The coded signal that are programmed to control devices are sent by the home wiring to relay switching ON and OFF in every part of the house.

1.2 PROBLEM STATEMENTS

Physically challenged people usually face hard time to move from one place to another. Hence, they have to depend on other people to done their needs all the time. Depending on other people to complete, a simple needs make the sick people feel even worst. Normally physically disabled people would be undergo a depressing life when seeing people around them are leading their life in dependent way. In addition to this, sometimes they do feel bad to call the person in charge to tell their needs. For example, In the case of living place if they want to have some brightness in their place they have to call up some one or the person in charge to ON the light. Same thing goes to, if they want to OFF the light or fan. It makes their self-esteem level even worst.

Usually physically disabled people must have someone to take care after one. That would be a family member or a paid home nurse. Paid home nurse usually do all the physically disabled person's needs. Their salary would be depend on the hour of their working time and the type of caring they are doing. For an example, this paid home nurse will start their routine start from getting clean the patient, providing them meals at right time, ensure patient take their medicine, and always be with them to take care and do their simple needs. For this kind of task, the paid nurse could charge very expensively. There are some disabled people can do certain things by their own like cleaning themselves, having meal, and consume medicine. However, they have to seek help from some to move and get thing to them from other place. Such as, going to wash rooms or toilet, getting food or water from the dining table of kitchen and switch on the light of fan.

Now days, variety type of home automation is trending among all over the world. It is becoming a basic necessity of a home. People are very interested in this system. Because of its creative and innovative features which are very impressive and

leads to an easy and efficient life style. As the features of a home automation system get advanced, sadly the price also will rise tremendously. When the home automation system is purposely for disabled people the price of the system would be unaffordable by the medium and lower economic class people. Although there are a number home automation system for disable people in the market, it is too expensive to be afforded by the every disable persons.

Regarding to the problems stated above, a brand new system especially to control the home electrical appliances is create to help the physically disabled people to be little dependent at their living place. This innovation tend make the disable people control the electrical appliances as per their needs by their own. Besides that, this development would be a user friendly for different type of physically disabled people. Such as, people who are suffering with minor stoke or blind and dump people. By using Arduino, it plays a part as a microcontroller for this innovation and it requires the expected code of programming to run it. Arduino makes the circuit more simpler look and it is suitable device to be used for control system.

.1.3 OBJECTIVES

The objectives of the project are:

i. To design a wireless base home automation that could help the disable people to operate the electrical appliances from one place.
ii. To minimize the cost of pay for paid home nurse or maid.
iii. To design a home automation system for disable people with affordable cost.

1.4 WORK SCOPE

To develop a home automation system which can monitor electrical appliances by using hand gesture for disable people. Such as, to operate light and fan. It is hardware advancement and integration of hardware and software in order to achieve the objectives of the project. The scope of this project motivated on a home automation system that will used by physically disabled people. In this project, the Arduino UNO works as controller and is programmed by C language. Flex sensor is used to detect the hand gesture. By a specific hand gesture as fixed template, the electrical device will ON or OFF. A part from that, a LCD will display current operation or status of the respective device.

1.5 THESIS SUMMARY

There are five chapters in this report. The first chapter is all about the project background, problem statements and objectives of the project and the scope of work. While in Chapter 2 is all about literature review. It is more discussed about the former researches that have been conducted by other students or other researchers and differentiate the products in the market. Finally, in Chapter 3 will be about block diagrams, material selection, simulation development and hardware of the project, flowchart of the project will be discussed.

CHAPTER 2
LITERATURE REVIEW

2.0 INTRODUCTION

Chapter 2 discussed more about the difference in the components and instruments can be used for this project. Furthermore, there are some of past-related projects or research about related to this project.

2.1 HOME AUTOMATION SYSTEM

Home automation system makes the handling of home appliances easier with not requiring large energy consumption. This leads life exceptionally simple these days. Home automation includes automatic monitoring of all electrical and electronic appliances at homes. The electrical or electronic devices can also controlled by remotely through wireless communication. For example, centralized controlled of lighting equipment, air conditioning, heating and all other equipment are used at home is imaginable with this system. Home automation system mainly applied by sensors, controlling devices and actuators (Tharun Agarwal, 2009). Home automation is not just purposed to decreasing human energy yet additionally vitality effectiveness and time saving. The primary target of home automation and security system is to control home machines by utilizing distinctive methods like android application, site pages, GSM when a man is far from home. The system cautions the individual on the off chance that a robber goes into the house by sending SMS on individual's hand phone which will empower them to shield their home from criminals. The framework likewise helps old individuals by controlling home apparatuses with the assistance of their cell phones as they don't have to go to distinctive areas for killing the apparatus ON or OFF (Aircconline.com, 2018). A home automation is one that is furnished with lighting, heating, and electronic gadgets that can be controlled remotely by hand phone or through the web. Home Automation enables a person to remotely or naturally control

things around the home. A home appliance is a gadget or instrument intended to perform out a particular capacity, particularly an electrical gadget, for example, a fridge, for family utilize. The words apparatus and gadgets are utilized conversely (Nathan David, 2015). Home automation system usually requires a control element. The purpose is to transmit and receive data from input to relay. There are mainly three type of controls. Such as, power line based home automation, wired or BUS cable home automation and wireless home automation (Anon, 2018).

2.1.1 POWER LINE HOME AUTOMATION SYSTEM

For its helpful establishment and minimal effort, the electrical cable progressively turn into a prominent transmission medium in making private system. In houses, light switches regularly situated at a high area and it is difficult to go after the switches without help for kids and impair individual including individuals who unfit to move a ton because of mishap cases. These issues can be overwhelmed by utilizing the Home Robotization System Using Power Line Communication (PLC) at home which is client neighborly and cost effective. It requires just power to run the system. Hence this framework is exceptionally basic and shoddy (Darline, 2008). This automation is reasonable and does not require extra links to exchange the data, yet utilizes existing electrical cables to exchange the information. By installing power line wires to send signal is a good idea since there are no extra payment for installation for how much wire usage. Apart from that, there is no the need of break the divider (wall), to do building work at home and there are no impedance with different gadgets (Elena Mainardi & Marcello Bonfè, 2008).