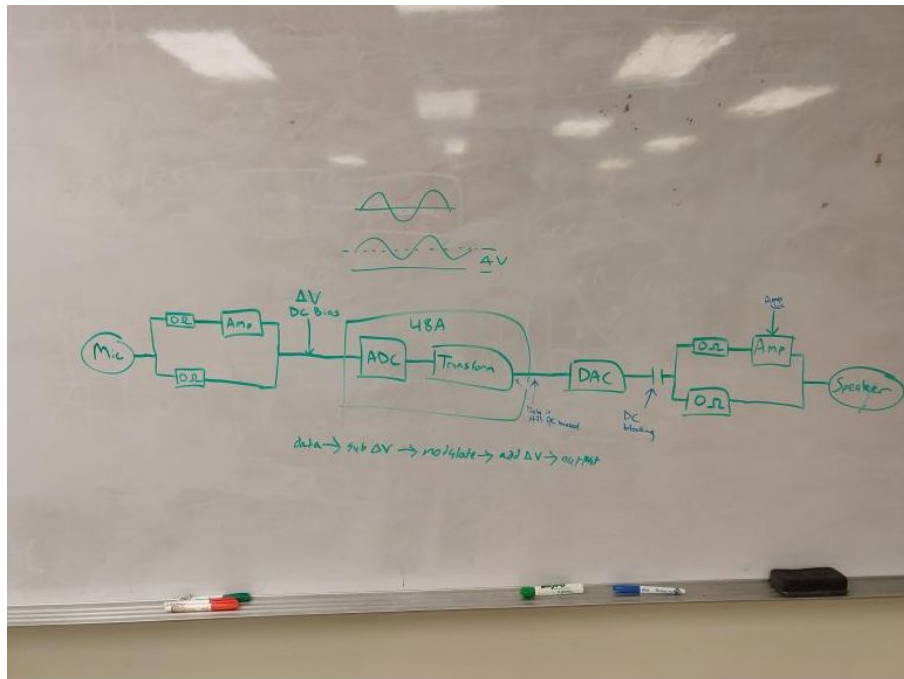


Date: 11/11/18

Place: Capstone Lab

People: Aaron Chan, Ryan Writz, Philip Arola, Jordan Bergmenn

- Phillip cleaning up Github
- Ryan continuing work on finishing touches of layout and schematic
  - Added LEDS and output mic jack
  - Still working on:
    - Bypass caps
    - More test points on Output of ADC Input of DAC
    - Segmenting input and output to w/ amp vs. not:



- Silkscreen layer: Group # and Project name
- Ground plane
- Aaron and Jordan working on Output amplifier
  - Consulting Stephen through discord
- Found the model of Atmega84A was incorrect
  - Aaron fixed it and updated the library
- Plan to meet again on Tuesday
- Board to submit to Oshpark between Wednesday 11/14 12 pm to 11/15 10 am.

Date: 11/4/18

Place: Capstone Lab

People: Aaron Chan, Ryan Writz, Philip Arola, Jordan Bergmenn

- Since last meeting:
  - Ryan created layout for board
  - Andrew gave following feedback for project:

- Reset line needs a 10k pullup
- Power needs to be defined (we haven't discussed how to power this), Vcc to be 5V
- Bypass caps for power pins throughout board(don't know what values to use yet)
- Use op amps because they are simpler for the amplifier?(Stephen)
- Try using built-in ADC so that we don't need to use a separate ADC IC
- Needs 16MHz crystal oscillator (Jordan/Phillip)
- Test points suggested at ADC input, DAC output, SPI bus?
- Also consider adding LEDs for power and some status indication
- Aaron and Jordan working on testing microphone
  - 5V and 4.7K resistor needed to create enough DC bias to accept audio input
  - Got microphone working
- Ryan reaching out to other teams about Design Review
- Ryan slowly working on creating edits for schematic/ layout based of suggestions
  - Uploading each time after a few edits
- Phillip working on getting libraries working for waveform to make our life's easier without having to do a lot of math ourselves

Date:10/28/18

Place: Capstone Lab

People: Aaron Chan, Ryan Writz, Philip Arola

- Ryan and Phillip went to Eagle CAD workshops on 10/27, Aaron went last year
- Ryan, Phillip and Aaron verified material on PDS
  - Submitted to D2L and uploaded to Github
- Tasks:
  - Aaron and Ryan working on getting a few DRC errors to work on schematic
    - A few pins that are used on part are not showing on schematic
    - May need to edit schematic to get to work properly
  - Aaron and Ryan working on getting layout produced by Thursday
  - Phillip continuing work on DAC

Date:10/21/18

No Meeting

Tasks:

- Ryan and Stephen both working on ADC
  - Working to find SPI communication
- Aaron working on preliminary schematic
- Phillip working on DAC

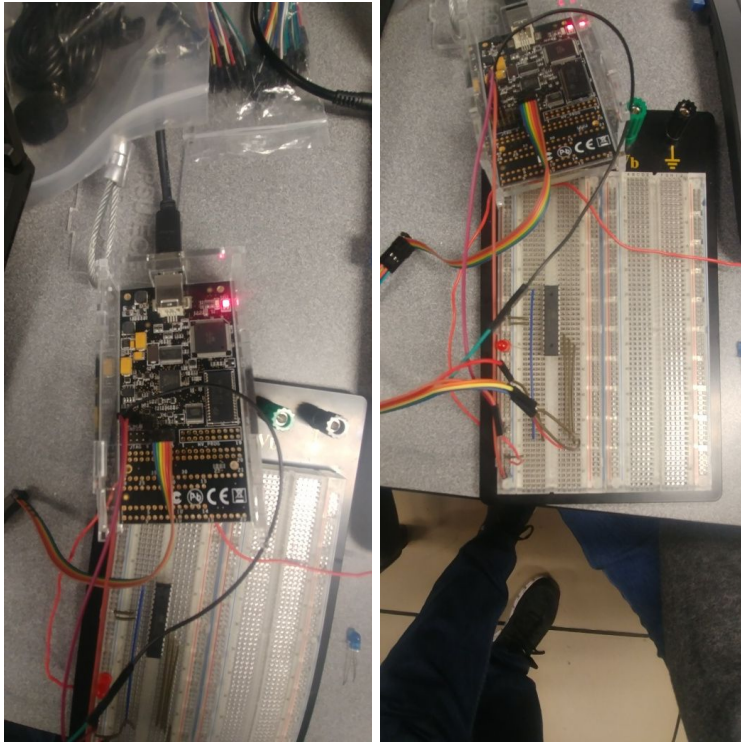
Date:10/14/18

Place: Capstone Lab

People: Aaron Chan, Jordan Bergmenn, Stephen Johnston, Ryan Writz, Philip Arola

Notes:

- Tentative thursday meeting this last week did not happen
- Stephen and Jordan able to plug a direct connection between ADR and Microcontroller on Bread Board. Pictures provided below:



- Stephen and Aaron working on programming the microcontroller
  - Trying to make LED flash - writing in C
  - DDRD set all to 0 got LED on
- Phillip and Ryan working on DAC and ADC
  - Borrowed breadboard from Robotics Lab
- Most supplies arrived on Thursday
  - Mics arrived between Thursday and Sunday
- Ryan added links to Bill of Materials
- Divvying up project-
  - Stephen- Testing DAC, transmitting data(What form), clock speed, any frequency limitations, output impedance for amplifier. Amplifier
  - Ryan/Jordan-Testing ADC, transmitting data(What form), clock speed.
    - If any help needed with Mic seek out Stephen
  - Phillip-Potential solder on solutions for SD Card as potential
  - Aaron/Phillip- continuing work on Atmel controller
  - Aaron- Overall schematic work
- Robotics Locker to be used for storing materials
  - Using Locker #33, passcode on discord channel
- Future 2nd meetings are mainly to be tentative Thursdays, Sundays look to be only really good day to meet up

- Sunday meetings to potentially occur sooner
- Aaron no longer able to meet on Thursdays
- Need Prototyping done by 10/28

Date: 10/7/18

Place: Robotics Lab

People: Aaron Chan, Jordan Bergmenn, Stephen Johnston, Ryan Writz, Philip Arola

Notes:

- Getting voice call set up
- Discord set up as instant messenger
- Practicum Ideas- we need 3 contenders by Thursday
- 1. Magnetic sensor and response unit- Needs magnetometer, microcontroller, inductor
  - Good idea but may be too focused on Electromagnetics.
  - What if it cancelled out EMF for brain activity?
- 2. Climate Controlled Coat- HVAC, wiring
  - Need to transfer heat away from component with fan/water cooling or ventilation.
  - Research: Find Coat-Structure needs to be strong, be able to take some holes in it
  - Main downside consumer side is going to be battery life
  - Research: Output resistance- figure out what batteries to use
  - Thermistors into key areas
    - Research: Where most heat is produced on body
      - Maybe areas where large arteries near surface at skin
        - Wristbands that cool down
        - Cool enough to keep from fatigue but also not too cold as to trigger reaction from blood vessels -PWM controls?
      - Could average signal/ reroute air to certain areas
    - Research: Find Coat
    - Research: Appropriate thermistors
    - Include dial
    - Coat able to spread out and pull heat evenly
    - May be expensive and would have a lot of construction
  - 3. Voice Modulator
    - Simple idea- Take voice and change it
    - Could do a lot with it once we have it working
    - Do we have a means of going from binary to mp3?
    - Use microcontroller to store on SD card/ computer, could do all filtering as analog
    - Try to make it work for any microphone, [example](#).
    - May need an audio amplifier
    - May need an OS on kernel, but could probably get away with CPU Interrupt switching
      - Use of threads with the sampling
    - 3 programs running :Measurement, frequency and transforming
    - Can we run Linux and C on it?
      - Maybe do it incrementally where we get working without Linux then use

Linux later if time

- From the waveform with sampling can we get the frequency?
  - Sampling in small intervals, measure at 2 end points to determine frequency
  - AM radio usually sounds like a higher pitch since easier to use/ less data to have to filter
- Will 16 bits be enough for audio?
  - May need more for overhead
- Use [Atmega controller](#)
- Does the controller have any RAM on it?
- Should we have any security restrictions on microphone?
  - Overflow exploit or looking for certain pattern
- How much data are we taking in?
  - How precise do we need the voltage to be? 8 bits of precision, can use extra registers for other things
  - 100 KB/s
  - 100,000 samples per second
  - How quickly are filling up our memory?
    - Will need external RAM to shift out to
- Eric(TA) suggests we focus on project management rather than challenging yourself as an engineer
  - Want easy requirements to build off of
  - Good use case
  - Do want us to use Github and EagleCAD and how to flash microcontroller, past that not really anything other than project management
  - Use multiple microcontrollers for multiple programs
  - No need to do work with an OS
- Should probably be able to do transform and sampling in one program with how fast processor is
- Can probably use FFT from online for transform, arduino has FFT functionality
- Decision: Voice Modulator, all agreed
- Maybe record meetings as secondary source of info
- To Do :
  - Research- Will a 16 bit processor work?
  - Github work-
    - Each team members must have R/W access. Add some content (front page / readme / whatever) to prove you can write to it.
    - Send Eric the site URL at [eruhl@pdx.edu](mailto:eruhl@pdx.edu).
    - Give access to add users 'andrewgreenberg' and 'e-ruhl'
  - Ordering parts
    - ATmega48A
    - MCP4921 DAC
    - MCP3208 ADC
    - Microphone

## Total Bill of materials

ATmega48A  
MCP4921 DAC  
MCP3208 ADC  
Microphone

Part Numbers	Customer Reference	Description	Quantity	Availability	Unit Price	Extended Price
ATMEGA48A-PU-ND ATMEGA48A-PU	<input type="text"/>	IC MCU 8BIT 4KB FLASH 28DIP	<input type="text" value="3"/>	Immediate	1.78000	\$5.34
This part can be programmed by Digi-Key. For details please contact our custom department at <a href="mailto:custom.orders@digkey.com">custom.orders@digkey.com</a>						
MCP4921-E/P-ND MCP4921-E/P	<input type="text"/>	IC DAC 12BIT SNGL W/SPI 8DIP	<input type="text" value="3"/>	Immediate	2.03000	\$6.09
MCP3208-CI/P-ND MCP3208-CI/P	<input type="text"/>	IC ADC 12BIT 2.7V 8CH SPI 16DIP	<input type="text" value="3"/>	Immediate	3.58000	\$10.74
CP1-3523N-ND SJ1-3523N	<input type="text"/>	CONN JACK STEREO 3.5MM R/A	<input type="text" value="3"/>	Immediate	0.73000	\$2.19
Tariff Pending						
Subtotal:						\$24.36

## Requirement List:

### MUST

1. Sample sound through a microphone using the microcontroller
2. Interpret data from analog to digital, with some degree of high frequency (8kHz-100kHz) sampling
3. Transform sound to something different and output to speaker

### SHOULD (would be nice but won't be detrimental if it doesn't work)

1. Have multiple transformation options
2. Be able to interface with multiple types of microphones
- 3.

### MAY (optional and additional things to make it fancy)

1. Transform sound using the microcontroller
2. Provide live graphing of input sound
3. Record sound and save to file