KOLEJ UNIVERSTI TEKNIKAL KEBANGSAAN MALAYSIA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENYERAHAN LAPORAN AKHIR PROJECT
PROJECT FINAL REPORT SUBMISSION FORM

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Saya akui bahawa telah menerima:
I hereby acknowledge that received:

(i)	**SATU salinan Laporan Akhir Projek berjilid** *One copy of Project Final Report*	✓
(ii)	**SATU salinan cakera padat yang mengandungi Laporan Digital PSM** *One copy of compact disc containing PSM Digital Report*	✓
(iii)	**Hasil projek pelajar** *Student's project*	✓
(iv)	**Baki komponen yang tidak digunakan dalam projek** *Extra components that not used in project*	

daripada pelajar di atas.
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Tarikh / *Date* : 1/4/05

(Sila isi dalam dua salinan)

"I hereby declare that I have read this thesis and my opinion, it is suitable in terms of scope and quality for the purpose of awarding a Bachelor Degree of Electronic Engineering (Industrial Electronic)."

Signature : .....

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Date : 17/4/05

SOUND DETECTOR WALKER ROBOT

FADHLINASRI BIN YUSOP

This Report Is Submitted In partial Fulfillment of Requirement for the Bachelor Degree of Electronic Engineering (Industrial Electronic)

Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer
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March 2005

"I hereby declare that this thesis entitled Sound detector for walker robot
Is the result of my own research and idea except for works that I have been clearly cited in the references."

Signature : .....
Name : FADHLINASRI BIN YUSOP
Date : 25/03/2005

To the greatest 'success recorder' in my life with love.....

Yusop Bin Hj Ahmad

Aisah Bte Hj Ismail

Fadhlina Bte Yusop

Noor Azizah Bte Yusop

Nur Azwani Bte Yusop

And last but never the least, my entire friend.

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ABSTRACT

Walking robot used sound detector control that has been developed. This project is design and builds from electronic component circuit and PIC programs. The robot operation is controlled by PIC. The PIC command forward and reverse to the robot. The command represent in a waveform traduce from clap sound to the robot. The system use high frequency sound to get the required pulse and to operate the system. Every clap given an output of one pulse that will trigger the PIC and operate the DC motor to move the robot.

ABSTRAK

Robot berjalan menggunakan kawalan bunyi ('Sound detector for walker robot") telah di bangunkan. Projek ini di bentuk dan di bina daripada litar dan komponen elektronik serta program PIC. Operasi pergerakan robot ini dikawal dengan PIC untuk memberi arahan bergerak kedepan atau kebelakang mengikut arahan yang diberikan. Arahan yang diberi adalah dalam bentuk bunyi daripada tepukan tangan untuk beroperasi. Ini kerana sistem ini menggunakan hasilan bunyi yang berfrekuensi tinggi untuk mendapatkan denyut yang dikehendaki dan mengoperasikan sistem. Setiap tepukan akan menghasilkan satu denyut yang mana akan memberi picuan kepada PIC dan seterusnya menjalankan operasi DC motor untuk mengerakan robot.

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NOMENCLATURES

ADC	-	Analog to Digital Converter
ASM	-	Assembler
B	-	Byte
CAD	-	Computer-Aided Design
CADD	-	Computer-Aided Design Directories
CCP	-	Compression Control Protocol
CD	-	Compact Disc
CIS	-	Component Information System
C-MOS	-	Complementary Metal Oxide Semiconductor
CPU	-	Control Processing Unit
dB	-	Decibel
DC	-	Direct Current
DIP	-	Dual-in-line Package
DOS	-	Disk Operating System
EEPROM	-	Electrically Erasable Programmable Read Only Memory
FF	-	Flip-flop
Gnd	-	Ground
H	-	High
Hex	-	Hexadecimal
Hz	-	Hertz
IC	-	Integrated Circuit
IDE	-	Integrated Development Environment
I/O	-	Input/Output
LED	-	Light Emitting Diode
Lib	-	Library
LSI	-	Large Scale Integration

MPU	-	Microprocessor Unit
NOP	-	No Operation
Pa	-	Pascal
PCB	-	Printed Circuit Board
PIC	-	Peripheral Interface Controller
RAM	-	Random Access Memory
RC	-	Resistor Capacitor
Rx	-	Receiver
Sec	-	Second
RISC	-	Reduced Instruction Set Computer
SFR	-	Special Function Register
SCI	-	Scalable Coherent Interface
SPI	-	Serial Peripheral Interface
SR	-	Set Reset
SRAM	-	Static Random Access Memory
SPL	-	Sound Pressure Level
TMR	-	Timer
TTL	-	Transistor-Transistor Logic
UART	-	Universal Asynchronous Receiver/Transmitter
V	-	Voltage
VLSI	-	Very Large Scale Integration
WIN	-	Window

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CHAPTER I

INTRODUCTION

1.1 Programmable Walker Robot Background

Sound detected for walker robot will allow easy programmability for individual application. This project can control the walker robot to move forward and backward. This sound input can be produced from claps of hand. Claps of hand can make a sound with high frequency where the circuit can detect as an input through the sensor.

There are many different types of sensors on the market today. For example door contacts, heat, flood, smoke, gas, freeze, motion and sound. A sound sensor can be designed to listen for the exact frequency of breaking glass and to send a signal to the main computer it detects that sound. The average sound sensor also known as a glass discriminator covers a 35' radius and also looks for the shock waves that are sent through the air by the sound that the breaking glass makes. The application, for example, would be if your home or business has quite a large number of windows that need protection. You could spend a small fortune protecting each one individually, where as you could use 1 sound sensor and cover them all for a fraction of the cost. As the sound sensor does not adhere to motion this sensor could be on while the home or business is occupied.

1.1.1 Robot

There are many definitions of robots. It seems to be of difficulty to suggest an accurate meaning for the word robot, that there are various definitions of this word, different according to the points of view. Some view a robot through the aspect of reprogram ability while others more concern on the manipulation of the robot, behavior, intelligence and so on.

The British Robot Association (BRA) defines robot as:
"A programmable device with a minimum of four degrees of freedom designed to both manipulate and transport parts, tools or specialized manufacturing implements through variable programmed motion for the performance of the specific manufacturing task" (Al Salameh, 2000).

The Robotic Institute of America, on the other hand defines the robot as:
"Reprogrammable multifunctional manipulator designed to move material, parts, tools or specialized devices through variable programmed motion for the performance of a variety of tasks." (Fu et al.,87).

Based on the definition of robot by the two institutes, it can be concluded that a robot must be an automatic machine and be able to deal with the changing information received from the environment.

1.1.2 Legged robot

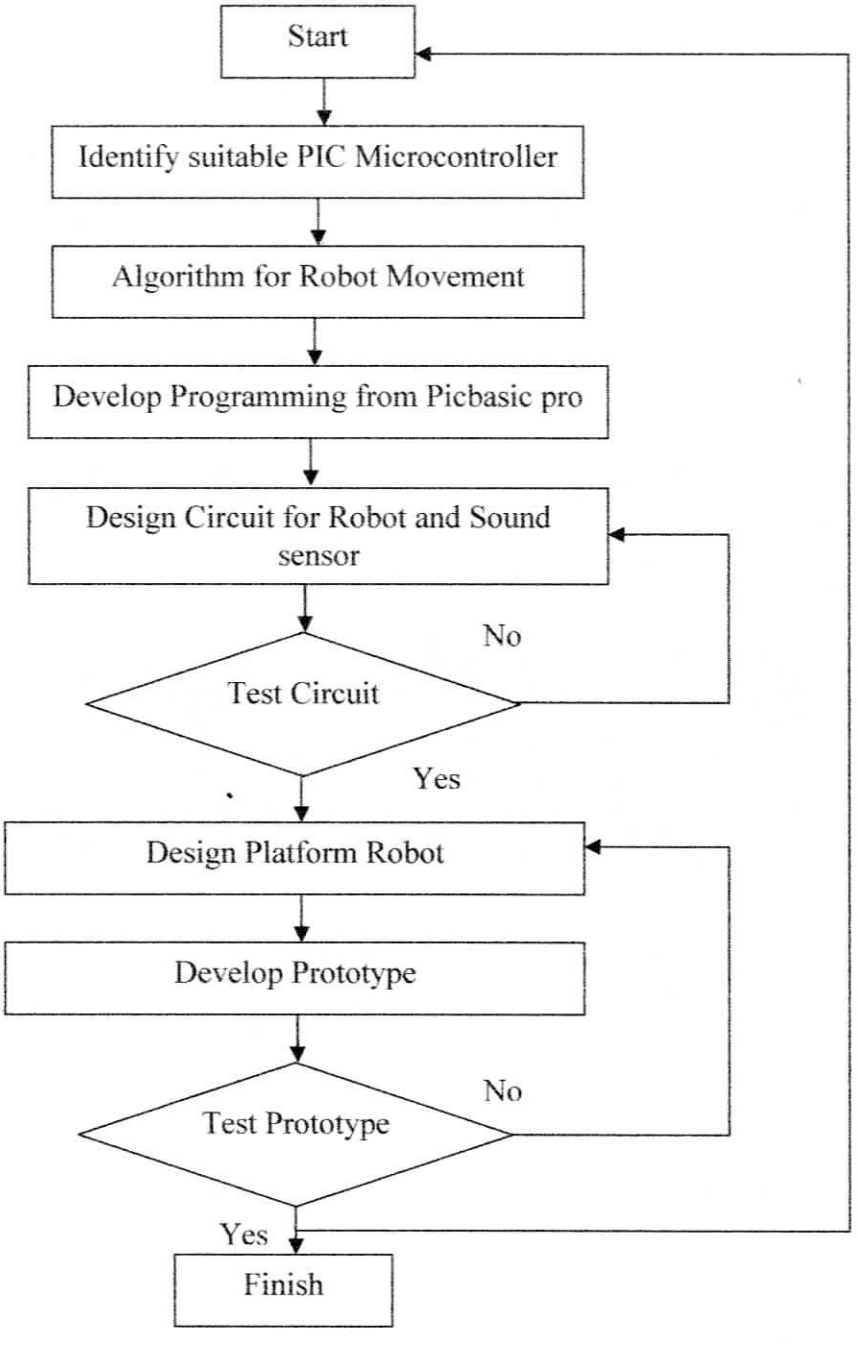
Basically, robots can be classified in to two categories that are fixed robot and mobile robot. Fixed robot is a robot mounted on fixed surface and the working materials are brought to the work space. A mobile robot moves from one place to another to do their task. The mobility of a robot is the robot's capability to move from one place to another in unstructured environments to a desired target. [Al Salameh, 2000]. Legged robots may further categorized into wheeled, tracked or mobile robot.

Legged robots are mostly used in difficult task and dangerous environment such as bomb defusing. Besides that, legged robots are also used in manufacturing area and agriculture related activity such as in placing the seeds in the soil and fruit harvesting. Legged robots may be used in houses to take care for the elderly and doing household chores [Pete Miles 2002].

1.2 Objective

i) To study and build the legged robot.
ii) To study the characteristic of the sound sensors and operation.
iii) To design complete set of legged robot with sound detector.
iv) To build DC motor driver and programming.
v) To construct a prototype of a walker robot using sound detection.

1.3 Methodology



To design, to test and build a project of walker robot that can indicate the output of the circuit using the PIC microcontroller and make a research about the sound and movement the walker robot for forward and backward.

Sound detector is a circuit that capable to detect sound as an input and control the output through the process that we program in the microcontroller.

The sound sensor was chosen because it is low cost, which can triggered by environmental source and no remote controller is required.

Basically, this project consists of hardware and software programming, the hardware include PIC microcontroller, high pass filter circuit, DC motor, power supply and DC motor driver. Programming that have been used with the project is PIC Basic Pro.

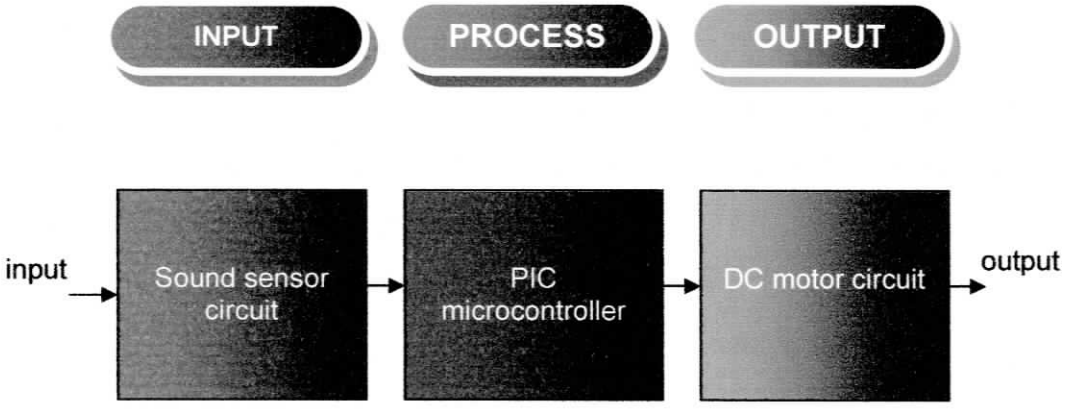


Figure 1.1: Block Diagram of Project.

physically, the circuit consists of three parts: a microphone circuit, microcontroller circuit and DC motor circuit. The microphone circuit is sensitive to the incoming sound and sends its output through a DC filtering capacitor into the monostable circuit.

The monostable circuit is operated when an input signal to one amplifier is large enough, the transistor can be driven into cutoff, and its collector voltage will be almost V_{CC}. However, when the transistor is driven into saturation, its collector voltage will be about 0 volts. A circuit that is designed to go quickly from cutoff to saturation will produce a square or rectangular wave at its output. This principle is used in multivibrators. Multivibrators are classified according to the number of

steady (stable) states of the circuit. A steady state exists when circuit operation is essentially constant; that is, one transistor remains in conduction and the other remains cut off until an external signal is applied. The three types of multivibrators are the astable, monostable, and bistable. The monostable circuit has one stable state; one transistor conducts while the other is cut off. A signal must be applied to change this condition. After a period of time, determined by the internal RC components, the circuit will return to its original condition where it remains until the next signal arrives.

The output from monostable would then be sent as an input to the microcontroller. This will triggered the operation that was programmed. The program is in PIC Basic Pro format. This format is used because it short and easy to build. The will be discussed in next chapter.

Finally, the PIC microcontroller output will be used to drive the motor. In the microcontroller section, the process of the program will start when it receive a signal from the sensor circuit. The output will display as programmed in the microcontroller.

1.3 Project Report Overview

This project is consisted of 5 chapter, when chapter 1 will discuss about introduction, when chapter 2 discuss about literature review, when chapter 3 will discuss about circuit design, when chapter 4 discuss analysis and discussion and finally chapter will discuss about conclusion.