Sound Sensing Robot

Different Tasks for Different Frequencies

Group 1

Jiaming Lin and Patrick Williams
Electret Microphone Board with OPA344 Operational Amplifier

The circuit diagram shows a system with two microphones: Left and Right, each connected to a Task Band Pass Filter. The output from these filters is fed into Peak Detectors, which are then connected to Arduino Input Pins. The Arduino reads these inputs using Analog and Digital Read functions, and further processes the signals using Comparators, Peak Detectors, Task Band Pass Filters, and Ground connections. The diagram illustrates the flow of signals, with red lines indicating +5 V from the Arduino.
Programming

- Two tasks: move toward or circle sound source depending on logic high at digital read
- Forward when facing correct direction
- Slight turn while moving forward when pointed close to correct direction
- Rotate when far from correct direction
- Direction of turn depends on relative voltages at analog reads
HEAT SEEKING ROBOT

Henry Knutzen
Alex St. Claire
Lab Bench #3
MLX90614 infrared temperature sensor
- Configurable using serial interface
- Outputs PWM signal, duty cycle proportional to temperature
- Use array of IR temperature sensors to point robot at hottest object in the room
- Use servo to fire Nerf gun at hottest object
Dog-Bot

Eric Daugherty
Ben Herman
Additional Hardware

• 2x Servo Motors – Ear rotation
• 2x Microphone – Auditory input
• Speaker (w/amplifier) – Barking

How it works

Listen for command
Reposition “ears”, listen for second command
Determine direction of source, move towards it
Upon completion, bark!

BOB-12758  ROB-09065  COM-09151  BOB-11044
Pirate Robot
Kyle Wislinsky
Clint Olsen
Lab Group 5
What will it do?

• Bluetooth controlled
• Motorized plank for dealing with mutinies
• Motorized flag for hoisting the colors
• Projectile launcher
Ping pong ball launcher obstacle course
Project outline

Final design:
- A robot that is controlled via a phone app that users will navigate through a course and shoot ping pong balls into baskets in the shortest amount of time possible.

Implementation:
- Phone communicates to Arduino board using a bluetooth module.
- Arduino controls the movement of the robot and activates the ping pong ball launcher.
Phone controller

- Entire robot will be controlled by user through a phone app.
- App will allow user to tell the robot to move forwards, backwards, left, right, and to fire the ping pong ball launcher.

User has 5 buttons (forward, backwards, left, right, fire) that each send a unique ASCII number to the Bluetooth module.

Bluetooth module sends ASCII number to Arduino through UART. Arduino translates ASCII into a command.

"Forward"
Ping pong ball launcher

Motor current is given by:

\[ I_m = \frac{V_{in}}{R_{sense}} \]

Vin
Motor 1 Control Wire
Motor 2 Control Wire (goes to a mirror circuit)
5V on / 0V off
Only ~10 pA of current when motor is off

Serial Rx (green)
Serial Tx (yellow)

+5V\text{DC}, 20-45 mA (idle and Tx/Rx draw)

Ground

SparkFun BlueSMiRF Silver Bluetooth Modem

Image taken from Francisco Dias’s “Arduino controlled Ping Pong Balls Launcher” (http://www.instructables.com/id/Arduino-controlled-Ping-Pong-Balls-Launcher/)
Remote Controlled Robot with Color and Light Sensing Capabilities

Ruben Vargas

Miles Shayler

Laboratory Bench #7
Concept and Objectives

- Wirelessly remote controlled robot utilizing speed control circuits, the transmitter and receiver circuits, the MSP42 microcontroller, RGB color and luminosity sensors, and the attached Educational Boosterpack MKII.
- Capable of sensing color and outputting it via an RGB LED light.
- Turns LED on whenever room goes dark via the use of a luminosity sensor.
Schematic and Overview

Joystick controls direction, buttons can adjust speed (Vref)

MSP Joystick -> MSP42 Microcontroller

MSP42 Microcontroller -> Wireless RF Transmission -> Arduino Uno

Arduino Uno -> TCS34725 Color Sensing

Arduino Uno -> TSL2561 Light Sensing

Arduino Uno -> RGB LEDs

Arduino Uno -> Lumos LED
Collision Prevention Circuit

Ian Schneier
Melissa Mantey
Bench 8
The Plan

Collision prevention circuit
Detect distance using HC-SR04 Ultrasonic Sensor
Control speed sensor using sensor output
HC-SR04 Ultrasonic Sensor

Circuit Diagram

5V
Dog Bot

Jonathan Peterson & Charlie Vail
Bench 9
What will Dog Bot do?

- Give voice commands to Dog Bot

- Depending on the voice command given, Dog Bot will perform an instruction
  - Ex: We’ll say “Dog Bot, sit.” and Dog Bot barks, and then will stop moving.

- This will be done with a voice recognition module that is compatible with Arduino
  - Model: AU_VOI_REC_00A

- Dog Bot will respond with barks to confirm received instructions, outputted through a speaker
Block Diagram

- Microphone
- Voice Recognition
- Sound File
- Power
- Arduino
- Motors
- Speaker
Voice Recognition Bot

Cameron Schimmoller
John Kim
Lab Bench 11
Instantly graphing Robot

Weikang Zhang
Jingwen Luo
Group 12
Block Diagram on Robot
Block diagram
Ball Fetching Robot

Matt Zarekani, Milan Formanek
Basic Outline

The user will throw a ball

The robot then finds the ball and retrieves it for the user.

Image recognition

- OpenCV + python

  Needs substantially more computing power than the Arduino can provide

Device to physically manipulate the ball

  Electromagnet (coil) and MOSFET circuit to drive it
Robot operational control

OpenCV Image Recognition

Navigation Logic

Motor control
Positional information

USB

Raspberry Pi

Arduino

Mosfet Driver

Electromagnet

12 V 0.33 A

Ball

SPI

RS-232
General Overview

The robot follows a person using reflected light, now you can pretend to have a friend

The chassis shines a light powered by the Arduino

Reflective tape reflects light back at the chassis

Ambient light sensors determine which direction it should move
Parts and Usage

Ambient Light Sensor - Increases the output voltage based on detected light
  - Powered off of $6 \, V_{CC}$
  - 5 will be used to determine general direction of light
  - Connected to analog Arduino Inputs

Light - Emits photons
  - Powered off of $12 \, V_{DC}$
  - An external power supply will be used for this

Reflective Tape - Reflects light
  - It’s tape
ECEN 2270 Final Project

Dancing Robot

Group 17: Zhou He, Hoiwang Wong
Overview

Series of simple notes

Series of moves with music
Obstacle avoiding Robot

Group 18
Jinhong Chen  Yang Hu
Here are the things of what we are going to do

- Use the Arduino with connecting to ultrasonic range finder sensors to avoid collisions.
- When it find the obstacle, it will stop going forward. And start to rotate till it can’t detect the obstacle, then it will start to go forward.
- If all the direction be surrounded by obstacles, a buzzer will begin to alert.

**hardware requirement**

1. Arduino Board

2. HC – SR04

This is an Ultrasonic Range Finder Sensor. It is a non-contact based measurement system and can measure distance of 2cm to 4m.
How it work?

BUT! If here is no track and be Surrounded by obstacles, a buzzer Will begin to alert.

See if it’s less than 15cm distance to the obstacle If yes, then it will send the signal to motor that begin To rotate till no obstacle can be found, it will begin to go Forward.

Future steps that may be added:
1. A sound sensor may be added to give the Initial direction and start the robot. By recognizing the frequency of the claps. It will move to different directions.
Final Project
Sachio Kimura
Lab 5

• 11/14 – 11/18
• For the next week finish lab 5
• Fully functioning robot
Project Idea

Enviro-Bot

- Collect temperature and humidity of surrounding area
- Sensory patrol for automated readings
- Water spray to change humidity
- Lights
Materials

- DHT11 Humidity & Temperature Sensor
- Rangefinders
- Solenoid switch & water spray
- LEDs
Line Follower

Mallory Hoover, Derek Mullen, Lauren Lee

Group 21
Schematic

COM-11118

SEN-12055

PRT-12699

3.3V 80mA

3.3V 60mA
ROAMING ROBOT

Lab Bench 23
Boskin Erkocevic
Marika Schubert
Samantha Williams
Project Goals

- Program robot to roam around the room
- Avoid obstructing objects by detecting them with ultrasonic sensing
- Stop roaming when hit with an LED flashlight
- Incorporate sound effects using a buzzer
Notable Part List

- Green flashlight
- Ultrasonic sensor - HC-SR04
- Photoresistor - PDV-P8103-ND
- Comparator - TLC3702
- Uxcell DC 5V Buzzers
- Various resistors from the kit
  - Tuning comparator threshold
  - Current limiting
- TTL OR gate chip

Voltage divider and comparator circuit for detecting flashlight

Output of photo resistor circuit to Arduino interrupt pin
Object Detection Robot

Andrew Shepherd
Maxwell Maurice
Functionality/Parts

❖ Ultrasonic Sensor - HC-SR04
- Operating Voltage: 5V DC
- Operating Current: 15mA
- Maximum Range: 4m
- Minimum Range: 2cm
- Trigger Pulse Input
- Echo Pulse Output

❖ Phototransistor - OSRAM SFH 3310
- Wavelength of max. sensitivity: 570nm (Green Light)
- Maximum collector Voltage: 5.5V
- Maximum collector current: 20mA
- Dark current: 3nA

❖ Green LED
- Peak emission at ~570nm

● Bumper Collision Detection
● Forward Ultrasonic Proximity Detection
● Line Following Capability
Block Diagram

Arduino 1: Controls motion of the robot

Arduino 2: Interprets sensor inputs and communicates to Arduino 1 to control boundaries of the robot's position.
Pet Bot

By Hanwen Zhao, Meifang Li
Group #32
Objectives

Person Following Mode

Following the person by using the infrared sensor

Phone Control Mode

Fully controlled by Android Phone App

Control it to grab things for you

Components

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<td>Infrared sensor</td>
<td>Bluetooth Module</td>
<td>LCD Display</td>
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Components/Block Diagram

- Android Phone App
- HC-05 Bluetooth
- Arduino Mega
- LCD Display
- Servo/Gripper
- Infrared Sensor
- Robot

5V generated by Arduino
10V from power supply