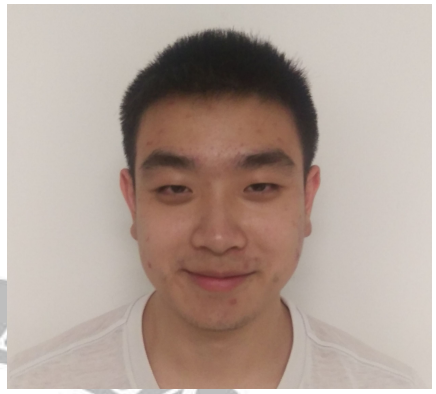
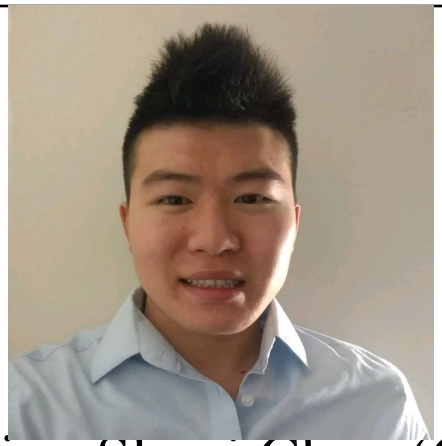
So-Lo

Team 12



Andy Weng (CSE)



Ming Shuai Chen (CSE)

Suzet Nkwaya (EE)

Dan-Michael Tiamzon (EE)

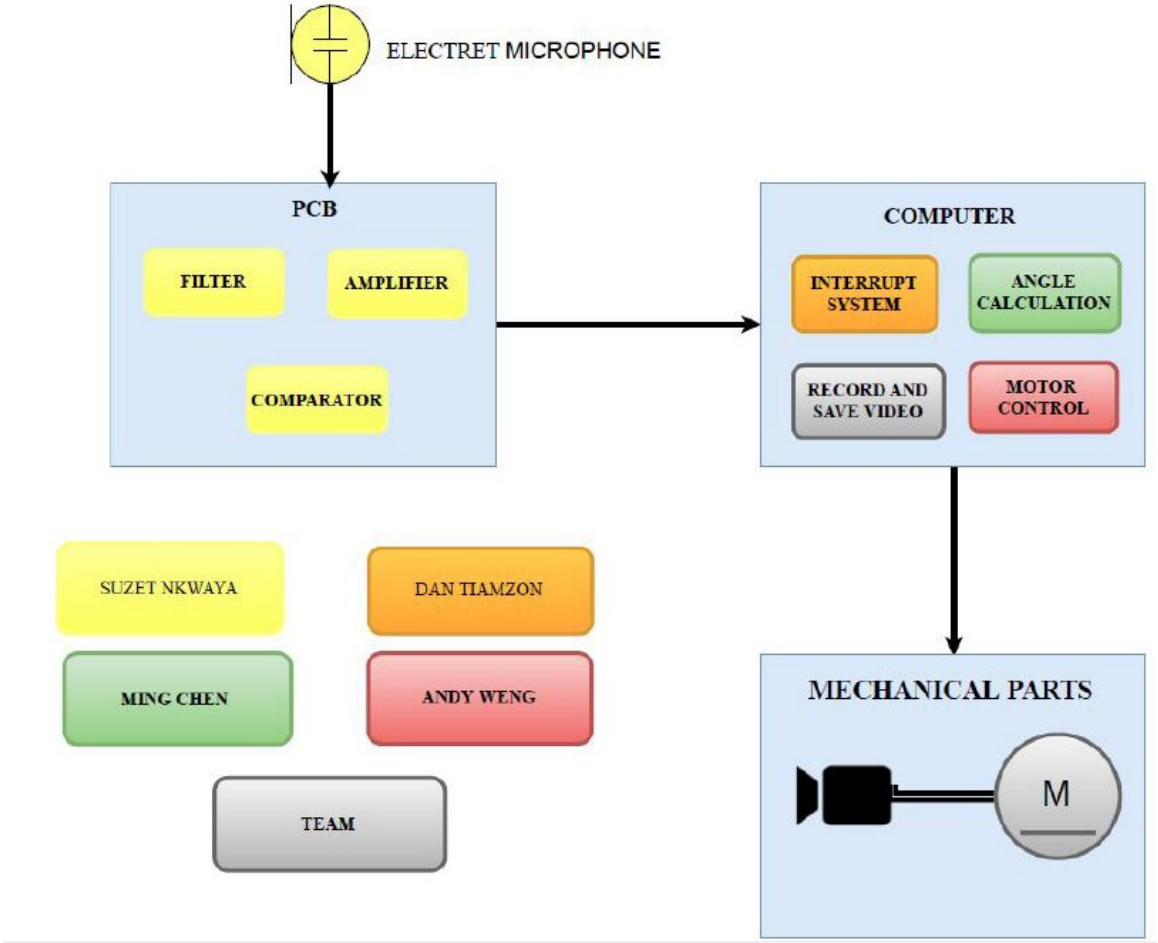
Presentation Overview

- Review of the Project
- CDR Deliverables
- Demo
- FDR Deliverables

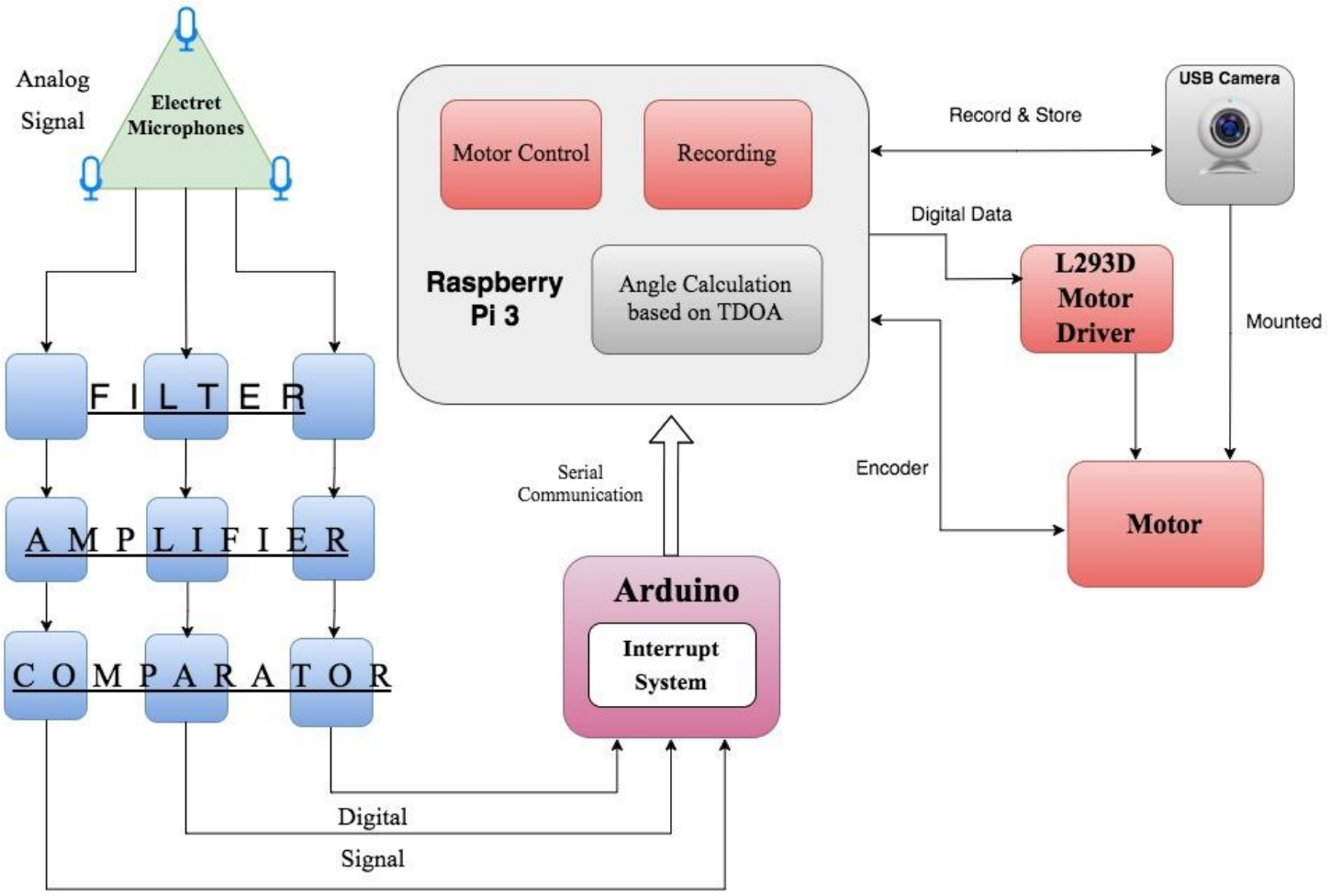
So-Lo

- Real-time sound locator
- Camera mounted on a rotating stand that points to the location of sound
- Effective for small to medium-sized room

Previous Block Diagram



Block Diagram



System Requirements

- Calculate source of sound based on time differences between microphones located at a known position.
- Microphone Array
  - Detect sounds from 3 feet away
  - Amplify voice and filter out noise.

System Requirements

- Raspberry Pi
  - Use microphone array outputs to calculate sound source location
- Motor
  - Receive commands from Raspberry Pi
- Camera
  - Record video and save data on SD

CDR Deliverables

- Demonstration of Complete System Functionality
- Place the microphone arrays in an equilateral triangle
- Detect voice from 3 feet away
- Motor will respond and turn to the angle produced by the angle calculator
- Record and store 30 second video on SD card

Current System Functionality

- Each individual subsystem working
- Interrupt system determines the time differences between the microphones
- Motor will turn when microphones detect sound
- Works accurately when time differences are calculated correctly
- Can record and store video on Raspberry Pi SD card

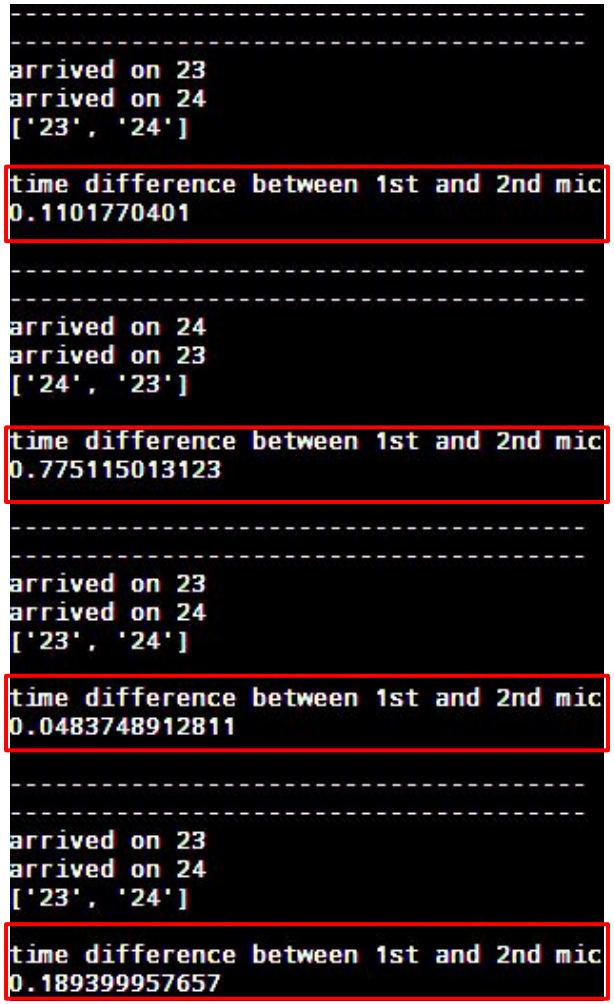
Problems Encountered

- Latency in interrupt response time from Raspberry Pi
  - Inaccurate time differences
  - Throws off angle calculations
  - Motor points to the wrong direction
- Get all three microphones to detect the same signal

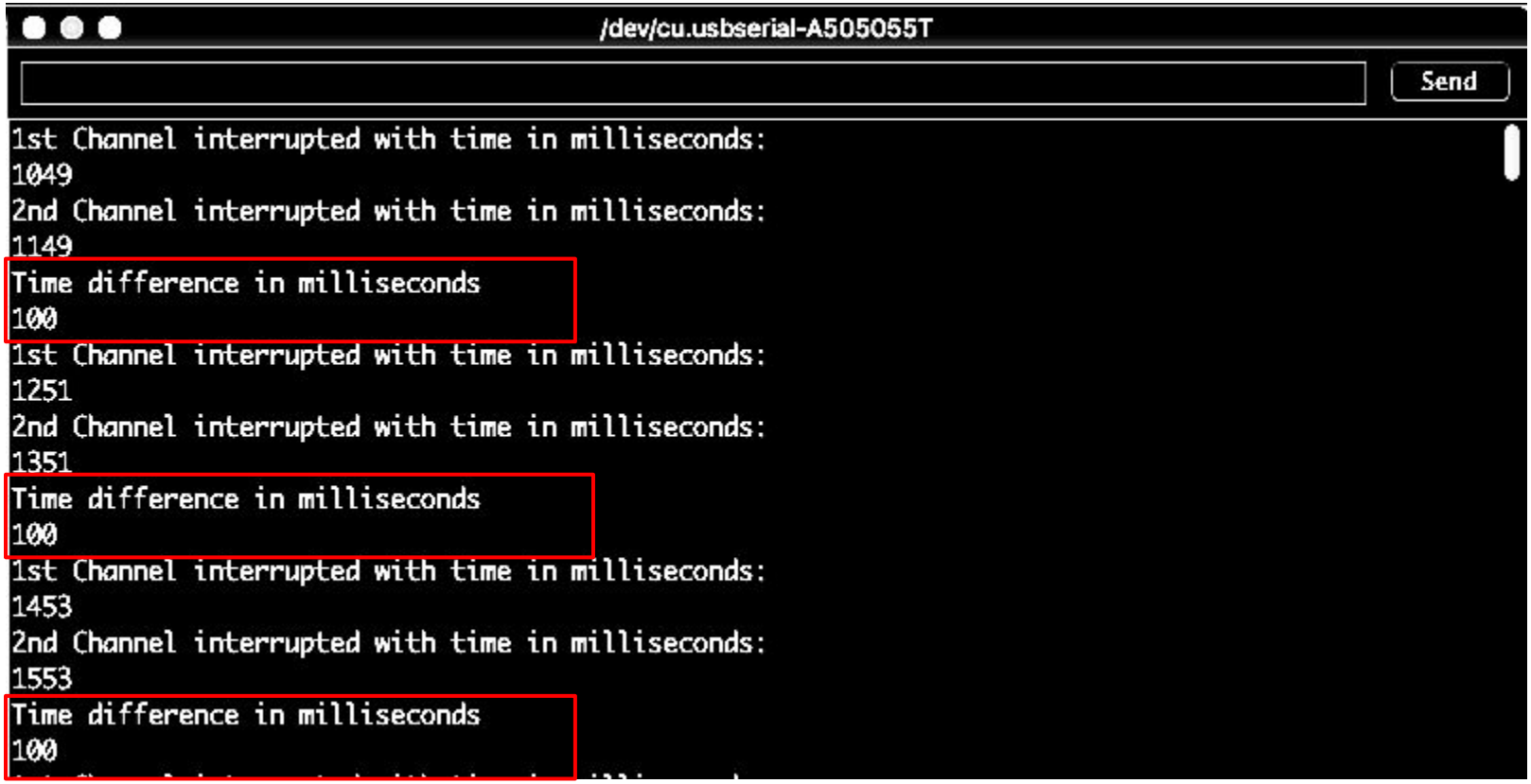
The importance of immediate response

- Ideal test signals with known time differences
  - Generated from Arduino
  - Clean, ideal signals
  - Signals observed by Logic Analyzer

Raspberry Pi GPIO Pins vs Arduino Pins



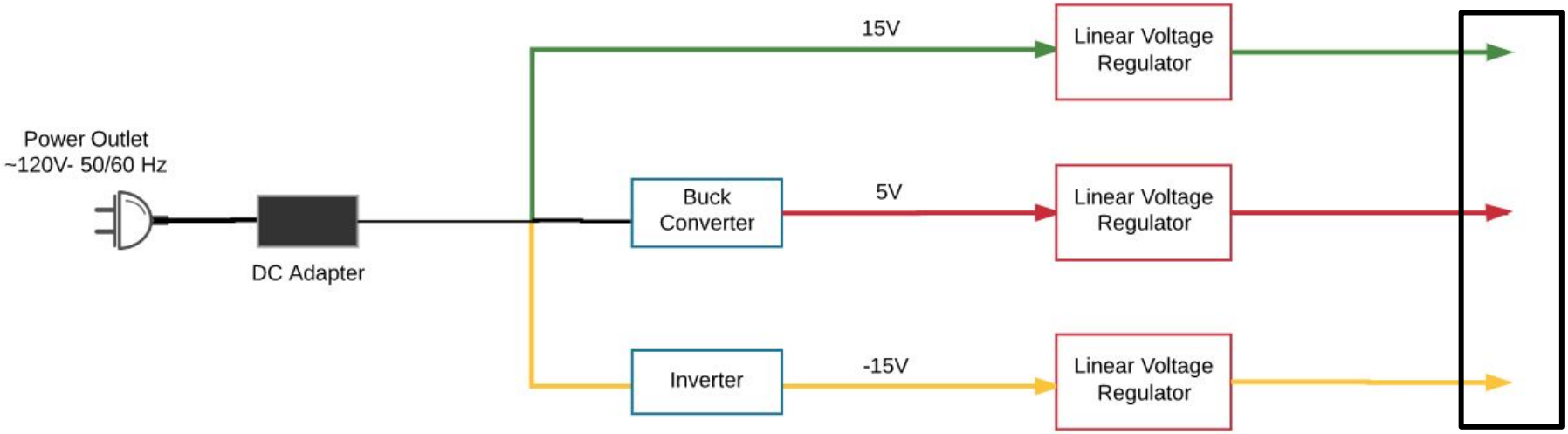
Raspberry Pi GPIO Pins vs Arduino Pins



Solution

- Use Arduino instead of Raspberry Pi for interrupt system
- Arduino
  - No operating system
  - Interrupts respond almost immediately
  - No need to worry about Raspberry Pi overheating
- Communication between Arduino and Raspberry Pi

Preliminary Design of Power Supply



CDR Demonstration

- Demonstrate complete, flow of power, data and/or information among subsystems.
- Demonstrate the camera recording and storing video on Raspberry Pi SD card
- Demonstrate a working case (time differences are accurate)

FPR Deliverables

- Full System Integration
- Accurately point to the source of sound (speaker)
- Microphones assembled (something other than cardboard)
- Filter, Comparator, and Amplifier assembled on PCB
- Power Supply for system assembled on PCB

Questions

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Demo Video Back-up