



DESIGN OF AN ULTRASONIC RADAR

ECE496Y – Design Project

By: Herbert Graf and Jason Chung

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Supervisor: Prof. K. Phang

Coordinator: R. Gillett



Overview

- Goal of Project
- Basic Ultrasonic Principles
- Project Implementation
- Progress of Project
- Summary
- Questions



Goal of Project

- To build an accurate range detection device based on Ultrasonic Principles
- Similar to “radar” detection
- The device will be: forward looking, computer controlled and display results in real time
- Detection solution that provides intermediate sensing capabilities



Basic Ultrasonic Principles

What is Ultrasonics ?

- High Frequency Sound
- More importantly: Sound is a WAVE

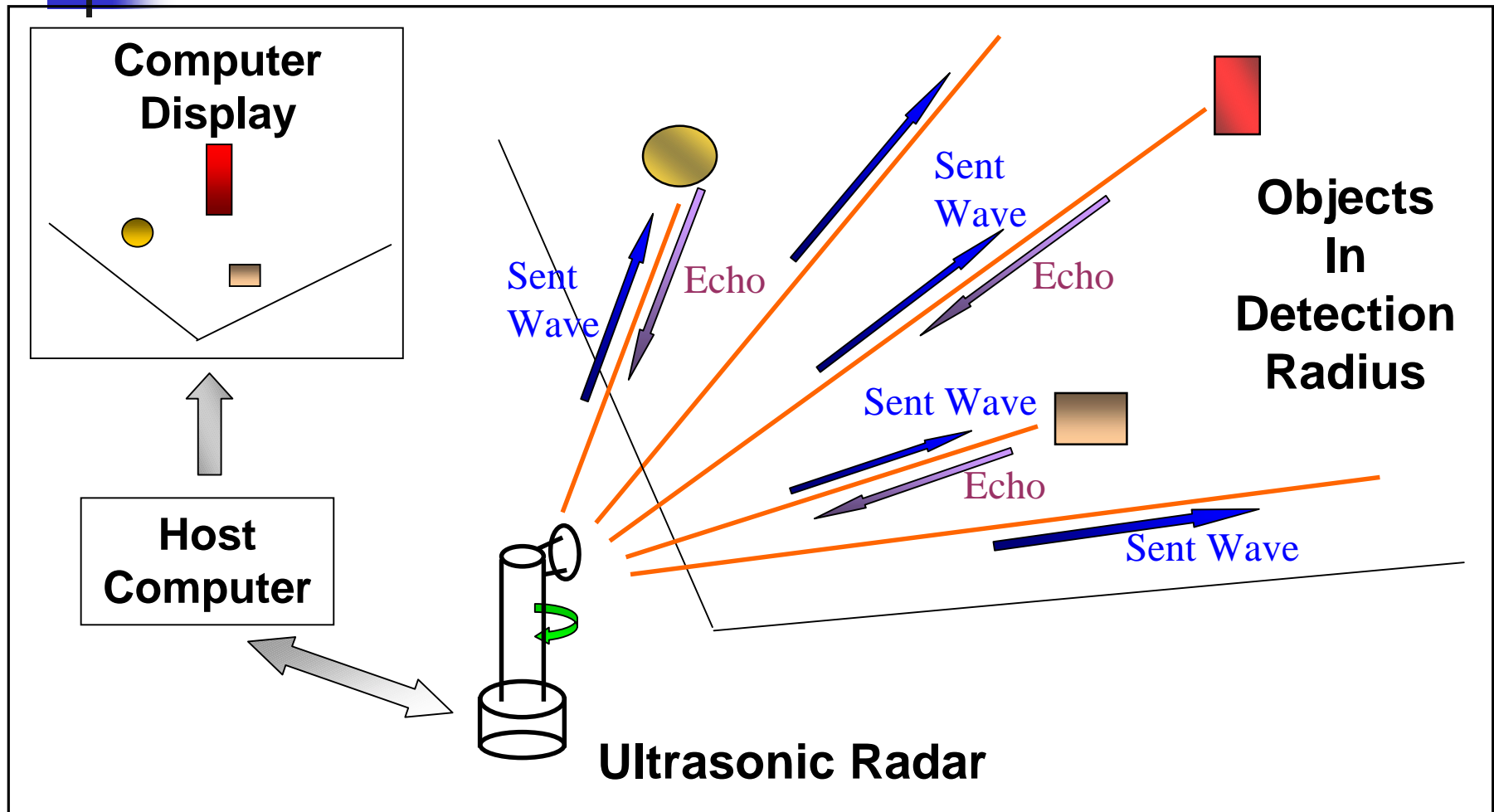


Basic Ultrasonic Principles

Range detection is possible because:

- Sound waves can be transmitted
- Propagating sound waves reflect off objects
- Sound waves travel at a specific speed

Basic Ultrasonic Principles



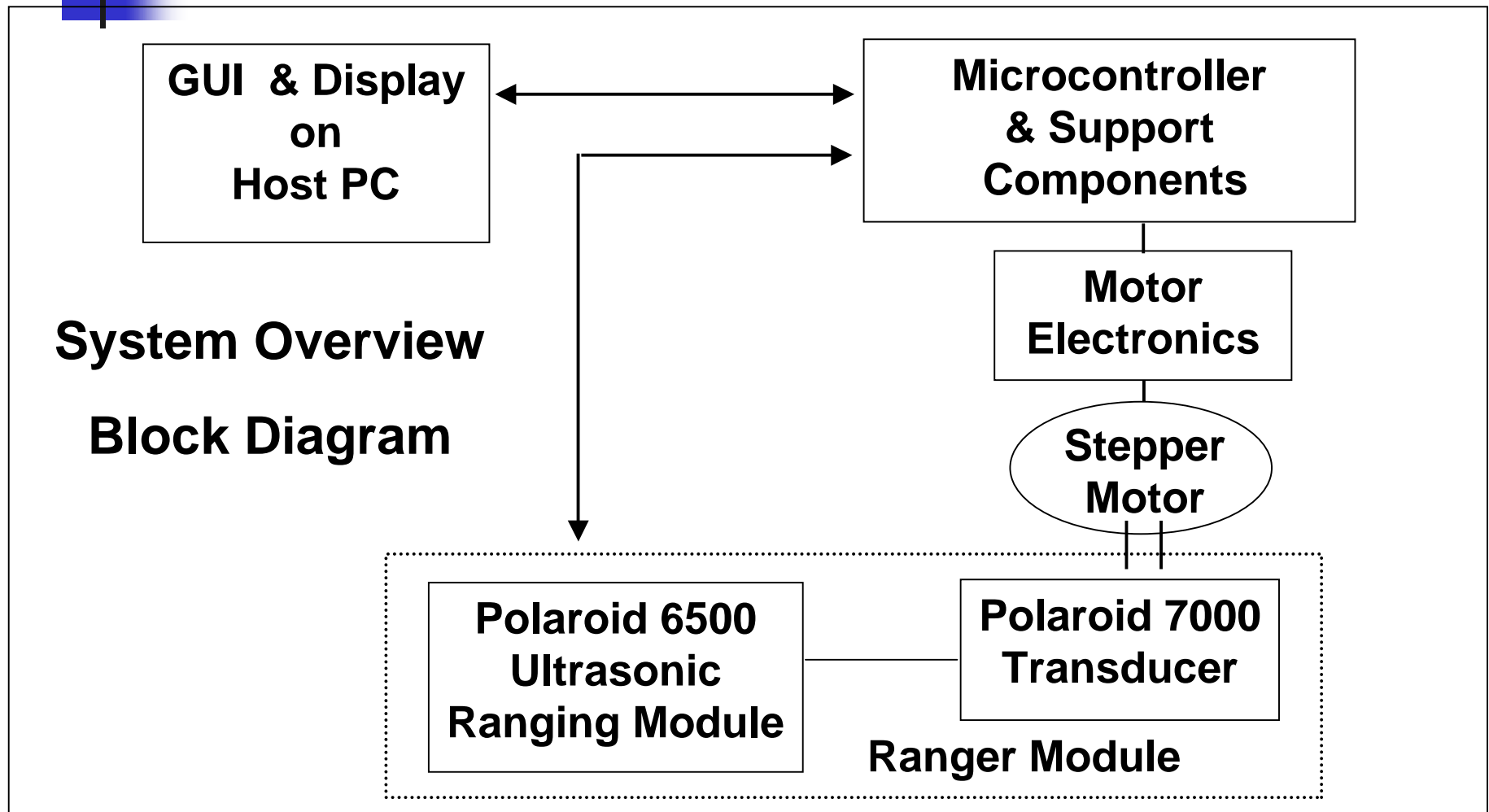


Project Implementation

To Realize Ultrasonic Range Finder:

- Polaroid Ultrasonic Ranger Module used
- Ranger will be controlled by a Microcontroller
- Data output to a host PC
- Data is processed and displayed on computer

Project Implementation





Progress of Project

Three Major Stages to Project:

1. Preliminary Platform – to test feasibility and concept (complete)
2. Final Platform – contains all components in final form (in progress)
3. GUI Interface – processes and displays data in human readable format (future)



Progress of Project

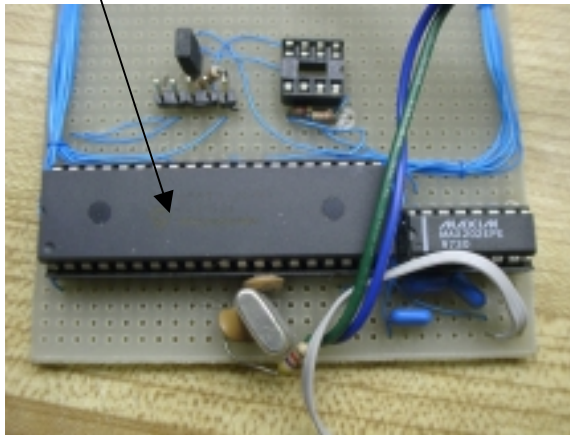
Stage 1 – Preliminary Platform

- Consists of preliminary hardware and software
- Built to determine feasibility of concepts and components
- Locate possible component interaction issues
- Completed late November 2002

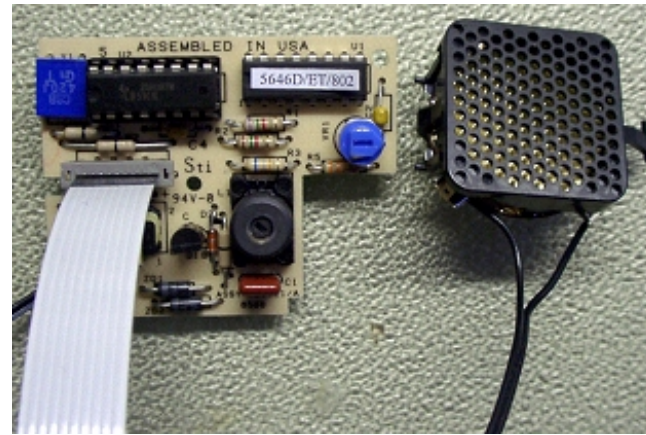
Progress of Project

Stage 1 – Preliminary Platform Pictures

Microcontroller



Ultrasonic Module





Progress of Project

Stage 2 – Final Platform

Consists of:

- Software for Microcontroller - complete
- Mount for motor - 85% complete
- PCB for motor electronics - 75% complete (in fabrication phase)
- PCB for Microcontroller board - 50% complete (currently in layout)



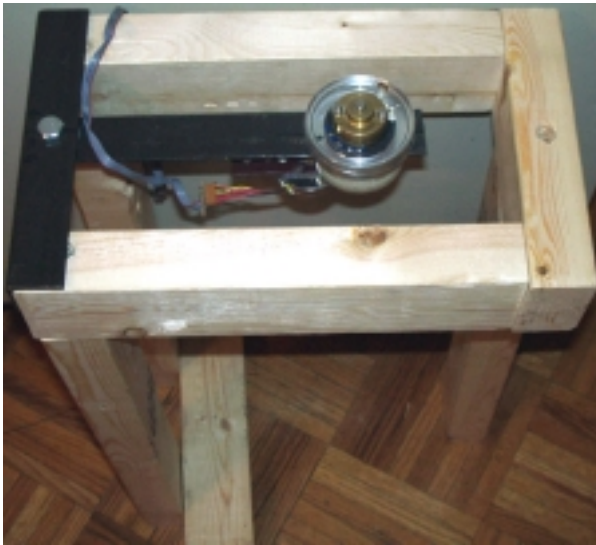
Progress of Project

Stage 2 – Final Platform

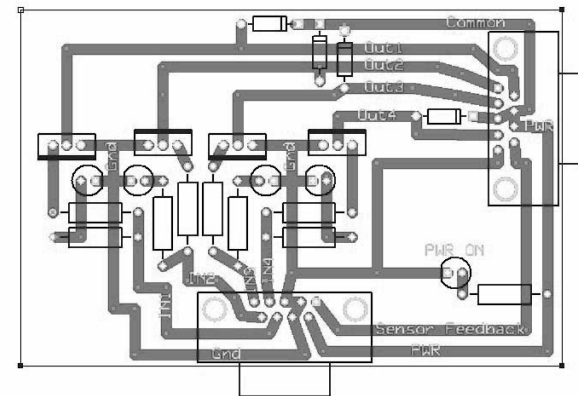
- Expected to be completed by end of month
- Motor mount requires installation of position sensor
- Currently investigating PCB fabrication techniques
- Layout of Microcontroller PCB in progress

Progress of Project

Stage 2 – Final Platform – Selected Pictures



Motor Mount



Layout of Motor Electronics
PCB



Progress of Project

Stage 3 – GUI Interface

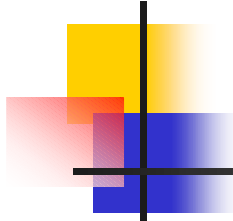
- Instructs hardware to 'scan' an area
- Processes data received
- Formats data for display in a human readable format









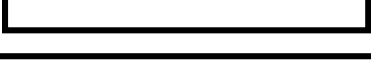
Progress of Project

Stage 3 – GUI Interface

- Will be written using Borland C Builder 3
- Work expected to begin February 1
- Will be designed in modules to facilitate parallel work



Progress Summary

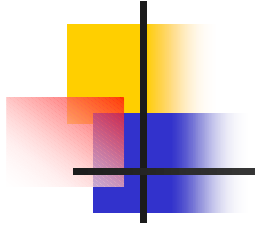
Stage	Status (%)
Prelim. Hardware	 100%
Prelim. Software	 100%
Final Code	 100%
Motor Mount	 85%
Motor PCB	 75%
Microcontroller PCB	 50%
GUI	 0%



Project Summary

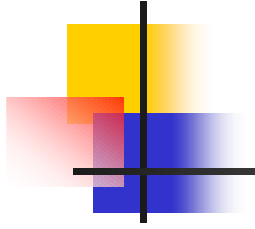
In A Nutshell:

- Goal is to design a 'radar' based on Ultrasonics
- Detection is based on the sending/receiving sound waves
- Project involves hardware interfacing, microcontroller and GUI programming
- Three Main Stages (Prelim. & Final Platforms, GUI)
- Currently in Stage 2
- Project is ~60% Complete
- Project is on schedule for completion end of February



Questions





The End

**THANK YOU
AND
GOOD NIGHT !**