PORTABLE DISTANCE MEASUREMENT

MOHD ASHRAF BIN MD SAID

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FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : PORTABLE DISTANCE MEASUREMENT

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To my beloved parents, family, fellow friends and supervisor, thanks for all supports in successfully producing this projects.

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ABSTRACT

The purpose of this project is to design and develop a system that can be used to measure distance in order to make the measurement process easier without any hazard, wasting the energy and time. This portable distance measurement used the reflection concept. In this system, the distance will be measured by transmit ultrasonic and infrared wave to the object and then the wave reflect back to receiver. After the receiver received the reflected wave, the system will calculated and then display the distance on the Liquid Crystal Display (LCD). In detail, the data (input) will be collected from the Infrared and Ultrasonic sensors as an analog voltage. And then the analog voltages will calculated and then convert it to digital binary using Analog to Digital Converter (ADC) that built-up in PIC16F877A as converted data (output) of the system before display the distance on the Liquid Crystal Display (LCD). For this project, the measurement distance target is less than 1 meter. The sensors that were used for this project are infrared and ultrasonic sensor. The main objective for this project is to measure exactly the distance from system to the target.

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ABSTRAK

Projek ini adalah bertujuan untuk merekabentuk dan membina sebuah sistem yang boleh digunakan untuk mengukur jarak disamping untuk memastikan pengukuran jarak yang dibuat lebih mudah tanpa sebarang bahaya, pembaziran tenaga dan masa. Konsep yang digunakan oleh pengukur jarak mudah alih ini ialah konsep pantulan. Di dalam konsep ini, jarak akan diukur dengan menghantar gelombang kepada objek daripada penghantar dan kemudiannya gelombang itu terpantul kembali kepada penerima. Selepas penerima menerima pantulan gelombang, sistem ini akan mengira dan kemudiannya akan memaparkan jarak pada Paparan Cecair Kristal. Secara terperinci, data (masukan) akan dikumpul daripada pengesan inframerah dan ultrabunyi sebagai voltan analog. Dan kemudiannya, voltan analog akan dikira dan ditukar kepada digit binary dengan menggunakan penukar Analog ke Digital yang terbina di dalam PIC16F877A sebagai data keluaran pada system sebelum dipaparkan jarak di atas Paparan Cecair Kristal. Untuk projek ini, sasaran jarak yang akan diukur adalah kurang daripada 1 meter. Pengesan yang akan digunakan untuk projek ini adalah pengesan inframerah dan ultrabunyi. Objektif utama projek ini adalah untuk mengukur jarak yang tepat daripada sistem kepada sasaran.

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LIST OF SHORTFORM

A/D	–	Analog/ Digital
ADC	–	Analog to Digital Converter
DC	–	Direct Current
IR	–	Infrared
LCD	–	Liquid Crystal Display
LED	–	Light Emitting Diode
PCB	–	Printed Circuit Board
PIC	–	Peripheral Interface Controller
MCU	–	Microcontroller
UART	–	Universal Asynchronous Receiver/Transmitter
US	–	Ultrasonic
USB	–	Universal Serial Bus

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CHAPTER I

INTRODUCTION

This chapter explains an introduction about the portable distance measurement system, problem statement, project objectives for this project, and scope of project.

1.1. Introduction

Portable Distance Measurement is a system that used to measure distance. Usually this system used to measure the distance that cannot be done manually by human. This system is designed to make the measurement distance easier without waste of time and energy. Common sensor that used in the market is laser, ultrasonic and infrared sensor. For this system, the concept used is reflection. Generally, the system will transmit wave from the transmitter of the sensor to the object. Then the object will reflect the wave to sensor receiver. When the reflected wave was received by receiver, the system will read that reflected wave as data in the form of analog input. Then, the system will calculate the distance and convert it to digital output. This conversion was done

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by using analog to digital converter that built in the system. After the distance measured converted into digital form, the output then will display on the LCD.

1.2. Problem Statement

This project is about to make the daily live easier. In order to make this project successfully achieved with the objective, there are several problems that must be considered. The problem statement that considered for this project is:

i. The imprecise measurement value using manual measurement.

This project is used to measure the exact value of distance. In order to make this system more precisely, the suitable distance sensor will using to improve the value of the exact distance from system to the target. This measurement system also can save the cost and can make the distance can be measure faster without any error.

ii. Take the distance measure manually in small workspace can get hazard.

The people have difficult to measure the distance in the difficult place or small space area. Based on this situation, we need some system or tool that can measure the distance without any hazard.

iii. The type sensor that used can affect the data values

For this project, the system will test by using two types of sensors which is infrared and ultrasonic sensor. In this project, the system will do the testing for the comparison for both sensors. This system will be a prototype for distance measurement system.

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1.3. Objectives

In order to make a perfect prototype for distance measurement, there must be an objectives to achieve the desired target. The main objectives for this project are:

i. To design a prototype system using Infrared and Ultrasonic sensors that can measure the distance and display it on the LCD.

ii. To design a system using infrared and ultrasonic sensor that can be as the prototype for the distance measurement system tool.

1.4. Scope of work

Every project has their advantages and disadvantages. Especially for this project, there are some limitations that cannot be prevented. These scopes are used to make sure that all the limitation considered in order to make the project achieved based on the objective target.

i. The distance range for this project is less than one (1) meter for infrared and less than five (5) meter for ultrasonic sensor.

ii. The minimum detection distance for infrared is 15 cm while minimum detection distance for ultrasonic sensor is 20 cm.

iii. This project will using two types of sensor detections which is the infrared and ultrasonic sensors.

iv. For sensor selection, the suitable detection sensor must have less influence on the color of reflective objects and reflectivity.

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CHAPTER II

LITERATURE REVIEW

This chapter explains about the literature reviews including the previous project that using the same system, the hardware development (infrared and ultrasonic), PIC Basic Pro Compiler, detection sensors (infrared and ultrasonic sensor), and components that using in this project.

2.1 Literature Review introduction

Literature review is needed to make sure that all the progress will continue smoothly without any problem. For the literature review, we can compare the result with the previous project in order to make the project objective successfully achieved. This literature review will be an analysis concerning the advantage and disadvantage for each sensor in this project. Besides that, all the explanation about the techniques, detections and characteristics of sensor will cover in this chapter. All the detail about the electronic components and devices that using in this project also stated in this chapter.

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2.2 Detection techniques

Possible techniques for detecting can be generally divided into the following categories: [3]

- Sensing of infrared technique
- Sensing of ultrasonic technique

2.2.1 Infrared Characteristics

Infrared radiation is the electromagnetic waves in the wavelength region longer than the visible light wavelengths, lying from 0.75 micro meters (μm) to 1000 micro meters (μm). The wavelength region of 0.75 micro meters (μm) to 3 micro meters (μm) is often called the near infrared, the wavelength region of 3 micro meters (μm) to 6 micro meters (μm) the middle infrared, and the wavelength region of 6 micro meters (μm) to 15 micro meters (μm) the far infrared. Also, even longer wavelength regions are sometimes referred to as ultra infrared. [3]

The infrared radiation has the following characteristics:

1. Invisible to human eyes
2. Small energy
3. Long wavelength
4. Emitted from all kinds of objects

2.2.2 Infrared detection

Infrared radiation is used in a wide variety of applications, and new applications are constantly being developed. A typical system for detecting infrared radiation is usually configured as shown in figure 2.1.

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