EE/CprE/SE 491 WEEKLY REPORT 09

11/8/2024 – 11/14/2024

number: 36

Project title: ***Ultrasonic Object Detector***

Client &/Advisor: Professor Jiming Song

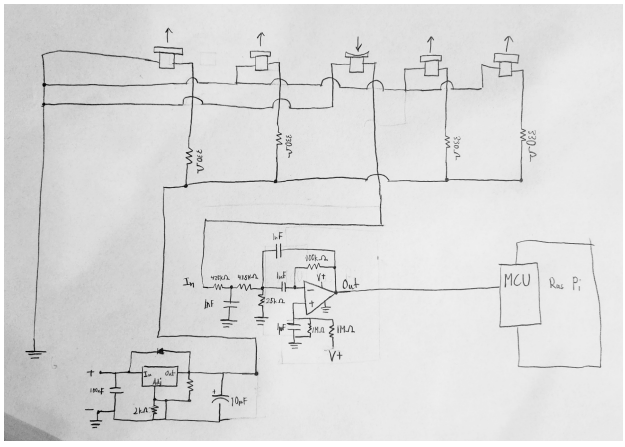
Team Members/Role:
Nathaniel Clarke - Project Software Designer
Brock Dykhuis - Circuit Analysis
Nicholas Jacobs - Electronics
Jonathon Madden - UI Designer & Software Tester

Weekly Summary

We received the MCU and have begun testing, and will need to begin programming it soon. We are beginning to make a more official circuit design to later be implemented.

Past week accomplishments

- Circuit Design Draft: **-Nicholas Jacobs**
  - Sketched an initial circuit layout, identifying necessary components and arranging the preliminary connections between the MA40S4S transmitters, the MA40S4R receiver, the ESP32-S3-DevKitC-1-N8R8, and the Raspberry Pi 3b.
- Schematic Creation: **-Nicholas Jacobs**
  - Drew detailed circuit schematics based on the draft, including connections for the transducers and signal processing elements
- Component Calculations: **-Nicholas Jacobs**
  - Voltage and Current Requirements: Calculated specific voltage and current requirements for the transmitters and receiver, ensuring compatibility with the power supply and MCU



- Looked into connecting the MCU with the raspberry pi - **Brock Dykhuis**

    - Mosquito, this implements MQTT(Message Queuing Telemetry Transport) protocol.
        - This is open source
    - This allows devices to communicate efficiently

- Setup Arduino IDE and ESP-IDF to begin testing both options for MCU programming - **Nathaniel Clarke**
- Took notes on the sdmay23-22 (2023) .ino file MCU code implementation
    - Noticed the use of coroutines to send pulse (this handles each transducer individually)
    - MCU Code Analysis (2023 Project)
- Looked over processing display code to see what type of data it gets from the raspberry pi - **Jonathon Madden**
- Worked on setting up the Arduino IDE and then looked over previous groups code - **Jonathon Madden**

Individual contributions

NAME	Individual Contributions	Hours this week	HOURS cumulative
Nathaniel Clarke	Started setting up services to begin coding the MCU, and built a sample template to use for testing.	6	58
Brock Dykhuis	Looked into connecting the MCU with the Raspberry Pi	6	53
Jonathon Madden		6	50
Nicholas Jacobs	Sketched an initial circuit layout, developed detailed schematics connecting all components, and calculated voltage and current requirements for the transmitters and receiver to ensure power compatibility	7	54

Comments and extended discussion

Sign up for a faculty panel time.

Plans for the upcoming week

Brock Dykhuis - connect the MCU with the raspberry pi. This will require downloading Mosquitto and having both of them under the same connection.

Nicholas Jacobs- I'll focus on refining the signal amplification and filtering stages to improve clarity, testing various amplifier settings to balance strength and noise. I'll also conduct baseline

tests on the MA40S4S transmitters and MA40S4R receiver, adjusting pulse-echo timing to optimize detection range and accuracy. Finally, I'll verify each component's performance under operational conditions, paying close attention to any issues flagged in my schematics or calculations.

Jonathon Madden - Continue with figuring out what code that the microcontroller will need and running tests on the arduino IDE.

Nathaniel Clarke - Review 2024 project's implementation of MCU code and compare it with the 2023 implementation. Begin laying out the MCU code for our implementation.

Summary of weekly advisor meeting

The advisor has confirmed his availability for the upcoming Faculty Panel and has provided us with his preferred time slots. We are coordinating with him to ensure his participation aligns with the schedule and requirements.