So-Lo
Team 12

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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
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

Power Outlet ~120V, 50/60 Hz

DC Adapter -> Buck Converter

Buck Converter

15V -> Linear Voltage Regulator

5V -> Linear Voltage Regulator

-15V -> Linear Voltage Regulator

Inverter
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
Demo Video Back-up