PORTABLE MAME EMULATOR

Senior Project

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CETN4001

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Summary

The Portable Game Controller is a final project for the group's Senior Project class. The original scope was to create a:

- Controller
  - A controller with tactical retro buttons, an analog stick and an LCD embedded inside
- Portable
  - The controller does not require to be plugged in to an outlet to be powered on
- Emulator
  - It runs the Retro-Pi emulator on a Raspberry Pie device able to emulate retro game consoles such as: Gameboy, snes, nes, atari 2600...

The group started this project with a smaller mini-project intended as a research phase. The goal of this mini Project was to renovate a previous students' Senior Project which was also a retro game emulator. However, this project is a full-size arcade table running on an old windows XP system and it was getting old, so it needed an upgrade.

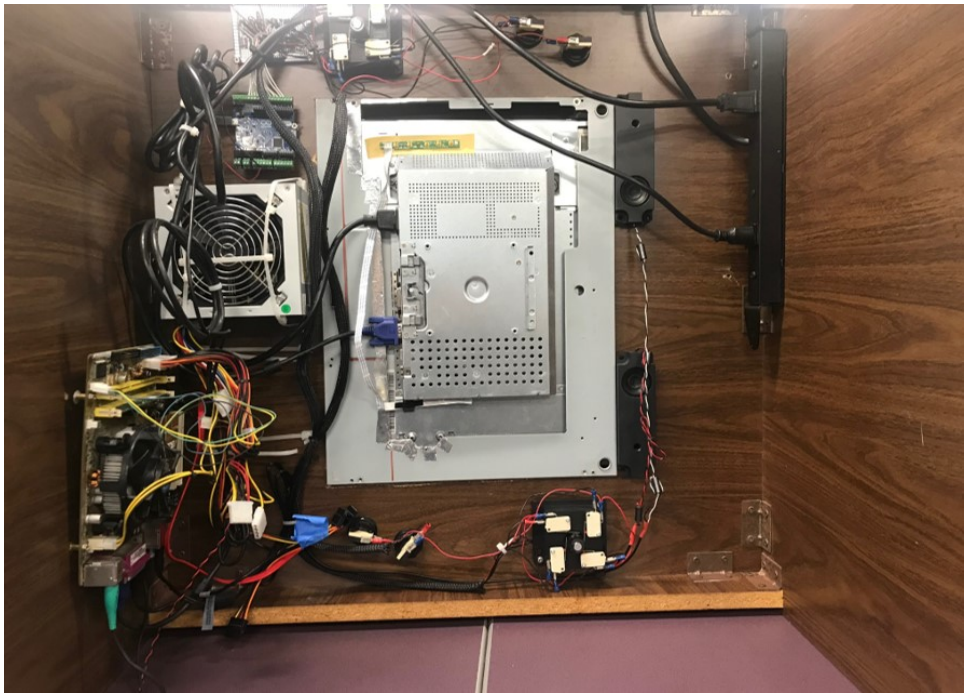


Figure 1 - Underside of the Arcade Table

We upgraded the table to a Raspberry Pi 3 based system while successfully keeping most of the games that where there previously. Once we got it working with a Pi, we implemented additional player buttons, instructional 3D printed labels and a security panel to prevent vandalism.

Figure 2 - Renovated Arcade Table

Using the knowledge acquired from this research phase, we created our smaller portable emulator controller using the same concepts. Using as a Raspberry Pi A+, we shrunk the arcade table to a handheld version with some addition games including Pokémon and super Mario Bros. The controller can run smoothly for 5+ hours before needing a recharge.

Figure 3 - Final Product

This is the final controller with 10 functional tactical buttons, and analog stick, and a 3.5” display embedded inside the controller. Under the components, there is a 25000mah battery with a micro USB port accessible from the side from recharging.

Contents

Introduction

The Dream Team

Senior Project is the last class in our program, Computer Electronics Technician, where the students group up, plan, and execute a 5-week intense project. Our group “Portable Game Controller” consists of 4 members;

Keven Ayoub

Figure 4 - Keven Ayoub working in the lab

Hi, I’m Keven Ayoub, I was the “soldering guy” on this project. I enjoy working with circuits and computer electronics.

Andrew Parisee

Figure 5 - Andrew Parisee seated in lab

Hello, my name is Andrew Parisee! I am one of the programmers of the group. I wrote the C programming to go onto the SAMD21 Mini Breakout Chip and tested the logic for button presses, analog movement, and D-pad movement in RetroPie games.

Justin Smith

Figure 6 - Justin Smith examining Prototype

Hi everyone, I'm Justin Smith, on this project I was a programmer. During this project I worked on the set up of the SAMD21, using Arduino. Along with the setup of the SAMD21, I also tested out its functionality with the RetroPie games.

Edward Thompson

Figure 7 - Edward Thompson soldering

Hello, my name is Edward Thompson. My roles on this project were Team lead and Structural designer, I also helped with the soldering of the power switch and the installation and layout of hardware. I also designed the casing, along with the cover.

The Project

When our group finally settled on this Portable game Controller as our project. We quickly started planning and drafting controller concepts. We originally had grand ideas such as a sliding display that would slide into the controller when not used then with a press of a button, would propel itself out of the controller and snap in place with a sliding mechanism. Thanks to our professors, we quickly changed our approach to more realistic expectations.

While the controller has gone through various stages and transformations, the goals where the same. Our three main goals were;

Portable

- The main overarching goal of the project was portability. This feature made our product different. The device does not require external power to operate. It has a rechargeable battery with an easily accessible charging port at the bottom. The battery will last 5+ hours thanks to the efficient Pi A+. It also has an HDMI output which can be used for some cool group play on a large TV.

Game

- The controller was built around a raspberry pie running Retro-Pie to emulate game consoles. We transferred the ROMs' we used from the mini project and even added some new ones along with a modified front end.

Controller

- Instead of an arcade machine or table, our project is different. It's compact, small, it's a controller with an embedded 3.5" screen and a glass faceplate revealing the inner workings of the controller. The controller was 3D modeled and printed using a 3D printer.

Making an impact

This documentation acts as a blueprint to guide any interested students or hobbyists. All this information will be available on instructables where anyone can learn from this project, and our progress through the various stages of our project. We want to give back to the open- source community by contributing this documentation.

Hopefully someone will use this knowledge to make their own portable game controller having avoided the issues that we ran into. We believe that the portable emulator community can learn from our project. This type of emulator controller can be used in game stores to display retro consoles which can be difficult to setup individually. This small form factor and ease of use can be marketed and potentially sold to a niche customer seeking nostalgic relief from their child favorite games that comes in a sleek package.

Issues and Limitations

As a relatively small program in an already small and aging campus, we didn't have the luxury of new equipment or top of the line electronic parts. We did however have spirit, and dedication. The class raised $370 for all the projects and by the end had used nearly all of it for new and necessary parts.

Our main limitation was the equipment in our lab at NSCC. Here are the four primary limitations that slowed down our progress;

3D printer

- This was the main time killer. We have a 3D printer, a MakerBot Replicator 5th gen, was shared among three teams. The prints took many hours to complete, usually we'd have overnight prints. Unfortunately, the printer extruder head was giving us many errors;

Temperature drop

- This error happened when the extruder head temperature dropped 10 degrees below the set temperature. This would pause the print constantly and halting the progress. We fixed the problem by rebooting and moving the printer to another room.

Extruder Error

- The extruder has been detached. The metal contacts on the extruder sometimes loose contact and the printer loses connection with the extruder piece so the print stops. This issue was fixed by cleaning the extruder and securing it tightly.

Filament Jam

- The filament is not extruding properly. The filament tube is most likely stuck so the filament gets jammed and the roll in the back containing the filament cannot rotate. To fix the issue, remove the roll and reinsert the wire into the tube and ensure the tube is not angled aggressively.

Filament Slip

- The filament slipped out of the extruder. Still not sure why this happens but checking the raft option seams to fix the issue.

Accessibility

In our small lab, the only soldering station available at the time was in the back corner where the drill press was also located along with every tool that we needed to use in one small cramped corner that can only fit one person passing through at a time. We also only have one tool of each kind. Here are the accessibility issues we ran into;

Soldering station

- In the corner of our lab was located a single soldering station. Most of the soldering was done during our march break thus the instructors where not present and the additional stations where locked up.

Dremel

- There was a single Dremel tool that the three groups shared. We often had to wait to use this tool.

Glue Gun

- Originally struggling to find the glue sticks was the issue but then having to wait to use this popular device was also slowing the pace.

Drill press

- Another very popular machine. Since two projects where very similar, it was constantly being operated.

Space

The lab started getting really crowded near the end of the 5 weeks. We had three prototype, 3 Pie setups. Other groups also had their various iterations and we started to run out of space. When we had to create of presentation board, we took over the room next door and had papers occupying nearly every table. Those are minor issues compared to the following;

The work cave

- In one corner of the lab laid the only soldering station along with all the heavy and light tools, the accessories for them, the electronics microscope, and the drill press. There was space for one person to pass at a time through this cave. We got really close with our peers working in the cave

Figure 8 - Keven and Ed working in the cave

Parts

We had a small budget to spend on our project, the performance of the controller was limited by a few parts.

Tactile buttons

- We ordered low quality tactile buttons from amazon. They had the retro appearance we wanted but lacked in performance. They gave off false readings which we struggled to fix in Arduino code using debouncing methods.

Analog Sticks

- They were also bought from amazon and the quality of these sticks where deplorable. They would constantly get stuck in the corner positions. The where also not smooth. We acquired higher quality Analog sticks for our final Product

Raspberry Pi

- We were limited to a raspberry Pi A+ for our final product. The Pi A+ is an older model thus the performance was noticeably weak. We improved the performance by overclocking the Pi A+.

Similar Projects

As mentioned in the summary, our final project is a little special. It consisted of a 2-week mini project and 3 weeks dedicated to the final project. The 2 weeks mini project also acted as a research phase for the group and prepared us for the controller.

Many years ago, a group of students made a full-size arcade table emulator. To prepare us for our very similar project, we decided to renovate their now old and broken table. Our main tasks where to;

Upgrade to Pi base

- The main objective with this mini-project was to replace the ancient system running Windows XP to a much more recent Raspberry Pi 3 running RetroPie

Add roms

- Along with getting the table working again, we wanted to add additional games. We added ghost and ghouls at the request of one of our professors.

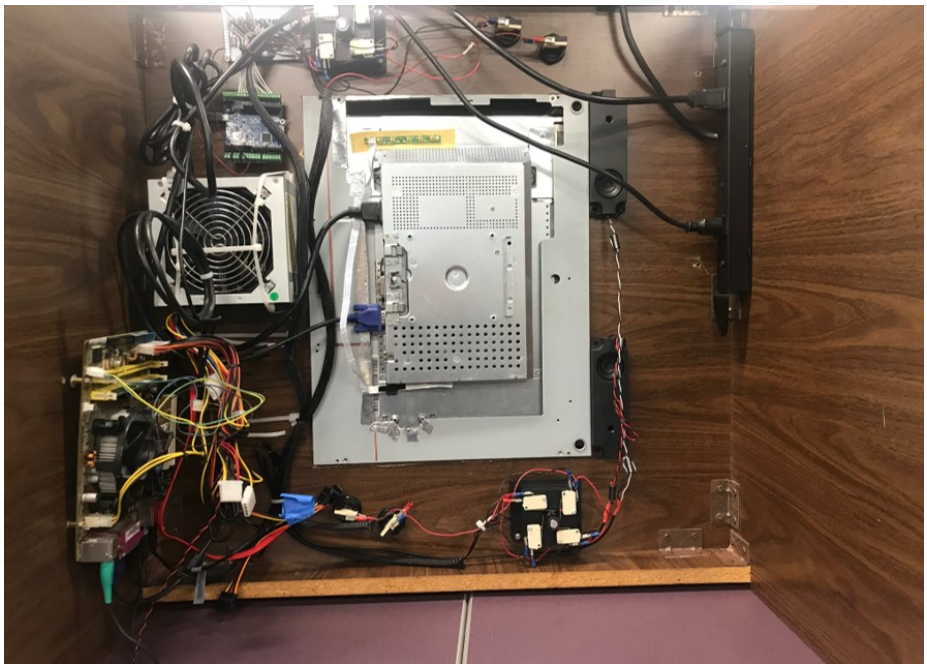


Figure 9 - Before: Underside of Arcade Table

This is how the electronics looked when we first brought the table into the lab. There were many issues;

Bad cable management

- The cables where everywhere without any sense of order. Zip ties where broken probably year before we got to it.

Black wires were VCC

- The color codes where inversed

Red wires were Ground

- This made absolutely no sense.

Broken Screw Mounts

- Mounting headers holding components to the board where broken. They were being held together by the wires attached.

No boot

- We couldn't get any boot on the Windows XP system at first.

Acknowledgments

We would like to acknowledge our two professors Todd Verge and Brian Shewan for their patience and guidance through these projects.

Brian's expertise and seemingly endless knowledge of electronics never ceases to amaze us. He understands our intentions and reliably gives honest feedback.

Our controller would never have been made had it not been for Todd unexpectedly barging in the lab excited to tell us about a new idea he thought up of. It was a portable game controller.

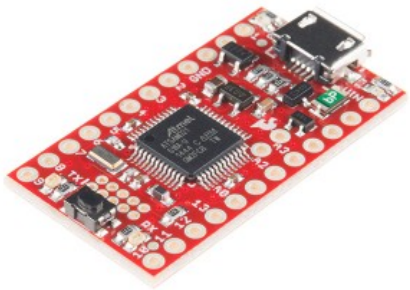
Main Body

Major Components:

Raspberry Pi 3 Model B+
Price: $45.95 before taxes
Website: https://www.canakit.com/raspberry-pi-3-model-b.html?cid=cad&src=raspberrypi

Raspberry Pi 1 Model A+
Price: $33.95 before taxes
Website: https://www.canakit.com/raspberry-pi-model-a-plus.html?cid=cad&src=raspberrypi

SparkFun SAMD21 Mini Breakout Board
Price: $20.95 before taxes
Website:
https://www.sparkfun.com/products/13664



ISound BP140 2,500 mAh Backup Battery
Price: $19.60 before taxes
Website: https://www.swagbrokers.com/iSound-BP140-2500mAh-Backup-Battery-984766259

MHS-3.5inch RPI Display
Price: $24.38 before taxes
Website:https://www.amazon.ca/TOOGOO-Press-Screen-Display-Raspberry/dp/B07MLGX9CS/ref=sr_1_fkmr0_1?keywords=MHS-3.5inch+RPi+Display&qid=1555039548&s=gateway&sr=8-1-fkmr0

Generic Set of 50 Tactile Push Button Switches and Round Caps
Price: $7.99 before taxes
Website: https://www.amazon.ca/Generic-Tactile-Button-Switch-Momentary/dp/B01G36GRO2/ref=sr_1_37?keywords=tact+tactile+push+buttons&qid=1554986433&s=gateway&sr=8-37

5 Pin Joystick Breakout Module Shield
Price: $14.39 before taxes
Website: https://www.amazon.ca/Davitu-Connectors-Joystick-Breakout-Controller/dp/B07L4NWFSC/ref=sr_1_60?keywords=analog+joystick+board&qid=1554986873&s=gateway&sr=8-60

MakerBot PLA Filament, Large Spool, Red
Price: $77.07 before taxes
Website: https://www.amazon.ca/MakerBot-Filament-Diameter-Large-Spool/dp/B00SPEUG3Y/ref=asc_df_B00SPEUG3Y/?tag=googleshopc0c-20&linkCode=df0&hvadid=292982668511&hvpos=1o1&hvnetw=g&hvrand=13194621352067329095&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9000101&hvtargid=pla-449380772082&psc=1

SanDisk Micro SD 64GB
Price: $24.99 before taxes
Website: https://www.costco.ca/SanDisk-Ultra-microSDXC-and-microSDHC-64-GB-UHS-I-Card-with-Adapter-and-Reader.product.100484333.html

Programs Used:

- **Win32 Disk Imager** - https://sourceforge.net/projects/win32diskimager/
  - Used to write raw disk image to a removable device. Can also be used to back up a removable device to a raw image file.
- **RetroPie** - https://retropie.org.uk/download/
  - Used to turn devices such as a Raspberry Pi, an ODroid, or a PC into a retro-gaming machine.
- **MHS 3.5 Inch RPI Display -** http://www.lcdwiki.com/MHS-3.5inch_RPi_Display
  - Attached to the GPIO of the Raspberry Pi. An image for the RetroPie can be found on the website listed above.
- **WinSCP** - https://winscp.net/eng/download.php
  - SFTP and FTP client used to transfer ROMs to specific emulators and to edit configuration files (Note: Using root account makes editing files much simpler).
- Auto CAD 2018 – https://autocad.en.softonic.com/
  - AutoCAD software is used to make blueprints. We used this program to create a drawing of the cut-outs for the holes in the Lexan.
- Autodesk Fusion 360 – https://www.autodesk.com/products/fusion-360/free-trial
  - Industry standard software for 3D modeling. The 3D controller model was designed using simple shapes, filet and chamfer tools.
- MakerBot Print – https://www.makerbot.com/3d-printers/apps/makerbot-print/download/
  - This is the software that communicates with the 3D printer.

Milestones:

Arcade Table:

Beginning with repairing and improving the Arcade Cocktail machine that sits up on the third floor of D wing. We were quickly able to add a Raspberry Pi with a USB Encoder and a new set of speakers with an amplifier to the table. The result of this milestone gave us a pretty good game machine that people can relax and have fun on and gave us the idea to shrink down the concept into a portable lightweight version.

Figure 1 – Arcade Cocktail Machine

Prototype One:

This first step to the five-week project begins with a simple breadboard set up of digital buttons and an analog joystick. Each digital button is connected to a digital pin on a SAMD21 Mini Breakout chip while the x range of the analog joystick is connected to A0, the y range is connected to A1. A simple code is written and programmed onto the Mini breakout board. The entire purpose of this is to make sure that we can detect key presses with the push of a button or the movement of the analog joystick.

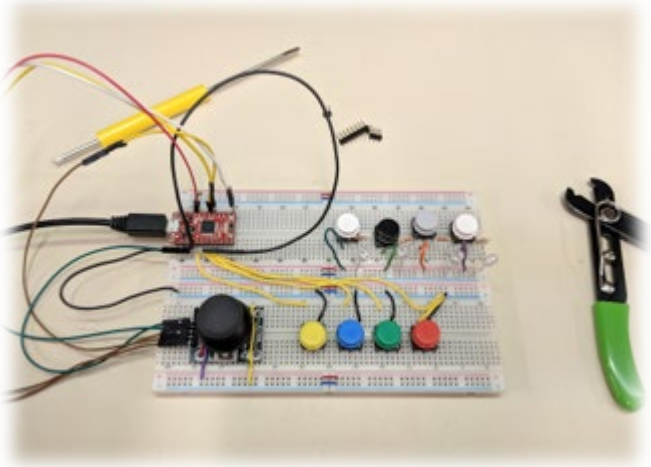


Figure 2 – Prototype One: Breadboard Controller

Figure 3 – Align right-side to insert the LCD screen

Prototype Two:

The next phase of the five-week project develops from the breadboard testing phase. This milestone is to design and test how portable we can make this controller. With the use of a portable power bank, a copper plate, and our school's 3D printer. This results in a design that can be created into a working semi-portable controller that has a Raspberry Pi 3B and a screen.

Figure 4 – Prototype Two: Semi-Portable Controller

Prototype Three:

The last phase of this five-week project includes improving the second prototype and optimizing the layout for the portable battery to be placed inside with the SAMD21 Mini Breakout inside. The front plate of the third prototype is Lexan glass and is placed in order to admire the awesome wiring and the lights given off the Mini breakout.

Figure 5 – Prototype Three: Portable Controller

RetroPie Initial Setup:

Step 1: Tear Down

Being given a new Raspberry Pi Model A. The plan begins, first off is finding a program that will run off a Raspberry Pi to play video games on the table again. It is quickly decided that RetroPie is the perfect program to use on this device. Using Win32 Disk Imager, you can write the RetroPie image to the Pi's 32GB SD card.

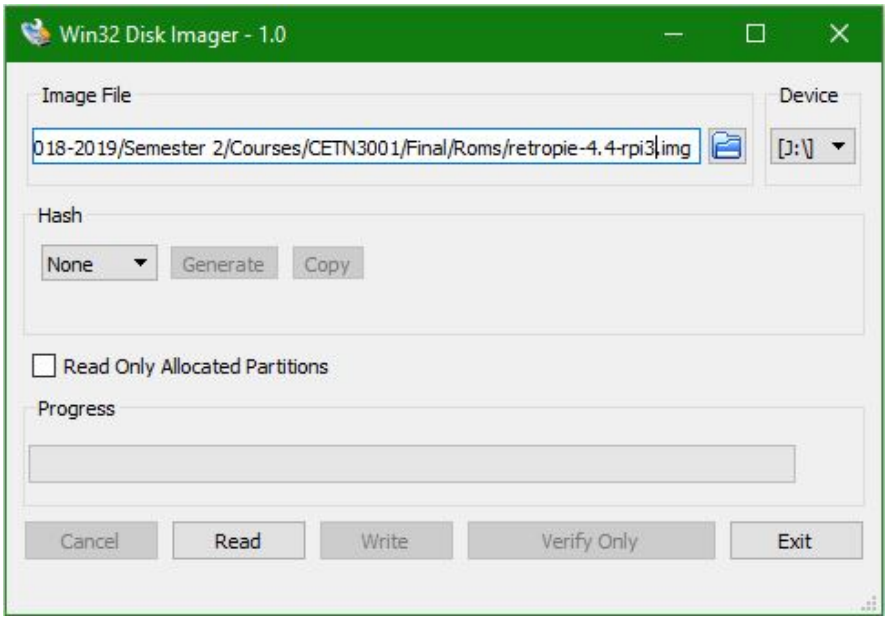


Figure 5 – Installing the RetroPie Software to the SD Card

Step 2: The Initial Setup of the Raspberry Pi

The Raspberry Pi has RetroPie installed but it has no style. The absolute first thing to do on the Pi is hit the F4 key and type the following command: "sudo apt-get update && sudo apt-get upgrade". This will update the repositories installed on the RetroPie system and remove the broken ones. Once that has finished access the Raspi-Config menu and expand the filesystem of the Pi in order to allow for more games to be installed.

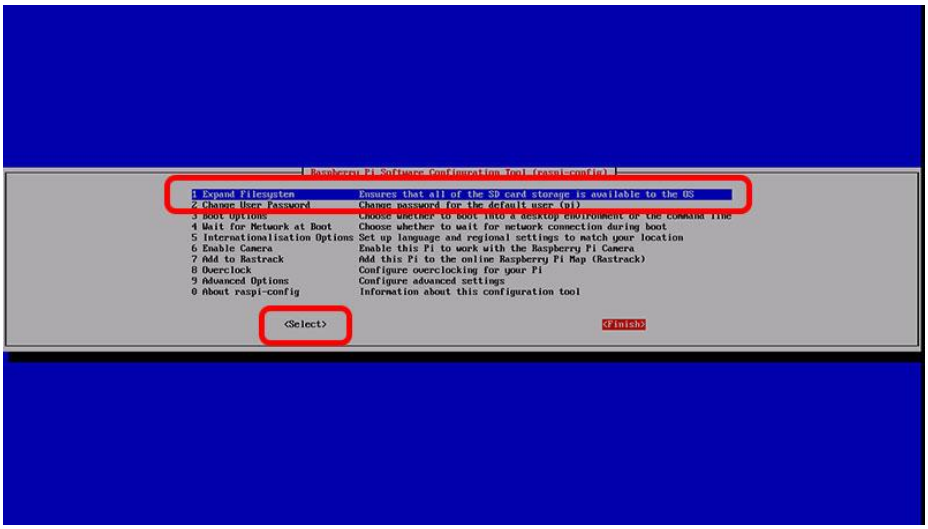


Figure 6 – Raspberry Pi Configuration Menu

Step 3: Installing ROMs to Emulators

When going to install games on the RetroPie system you need to consider what type of games you are looking to play. In this case, use the Arcade emulator for the retro arcade games. In order to add the games to the ROM you can access the file system by connecting an Ethernet cable from your Raspberry Pi to your PC. In windows File Explorer type in \\RETROPIE. Within the file system you want to access the ROMs folder and drop the .zip files into the arcade folder.

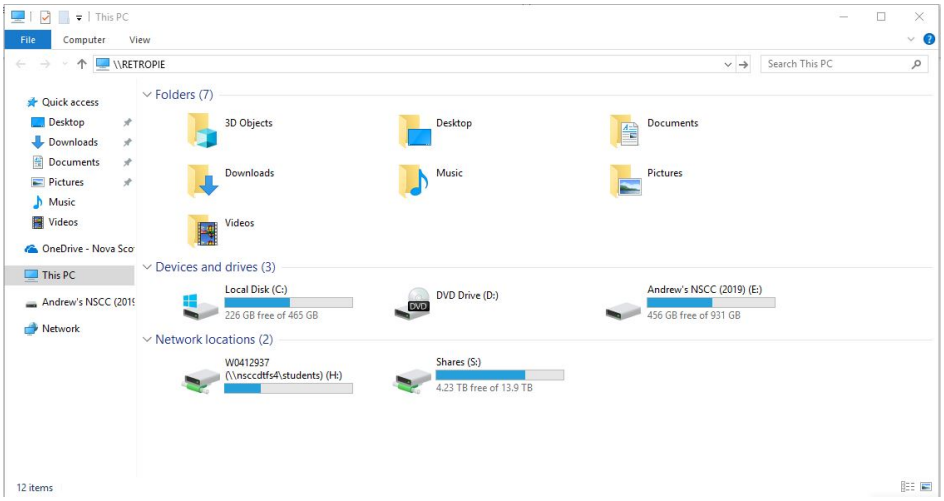


Figure 7 – Installing ROMs to the RetroPie

Step 4: Customizing the Front-End Screen

This task can be extremely simple and fast. All you need to do in order to change things such as the text size and the label of the emulator is editing the XML file. In order to change the image from the Arcade logo you need a new image to insert into the art folder of the arcade theme. This can be done with any ".png" file you can find online or create one yourself. To change things such as text size, you can edit the theme.xml file with notepad and manipulate the values.

Figure 8 – File Directory: /etc/emulationstation/themes/carbon/arcade

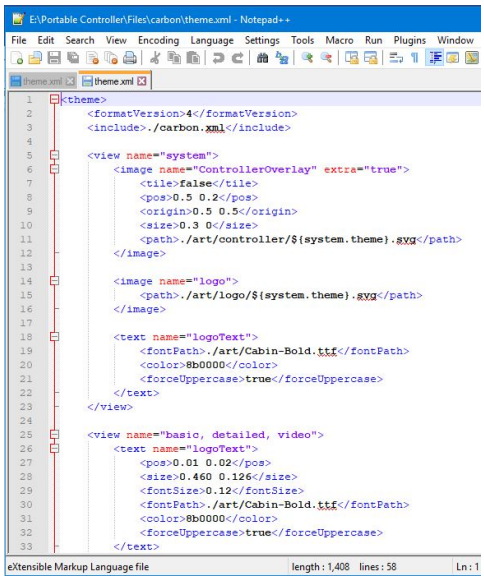


Figure 9 – File Directory: /etc/emulationstation/themes/carbon

3D Case Design:

The task of creating the 3D model for the portable controller case, first use Autodesk fusion 360 software. Although you could use another 3D modelling software, fusion 360 is: easy to use, runs smooth, and there are plenty of tutorials for beginners. When creating the case, you start by first designing a rough idea of what you want, then on fusion 360 create a 3d drawing using earlier specifications. Proceeding to create a 3D sketch, extrude to a specified height, next make a sketch of the walls and extruded them to the specified height to fit components, next I used a template for the cut outs for the HDMI, Audio, micro USB and SD card slot. Finally, I added handles to the case.

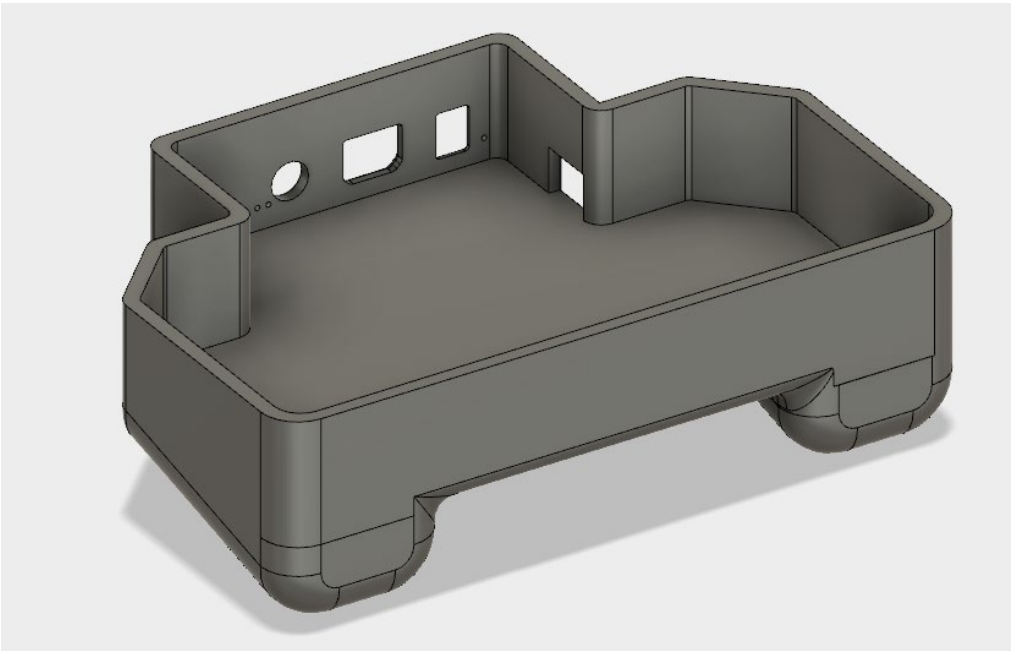


Figure 10 – 3D Fusion Model of Controller Case

3D Printing:

This task is taking the fusion 360 model and converting it to an STL file for printing. When the drawing is converted you take the STL file and upload it to the Maker Bot desktop software. The next step is to make sure the STL file model is the right size, lying flat and centered on the base of the software. After that is complete, set the settings (shown in the figure below) to default with the exception of adding a rift to prevent curling of 3D print. Before printing make sure to replace the tape on the printer base and make sure the base is level with the extruder. Last but not least you are ready to print!

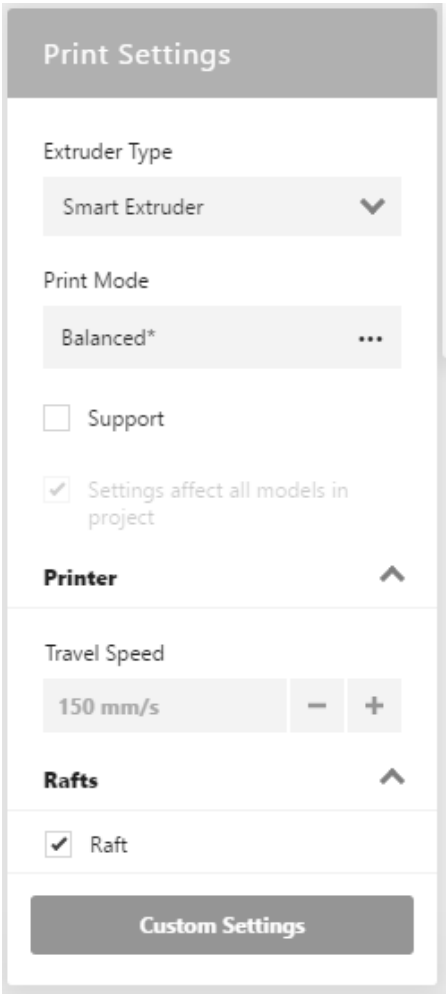


Figure 11 – 3D Printer Settings

Lexan Cover Preparation:

To do this task start with the layout of your buttons and analog stick, next use a digital caliber to measure the center of each button/analog stick (top to center, side to center, bottom to center), after the measurements were completed use the AutoCAD to create a 2D diagram of the Lexan cover. Once that is complete take those measurements and implemented them to a physical piece of Lexan. The

tools used in the process are: jigsaw (cutting out the outline of controller), belt grinder (for polishing edges of Lexan) and a drill press (for precision drilling of holes).

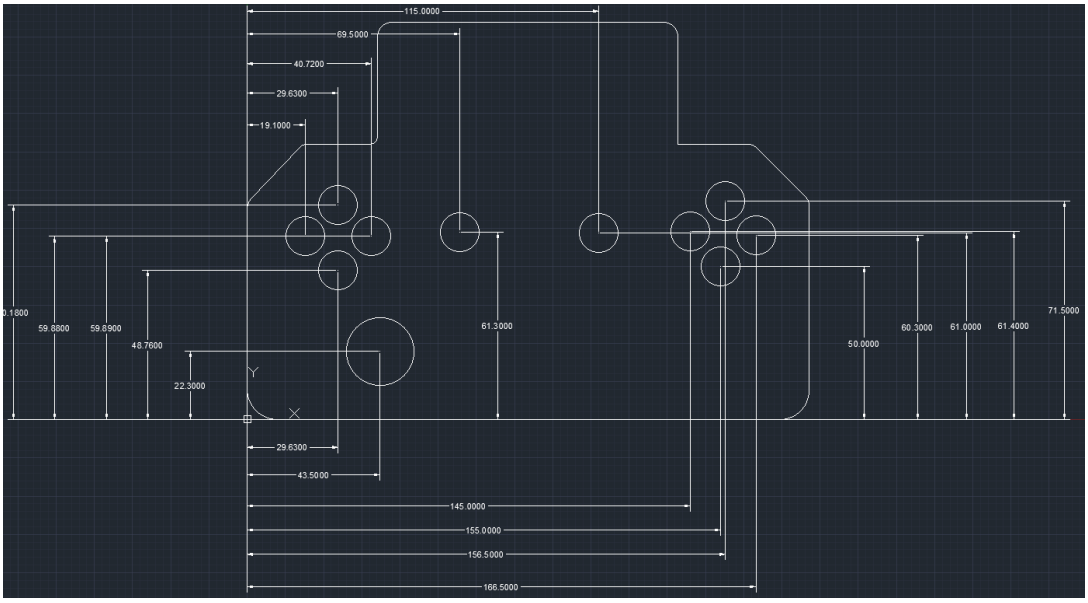


Figure 12 – 2D AutoCAD Drawing of Lexan

Soldering

This is where precision and patience meet. Soldering was the heart and soul of this project. Every wire was well placed and carefully maneuvered into position. Colors were chosen according to their purpose and the perf boards where measured to the millimeter. The final prototype used perf board to mount the buttons and the analog stick.

Figure 10 - Final Prototype Perf Boards

This was no easy task. First, we simply tested the button wiring on the first prototype. We used a Sparkfun break out mini SamD21 to act as a controller for all the inputs. This solved our original lack of pins. While this chip made our project work, there was lots of coding necessary to tame the wild inputs receive from the buttons as well as configuring the ranges for the analog joystick.

Buttons

- The buttons are simple to wire. The datasheets are located in the appendices section. The only difficult part about these is the number of them to solder. Proper wire management is key here.

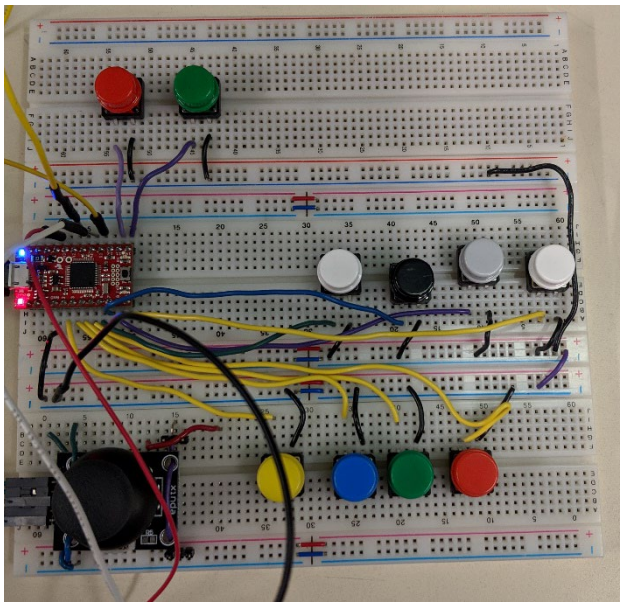


Figure 11 - Prototype one wiring

Analog Stick

- This component is labeled with all the connections necessary (also available in the appendices). Just make sure the orientation is correct before soldering.

Here’s a draft of the wiring. This helped better visualize the connections.

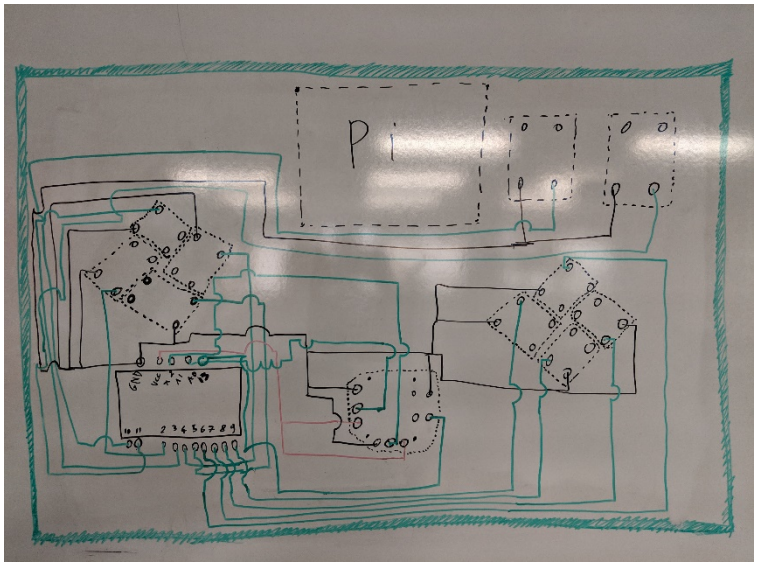


Figure 12 - wiring Draft

Once the layout was understood. The rest was simply doing it. soldering the components to the perfboards like so;

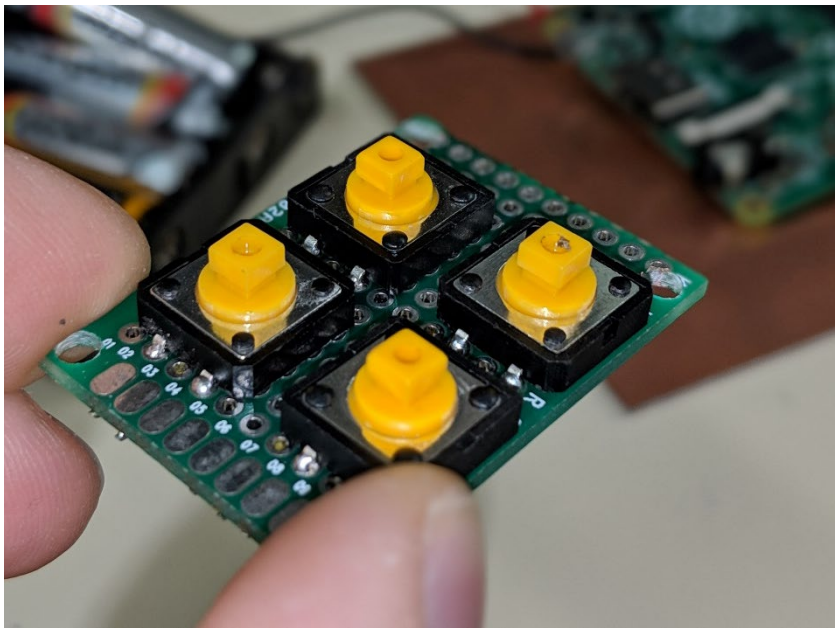


Figure 13 - Buttons Soldered to board

Then, solder the grounds. The route the wires would take was pre-determined to avoid overlapping. The yellow wires are the data.

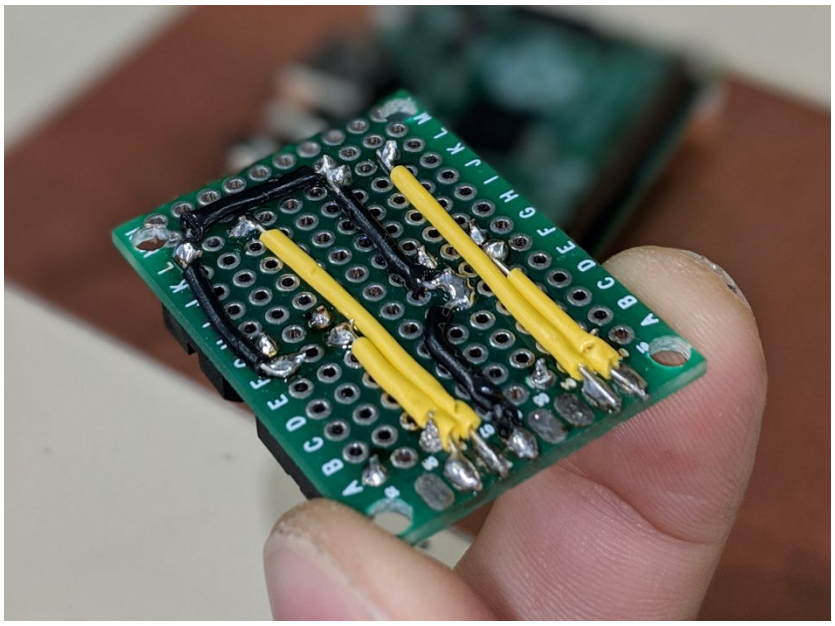


Figure 14 - Underside of buttons board

The SamD21 was also soldered to a perf board and the pins where connected at the bottom like so;

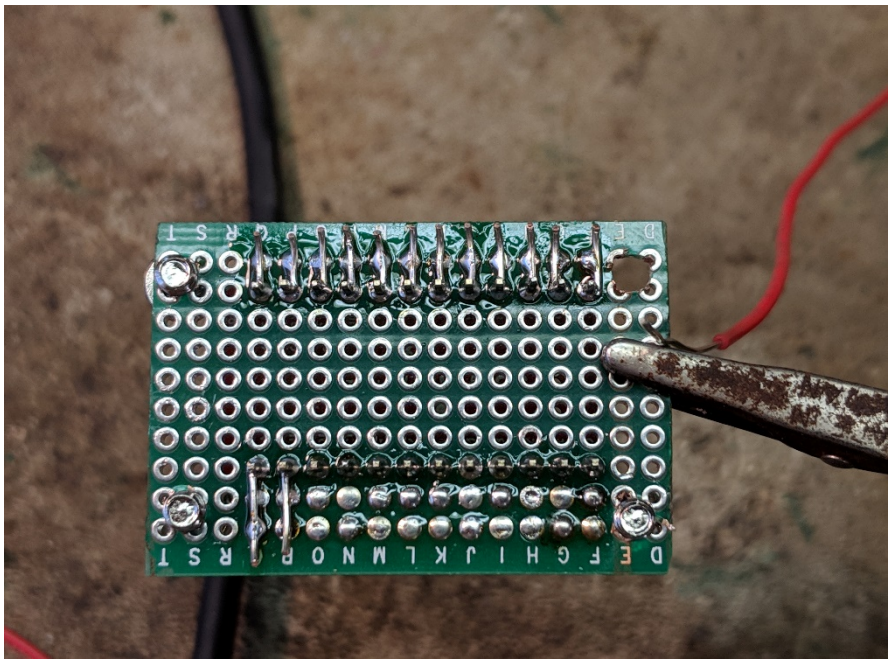


Figure 15 - Underside of Mini breakout board

Use something to hold the perf boards at the right level before connecting the grounds across the boards.

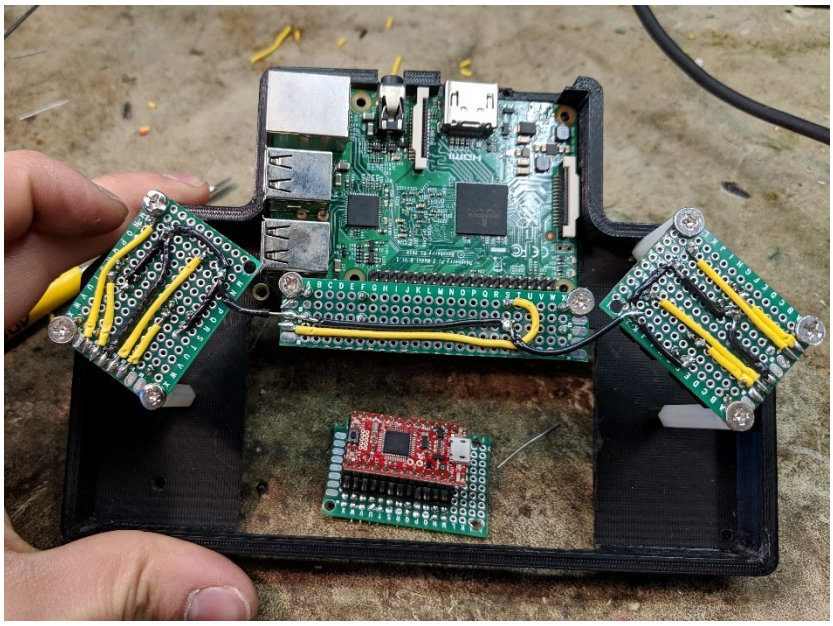


Figure 16 - Buttons wired up

Then wire everything to the breakout board perf board. Make sure to plan where the wires will pass.

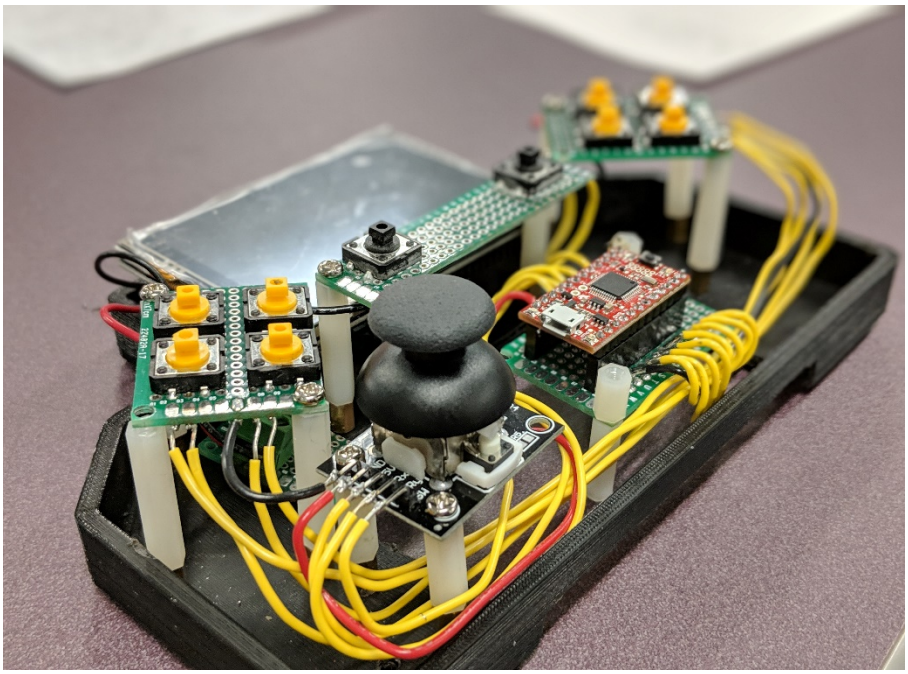


Figure 17 - perf boards wired up

Battery

Next up, the battery had to be connected to the Pi. The battery bank used was a 2500 mAh with a micro USB output and input. To connect the battery to the Pi, we created a DIY micro USB extender with a power switch to turn the Pi on and off.

Figure 18 - Battery and extender switch

Assembly

The final product was difficult to put together. The team put lots of effort to be as precise as possible. We double checked everything. The glass was precision cut and carefully grinded with a Dremel to allow for stiff buttons to pass.

Figure 19 - Cut glass

Notice the controller has two colors. We split the print in two and switched the filament color for effect.

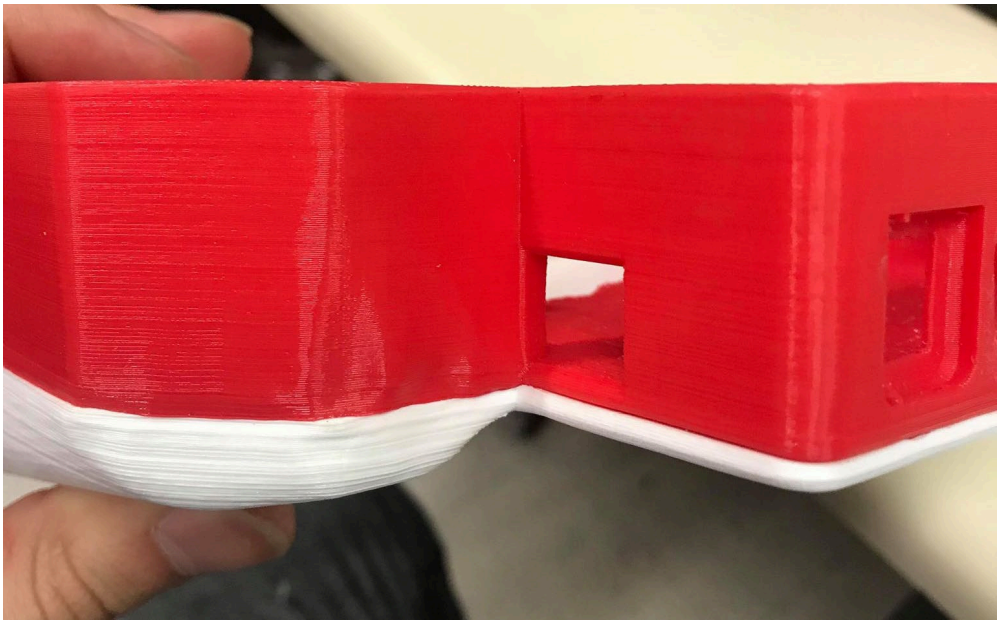


Figure 20 - Controller color split

Plastic headers were cut and drilled into place to hold the perf boards at the appropriate height.

Figure 21 Plastic Header

Conclusion

Overall, the group has had productive project time despite any setbacks due to weather or attendance issues. With group work we need to set more concrete rules for group members so that everyone contributes. The group was able to fully complete the table with the appropriate labels and allowing it to be user friendly for all ages. There is a working product of our portable controller, despite some bugs that we are hoping to resolve in a future prototype. Also, with a future prototype we are hoping to get all the internal parts included on a PCB board. This way we can shrink the controller to a more funtional size for all hands and ages.

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Appendices

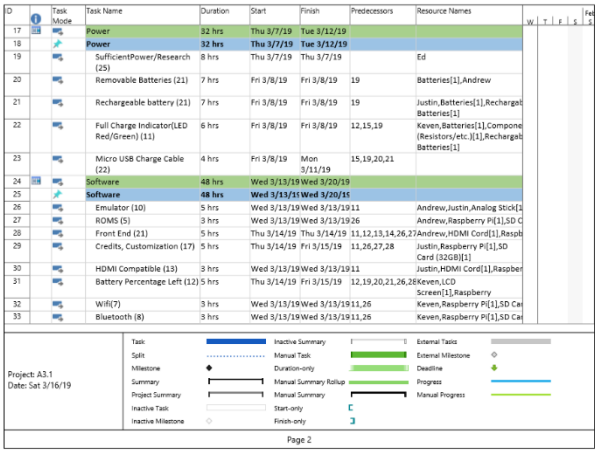
Gantt charts

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		Mini Project	24 hrs	Mon 2/25/19	Wed 2/27/19		
2		**Mini Project**	**17 hrs**	**Mon 2/25/19**	**Wed 2/27/19**		
3		Attach components / Hardware, Install Buttons (7)	6 hrs	Mon 2/25/19	Mon 2/25/19		Ed,Keven
4		Button Config (9)	1 hr	Mon 2/25/19	Mon 2/25/19	3	Andrew,Justin
5		Player Configuration(9)	2 hrs	Tue 2/26/19	Tue 2/26/19	4	Andrew,Justin
6		Audio (8)	2 hrs	Tue 2/26/19	Tue 2/26/19	5	Ed,Keven
7		Install Security Door (7)	2 hrs	Tue 2/26/19	Tue 2/26/19	6	Andrew,Ed,Justin,Keven,Latc (Screwdriver/Drill/Heatgun/S
8		Documentation (13)	4 hrs	Tue 2/26/19	Tue 2/26/19	3,4,5,6	Keven
9		Hardware	33 hrs	Thu 2/28/19	Wed 3/6/19		
10		**Hardware**	**33 hrs**	**Thu 2/28/19**	**Wed 3/6/19**		
11		Research (16)	8 hrs	Thu 2/28/19	Thu 2/28/19		Ed,Justin,Keven,Andrew
12		LCD Screen (Touch?) (29)	7 hrs	Fri 3/1/19	Fri 3/1/19	11	LCD Screen[3],Raspberry Pi[3],SD Card
13		Button Mapping (21)	5 hrs	Fri 3/1/19	Mon 3/4/19	11,12	Bumpers[1],Buttons[1],Justin (Buttons)[1],Triggers[1],LCD
14		Analog Stick Mapping (10)	5 hrs	Fri 3/1/19	Mon 3/4/19	11,12	Analog Stick[1],Ed,LCD Screen[1],Raspberry
15		Wiring/Soldering (18)	5 hrs	Mon 3/4/19	Tue 3/5/19	13,14,16	Analog Stick[1],Breadboard[1
16		Sound/Audio (11)	3 hrs	Fri 3/1/19	Mon 3/4/19	11,12	Ed,LCD Screen[1],Raspberry

Project: A3.1
Date: Sat 3/16/19

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

Page 1



ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
17		Power	32 hrs	Thu 3/7/19	Tue 3/12/19		
18		**Power**	**32 hrs**	**Thu 3/7/19**	**Tue 3/12/19**		
19		SufficientPower/Research (25)	8 hrs	Thu 3/7/19	Thu 3/7/19		Ed
20		Removable Batteries (21)	7 hrs	Fri 3/8/19	Fri 3/8/19	19	Batteries[1],Andrew
21		Rechargeable battery (21)	7 hrs	Fri 3/8/19	Fri 3/8/19	19	Justin,Batteries[1],Rechargeb Batteries[1]
22		Full Charge Indicator(LED Red/Green) (11)	6 hrs	Fri 3/8/19	Fri 3/8/19	12,15,19	Keven,Batteries[1],Compone (Resistors/etc.)[1],Rechargeb Batteries[1]
23		Micro USB Charge Cable (22)	4 hrs	Fri 3/8/19	Mon 3/11/19	15,19,20,21	
24		Software	48 hrs	Wed 3/13/19	Wed 3/20/19		
25		**Software**	**48 hrs**	**Wed 3/13/19**	**Wed 3/20/19**		
26		Emulator (10)	5 hrs	Wed 3/13/19	Wed 3/13/19	11	Andrew,Justin,Analog Stick[1
27		ROMS (5)	3 hrs	Wed 3/13/19	Wed 3/13/19	26	Andrew,Raspberry Pi[1],SD C
28		Front End (21)	5 hrs	Thu 3/14/19	Thu 3/14/19	11,12,13,14,26,27	Andrew,HDMI Cord[1],Raspb
29		Credits, Customization (17)	5 hrs	Thu 3/14/19	Fri 3/15/19	11,26,27,28	Justin,Raspberry Pi[1],SD Card (32GB)[1]
30		HDMI Compatible (13)	3 hrs	Wed 3/13/19	Wed 3/13/19	11	Justin,HDMI Cord[1],Raspber
31		Battery Percentage Left (12)	5 hrs	Thu 3/14/19	Fri 3/15/19	12,19,20,21,26,28	Keven,LCD Screen[1],Raspberry
32		Wifi(7)	3 hrs	Wed 3/13/19	Wed 3/13/19	11,26	Keven,Raspberry Pi[1],SD Ca
33		Bluetooth (8)	3 hrs	Wed 3/13/19	Wed 3/13/19	11,26	Keven,Raspberry Pi[1],SD Ca

Project: A3.1
Date: Sat 3/16/19

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

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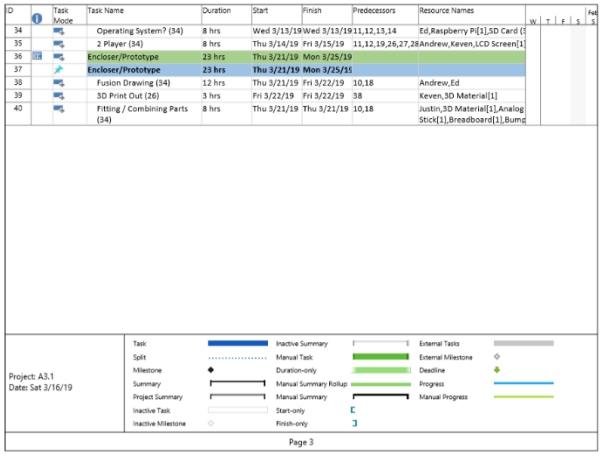

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
34		Operating System? (34)	8 hrs	Wed 3/13/19	Wed 3/13/19	11,12,13,14	Ed,Raspberry Pi[1],SD Card ([
35		2 Player (34)	8 hrs	Thu 3/14/19	Fri 3/15/19	11,12,19,26,27,28	Andrew,Keven,LCD Screen[1]
36		Encloser/Prototype	23 hrs	Thu 3/21/19	Mon 3/25/19		
37		**Encloser/Prototype**	**23 hrs**	**Thu 3/21/19**	**Mon 3/25/19**		
38		Fusion Drawing (34)	12 hrs	Thu 3/21/19	Fri 3/22/19	10,18	Andrew,Ed
39		3D Print Out (26)	3 hrs	Fri 3/22/19	Fri 3/22/19	38	Keven,3D Material[1]
40		Fitting / Combining Parts (34)	8 hrs	Thu 3/21/19	Thu 3/21/19	10,18	Justin,3D Material[1],Analog Stick[1],Breadboard[1],Bumg

Project: A3.1
Date: Sat 3/16/19

Task, Split, Milestone, Summary, Project Summary, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Start-only, Finish-only, External Tasks, External Milestone, Deadline, Progress, Manual Progress

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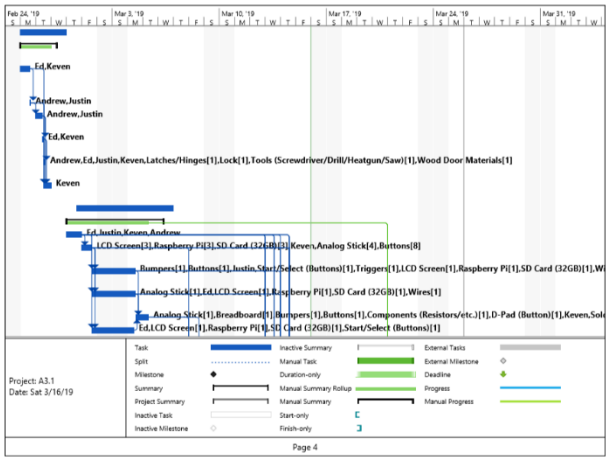
Timeline


Feb 24, '19
Mar 3, '19
Mar 10, '19
Mar 17, '19
Mar 24, '19
Mar 31, '19
Ed,Keven
Andrew,Justin
Andrew,Justin
Ed,Keven
Andrew,Ed,Justin,Keven,Latches/Hinges[1],Lock[1],Tools (Screwdriver/Drill/Heatgun/Saw)[1],Wood Door Materials[1]
Keven
Ed,Justin,Keven,Andrew
LCD Screen[3],Raspberry Pi[3],SD Card (32GB)[3],Keven,Analog Stick[4],Buttons[8]
Bumpers[1],Buttons[1],Justin,Start/Select (Buttons)[1],Triggers[1],LCD Screen[1],Raspberry Pi[1],SD Card (32GB)[1],W
Analog Stick[1],Ed,LCD Screen[1],Raspberry Pi[1],SD Card (32GB)[1],Wires[1]
Analog Stick[1],Breadboard[1],Bumpers[1],Buttons[1],Components (Resistors/etc.)[1],D-Pad (Button)[1],Keven,Sold
Ed,LCD Screen[1],Raspberry Pi[1],SD Card (32GB)[1],Start/Select (Buttons)[1]
Project: A3.1
Date: Sat 3/16/19
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Manual Progress
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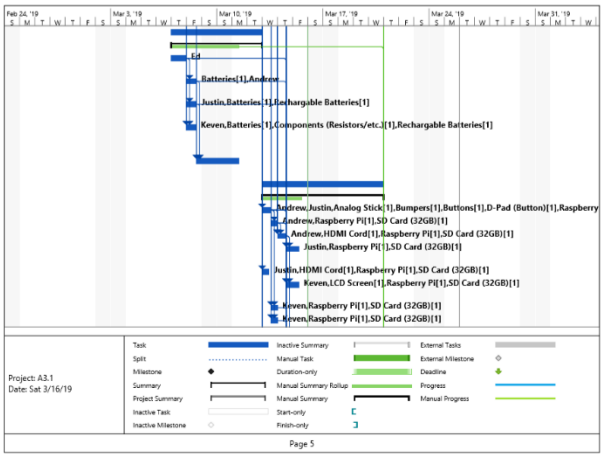
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Ed
Batteries[1],Andrew
Justin,Batteries[1],Rechargable Batteries[1]
Keven,Batteries[1],Components (Resistors/etc.)[1],Rechargable Batteries[1]
Andrew,Justin,Analog Stick[1],Bumpers[1],Buttons[1],D-Pad (Button)[1],Raspberry
Andrew,Raspberry Pi[1],SD Card (32GB)[1]
Andrew,HDMI Cord[1],Raspberry Pi[1],SD Card (32GB)[1]
Justin,Raspberry Pi[1],SD Card (32GB)[1]
Justin,HDMI Cord[1],Raspberry Pi[1],SD Card (32GB)[1]
Keven,LCD Screen[1],Raspberry Pi[1],SD Card (32GB)[1]
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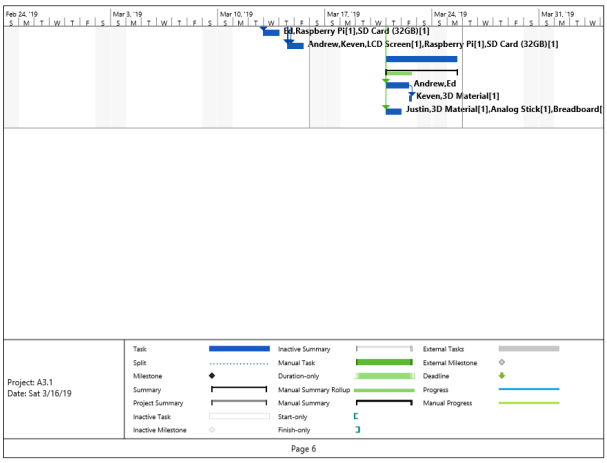
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Ed,Raspberry Pi[1],SD Card (32GB)[1]
Andrew,Keven,LCD Screen[1],Raspberry Pi[1],SD Card (32GB)[1]
Andrew,Ed
Keven,3D Material[1]
Justin,3D Material[1],Analog Stick[1],Breadboard[
Project: A3.1
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Inactive Summary
Manual Task
Duration-only
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Manual Summary
Start-only
Finish-only
External Tasks
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Schematics or wiring diagrams

samples of code

Button Push Code:

```
// If the switch changed, due to noise or pressing:
if (buttonStateA != lastButtonStateA) {
  // reset the debouncing timer
  lastDebounceTimeA = millis();
} else if ((buttonStateA == LOW) && (millis() - lastPressTimeA) > holdTime ) {
   Keyboard.press(90); //Z
   lastPressTimeA = millis();
   delay(0.05);
}
else {
  Keyboard.release(90);
}

if ((millis() - lastDebounceTimeA) > debounceDelay) {
  // whatever the reading is at, it's been there for longer than the debounce
  // delay, so take it as the actual current state:

  // if the button state has changed:
  if (readingA != buttonStateA) {
    buttonStateA = readingA;

    if (buttonStateA == LOW) {
       Keyboard.press(90); //Z

       lastPressTimeA = millis();
       delay(0.05);
    }
    else {
      Keyboard.release(90);
      }
   }
}
lastButtonStateA = buttonStateA;
```

Analog Movement:

```
if ((xValue >= 500 && yValue >= 1000) && (xValue >= 1000 && yValue >= 500)) {
  Keyboard.press(68); //d
  //lastDebounceTime = millis();
}
// Move Down -Y
else if (xValue >= 500 && yValue >= 1000) {
  Keyboard.press(83); //s
  //lastDebounceTime = millis();
}
// Move UpB +Y
else if (xValue >= 0 && yValue <= 10) {
  Keyboard.press(87); //w
  //lastDebounceTime = millis();
}
// Move Left -X
else if (xValue <= 10 && yValue >= 500) {
  Keyboard.press(65); //a
  //lastDebounceTime = millis();
}
// Move Right +X
else if (xValue >= 1000 && yValue >= 500) {
  Keyboard.press(68); //d
  //lastDebounceTime = millis();
//}
}
// To The Top Left Corner
else if ((xValue >= 0 && yValue <= 10) && (xValue <= 10 && yValue >= 500)) {
  Keyboard.press(65); //a
  //lastDebounceTime = millis();
}
// To The Bottom Left Corner
else if ((xValue >= 500 && yValue >= 1000) && (xValue <= 10 && yValue >= 500)) {
  Keyboard.press(65); //a
  //lastDebounceTime = millis();
```

Component specifications

Buttons:

Datasheet: https://www.mouser.ca/datasheet/2/140/TL1100-345914.pdf

Amazon: https://www.amazon.ca/Generic-Tactile-Button-Switch-Momentary/dp/B01G36GRO2/ref=sr_1_37?keywords=tact+tactile+push+buttons&qid=1554986433&s=gateway&sr=8-37

Analog stick:

Datasheet: http://www.energiazero.org/arduino_sensori/joystick_module.pdf

Amazon: https://www.amazon.ca/Davitu-Connectors-Joystick-Breakout-Controller/dp/B07L4NWFSC/ref=sr_1_60?keywords=analog+joystick+board&qid=1554986873&s=gateway&sr=8-60

Raspberry Pi 3 B:

Datasheet: https://www.terraelectronica.ru/pdf/show?pdf_file=%252Fds%252Fpdf%252FT%252FTechicRP3.pdf

Amazon: https://www.amazon.ca/s?k=raspberry+pi+3+b&crid=12NOVB5O9CG9L&sprefix=ras%2Caps%2C152&ref=nb_sb_noss_1

Raspberry Pi A+:

Datasheet: https://static.chipdip.ru/lib/552/DOC001552168.pdf

Amazon: https://www.amazon.com/Raspberry-Pi-512MB-2016-Model/dp/B01MA1CQT7

MHS Series Display (LCD):

http://www.kumantech.com/kuman-35quot-320480-tft-lcd-display-with-case-for-raspberry-pi-pi-2-pi-3-model-b-sc11_p0162.html

SparkFun SAMD21G mini breakout:

Data Sheet: https://cdn.sparkfun.com/datasheets/Dev/Arduino/Boards/Atmel-42181-SAM-D21_Datasheet.pdf

Sparkfun: https://www.sparkfun.com/products/13664

Wire:

Amazon:
https://www.amazon.ca/dp/B075LX9K3Z/ref=sspa_dk_detail_5?psc=1&pd_rd_i=B075LX9K3Z

Perf Board:

Amazon: https://www.amazon.ca/Prototype-Universal-Printed-Soldering-Electronic/dp/B07JMWPSHR/ref=sr_1_17?keywords=perf+board&qid=1554988341&s=industrial&sr=1-17

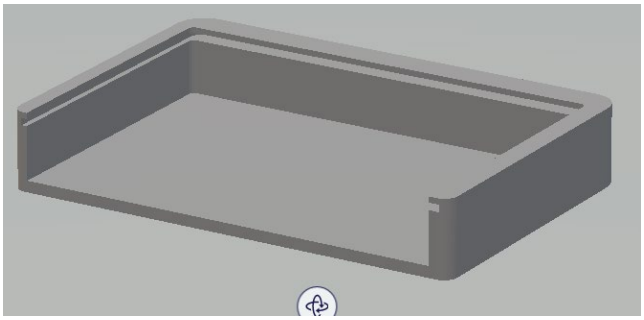
Battery:

Best buy: https://www.bestbuy.ca/en-ca/product/insignia-8000mah-portable-power-bank-ns-mb8002-c-black/11467784.aspx?

CAD drawings

We used Autodesk fusion 360 to create our 3-d models of the controller shell for our project. We had to split our model into two pieces due to some 3-d printer issues involving multiple errors including extruder error, heating error, filament jam and slips.

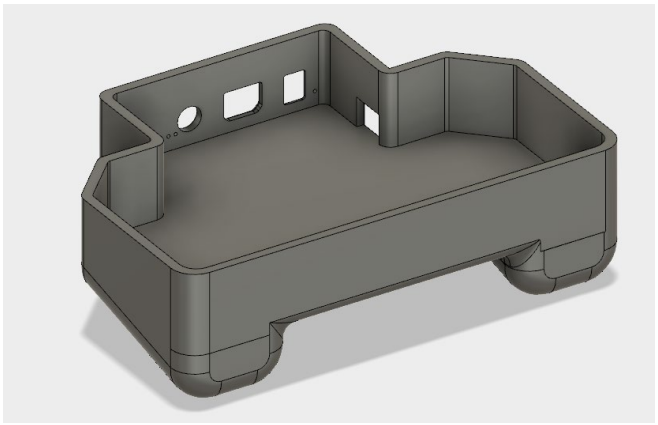
Prototype 2:



This figure shows the model for our second prototype case.

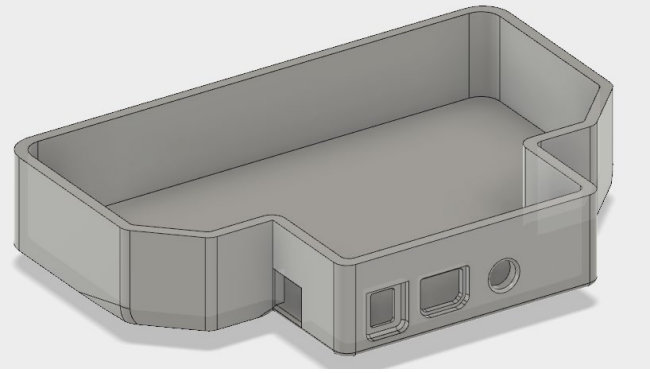
Prototype 3:

Controller:



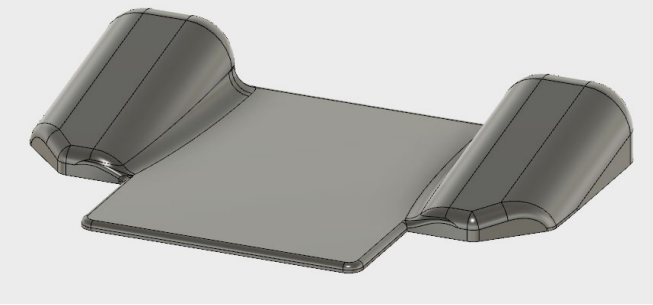
This figure shows the CADD drawing for prototype 3 of our senior project

Controller Top:



This figure shows top portion of the controller.

Controller Bottom:



This figure shows bottom portion of the controller.

Team Charter

Team Purpose:

This team is to work together to get a working prototype of our portable emulator controller.

Duration and Time Commitment:

The group has agreed to work from 8:30am to 12:30pm Monday-Friday in order to foresee the completion of this project.

Scope

The work that occurs during the four hours on Monday till Fridays are all in scope. Any work outside of those times will be documented as agreed upon.

Members

Ed Thompson – Team Leader

Andrew Parisee

Justin Smith

Keven Ayoub

Preliminary Investigation

	Title	Link
1	Google	www.google.ca
2	YouTube	www.youtube.com
3	Easyget Arcade Setup for Retropie	https://www.youtube.com/watch?v=RDJJ0MJ8mbw
7	RetroPie: Build your own Raspberry Pi retro gaming rid	https://howchoo.com/g/n2qyzdk5zdm/build-your-own-raspberry-pi-retro-gaming-rig
8	Top 6 Mistakes Investors Make	https://www.entrepreneur.com/article/159560
9	Noob trying to first time navigate File Manager to delete. _ files	https://retropie.org.uk/forum/topic/9533/noob-trying-to-first-time-navigate-file-manager-to-delete-_-files
10	Installing RetroPie ROMs Through a USB Drive	https://www.instructables.com/id/Installing-RetroPie-ROMs-Through-a-USB-Drive/
11	Transferring Roms	https://github.com/retropie/retropie-setup/wki/Transferring-Roms
12	Raspberry-Pi-Essential-Training	https://www.lynda.com/Raspberry-Pi-tutorials/Raspberry-Pi-Essential-Training/667376-2.html
13	Customize RetroPie Themes	https://github.com/retropie/retropie-setup/wiki/themes
14	How to Configure Retropie on Raspberry Pi and Play Games Without Hassle	https://www.maketecheasier.com/configure-retropie-raspberry-pi/
15	lynda.com	https://www.lynda.com/
17	RetroPie: Enable SSH and How to Use WinSCP	https://www.youtube.com/watch?v=fsRkTlv5rxw
18	Retropie command line setup	https://github.com/RetroPie/RetroPie-Setup/wiki/SSH
19	42 OF THE MOST USEFUL RASPBERRY PI COMMANDS	http://www.circuitbasics.com/useful-raspberry-pi-commands/
20	Don't Fear The Command Line: Raspbian Linux Shell Commands and Tools – Part 1	https://retroresolution.com/2015/12/06/dont-fear-the-command-line-raspbian-linux-shell-commands-and-tools-part-1/
21	Making a USB Game Controller	https://www.instructables.com/id/Making-a-USB-Game-Controller/

22	Construct Your Own Custom Video Game Controller	https://makezine.com/2018/03/15/custom-video-game-controller/
23	Build a video game controller	https://diy.org/skills/hardwarehacker/challenges/199/build-a-video-game-controller
24	joy-controller	https://learn.adafruit.com/joy-controller-feather/slide-switch
25	DIY game controller from scratch	https://www.element14.com/community/thread/62131/l/diy-game-controller-from-scratch?displayFullThread=true
26	Creating your own USB Cables	https://www.instructables.com/id/Creating-you-own-USB-cables/
27	how to make a controller for retro pi using tackt switches?	https://www.raspberrypi.org/forums/viewtopic.php?t=144365
28	arcade-bonnet-controller	https://learn.adafruit.com/arcade-bonnet-controller/button-wiring
29	How to build a Raspberry Pi retrogaming emulation console	https://www.pcworld.com/article/3190347/gaming/how-to-build-a-raspberry-pi-retrogaming-emulation-console.html
30	HifiBerry Amp+	https://www.hifiberry.com/products/ampplus/
31	Gamepad Controlled Raspberry Pi Using Qjoypad	https://www.instructables.com/id/Gamepad-Controlled-Raspberry-Pi-Using-Qjoypad/
32	joystick/pcb_wiring	https://www.slagcoin.com/joystick/pcb_wiring.html
33	PS3 Controller	https://github.com/RetroPie/RetroPie-Setup/wiki/PS3-Controller
34	Xbox faceplate	https://www.thingiverse.com/thing:599035
35	How to Install 3.5 Inch LCD on Raspberry Pi - Super Easy Way (In 3 Minutes)	https://www.youtube.com/watch?v=Fj3wq98pd20
36	Xbox One Controller Backplate	https://www.thingiverse.com/thing:645201
37	Game Controller Modeling with Fusion 360	https://www.youtube.com/watch?v=5baSrV898MI
38	Game Controller - Part 1 of 3	https://www.youtube.com/watch?v=YO_MxA5jV4o
39	Game Controller Button Details - Part 2 of 3	https://www.youtube.com/watch?v=2hROFUWmitg

40	Game Controller Analysis of surface - part 3 of 3	https://www.youtube.com/watch?v=L8F2r1KZ3uM

Project Idea:
Connecting an LCD to a raspberry pi
Add more buttons to the cocktail arcade machine
Test analog sticks for controllers to work with the raspberry pi
Test to see how many buttons and analog sticks work with the pi
See how games run on the pi
Get two players working on the cocktail table
Get the wifi working on the cocktail table
Shrink the cocktail table to half its size
Shrink the half table to twice the size of our end product controller
Secure the Pi
Document everything
Create an instructional documentation for retroPie

Entrepreneurship and service learning:
instructables.com
kickstarter.com
https://www.entrepreneur.com/

Journals

Andrew's Work Journal

Student Name: Andrew Parisee
Date: Thursday, Mar. 14, 2019

Work Scheduled for Today

- Catch up from absent days of work.
- Research the SAMD21 Mini Breakout Chip.
- Program SAMD21 Mini Breakout Chip with Arduino coding to emulate a USB keyboard.
- Image the second Raspberry Pi with the RetroPie software for game emulation.
- Prepared demo for scrum meeting with the class.

Work Completed

- Caught up with the team and found out what I missed in the 3 days I was out sick.
- Attempted to find resources on the SAMD21 Mini Breakout.
- Image installed on to the micro-SD card with RetroPie for the second Raspberry Pi.
- Prepared a demo to demonstrate at the 11:30am Scrum meeting.

Work Comments and Results

- Did not take a lot of time to catch up from the absent days.
- The Spark fun website with the information on the SAMD21 was unresponsive and would not give us any information.
- In order to code the Mini Breakout, we found that you must install the board drivers with a given web link. The process should be followed as such:
    - Google - sparkfun samd21 mini breakout setting up Arduino
    - Get information on the mini breakout at: (https://learn.sparkfun.com/tutorials/samd21-minidev-breakout.../setting-up-arduino)
    - Copy the link below and paste it into “Additional Boards Manager URLs: in the Arduino Preferences section: (https://raw.githubusercontent.com/sparkfun/Arduino_Boards/master/IDE_Board_Manager/package_sparkfun_index.json)
    - Reload Arduino and load the board manager.
    - Search for “samd”.
    - Install Sparkfun SAMD boards.
- Pi imaged successfully with no errors.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Begin coding for the button sequences and attempt to get analog movement working.
- Test!

Student Name: Andrew Parisee
Date: Friday, Mar. 15, 2019

Work Scheduled for Today

- Continue research on the SAMD21 Mini Breakout chip.
- Begin coding the digital button presses to work from the Mini Breakout chip.
- Digital pins 2-13 are set as different keyboard presses.

- Test using notepad on the Windows machine.
- Test key presses with the Raspberry Pi.

Work Completed

- Continued researching the Mini Breakout.
- Began coding the Arduino coding for digital button presses.
- Digital pins 2-13 were assigned different keys.
- Tested button presses as keyboard writes on the Notepad.
- Tested using button presses with the Pi.

Work Comments and Results

- The Spark fun sites were responsive today, so information was easier to obtain than it was from the previous work day.
- Simple coding set up to test that button presses would work as key presses.
    - "Keyboard.write('A');"
    - "Keyboard.release('A');"
- Each pin was assigned a different key with ease.
- Button presses are detected within the notepad as expected!
- Button presses are not detected on the Raspberry Pi! More work needed.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Research into "Keyboard.writes" and why the Raspberry Pi may not detect them as keyboard presses.
- Begin coding and testing the analog joystick for movement.

Student Name: Andrew Parisee
Date: Saturday, Mar. 16, 2019

Work Scheduled for Today

- Research analog joysticks being used in Arduino.
- Develop coding to isolate different movements on the analog as certain key presses.
- Repaired the logic for buttons presses in order to operate more efficiently.
- Test analog joysticks on Notepad within the Windows machine.
- Test button presses and analog joystick movement on the Raspberry Pi.

Work Completed

- Found lots of information on analog joysticks being used in Arduino for different purposes.
- Adjusted the coding for digital presses in order to be detected on the Pi and work more efficiently.
- Developed coding to isolate different movements on the analog as certain key presses.

- Tested digital button presses and analog joysticks movement on Notepad.
- Tested digital button presses and analog joysticks movement on the Raspberry Pi.

Work Comments and Results

- There was a wide variety of information on using analog joysticks in Arduino! There was especially lots of information on isolating the different directions the analog would be moved within.
    - X+ direction: (analogJoystickX >= 1000 && analogJoystickY >= 500)
    - X- direction: (analogJoystickX <= 10 && analogJoystickY >= 500)
    - Y+ direction: (analogJoystickX >= 0 && analogJoystickY <= 10)
    - Y- direction: (analogJoystickX >= 500 && analogJoystickY >= 1000)
- Adjusted the button press coding from “Keyboard.write()” to “Keyboard.press()” and allowed for a good time before releasing the key. The “keyboard.write” function would act as a press and a release when I want to control when the key is released.
- Coding the analog movements was much simpler than anticipated, there still needs to be an adjustment in the logic of the coding but it works as needed.
- Testing works for both the notepad and the Raspberry Pi.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Fix the issue for the analog when being pushed in each corner it prints both up and right instead of the desired right press.
- Design a front end for the RetroPie.

Student Name: Andrew Parisee
Date: Thursday, Mar. 14, 2019

Work Scheduled for Today

- Catch up from absent days of work.
- Research the SAMD21 Mini Breakout Chip.
- Program SAMD21 Mini Breakout Chip with Arduino coding to emulate a USB keyboard.
- Image the second Raspberry Pi with the RetroPie software for game emulation.
- Prepared demo for scrum meeting with the class.

Work Completed

- Caught up with the team and found out what I missed in the 3 days I was out sick.
- Attempted to find resources on the SAMD21 Mini Breakout.
- Image installed on to the micro-SD card with RetroPie for the second Raspberry Pi.
- Prepared a demo to demonstrate at the 11:30am Scrum meeting.

Work Comments and Results

- Did not take a lot of time to catch up from the absent days.

- The Spark fun website with the information on the SAMD21 was unresponsive and would not give us any information.
- In order to code the Mini Breakout, we found that you must install the board drivers with a given web link. The process should be followed as such:
    - Google - sparkfun samd21 mini breakout setting up Arduino
    - Get information on the mini breakout at: (https://learn.sparkfun.com/tutorials/samd21-minidev-breakout.../setting-up-arduino)
    - Copy the link below and paste it into "Additional Boards Manager URLs: in the Arduino Preferences section: (https://raw.githubusercontent.com/sparkfun/Arduino_Boards/master/IDE_Board_Manager/package_sparkfun_index.json)
    - Reload Arduino and load the board manager.
    - Search for "samd".
    - Install Sparkfun SAMD boards.
- Pi imaged successfully with no errors.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Begin coding for the button sequences and attempt to get analog movement working.
- Test!

Student Name: Andrew Parisee
Date: Friday, Mar. 15, 2019

Work Scheduled for Today

- Continue research on the SAMD21 Mini Breakout chip.
- Begin coding the digital button presses to work from the Mini Breakout chip.
- Digital pins 2-13 are set as different keyboard presses.
- Test using notepad on the Windows machine.
- Test key presses with the Raspberry Pi.

Work Completed

- Continued researching the Mini Breakout.
- Began coding the Arduino coding for digital button presses.
- Digital pins 2-13 were assigned different keys.
- Tested button presses as keyboard writes on the Notepad.
- Tested using button presses with the Pi.

Work Comments and Results

- The Spark fun sites were responsive today, so information was easier to obtain than it was from the previous work day.

- Simple coding set up to test that button presses would work as key presses.
    - “Keyboard.write(‘A’);”
    - “Keyboard.release(‘A’);”
- Each pin was assigned a different key with ease.
- Button presses are detected within the notepad as expected!
- Button presses are not detected on the Raspberry Pi! More work needed.

Work Scheduled for Tomorrow
- Continue to assist group members with tasks as needed.
- Research into “Keyboard.writes” and why the Raspberry Pi may not detect them as keyboard presses.
- Begin coding and testing the analog joystick for movement.

Student Name: Andrew Parisee
Date: Saturday, Mar. 16, 2019

Work Scheduled for Today
- Research analog joysticks being used in Arduino.
- Develop coding to isolate different movements on the analog as certain key presses.
- Repaired the logic for buttons presses in order to operate more efficiently.
- Test analog joysticks on Notepad within the Windows machine.
- Test button presses and analog joystick movement on the Raspberry Pi.

Work Completed
- Found lots of information on analog joysticks being used in Arduino for different purposes.
- Adjusted the coding for digital presses in order to be detected on the Pi and work more efficiently.
- Developed coding to isolate different movements on the analog as certain key presses.
- Tested digital button presses and analog joysticks movement on Notepad.
- Tested digital button presses and analog joysticks movement on the Raspberry Pi.

Work Comments and Results
- There was a wide variety of information on using analog joysticks in Arduino! There was especially lots of information on isolating the different directions the analog would be moved within.
    - X+ direction: (analogJoystickX >= 1000 && analogJoystickY >= 500)
    - X- direction: (analogJoystickX <= 10 && analogJoystickY >= 500)
    - Y+ direction: (analogJoystickX >= 0 && analogJoystickY <= 10)
    - Y- direction: (analogJoystickX >= 500 && analogJoystickY >= 1000)
- Adjusted the button press coding from “Keyboard.write()” to “Keyboard.press()” and allowed for a good time before releasing the key. The “keyboard.write” function would act as a press and a release when I want to control when the key is released.

- Coding the analog movements was much simpler than anticipated, there still needs to be an adjustment in the logic of the coding but it works as needed.
- Testing works for both the notepad and the Raspberry Pi.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Fix the issue for the analog when being pushed in each corner it prints both up and right instead of the desired right press.
- Design a front end for the RetroPie.

Student Name: Andrew Parisee
Date: Monday, Mar. 18, 2019

Work Scheduled for Today

- Fix the analog issue encountered with the corners of the joystick.
- Enable root access on the Raspberry Pi for easier access/manipulation of the file system.
- Flip the screen rotation on the Raspberry Pi so the HDMI output is on the front side of the Pi.
- Add ROMs to the emulator.

Work Completed

- The analog issue encountered when moving to the corners on the analog stick was repaired.
- SSH was enabled to access the Raspberry Pi file system remotely.
- Root access was given on the Raspberry Pi to manipulate the file system with ease.
- The screen was rotated in order to have the HDMI output on the front.
- ROMs were added to the emulator for gameplay.

Work Comments and Results

- The analog coding was adjusted to encounter movement with certain direction.
- Enabling SSH within Raspi-Config:
    - Access Raspi-Config in RetroPie.
    - Move down to and Select “5. Interfacing Options”.
    - Move down to and Select “P2 SSH”.
    - There will be a prompt asking if you would like the SSH server to be enabled, press enter on “<Yes>”.
- Root access was given using root account:
    - Open file **sshd_config** located in **etc/ssh**:
      sudo `nano /etc/ssh/sshd_config`
        - Find line:
          PermitRootLogin **without-password**
        - Comment it out (or delete) it and replace with:
          PermitRootLogin **yes**

        - Save changes (CTRL + X)
    - Set **root** password:
      sudo `passwd root`
    - Reboot your Raspberry Pi
- Screen rotation on the Raspberry Pi was flipped by:
    - Start by editing the config.txt file ether via the sd or with:

      sudo nano /boot/config.txt

    - Add one of the following lines to the bottom of the file:

      display_rotate=2
    - Save the file by using CTRL-X, Y then ENTER.
- Added ROMS through ethernet
    - Typed into the file explorer:
      \\RETROPIE
- Added ROMS through the Ethernet on the Raspberry Pi:
    - This can be done by typing "\\RETROPIE" in the File Explorer on Windows.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Test the digital button presses and analog movements within the games on the emulator.
- Edit the keyboard configuration on the RetroPie front end to work with the buttons and analog joystick.

Student Name: Andrew Parisee
Date: Wednesday, Mar. 20, 2019

Work Scheduled for Today

- Test the analog joystick and digital buttons within the games on the RetroPie.
- Edit the keyboard configuration in order to use the digital buttons and analog joystick on the front end of the Raspberry Pi.
- Fix the screen issue encountered last week. When the HDMI is used to output to a second display the entire screen is flipped instead of just flipping the mini screen on the Raspberry Pi.

Work Completed

- Tested the analog and digital buttons within the games. There are slight issues with movement and button presses. There is not an allowance for movement while buttons are pressed.
- Keyboard configuration on the front end was deleted and entered again:
    - Plug a keyboard into your Pi and hit F4. You should be presented with a command line.
    - Type in: "rm /home/pi/.emulationstation/es_input.cfg".
    - Hit enter followed by: "emulationstation".

    - Hit enter again and you should be able to configure your controller again.
- Repaired the screen issue with the HDMI output:
    - Press F4 and you will be presented with the command line.
    - Enter “sudo nano /boot/config.txt”.
    - Remove the following line from the file “display_rotate=2”.
    - if it is LCD 3.5”, then find line “dtoverlay=tft35a” and add rotate parameter value as format following: “dtoverlay=tft35a:rotate=270”.

Work Comments and Results

- The analog joysticks and the digital button presses did not work as planned in the games. The button latency and debounce need to be considered in order to improve the functionality of each button.
- The keyboard configuration was a simple fix and works as expected!
- Finding the screen rotation so it only rotates on the mini screen took a bit of searching although it was successfully completed and works as needed.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Edit the Arduino code to function with the emulator and games more efficiently.
- Configure the exit buttons within the ROMs to work as the select button.

Student Name: Andrew Parisee
Date: Thursday, Mar. 21, 2019

Work Scheduled for Today

- Revised the Arduino code for the Retropie emulator to work better with delays and keyboard debouncing.
- Configured the select button as the ESC key in order to exit games.
- Each key was assigned to a specific key as designed for the games.

Work Completed

- The code was revised in an attempt to function better within games.
- The select button was set to the ESC key.
- Each pin was given certain keys to meet the game set up.

Work Comments and Results

- Code revision includes debouncing and appropriate delays of key releases.
- The select button was simple to set as the ESC key.
- The pin layout is as follows:
    - “buttonpinA = 2;”.
    - “buttonpinB = 3;”.
    - “buttonpinX = 4;”.
    - “buttonpinY = 5;”.
    - “buttonpinUP = 6;”.

- “buttonpinDOWN = 7;”.
- “buttonpinLEFT = 8;”.
- “buttonpinRIGHT = 9;”.
- “buttonpinSTART = 10;”.
- “buttonpinSELECT= 11;”.
- “joyStickButton = 13;”.
- “analogJoystickX = A0;”.
- “analogJoystickY = A1;”.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Controller configuration adjusted to work with final keys assigned to the pins listed above.
- Increase the font size on the front end to give a more appealing visual display.
- Front end customization for our Portable Controller layout.

Student Name: Andrew Parisee
Date: Saturday, Mar. 23, 2019

Work Scheduled for Today

- Change the controller configuration to work as the new keys assigned to the pins on the SAMD21 Mini Breakout chip.
- Increase the font size on the RetroPie front end.
- Customized the front end of the RetroPie to suit our Portable Controller emulator needs.

Work Completed

- Changed the controller configuration to work as the new keys assigned to the pins on the SAMD21 Mini Breakout chip.
- Increased the font size on the RetroPie front end.
- Customized the front end of the RetroPie.

Work Comments and Results

- The controller configuration was simple to adjust to the SAMD21 Mini Breakout chip.
- To increase the font size, you need to edit the XML file in the following directory:
  - Directory: /etc/emulationstation/themes/carbon/carbon.xml
  - The fontsize was changed from 0.03 to 0.08.
- The front end was changed in the following directory:
  - Directory: /etc/emulationstation/themes/carbon/arcade/

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Revise the Arduino code as needed to work better with games and the front end.

- Help prepare the battery in the 3D print model.
- Set up each Raspberry Pi with the customized files.

Student Name: Andrew Parisee
Date: Tuesday, Mar. 26, 2019

Work Scheduled for Today

- Revision of Arduino coding.
- Assist in preparation of the battery for the case.
- Customize the Arduino image on every SD card.
- Change the resolution output from the HDMI in /boot/config.txt
- Add lines to retroarch configuration.

Work Completed

- Arduino coding revised and tested with the raspberry pi.
- Assisted in preparation of the battery for the case.
- Customized the Arduino image on every SD card.
- Changed the resolution output from the HDMI in /boot/config.txt
- Added lines to retroarch configuration.

Work Comments and Results

- The code revision still needs some work in order to function with the retropie games better.
- Assisted with installing the battery compartment by grinding the edges of the cut-out for the battery in the prototype.
- Each image on the raspberry pi's were updated with ease.
- The resolution was altered in the config.txt in the boot directory.
    - Directory: /boot/config.txt
    - "framebuffer_width=1280 -> 640"
    - "framebuffer height=720 -> 480"
- Configured the escape button for retroarch in order for then button selection to work as the escape key.
    - Directory: /opt/retropie/configs/arcade/retroarch.cfg
    - "input_enable = "escape"".
    - "input_exit_emulator = "escape"".
    -

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Altering the button logic for the ABXY keys and the D-Pad buttons.

- Remapping the buttons on the second prototype due to incorrect soldering of certain pins from the buttons to the SAMD21 Mini Breakout chip.

Student Name: Andrew Parisee
Date: Wednesday, Mar. 27, 2019

Work Scheduled for Today

- Altering the button logic for the ABXY keys and the D-Pad buttons.
- Remapping the buttons on the second prototype due to incorrect soldering of certain pins from the buttons to the SAMD21 Mini Breakout chip.

Work Completed

- Altered the button logic for the ABXY keys and the D-Pad buttons.
- Remapped the button layout for the second prototype.

Work Comments and Results

- The work this day was not quite productive due to environmental distractions such as people hanging around us that are not in our group.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Adjusting the hold time for the running button as well as the jumping button.

Student Name: Andrew Parisee
Date: Thursday, Mar. 28, 2019

Work Scheduled for Today

- Adjusting the hold time for the running button as well as the jumping button. These buttons are assigned in games as keys A and B.
- Testing the button timing on the sample games like GNG and Super Mario.
- Measuring the distance for the button layout in order to have the Lexan glass cut for the third prototype.

Work Completed

- The hold time for the running as well as the jumping button were set to:
    - holdTime = 10;
    - holdJump = 7;
    - runtime = 0.05;
- In order to adjust the button timing the debounceDelay was increased to 25.
    - debounceDelay = 25;
- The button layout measurements were recorded and taken by Edward to get the Lexan cut for prototype 3.

Work Comments and Results

- Some issues with the hold time were encountered when playing different games. For Super Mario it needed to be lowered in order to allow for the player to jump high as they hold the button.
- The run time needed to be set even lower to allow for the running to be at optimum speed when being held.
- Measuring the button layout was made much easier when we were given the calipers to measure as precisely as possible.

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Button holes need to be drilled into the Lexan glass.
- Button testing must be done before the Tech showcase in order to be sure there are no unknown errors that arise.

Student Name: Andrew Parisee
Date: Monday, Apr. 01, 2019

Work Scheduled for Today

- Assist in drilling the Lexan glass for the cover of the portable controller.
- Much more button testing for the Raspberry Pi. The analog joystick was not sending key presses properly so the character would not move when the user selected different directions.
- Making sure that the user can press the D-Pad buttons while pressing other buttons.

Work Completed

- Assisted in drilling the Lexan glass for the cover of the portable controller.
- Much more button testing for the Raspberry Pi was attempted on the digital buttons as well as the analog joystick in order to make sure everything was working as it was on the second prototype.

Work Comments and Results

- Drilling the holes for the Lexan glass was not a simple task. Justin, Ed and I were moving it around all around the drill before Ed drilled the holes.
- The button logic seems to be working as needed for the Tech showcase at the Ivany campus on Thursday!

Work Scheduled for Tomorrow

- Continue to assist group members with tasks as needed.
- Attempt to get HDMI output working on any monitor as opposed to only working with certain ones encountered in the lab.
- Test the battery life of the Raspberry Pi to be sure it will have a strong life.

Student Name: Andrew Parisee
Date: Wednesday, Apr. 03, 2019

Work Scheduled for Today

- Attempt to get HDMI output working on any monitor as opposed to only working with certain ones encountered in the lab.
- Test the battery life of the Raspberry Pi to be sure it will have a strong life.
- Repair the images on the first and second raspberry pi prototypes. Repairs needed due to power loss when the school lost power.

Work Completed

- HDMI output was given numerous different values but still only seem to work on the 24" Dell monitors in the lab.
- The battery life was tested while sitting on the front screen and left in games.
- The images on the two raspberry pi's were restored to their original setup before power loss.

Work Comments and Results

- The HDMI output requires more research in order to work with various screens as opposed to the current few we have encountered working.
- The battery lasts for about 5 hours until it loses power.
- Images were quickly restored to the Raspberry Pi's due to backing up data.

Work Scheduled for Tomorrow

- Attend and present final working product at the NSCC Ivany Campus Tech Showcase!

Keven's Work Journal

Date: Wednesday, Mar. 13, 2019

Status Report 1

Work Scheduled for Today

- Research Joystick methods of connection to the Pi
- Test joystick

Work Completed

- Research Joystick methods of connection to the Pi
- Connect joystick to Arduino and analyzed the range (0 – 512 - 1024)
- Connected joystick to a LED

Work Comments and Results

- Andrew is sick
- Brian gave us many options for connecting the joystick to the Pi. They are not easy though
- Realized that we chose to use an analog joystick which is harder to configure to work with retro pie
- Lots of research needs to be done on analog joystick.
- I've been away from class for 2 days. Needed to catch up
- Had a meeting with Brian
- Got called up to meet the principal

Work Scheduled for Tomorrow

- Analog stick testing
- Research analog joystick and digital joystick
- Find purchase links for digital joysticks

Date: Thursday, Mar. 14, 2019

Status Report 2

Work Scheduled for Today

- Analog stick testing
- Research analog joystick and digital joystick
- Find purchase links for digital joysticks

Work Completed

- Connected SAMD21 board with Arduino software and got led blinking
- Research analog joystick and digital joystick
- Wired up mock analog stick setup with led to show function
- Sprint meeting

Work Comments and Results

- Andrew is back
- Had some trouble connecting SAMD21 board to Arduino software.
- Installed library for SAMD 21 spark fun board and got Arduino software to recognize it.
- Got lights to blink on the board
- Used analog joystick to control two LEDs

Work Scheduled for Tomorrow

- Research SAMD21 Micro Breakout board serial ports
- Connect buttons to SAMD21
- Test SAMD21 with Arduino software

- Connect SAMD21 to Pi and test buttons

Date: Friday, Mar. 15, 2019

Status Report 3

Work Scheduled for Today

- Research SAMD21 Micro Breakout board serial ports
- Connect buttons to SAMD21
- Test SAMD21 with Arduino software
- Connect SAMD21 to Pi and test buttons

Work Completed

- Connect buttons to SAMD21
- Test SAMD21 with Arduino software
- Connect SAMD21 to Pi and test buttons
- Solder headers on SAMD21 Board
- Program Arduino code to receive inputs from the buttons through the SAMD21 board
- Assist Paul with de-solder his board

Work Comments and Result

- Coding was done by Andrew, but the team assisted including myself.
- We had issues with the inputs received through the SAMD21.
    - Key spamming
    - Unintended presses
    - Random characters
- Usefully translated buttons press int individual characters
- Implemented code to filter finger tremors.

Work Scheduled for Tomorrow

- Come in on Saturday to make up for lost time
- Buttons fully working with Pi
- Write up Project Plan as group

Date: Saturday, Mar. 16, 2019

Status Report 4

Work Scheduled for Today

- Come in on Saturday to make up for lost time
- Buttons fully working with Pi
- Write up Project Plan as group

Work Completed

- Soldered wire on analog joystick for testing purposes
- Got the SAMD21 board to recognize the analog joystick signals.
- Helped code the SAMD21 board to convert joystick signals as usable keyboard outputs
- Research on digital pins on the SAMD21 board
- Wrote up the Project Plan for Todd

Work Comments and Results

- We had some trouble getting the joystick to work with the board
- The joystick signals won't display on the serial monitor. We couldn't solve this issue
- The group has been working hard and we are now caught up.
- By getting the analog joystick working. We are ahead on our schedule.

Work Scheduled for Tomorrow

- Research on etching for the 2nd prototype board
- Program key bindings in retro pie to work with buttons and analog
- Test Buttons and joystick with Pi emulator
- Decide how to secure joysticks to first prototype.

Date: Monday, Mar. 18, 2019

Status Report 5

Work Scheduled for Today

- Research on etching for the 2nd prototype board
- Program key bindings in retro pie to work with buttons and analog
- Test Buttons and joystick with Pi emulator
- Decide how to secure joysticks to first prototype.

Work Completed

- Cleaned up the wiring for the first prototype
- Switched to an analog stick already soldered to a board for the prototype
- Button and joystick testing
- Pi recognized SAMD21 outputs

Work Comments and Results

- Working during march break
- The Pi is working with the SAMD21 but doesn't work in-game
- Potential issue could be the de-bouncing

Work Scheduled for Tomorrow

- Research Retro Pie button issues (De-bouncing)
- Test Pi and analog joystick and buttons
- Connect missing buttons on first prototype
- Start wiring the second prototype

Date: Tuesday, Mar. 19, 2019

Status Report 6

Work Scheduled for Today

- Research Retro Pie button issues (De-bouncing)
- Test Pi and analog joystick and buttons
- Connect missing buttons on first prototype
- Start wiring the second prototype

Work Completed

- Research on copper board etching
- Drilled additional holes for Start and Select button on 2nd prototype board
- Shaved the copper from the board
- Drew wiring schematic for 2nd prototype
- Soldered buttons and analog stick to board

Work Comments and Results

- According to Todd, we don't have the chemical material for etching
- Manually etching with a drill would be difficult
- Settled on using solder and wires to connect everything
- Before wiring anything, I needed a schematic so I created one on the board using colored markers

Work Scheduled for Tomorrow

- Solder wires to SAMD21 on 2nd prototype
- Test connectivity of wires
- Connect SAMD21 to pie and test the new prototype

Date: Wednesday, Mar. 20, 2019

Status Report 7

Work Scheduled for Today

- Solder wires to SAMD21 on 2nd prototype
- Test connectivity of wires
- Connect SAMD21 to pie and test the new prototype

Work Completed

- Finalize the schematic drawing on the white board
- Switch 3d Printer filament to clear
- Test printed a thin coin to test visibility trough the filament.
- Various other test prints

Work Comments and Results

- The clear filament isn't very see-through
- There is only one usable soldering station
- I attempted to use the second, bigger soldering station but it didn't work
- The 3D printer is giving back a heating arrow
- Wired all the grounds on second prototype

Work Scheduled for Tomorrow

- Solder VCC and data lines to SAMD21 on 2nd prototype
- Test connectivity of wires
- Research how to attach SAMD21 to prototype

Date: Thursday, Mar. 21, 2019

Status Report 8

Work Scheduled for Today

- Solder VCC and data lines to SAMD21 on 2nd prototype
- Test connectivity of wires
- Research how to attach SAMD21 to prototype
- Attach SAMD21 to prototype

Work Completed

- Researched how to attach SAMD21 to prototype
- Attached SAMD21 to prototype using the 1/8 drill to board and screws
- Wired VCC and some buttons to SAMD21

Work Comments and Results

- Drills bits and pieces where misplaced. I found them.
- Used tape to secure the SAMD21 board and drilled through it
- The screws that mounted the SAMD21 to the board where conductive and shorted everything.

Work Scheduled for Tomorrow

- Continue soldering buttons and joystick to SAMD21
- Test connections while soldering
- More 3D printing research to fix the issue

Date: Thursday, Mar. 28, 2019

Status Report 9

Work Scheduled for Today

- Research the height for the standoffs necessary
- Trim the plastic headers

Work Completed

- Research the height for the standoffs necessary
- De-solder the wires from SAMD21
- Re-solder the wires from SAMD21 proper
- Trim the plastic headers
- Draw holes positioning on cardboard and cut out the outline

Work Comments and Results

- Accidentally soldered the wires directly to the SAMD21 board so I fixed that this morning
- Used some leftover cardboard as a stencil
- Found some precision knives to use

Work Scheduled for Tomorrow

- Drill the holes in the 3rd prototype
- Mount component boards to plastic headers

- Hot glue plastic headers

Date: Friday, Mar. 29, 2019

Status Report 10

Work Scheduled for Today

- Drill the holes in the 3rd prototype
- Mount component boards to plastic headers
- Hot glue plastic headers
- Take pictures

Work Completed

- Help team members with tasks (Holding things, side research, moral support)
- Cleaned the extruder thorough using alcohol and heat
- Troubleshooting the 3d printer

Work Comments and Results

- Had lots of trouble with the 3d printer
- This day was slow as we were waiting for Eddie to cut the glass at a shop
- Tried old extruder. Didn't work.
- Decided to try cleaning the extruder we had. It works now
- Took pictures

Work Scheduled for Tomorrow

- Drill the holes in the 3rd prototype
- Mount component boards to plastic headers
- Hot glue plastic headers

Date: Tuesday, Apr. 2, 2019

Status Report 11

Work Scheduled for Today

- Drill the holes in the 3rd prototype
- Mount component boards to plastic headers
- Hot glue plastic headers

Work Completed

- Team drilled the holes, glued the headers and attached the boards
- Designed Pres Board layout
- Took lots of pictures
- Chose pictures of each members

Work Comments and Results

- Working with Justin is difficult
- We can use a brand new Bristol board
- We chose a white board and will use black and red and a color scheme

Work Scheduled for Tomorrow

- Print Letters
- Buy Bristol boards
- Print pictures
- Glue it all together

Date: Wednesday, Apr. 3, 2019

Status Report 12

Work Scheduled for Today

- Print Letters
- Buy Bristol boards
- Print pictures
- Glue it all together

Work Completed

- Further designed the template.
- Drew a draft template on the board
- Re-solder some wires that broke or where going to break
- Replace the analog stick
- Print Letters
- Buy Bristol boards
- Print pictures
- Glue it all together

Work Comments and Results

- Noticed some wires on the 2nd prototype where loose

- The analog button on 2nd prototype was broken
- Working with Justin is still difficult. He has strong views and defends them valiantly

Work Scheduled for Tomorrow

- Tech showcase

Justin's Work Journals

Student Name: Justin Smith

Forgot to write down work for the 7 and 8 because I didn't start the notes till Monday the 11th.

Monday March 11th

- Monday March 11 didn't do much had to finish digital labs
- Only Eddie and I were at school
- One member was sick, and the other didn't come in

Tuesday March 12th

Tasks to complete

- SD card setup
- Research
- Research into HDMI setup
- Configure LCD screen
- Update/upgrade LCD screen
- Cut out foam to make model of controller

Completed tasks

- SD card setup
- HDMI mirroring working with update and upgrade
- Mini project back in the halls
- LCD screen setup with update/upgrade

Tasks to do tomorrow:

- Layout for controller

Wednesday March 13th

Tasks to Complete

- Button layout

- Discussion on analog stick and ways to connect it to the pie
- Meeting with Brian
- **Completed tasks**
- decided on the layout for the buttons
- four buttons on the left for A, B, X, Y
- four buttons on the left D-Pad
- one analog thumb stick
- decided on how to set up the buttons:
- Breakout Mini
- Research into Breakout Mini
- Keven is still part of the group

Tasks to do tomorrow:

- Research Breakout mini

Thursday 14th

Tasks to complete

- Research Breakout mini
- Complete proto type layout for controller

Completed Tasks:

- Proto type layout for controller
- **Tasks to do tomorrow:**
- Research Breakout mini
- Research pie GPIO

Tasks to do tomorrow:

- Research Breakout mini
- Research pie GPIO
- Set up buttons to Breakout Mini
- Program buttons to work through Breakout Mini

Friday March 15th

Tasks to complete

- Research Breakout mini
- Research pie GPIO
- Set up buttons to Breakout Mini
- Program buttons to work through Breakout Mini

Tasks Completed:

- Andrew and I worked on the programming for the Breakout mini and got buttons A, B, X, and Y set up and working.

Tasks to do Tomorrow:

- Finish D-Pad button setup
- Program the D-Pad buttons to work
- Test them out on the Pie
- Set up the Start and Select button
- Program Start and Select Button
- Test all buttons on the Pie
- Set up analog Thumb stick
- Program thumb stick on breakout mini
- Test Thumb stick on pie
- Test everything on the pie.

Monday March 18, 2019

Work Scheduled for Today

- Finish D-Pad button setup
- Program the D-Pad buttons to work
- Test them out on the Pie
- Set up the Start and Select button
- Program Start and Select Button on the Pie
- Test all buttons on the Pie
- Set up analog Thumb stick
- Program thumb stick on breakout mini
- Test Thumb stick on pie
- Test everything on the pie.

Work Completed

- Finish D-Pad button setup
- Program the D-Pad buttons to work
- Test them out on notebook and the Pie
- Work Comments and Results
- Analog stick was set up over the weekend with the proper programming
- Setting up the D-pad buttons and programming it was quite easy because it was the exact same as A, B, X and Y.
- Buttons didn't work with the pie but worked on notepad with what they were programmed for
- Now we have 8 buttons and the analog stick set up

Work Scheduled for Tomorrow

- Research why the buttons don't work

- Start fusion drawing
- Setup start and select button and program them into the Breakout Mini
- Research power supplies
- Research front end customization
- Continue to work with Andrew on the programming

Tuesday March 19, 2019

Work Scheduled for Today

- Set up the Start and Select button
- Program Start and Select Button on the Pie
- Test Thumb stick on pie
- Test everything on the pie.
- Research why the buttons don't work
- Start fusion drawing
- Setup start and select button and program them into the Breakout Mini
- Research power supplies
- Research front end customization

Work Completed

- Research why the buttons don't work
- Test Thumb stick on pie
- Test everything on the pie.
- Button Testing

Work Comments and Results

- The buttons will work in the emulator, but nothing seems to work in the ROMS

Work Scheduled for Tomorrow

- Analog stick didn't work on pie
- Research why buttons and analog stick will not work in the ROMS
- Research a way to install power supply to make controller portable
- Continue to work with Andrew on the programming

Wednesday March 20, 2019

Work Scheduled for Today

- Set up the Start and Select button
- Program Start and Select Button on the Pie
- Research why analog stick isn't working and work with Andrew to fix it
- Start fusion drawing

- Setup start and select button and program them into the Breakout Mini
- Research power supplies
- Research front end customization

Work Completed

- Research power supplies
- Research why analog stick isn't working and work with Andrew to fix it

Work Comments and Results

- To get the controller to be portable we need a constant 4.8V to 5.2V continues. If more than 5.2V it could affect the chip in the future. We came to the conclusion that we will need to get a regulator chip if we have time to add batteries
- Analog stick now works with the pie but will not allow for two buttons to be used at same time, i.e. we can't jump left or right, but we can jump.

Work Scheduled for Tomorrow

- Research front end customization
- Set up the Start and Select button
- Program Start and Select Button
- Setup start and select button and program them into the Breakout Mini
- Research why we can't jump right/left

Thursday March 21, 2019

Work Scheduled for Today

- Set up the Start and Select button
- Program Start and Select Button on the Pie
- Setup start and select button and program them into the Breakout Mini
- Research front end customization
- Research WinScp
- Research how to get the ROMS to read two button presses as one so we can jump in a direction
- Research power supplies

Work Completed

- Set up the Start and Select button
- Program Start and Select Button
- Research WinScp

Work Comments and Results

- https://github.com/RetroPie/RetroPie-Setup/wiki/Creating-Your-Own-EmulationStation-Theme
- https://howchoo.com/g/ndy0njhhmzz/retropie-controllers
- https://retropie.org.uk/forum/topic/19244/two-buttons-equals-one-input/6

- https://www.fastcomet.com/tutorials/ftp/winscp-manage-files

Work Scheduled for Tomorrow

- Research front end customization
- Research how to get the ROMS to read two button presses as one so we can jump in a direction
- Discuss with the group what we are going to do about the power supply to make it portable

Friday March 22, 2019

Work Scheduled for Today

- Research front end customization
- Research how to get the ROMS to read two button presses as one so we can jump in a direction
- Discuss what we are going to do about the power supply to make it portable

Work Completed

- Research front end customization
- Discuss with the group what we are going to do about the power supply to make it portable

Work Comments and Results

- We tried to make the code on the breakout mini more efficient but had to revert to old code
- With the old code though we simplified it a bit but Andrew is going to take it home and get his brother that's a programmer to nag him in the right direction.
- While doing research on the front end I found out I need to do research on a photo shop program to make the proper custom image for the front end

Work Scheduled for Tomorrow

- Front end
- Photo shop program research
- Scrum meeting
- Talk to Brian about portable power supply

Monday March 25, 2019

Work Scheduled for Today

- Power supply research talk to Brian and Todd about it with the group
- Front end
- Programming – get button hold to work

Work Completed

- Scrum meeting
- Research what type of power supply to use

Work Comments and Results

- Decision on button layout, controller cover layout
- We all decided to make the controller battery powered

Work Scheduled for Tomorrow

- Help Andrew get button hold to work
- Acquire the desired power supply

Tuesday March 26, 2019

Work Scheduled for Today

- Help Andrew get button hold to work
- Acquire battery case for controller

Work Completed

- Helped Andrew get the button hold working with Brian
- Researched the battery the group decided on
- Decided on new layout because of the battery
- Cut out battery area to see how to layout final product

Work Comments and Results

- We decided on the ISoud bp140
- https://isound.com/content/user_guides/ISOUND-6354.pdf
- http://isound.com/content/sell_sheets/ISOUND-6354.pdf

Work Scheduled for Tomorrow

- Placing layout of the battery
- Installing the battery
- Finishing up the 3d drawing
- Programming touch ups

Monday March 27, 2019

Work Scheduled for Today

- Placing layout of the battery
- Installing the battery
- Finishing up the 3d drawing
- Programming touch ups

Work Completed

- Placing layout of the battery

- Tested layout in earlier print

Work Comments and Results

- Issue with battery layout, and how the battery output could be connected

Work Scheduled for Tomorrow

- Installing the battery
- Finishing up the 3d drawing
- Programming touch ups

Monday March 28, 2019

Work Scheduled for Today

- Installing the battery
- Finishing up the 3d drawing
- Programming touch ups

Work Completed

- Installing the battery
- Finishing up the 3d drawing

Work Comments and Results

- 3D print heating error, plus. Had to switch filament

Work Scheduled for Tomorrow

- Programming touch ups
- Putting everything into the controller

Monday March 29, 2019

Work Scheduled for Today

- Programming touch ups
- Putting everything into the controller

Work Completed

- Testing games
- Getting Lexan to fit

Work Comments and Results

- Button issues through the programming

Work Scheduled for Tomorrow

- Programming touch ups
- Putting everything into the controller

Monday April 1, 2019

Work Scheduled for Today

- Programming touch ups
- Putting everything into the controller

Work Completed

- Putting everything into the controller
- Getting Lexan to fit on controller

Work Comments and Results

- Games are lagging on pi model a
- Getting certain wires to fit, had to do some rigging

Work Scheduled for Tomorrow

- Programming touch ups
- Game testing
- Presentation

Monday April 2, 2019

Work Scheduled for Today

- Programming touch ups

Work Completed

- Games work but with some lagging issues

Work Comments and Results

Work Scheduled for Tomorrow

- Presentation prep
- Showcase prep

Eds Work Journal

Student Name: Edward Thompson

Date: Monday, Mar. 11, 2019

Work Scheduled for Today

- N/A

Work Completed

- No work done on project; this was due to make up day for labs in digital circuits.

Work Comments and Results

- Keven and Andrew did not show up.
- Project not started due to make up day for digital circuits labs.

Work Scheduled for Tomorrow

- Finish arcade table.

Date: Tuesday, Mar. 12, 2019

Work Scheduled for Today

- Finish arcade table.
- Replace buttons on player 1 joy stick

Work Completed

- Arcade table completed.
- Security door installed.
- Fix button on joy stick

Work Comments and Results

- Keven and Andrew (sick) did not show.
- Final check on components and wiring
- Security door attached after final touches.
- Buttons on joystick were sticky, had to grind Lexan glass cover to movement for joystick and replace one button.

Work Scheduled for Tomorrow

- Start portable controller.
- Testing of components.

Date: Wed, Mar. 13, 2019

Work Scheduled for Today

- Testing of analog stick with pi.

Work Completed

- N/A

Work Comments and Results

- Andrew was still sick (did not show).
- Meeting with Brian on options for connecting analog to pi.
- Decided on layout of buttons (revision 1).
- Had a conference call with Andrew for meeting.

Work Scheduled for Tomorrow

- Start setups up buttons for testing.
- Possibly get chip for buttons.

Date: Thursday, Mar. 14, 2019

Work Scheduled for Today

- Connecting buttons to bread board for testing.
- Connect buttons to break out board.
- Soldered wire to analog stick (for testing).
- Research done on setting up of break out board with Arduino software.

Work Completed

- Breadboard testing of buttons completed.
- Buttons connected to breakout board.
- Wires successfully soldering to analog.
- Setting up of samd21 break out board.

Work Comments and Results

- Testing of buttons to bread board with LED went great.
- Wires gauge on analog stick was too small to fit boards for testing so.
- SAMD21 mini break out steps to setup with Arduino software:
    - Copied link: (https://raw.githubusercontent.com/sparkfun/Arduino_Boards/master/IDE_Board_Manager/package_sparkfun_index.json)

- Pasted in preferences in Arduino software “board manager URL”.
- Reload Arduino, load board manager search for “SAMD”.
- Install Spark fun SAMD mini break out boards.

Work Scheduled for Tomorrow

- Generate a design/layout of controller.

Date: Friday, Mar. 15, 2019

Work Scheduled for Today

- Create a general design and layout of controller (Buttons, pi and analog stick)

Work Completed

- N/A

Work Comments and Results

- Started design and layout on foam board and paper, ran into problems with analog stick so I had to put the design aside to do some research on the analog stick.

Work Scheduled for Tomorrow

- The work scheduled for Saturday was to have the buttons working with pi tested on a game with pi.

Student Name: Edward Thompson

Date: Monday, Mar. 18, 2019

Work Scheduled for Today

- Scrum meeting.
- Refresh Autodesk fusion 360.

Work Completed

- Scrum meeting.
- Completed refresher with fusion 360.

Work Comments and Results

- Made a test coin and tested the different functions Fusion 360

Work Scheduled for Tomorrow

- Start the Fusion drawing.

Date: Tuesday, Mar. 19, 2019

Work Scheduled for Today

- Scrum meeting.
- Start Fusion drawing.

Work Completed

- Scrum meeting.
- Successfully Started the casement for the Pi and LCD.

Work Comments and Results

- Uploaded a general Raspberry pi 3 Model to fusion.
- Removed southern walls of case for hardware.
- Modified Audio, HDMI, Micro USB and SD card holes in model to fit appropriately with stand offs.

Work Scheduled for Tomorrow

- Continue progress on 3D Fusion model.
- Create a basic layout for base of controller.
- Add walls to base for shell of controller.
- Print out a test of top portion of controller shell.

Date: Wed, Mar. 20, 2019

Work Scheduled for Today

- Scrum meeting.
- Continue progress on 3D Fusion model.
- Create a basic layout for base of controller.
- Add walls to base for shell of controller.
- Print out a test of top portion of controller shell.

Work Completed

- Scrum meeting.

- Base of controller shell.
- Walls added to complete basic encloser.
- Printed Top Shell portion of controller.

Work Comments and Results

- Made Sketches of design with appropriate Dimensions.
- Made walls and base 4mm wide and 30mm in height (for walls) for durability and to allow room for Pi w/ LCD.
- Tested some fillet options for comfort.
- Calibrated 3D printer (Leveled base, replaces tape and sprayed hair spray for suction) in preparation on printing test shell.
- Started print before Heading home.

Work Scheduled for Tomorrow

- Evaluate Test print with group for revisions.
- Make modifications from evaluation.
- Add handles to controller shell.

Date: Thursday, Mar. 21, 2019

Work Scheduled for Today

- Evaluate Test print with group for revisions.
- Make modifications from evaluation.
- Add handles to controller shell.

Work Completed

- Evaluation done.
- Scrum meeting.
- Modifications complete.
- Handles added to shell.

Work Comments and Results

- Modifications on case were to:
  - Increase fillets on backside (more comfortable for palms when playing)
  - Increase section where the raspberry Pi is being placed (Pi 3 was a tight fit with USB, ethernet ports and LCD)
  - Increase hole size for SD card slot for ease of removal.
  - Test print helped with placement and size of handles.

- Fillets had to be removed for modification process.
- Started with a triangle sketch, then fillets to make more comfortable in hands.
- Time allotted for fillet testing on handles.

Work Scheduled for Tomorrow

- Print controller model with handles.
- Scrum meeting with group.

Date: Friday, Mar. 22, 2019

Work Scheduled for Today

- Print controller model with handles.
- Scrum meeting with group.

Work Completed

- Scrum meeting.
- Print started.
- Research on 3D printer errors.

Work Comments and Results

- Scrum meeting was to discuss possible power options.
- Calibrated 3D printer (Leveled base, replaces tape and sprayed hair spray for suction) in preparation on printing test shell.
- Came in on Saturday to check status of print.
- Extruder error occurrence on print.
- Retried print.

Work Scheduled for Next Week

- Scrum meeting.
- Research power supply options.
- Check on print

Date: Monday, Mar. 25, 2019

Work Scheduled for Today

- Scrum meeting.
- Research power supply options.

Work Completed

- Scrum meeting.
- Power supply chosen.

Work Comments and Results

- Found ISOUND mobile battery pack in lab.
- Research of ISOUND mobile battery pack (found that is was perfect of the pi we are using)
- Discussed placement of battery to power PI.
- Problem with placement of PI and Power bank.
- Printer failed again (filament jam and slip).

Work Scheduled for Tomorrow

- Find/Research Micro USB extender.
- Pursue battery modifications and layout.

Date: Tuesday, Mar. 26, 2019

Work Scheduled for Today

- Scrum meeting.
- Find/Research Micro USB extender.
- Pursue battery modifications and layout.

Work Completed

- Scrum meeting.
- Micro soldering of power switch chip.
- De-solder micro USB from Bad Pi.
- Print Bottom half of case.

Work Comments and Results

- Meeting with Brian to discuss possible micro USB extender options.
- Got a Raspberry pi for parts (Micro USB).
- Used hot air gun tool to de-solder micro USB.
- Modify a perf board to fit in in controller.
- Soldered Micro USB and terminal block too perf board (power chip).

Work Scheduled for Tomorrow

- Testing power chip with battery and Pi

Date: Wed, Mar. 27, 2019

Work Scheduled for Today

- Scrum meeting.
- Testing power chip with battery and Pi.
- Testing of hardware components with new power supply.

Work Completed

- Scrum meeting.
- Power chip testing with Pi and LCD.
- Testing of hardware components with new power supply delayed due to re-soldering of wires to SAMD21 break out board.

Work Comments and Results

- Testing of power chip with battery and Pi + LCD worked great as it powered on the pi with LCD without issues.
- Testing of hardware components with new power supply delayed due to re-soldering of wires to SAMD21 break out board.

Work Scheduled for Tomorrow

- Testing of hardware components with new power supply.

Date: Fri, Mar. 29, 2019

Work Scheduled for Today

- Scrum meeting.
- Preparation of Lexan cover

Work Completed

- Scrum meeting.
- Lexan cut to size and marked for holes

Work Comments and Results

- Preparation of Lexan took one day to cut and mark out button layout.
- Needed proper PPE in work place.
- Having experience in this field (Glazier) caused no issues in the preparation of Lexan Cover.

Work Scheduled for Tomorrow

- Test cover with case
- Look over all aspects of cover for revisions.

Student Name: Edward Thompson

Date: Monday, April. 1, 2019

Work scheduled today

- Scrum meeting.
- Test cover with case
- Look over all aspects of cover for revisions.
- Drill holes in Lexan.

Work Completed

- Scrum meeting.
- De-Solder power chip.
- Re-Solder switch to chip.
- Cutting hole in controller for power switch.
- Installation on power switch chip.
- Revisions made (grinding of Lexan cover to fit with parameter of controller.
- Drill holes in Lexan.

Work Comments and Results

- In scrum meeting, we discussed adding a switch for powering on/off controller.
- Proceeded with de-soldering and re-soldering to allow for switch to be incorporated in chip.
- Measured hole for cut out to allow power switch to be accessible from exterior.
- Lexan exceeded past controller case, had to grind a couple edged to have a nice fit.
- Drilled holes on drill press with Justin and Andrew to assist in precision.
- Problem with drilling of Lexan consist on not having clamps with drill press to secure Lexan to bench, so we needed multiple people to keep Lexan from slipping.

Work Scheduled for Tomorrow

- Assembly of prototype 3(all components and stand-offs)
- Discuss layout of presentation board.

Date: Tuesday, April. 2, 2019

Work Scheduled for Today

- Scrum meeting.
- Assembly of prototype 3(all components and stand-offs)
- Discuss layout of presentation board.

Work Completed

- Scrum meeting.
- Assembly of prototype 3
- General layout of presentation board

Work Comments and Results

- Scrum meeting resulted in a general layout of presentation board with the group to what the is needed.
- Got pictures and text ready.
- Revisions done with information for showcase.

Work Scheduled for Tomorrow

- Assembly and creation of presentation board.

Date: Wed, April. 3, 2019

Work Scheduled for Today

- Scrum meeting.
- Assembly and creation of presentation board.

Work Completed

- Scrum meeting.
- Assembly and creation of presentation board.

Work Comments and Results

- Picked up supplies for presentation board (glue stick and bristle board).
- A lot of time spent on precision cuts for a clean look.

Work Scheduled for Tomorrow

- Tech Show Case!!