

# **Electrical & Electronic Engineering: Theory and Applications**

## **Series 4: Compilation of Electronic Project for Engineering**

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**Abstract:** This book is the fourth series of book chapter that is produced by the Faculty of Electrical and Electronic Engineering (FKEE), Universiti Tun Hussein Onn Malaysia (UTHM). This book is the result of research and development as well as research conducted by the staff of FKEE. It can guide other researchers to improve their knowledge in the field of research, particularly in the area of Electrical and Electronic Engineering.

There are eight chapters in this book from multidisciplinary field of electrical and electronic engineering. All the topics discussed from basic to help readers understand easily. There are also included the source code for a particular topic, so it can motivate readers to study it in depth and can use the source code for further investigations.

This book is suitable for university students and researchers also fans of Electrical Engineering courses to enhance their knowledge. Undergraduate students can get a rough idea about certain topics that may be useful for their study and a final year project. Postgraduate students may find this book to help them in getting new knowledge that will be used as input to their research. While the fans can carry out certain techniques in this book to create an innovative project.

Therefore, this book should be part of the reference for everyone in the field of Electrical Engineering to guide and improve their knowledge. It is our hope that this booklet is able to produce a smart idea to all readers.

**Keywords:** Solar car, GUI, hear rate, UART



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HAZLI ROSLAN  
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UTHM**

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# Preface

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This book is the second series of book chapter that is produced from Faculty Electric and Electronic Engineering, Universiti Tun Hussein Onn Malaysia (UTHM). This book is the research output and also the progress of the research that is conducted by FKEE's staff. This book can guide other researcher to enhance their knowledge in research especially in Electric and Electronic Engineering area.

This book is a collection of ultrasonic project for Microcontroller and Microprocessor subject did by third year students in Faculty of Electric and Electronic Engineering, (UTHM). This book chapter is very useful for the reader to understand the ultrasonic operation and how to program the sensor using PIC microcontroller. It is hope that this book can help the reader to build the application based ultrasonic sensor that can be used for their daily live.

This books chapter contain the example of projects that was done by the students using ultrasonic sensor. All the program was clearly discuss in this book, therefore reader will understand how to program deeply. All the third year students have showing their effort to write this book after they success develop their project based ultrasonic sensor.

This book chapter is suitable for university's students and hobbyist also the researcher that struggle to find out the coding for ultrasonic

as this sensor has huge benefit to give the distance value. There are many applications that use distance as the main parameter.

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# SOLAR CAR AUTOMATED CONTROLLER

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## 1.1 INTRODUCTION

The main objective of this project is to design a solar car using a source of energy from solar energy. This study is adopting the renewable energy program to improve and acknowledge the energy sources and to minimize the greenhouse effect. In part, it is also meant to investigate the ramifications of participatory and to realize the importance of preserving the earth and pollution control. The expected outcome of this project is to produce a single solar car as shown in Figure 1.1.

## 1.10 CONCLUSION

The solar car can be considered as the planet hope, taking into consideration the situation of the environment in terms of pollution and financial crisis. It solves many problems related to environment and it's definitely the best pollution-free method. After going through the electrical and mechanical requirements for the design technologies, we proposed new technologies that can be investigated in other researches for a better conversion of solar energy. A future research can explore further, with simulation and exact scientific data.

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# HEART RATE MONITORING SYSTEM WITH GUI

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Ammar Asri  
Nurnaztulhidayah Othman

## 2.1 INTRODUCTION

The medical field is facing some growing public concerns and governments' demands for reform. The outrage is directed at the high costs of quality health care and the inability of health care specialists to provide adequate medical services for the rural populations. The availability of expert medical care can meaningfully improve health care services at understaffed rural and remote areas. In distant regions of the country, the degree of development of the health care services has not reached the appropriate level to address the health care needs of the populations adequately. At the consultation unit, a dedicated application software is required to send a patient's data to the doctor in charge to simplify a hospital's system. Knowledge of the electronic circuit system (embedded system), which is a microcontroller program, was used in this project. The project is a heart rate monitoring

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# A CONTROL UNIT FOR GARDEN SYSTEM USING GRAPHICAL USER INTERFACE (GUI)

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Fauzi Abdullah  
Nurliyana Zulkiflee  
Tan Yi Ting

## 3.1 INTRODUCTION

Plants are living things that need 'food', such as water, air (oxygen gas) and sunlight, to grow and stay healthy. Plants get water via roots, while air and sunlight are get through leaves. Plants can grow and stay healthy when they get their basic needs sufficiently. They make their own food through a process called photosynthesis.

Unfortunately, nowadays certain types of plants require certain conditions to survive. For example, their needs of water, oxygen and sunlight are affected by the weather, the soil moisture and many more. Agriculture, hydroponic and greenhouse have been

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# TABLE TENNIS MACHINE SYSTEM CONTROLLER

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## 4.1 INTRODUCTION

Graphical User Interface (GUI) is an important part in controlling Table Tennis Machine. This interface will ensure the smoothness of the overall system. Knowledge in programming of microcontroller is needed to ensure the success of the project. This section will give readers some knowledge about RS232 communication using PIC16F877A, motor communication using PIC16F877A and C language as a software tool to program the code.

The design and production of this table tennis machine will allow players to improve their table tennis skills, enable people to play table tennis anytime without finding a partner and help them to have a better posture, reactions and hand-eye coordination. Graphical User Interface (GUI) was the application for this system

## 4.11 CONCLUSION

In conclusion, this machine was able to teach a beginner to learn how to play table tennis by pitching the balls to the player. Other than that, the machine is also able to shoot at least 15 balls in 10 seconds. Besides, the speed of the table tennis balls being shot can be controlled by pressing the buttons with various speeds on the machine.

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# HOME SWITCH GUI CONTROLLER BY USING UART

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Siti Hajarul Hanim Fatimah Rosli

## 5.1 INTRODUCTION

Nowadays, people need an easier system to control equipment at home. Home Switch Graphic User Interface (GUI) Controller by using UART is a system that can control all of the electric equipment in the household. All equipment that have connections with the Peripheral Interface Controller (PIC) can be controlled using the GUI. The GUI has been programmed in the PIC. The data will be sent via the UART through the transmitter and the receiver. The GUI will be controlled by a user from another place through the UART and the data will be transmitted to the PIC to give instructions to either switch ON or OFF. Besides that, this system also includes a temperature controller. Temperature controller is used to detect the room temperature. When the sensor detects a

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# DESIGNING A GRAPHICAL USER INTERFACE (GUI) TO MANIPULATE ROBOCAT

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## 6.1 INTRODUCTION

In computing, a graphical user interface is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators to control, monitor, etc. The actions in the graphical user interface are usually performed through direct manipulation of the graphical elements. A good Graphical User Interface (GUI) gives an advantage to the device by making the system or component easier to use. The visible graphical interface features of an application interacts with the information of the devices by manipulating the visual widgets created by the programmer and achieves the goal of the user. A model-view controller interface allows a flexible structure in which



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# IR SENSOR FOR BLIND PEOPLE

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Nor Adlin Mohamad Nawi  
Nur Farah Izzati Mohamad Sabri

## 7.1 INTRODUCTION

This chapter presents a simple infrared sensor based control, which is controlled by a microcontroller PIC16F877A, for blind people. Microcontroller PIC16F877A is one of the PICMicro family microcontroller, which is popular among all users, from beginners to professionals. This is because PIC16F877A is easy to use and the FLASH memory technology can be written and erased for up to a thousand times. The superiority of this microcontroller compared to other 8-bit microcontroller is especially at the speed and code compression. PIC16F877A has 40 pins by 33 path of I/O. The main goal is to implement a control system for the operation of the infrared sensor to detect an obstacle at a certain distance. Several techniques, such as pulse width modulation (PWM) and analog-to-digital converter (ADC), are used to write the source code in C language. Besides, for hardware part, servo motors and a buzzer.

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# PRESS TO IMPRESS

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Muhammad Iqbal Syarif Khairul Anuar  
Lim Lean Tun  
Siti Aisyah Md Atan  
Ummu Kalsum Zamri

## 8.1 INTRODUCTION

Information display using LED has become common nowadays. With an average life of 300,000 hours, LED displays are long lasting and reliable. The researchers thus proposed the information display using dot matrix display. The matrix panel has an approximate dimension of 84cm (length) by 30cm (height). By estimation, the full length of the panel is capable of displaying 15 characters in every 4 lines. It repetitively displays any information that is fed to the system.

Light Emitting Diode (LED) is a kind of semiconductors that is used to give and receive electronic signals in infrared rays or light using the characteristic of the compound semiconductor. It is used for household appliances, remote control, electric bulletin board, and various kinds of automation appliances. An LED is a solid state electronic device that emits light when energized by applying power.

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Mitchell's modular LED x-y (horizontally and vertically digitally scanned array system) was cited in the 29th International Science and Engineering Exposition "book of abstracts", p. 97, published by the "Science Service", Washington D.C. May 1978.

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