# FINAL YEAR PROJECT REPORT

# Ultrasonic Based Distance Measurement system


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Project Report submitted to the

Department of Electrical Engineering, University of Management and Technology

in partial fulfillment of the requirements for the degree of

**Bachelor of Science**

**in**

**Electrical Engineering**

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04-07-2012

# Abstract

This report describes a distance measuring system based on ultrasonic sound utilizing the AT89C2051 microcontroller. The system transmits a burst of sound waves towards the subject and then receives the corresponding echo. The time delay of the transmitted and the received signal corresponds to the distance between the system and the obstacle. As the human ear's audible perception range is 20 Hz to 20 kHz, it is insensitive to ultrasonic waves, and hence the ultrasound waves can be used for applications in industries/vehicles without hindering human activity. They are widely used as range meters and Proximity detectors in industries also it can be used in parking assistance system. The distance measured is based on the speed of sound at 25°C ambient temperature and shows it on a 7-segment display.

# *Dedication*

*This work is dedicated to my parents, without whose caring support it would not have been possible.*

# Acknowledgements

I am greatly thankful to Almighty who made it possible this project to be successfully executed. This project would not have been a success without the guidance and motivation of all my mentors. I would like to express my gratefulness to Mr.Rauf Ali and Mr.Muhammad Aqeel Arshad, who acted as a mentor throughout my project for providing me valuable information and guidance. The project during the program would be nothing without the enthusiasm and imagination from both of you, without their encouragement and guidance this project would not have materialized. Their constant guidance and willingness to share their vast knowledge made me understand this project and its manifestations in great depths and helped us to complete the assigned tasks. Not forget, great appreciation go to the rest of the labs staff that help me from time to time during the project.

Although there may be many who remain unacknowledged in this humble note of gratitude there are none who remain unappreciated

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# List of abbreviations

SONAR.....Sound Navigation and Ranging

LED.....Light Emitting Diode

TX.....Ultrasonic Transmitter

RX.....Ultrasonic Receiver

MCU.....Microcontroller Control Unit

IC.....Integrated Circuit

Hz.....Hertz

DC.....Direct Current

$V_{p-p}$ .....Peak to peak voltage

# Chapter 1

## Introduction

The Ultrasonic Based Distance Measurement that we have made can sense the object placed within its range and can display the distance by calculating the Time of flight taken by the wave while striking the object. The techniques of distance measurement using ultrasonic in air include continuous wave and pulse echo technique. In the pulse echo method, a burst of pulses is sent through the transmission medium and is reflected by an object kept at specified distance. Atmel AT89C2051 microcontroller has been used for generation of pulses to transmit and for desired calculations. Their is quite few challenges and one of them is that the amplitude of the received signal gets significantly attenuated and is a function of nature of the medium and the distance between the transmitter and target. For transmission and receiving, we implemented ultrasonic transducers separately. The calculated distance is displayed on 7-Segment display

## 1.1 Block Diagram

The overall block diagram is shown below:

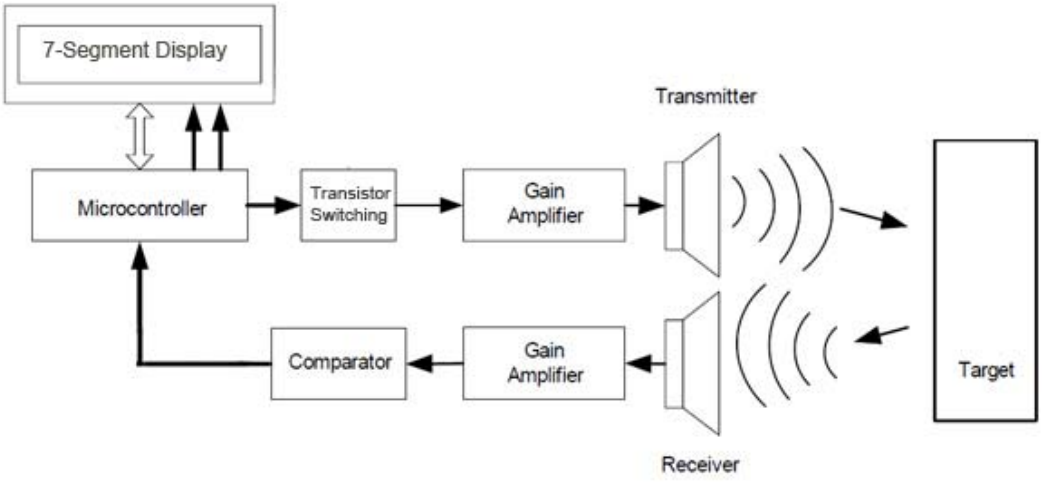


Fig 1.1 Block diagram