Electrical & Electronic Engineering: Theory and Application
Series 3: Ultrasonic and Application

Authors:
Siti Zarina Mohd Muji[1], Mohamad Hairol Jabbar[2], Norfaiza Fuad[3]
Email:
szarina@uthm.edu.my[1], hairol@uthm.edu.my[2], norfaiza@uthm.edu.my[3]

Abstract: This book is the third of a books series 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 six 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: LCD, detector, proteus, proteus ISIS

ELECTRICAL & ELECTRONIC ENGINEERING:

Theory and Applications

SERIES 3: Ultrasonic and Application

SITI ZARINA MOHD MUJI
MOHAMAD HAIROL JABBAR
NORFAIZA FUAD

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Preface

This book is the third series of book chapter that is produced from Embedded Computing System (Embcos) Research Focus Group, Department of Computer Engineering, Faculty Electrical 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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CHAPTER 1

PORTABLE MEASURING TAPE

Cheong Kah Hao
Azmirul Azmil Maula Kasim
Mohd Syahir B. Mamat
Suhassni A/P Ganeson
Nurul Maisara Binti Awang

1.1 INTRODUCTION AND MOTIVATION

Measurement is invaluable and useful in countless different ways. Architecture and construction depend heavily on the accuracy of measurement. Chemists and pharmacists also place a great deal of importance on measurement. Without accurate measurement, a great deal of humanity's physical accomplishments would crumble.

Measurement assigns a numeric value to represent the magnitude of the quantity of a given dimension. It is at the heart of analysis, testing and discovery. The British scientist Lord Kelvin once said, "When you can measure what you are speaking about and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind." Other than that, it can also be declared that the better you measure, the more accurate you are.

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Besides, we suggest that the measuring tools need to be water resistance and hardy so that it can be used at any condition, weather and situation. It will also increase the lifetime of product.

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CHAPTER 2

FAN RANGE DETECTOR

Muhamad Syazwan Bin Rosdi
Tan Ee Chaye
Siti Noor Aisyah Binti Yahya
Mohamed Awad Sirelkhatim
Nurul Salwa Shakira Bt Mohd Jamail

2.1 INTRODUCTION

For ventilation systems to be truly efficient, it is important for them to be operated only when it is needed. A Fan Range Detector is a device that is used to automatically switch on the fan when there is someone in the area.

This project proposed an automatic detection of human and an energy saving room to reduce standby power consumption and to make the room easily controllable with the presence and the range between human and an ultrasonic sensor. To realize the proposed room architecture, we designed and built a system that called Fan Range Detector. This system was made of low-cost, low-power and wireless system networking.

The proposed auto detection of range from human to the fan was done using an ultrasonic sensor and a PIC microcontroller that was used to monitor the receiver. For example, when a person enters a room, the

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CHAPTER 3

AUTOMATIC TRAFFIC CONGESTION CONTROL

Esmawi Sham Bin Shamsul Bohari
Nurul Huda Bt Rusli
Ong Wee Chuan
Salwa Binti Fadzil
Nor Afifah Binti Azmi
Mohamad Hairol Jabbar

3.1 INTRODUCTION

Traffic congestion is one of the serious global problems for both developed and undeveloped countries. To overcome the problem, we have come up with an exclusive idea to optimize the traffic flow, as the roads have become congested with the increasing number of vehicles. The system designed should be intelligent enough to make perfect decisions in regulating the traffic. Regulating the traffic through a smart system should provide better traffic control but at the same time should be inexpensive. The proposed system provided a smart and inexpensive way to regulate traffic.

This system was developed in such a way that it can detect the vehicles on each road to prevent traffic congestion. The green signal timing of traffic light was increased depending on the number of vehicles on the road. The ultrasonic sensor was located at the side of the road to detect the vehicles on the right lane and the left lane.

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CHAPTER 4

AUTOMATIC SWITCHING SYSTEM

Chai Chooi Yee
Nor Farahain Abdul Karim
Nurul Iffah Mohamad Azizi
Siti Aishah Shahadan
Norfaiza Fuad

4.1 INTRODUCTION

Automatic switching systems are widely being developed for energy saving. It needs no manual operation to switch on or off when there is a need for those electrical appliances. The automatic switching system made in this project can be used for toilet or storage room in which the switching of the electrical appliances is based on the occupancy of that space. If someone enters the room, the chosen appliances will be switched on and after that person left the room, it will be switched off.

4.2 PROBLEM STATEMENT

Nowadays, general people tend to forget or are not interested in switching off electronic appliances, especially lights and fans, after they have used the appliances or they have to leave that particular space such as toilets and storage rooms in their home. As more and

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to be used for microcontroller programming. Besides, the application of an ultrasonic sensor in different fields can be identified through the completion of this project, instead of just measuring distance.

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CHAPTER 5

SECURITY ALARM SYSTEM

Haizureen Halimi
Helen Yip Shan Jing
Siti Syaibi Nasruddin
Wong Kian Loo

5.1 INTRODUCTION

Nowadays, there is no place that guaranted our safety even in our house. This is because the number of crimes especially robbery, increases day by day. In order to decrease the number of burglaries, a security alarm system has been designed (Nimalan, 2011). Burglary often occurs regardless of rural or urban areas. However, almost all security and safety alarm systems were installed in luxury homes in the urban areas. The price for the installation of a security alarm system is quite expensive. This project is affordable for the use in rural areas due to its low cost. The system could be installed even by users themselves. The project can detect an intruder and thus reduce the manpower and improve the safety of resident.

In this project, the security alarm system was controlled by using a PIC microcontroller (PIC16F877A) and detection was performed using an ultrasonic sensor HC-SR04. The software used in this project to design and simulate the systems were MPLAB IDE and Proteus. The security alarm system also provided many output responses to inform the

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can monitor the situation of the area around the house using the user monitor system that displays the distance of the intruder. The intrusion deterrence system consists of a siren, a buzzer and the silhouette of person that deterrent to the intruder and improve the safety of the residents inside the house.

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CHAPTER 6

LIQUID LEVEL INDICATOR

Sivasangkar Kathivaloo
Tai Lih Jian
Siti Zarina Mohd Muji
Wan Ahmad Syazwan Wan Nazimuddin
Siti Noryasmin Jaffar

6.1 INTRODUCTION

Liquid level control in tank using a level sensor and a PIC controller system is an application of PIC controller. Since people, especially engineers have difficulties to measure and control the desired level for smooth transitions, this system provides the features that allow people to control and maintain liquid level in tanks accurately and steadily for a smooth transition process. This system is also able to continuously maintain the necessary processes non-stop during day and night.

Liquid level measurement is a key aspect for many applications in the processing industry. Liquid handling poses many challenges for measurement and control. In industries, it is very common that direct contact method is used for measuring a liquid leved. This method required the sensor to have direct contact with the liquid. By using this method, the material of the sensor will affect the liquid and the sensor also have a high probability to be damaged by the liquid

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6.9 RECOMMENDATION/ FUTURE PLAN

1. Improve the programming codes part to make it simpler

2. Improve in measurement part, rather than using look up table, we use formula.

3. Improve the delay time.

4. Add on pressure sensor and temperature sensor for advanced application.

6.10 CONCLUSION

This liquid level indicator was designed using a PIC microcontroller and ultrasonic sensor to measure the liquid level. The ultrasonic sensor detected and measured the level of liquid in a tank according to the program that had been written in PIC microcontroller. It consisted of two levels; low and high. When a tank was filled, full green LED glowed and at the same time, the buzzer sounded. When the water level dropped to the low range, a red LED glowed and at the same time, the buzzer was activated. This system helped to detect the level of water and save our time, money and energy. It also helped to accurately measure a liquid to make certain mixture or product. One does not have to climb up the tank to know the level of water and hence it is less risky.

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