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

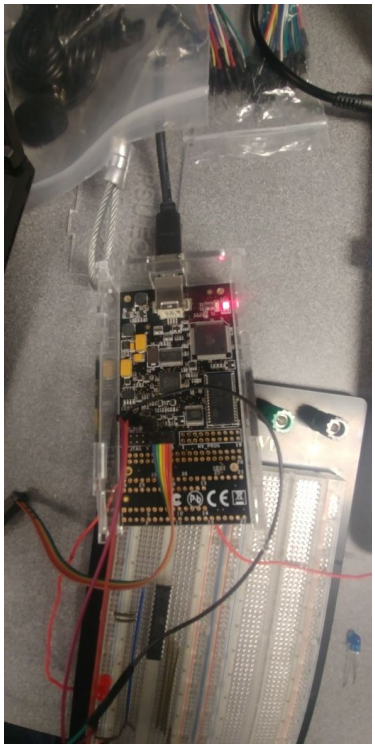
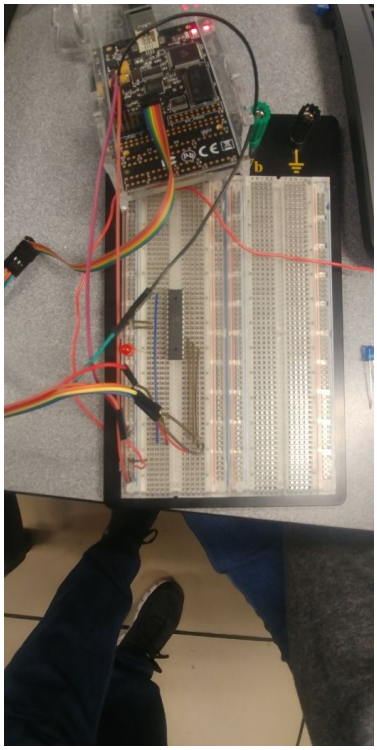
- Ryan and Phillip went to Eagle CAD workshops on 10/27, Aaron went last year
- Ryan, Phillip and Aaron verified material on PDS
    - Submitted to D2L and uploaded to Github
- Tasks:
    - Aaron and Ryan working on getting a few DRC errors to work on schematic
        - A few pins that are used on part 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.
      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		IC MCU 8BIT 4KB FLASH 28DIP	3	Immediate	1.78000	$5.34
This part can be programmed by Digi-Key. For details please contact our custom department at custom.orders@digikey.com						
MCP4921-E/P-ND MCP4921-E/P		IC DAC 12BIT SNGL W/SPI 8DIP	3	Immediate	2.03000	$6.09
MCP3208-CI/P-ND MCP3208-CI/P		IC ADC 12BIT 2.7V 8CH SPI 16DIP	3	Immediate	3.58000	$10.74
CP1-3523N-ND SJ1-3523N		CONN JACK STEREO 3.5MM R/A	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