

Final Report - ENT4960

Husky Games Arcade Cabinet

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Project Goals

The overall goal of my project was to build a custom arcade cabinet that would be able to showcase a variety of games made by the Husky Games Enterprise on Michigan Tech's campus. Considering it is going to go outside the enterprise's lab on the second floor of Rekhi, I wanted to make it accessible and easy for people passing by to hop into playing a student created game, but also small enough to rest comfortably on the showcase shelf. This cabinet will hopefully attract new students to the enterprise, while also giving existing teams an enjoyable new platform to develop for and showcase their games for years to come.

This project was created and built from the ground up using a variety of parts and facilities supplied by Michigan Tech. The custom aspects of the cabinet includes a unique design for the cabinet's case, handpicked parts for an internally assembled computer running Windows 10, a graphical user interface that runs on boot-up allowing users to scroll through games available to play, and a custom "game-loader" application that easily enables student teams and management members to upload games onto the cabinet with ease.

All of these goals were met regardless of the school lock-down situation with COVID19. The only thing left to do is secure the marquee to the top of the cabinet and install the "game-uploader" application once I have access to the lab again. I am currently enrolled in Michigan Tech's grad program, so I will be around next semester to do this. Nonetheless, I am prepared to supply ample documentation and help remotely install the custom server/client software game-loader application if this situation changes.

ENT4950 Progress

During the first year of the project, I spent a lot of my time in the first semester working on the design of the cabinet and conceptualizing it on scratch paper. This process included doing sketches and mock-ups while meeting up with the head of the enterprise and computer science departments to get clearance on the project's details moving forward. During this time I was also taking their feedback and concerns into consideration throughout the design process. Once settling on the final look of the cabinet, what features that would be necessary, and figuring out what materials I was going to need, I set out to build it using the "Maker's Space" facilities located in the basement of the Memorial Union Building on Michigan Tech's campus.

The cabinet is built out of wood that was obtained by the organization's stock-pile located in the back of the room. After I saw that I had what was necessary for its exterior, I began cutting and shaping each piece as I needed. Woodworking and being a carpenter is not something I knew anything about, so the entire process was a major learning curve for me. The Maker's Space was very helpful though, and assisted me with lessons and help where I needed it. During this time I put together a comprehensive list of computer parts that I was going to need, and sent them to the enterprise's management team. These details too I had to discuss and work with the management team to fall within an allowable budget also taking their feedback into consideration. At the end of the first semester I had the shell of the cabinet done, and plans on how I was going to implement putting the electronics into the cabinet.

The second semester I finished the exterior of the cabinet, and soon had the computer parts to start building the guts of the machine. This also included wiring up the arcade sticks and controller configurations for allowing two players to play at once. But before I got started wiring everything together, I put a dark wood finish on the cabinet. It was after this point that the entire project for me jumped off the initial sketches and was now coming together rather nicely. I gave a presentation on the cabinet's progress in front of enterprise at the end of the year.

ENT4960 Progress

The previous semester was done by myself without a team. The process of building the exterior of the cabinet looking back was something I do not see a full team working well on in hindsight. But the second year I was joined by my classmate Josh Kiger to help with coding and implementing the arcade cabinet's graphical user interface (GUI), front-end and back-end, as well as help with the server-client HTML game-loader application.

The first semester we were entirely focused on getting the GUI of the arcade cabinet done and working. We spent a little amount of time discussing our strengths regarding what tasks we can work on, as we have worked together before, and quickly got to work. We decided to use C++, C, and Windows Visual Studio 2017 as the backbone of the GUI application. I worked on creating the front end functionality, and Josh completed the backend. We came up with a way that the file structure of the games being stored on the cabinet was to adhere to, and created some standards that temas would have to have when putting their game onto the cabinet. At the end of the semester we built an application that was able to look through a specified folder hierarchy, pull each game's information and data resources, and then display them in an organized alphabetical list that users were able to scroll through and choose using the cabinet's arcade stick and buttons.

The second semester got off to a strong start, as Josh and I figured out what was needed for the HTML application. My familiarity with SQL and PHP proved to be a great help when designing and coding up the start of the app. Unfortunately, since Josh did not have a Windows 10 machine or the right tools provided by the lab to work on the application and cabinet features after the school locked-down in light of the COVID19 pandemic, he could not assist me too much afterwards. This was ok, as I had the bulk of the HTML game-loader app done and was able to simulate the arcade cabinet on my computer at home. This allowed me to debug the app without the need of the cabinet, and therefore make the application ready to install once access to the lab is granted in the future.

Conclusion

The end of this semester was not ideal, as I was not able to install the last remaining code and application updates to the cabinet, but I think I did the best I could given the situation. As I have mentioned previously, the work that remains is the implementation of the HTML game-loader application. This can be done by setting up the cabinet with the ability to have a private WiFi network to host a client/server application, and I have all the parts and tools necessary to do so quickly. But if necessary I can help someone do it remotely, but I do not think it is going to come down to that since I am currently enrolled in Michigan Tech's graduate school program.

I am very happy with what I was able to accomplish in designing a fun machine that is to be used by future generations of Michigan Tech students. Whether it was learning how to build a cabinet out of wood for the first time, putting a dark wood finish onto the exterior once it was assembled, wiring up the internal components, or learning how to lead a small two person team in building a software application from conception, there was never a dull moment and am very grateful for the opportunity to have worked on it.

Constraints

- **Knowledge:** Coming into the project, I was confident in my ability to create a software application from scratch as I have done this before. The thing I was not prepared for was the amount of work, knowledge, and skill that goes into the carpentry of building a wooden cabinet. I never did something like this before, and it was an up-hill battle.
- **Time:** The Maker's space was only open at certain times during the week. Trying to fit this in with school and other homework provided to be quite a challenge at certain periods of building the machine.
- **Leadership:** I have been competent in the past leading pre-made projects or managing people at work outside of school, but there was some learning on my part in developing tasks and a timeline to get a new idea conceptualized and then done.

Standards

- **C:** In order to quickly execute and retrieve multiple files from the Windows 10 operating system, we utilized standard C functions that would be ported to the C++ code-base used in the final Arcade Cabinet's GUI application.
- **C++:** In order to provide the above mentioned flexibility of incorporating C, C++ language was a perfect tool for the job. We were able to utilize methods and function calls to make the GUI as fast and speedy as possible, which helps the overall end-user experience when using the app.
- **Git:** Source code control systems are very valuable when working on large spanning projects, and Git was able to help aid in backing up our code every step of the way. It was easy to utilize its website to make commits and changes as each Sprint came to a close.
- **Maker's Space Safety Rules:** When dealing with power tools, such as saws and sharp objects, it is necessary to follow all the shop's safety procedures to ensure nobody gets hurt. These were simple things such as wearing safety goggles after a certain point in the room, to getting workers to train others on dangerous equipment before use.
- **Windows Visual Studio 2017:** This is the standard programming environment used on Windows 10 machines for C++ development. It allows intuitive ways to import large libraries of code to be used to complete complex applications.
- **Commenting:** Our team made a commitment to following a rule where we would comment as we code. This ensures that if we need to look at each other's work later, it wouldn't be too difficult.
- **MySQL:** Having an easy and heavily documented database language is essential when working on a time crunch. MySQL is heavily respected and well known.
- **PHP:** This backend server programming language proved to be invaluable for its flexibility with working with MySQL and Windows 10 directories.
- **wxWidgets:** Since many programming languages usually do not come with a standard way of creating GUI apps, this C++ library allowed for rapid and easy development.

List of Tasks

- Drew a sketch of the cabinet with a rough outline of core features
 - This was the first conceptual step to designing the look and feeling of the cabinet for the user to play. It was during this stage that main functions of the cabinet were debated upon and taking shape.
- Got measurements of the space outside the husky games lab
 - The cabinet design had to take into account the limited space outside the Husky Games lab. At first, the cabinet design was too large in depth after finding that it could only be a total of 15.5 inches deep. This led to re-thinking some features that wouldn't be practical for the space allowed.
- Learned how to use AutoCAD software to model cabinet
 - The beginning included a rough outline of specifications using a beginner's knowledge of AutoCAD software on the school library computers. This was the stage where the time it was taking to adequately learn the software was starting to take longer than desired, and the move from a plastic cabinet to a wood cabinet was coming into fruition.
- Had a meeting with the president of husky games, Professor Kuhl, and the head of the C.S. department to go over ideas and main design concerns.
 - This meeting had good insight on exactly what the department expects from the cabinet, such as making sure to allow the logo that lights up on top to change if need be, how modular would the cabinet need to be, making sure there were no other games besides the enterprise student games, etc. It was also encouraging, as the people who gave input and constructive criticism on the cabinet were excited about the project.
- Determined what materials to use for the project

- This is where the transition to wood materials was decided upon. The type of wood and how everything was going to go together was still being planned out more carefully.
- Determined what components were needed for the project
 - Finalized the list of electronic computer and circuitry components that are going into the cabinet. This included getting a tally of the price of the motherboard, joysticks, buttons, monitor, power supply, wires, etc.
- Met with the “makerspace” in the basement of the MUB building to set up a time to get trained and ready to cut materials for cabinet
 - I had to rearrange my semester schedule to fit these meetings, and also to make sure I was able to make it there before they closed at 9pm on Monday through Thursday. Extra time commitments were necessary also to see coaches that were familiarized with the arcade cabinet idea.
- Got new dimensions from the display cabinet outside the husky games lab.
 - This included taking measurements to get exact dimensions to better estimate the amount of extra space I needed in cutting the side panels, and also deciding what type of wood to use. After talking to the students who are employed by the school in the “maker’s space” located in the basement of the MUB, I went with a thick plywood called 5-ply.
 - This also was the step where I finalized the dimensions for the arcade stick layouts for both player 1 and player 2. Also, because of size concerns, I decided to scale back the size of the monitor from a 27in screen to a 21.5 in screen.
- Redrew the sketch on engineering paper with required dimensions
 - This was an essential step before starting to choose what type of saw blade, and how large of a space the top logo panel would take up. It was during this stage I got help from experienced woodshop craftsmen in determining what would be best. The person I talked to actually used to work for a company that helped repair old arcade cabinets, so he was a great help and provided great insight during the

redrawing of the cabinet from the 3D AutoCAD image to old-fashioned engineering graph paper.

- Penciled the shapes onto the wood and began to cut the pieces necessary for the outer shell of the arcade cabinet.
 - At that moment, I had both side panels cut and also set up a time to cut the rest of the base and top panel the following Monday. After the cutting was done, I will then begin to sand the edges of each piece to get a better “smoothness” for the arcade cabinet. I may still decide to put a wood finish onto the cabinet as well in the future, but I determined after some research that this is not a necessity.
- Finished cutting and sanding the side panels of the cabinet.
 - Modifying the dimensions from the documentation mentioned in my Sprint 2 report, I got to work on finalizing the cuts to the side panels. This included sanding the edges down thoroughly and learning how to use the extra functions of the jigsaw tool from the maker’s space coaches. The sanding also was done to make each piece more “square” with each other.
- Cut out the boards for the shelves that will hold up the monitor, joysticks, speakers, and electronics to power the cabinet.
 - Learned how to use the mill saw to achieve straighter cuts, and how to make pieces more “true” or “square” to the side panels finalized earlier.
- Cut out a board for the top panel that will be hidden and hold L.E.D. backlighting for the logo.
 - It was important to also consider the space I would need to drill wires to reach the power supply. The space in front of the panel must also be sufficient enough to hold a plastic panel that will be what the user sees.
- Designed the back door to the cabinet allowing future access into the internals of the machine.
 - This included getting hinges and dremeling the screws that poked through the back. This took a bit longer than expected, but the end result I believe is more flush, and of higher quality.

- Assembled all the parts and screwed them together.
 - As of right now, I currently have the cabinet completely put together and ready for computer components. All cutting and planning will have to be done once these components are able to be accurately measured and sized next to the cabinet itself.
- I acquired new dimensions for the computer monitor outside the lab and sketched the frame.
 - The next step forward after I had all the parts was to get estimates and build the frame for the computer monitor to rest in. This frame needed to have enough space at the bottom for speakers, but not angled too heavily to allow enough space for the joysticks and buttons to rest comfortably for the players.
 - I was still debating on how thick the bezel for the monitor should be. I worried that if it was too thick I will run out of space for the cable management later in the spring. This did not happen.
- Finalized computer components to be ordered and checked to see if they were compatible
 - After updating the parts list, I double checked to make sure all parts are compatible with each other from the new part list I emailed a week ago. I also separated the parts that I would need to get first to begin cutting the new pieces I would need right away. This reorganized list was also used to cut immediate costs for the enterprise.
- Had to change parts in my parts list.
 - In the time between last semester and now, I was surprised to find out a lot of the components that were readily available a few months prior were not available anymore. Most of the core components that were in the last list needed to be re-evaluated and made sure that they were compatible with the rest of the components.
- The parts came in and measurements were made to get the controllers built into the shelf.
 - I learned how to use the hold saw to drill into the top of the cabinet. Some test were done with different diameter sizes, and one was found to suit the joystick

placement correctly, but a friend said he would bring in the correct drill size for the arcade buttons.

- I designed two separate pieces for the joysticks to raise them off of the surface of the wood.
 - The wood I used to make the shelf was too thick, and the joystick recessed too deep into the cabinet. To solve this issue I took measurement to cut two separate pieces that will act as a place to rest a player's wrist when using the joystick, and exposes more of the joystick to both player one and player two.
 - I made sure that the sander was operational and ready to be used for this piece.
- Research was done on coats of paint/stain to use.
 - To prep the cabinet to use a vinyl coating in the future weeks, I did a little research on what type of primer to use, and ended up going with an English Chestnut stain and glossy finish to protect the wood.
- The materials and measurements for the motherboard's bracket were taken and drawn out onto the material.
 - The motherboard will be able to rest above the wood for better cooling conditions and cooler temperatures during operation of the arcade cabinet.
 - Metal drill bits were needed and are being obtained at the hardware store over the weekend.

- I carved out placements in the controller board to install the joysticks.
 - The separate pieces that I created last sprint for each joystick needed a hole cut into the board so the joystick's electrical components can fit underneath. There needed to be enough space surrounding each piece so four screws could fasten them into place.
- Holes were drilled to fit the buttons.
 - I changed the layout for the buttons because the other design would be a cramped fit. Instead of the buttons angled in a more traditional fighting-game style, they are laid perpendicular in a straight line next to each player joystick. This drastically freed up the room available to each player, and made more room for the future monitor frame.
 - Each hole was first drilled with a hole saw, and then dremeled and sanded by hand for each individual button.
- The fans were installed within the cabinet
- Each fan was measured to be placed on the bottom, next to each cabinet side panel. I used the hole saw again to drill holes a little smaller than the diameter of each fan, while screws hold each of the four fans in place pressed up against the openings.
 - I looked into a thin filter or metal mesh to screw onto the sides of each fan opening to give the inside better protection from dust and whatnot.
- All components were given a position within the cabinet
 - The motherboard and power brick were given their final placements to be screwed in once the final parts came in.
- The front panel was built and put on.
 - The front panel where the start and select buttons are going to go was put on and sanded down flush with the controller board. This flushness will create a smooth resting place for each player's palm while playing the arcade cabinet for extended periods of time.

- Cut holes for the player 1 / player 2 buttons and select buttons for each player in front panel.
 - I had to be careful, as the front panel is causing the side panels to be tight, causing a little bit of slight splintering to be concerned about.
- Top piece was cut and fitted..
 - Because of time constraints, I learned how to cut using the skill saw. The first piece was ruined, but the second time around was good.
 - Had to sand down the back and edges to get more flush with the side panels.
- Created a frame for the monitor
 - Was tedious with the measurements, and went in the end with rounded edges.
- Created a curved piece to rest beneath the frame of the monitor.
 - Well, to be honest I found it in the scraps from somebody else in the maker's space. I thought it would be a cool addition and add a lot to the look, so I cut it and wood glued it to the controller board.
- Took components out of the cabinet to prep for staining.
 - Didn't want the fans and components to get covered in stain.
 - Before installing the fans again, I am going to cut out foam pads for the screws to prevent noise while running.

- Sanded down the cabinet to prep for staining.
 - Used 120 grit sandpaper and hand sanded the cabinet down to prepare a smooth finish look for the stain.
- Stained the cabinet with english chestnut color
 - Went to the paint shop and picked out a pre-stain, stain, and poly coat.
- Applied the poly to get a glossy clear coat finish.
 - The whole process of staining and clear coating took 4 days.
- Created a flowchart for the GUI design. (Figure 1)
 - Outlined the different modules and structure needed to achieve the overall end project.
 - Briefly researched what needed to be in place for the back-end database of the application.
 - Tried to keep the philosophy that “simpler is better” mentality when deciding on the final features. These features include a select game screen, a game info screen, and options to either view the trailer or play the game.
- Features to be included in the GUI.
 - Game selection screen: This is where each game will be selectable to play in a drop-down style list using the control sticks.
 - Game info screen: Each game uploaded to the cabinet will have a standard way of viewing the game’s logo, description, team information, and controller layout.
 - Settings: Users with the correct password will be able to adjust the settings of the cabinet from here, this includes such things as volume/brightness/internet connection controls and whatnot.
- Mapping the controller buttons.
 - Research was done on deciding whether or not to write our own code to bind the keyboard to certain buttons on the joystick controllers, or go with open source software.

- Open source software was found called “AntiMicro” (Figure 2) that automatically detects controller input and remaps keyboard buttons to the joystick controller. This was exactly what we were looking for.
- I play-tested multiple games downloaded from the Husky Games website, and after re-mapping the inputs everything worked as desired.
- Oversaw the creation of the controller layout jpg. (Figure 3)
 - Tasked Josh with creating a standardized picture that will be used for the game info screen included with each game.
 - The layout is for each team to fill out, and works as a tool to inform teams creating games for the cabinet about which buttons are being mapped to where. This is to be used for the end user as well, being displayed on the game info screen.
 - Gave Josh direction on what it should look like.
- Set up the work environment for the GUI.
 - After some research, Windows Visual Studio C++ is going to be used for its built in CLR functionality in designing windows-based applications.
 - Set up and tested the programming environment on the arcade cabinet.
- Created GitHub repository.
 - Set up a new GitHub repository in preparation for future coding starting Sprint 2
- Downloaded Visual Studio 2017.
- Set up a coding environment.
 - Got necessary plugins and attachments necessary for windows.
- Download wxWidgets C++ library.
 - Researched and learned the documentation for wxWidgets GUI library functions.
 - Compiled all necessary .lib and .dll files to successfully use the library and create a window.
 - Linked all .lib and .dll files to Visual Studio and set it up with wxWidget’s configuration settings to run.
- Created a basic starting window for the application. (Figure 1)

- Looked through the documentation and successfully created a fully customizable window for the user interface.
- Imported the HGD logo into the center of the window.
- Found out how to configure the window to be full-screen, borderless, and without a toolbar. This is to ensure that the user cannot exit using the arcade controller once the application is running.
- Fixed player 2's configuration, as well as start/select buttons.
 - Set up player 2's buttons to new inputs, as the operating system only recognizes one keyboard at a time.
 - Assigned start/select buttons for the player and coin buttons on the cabinet.
 - Updated Josh and the developments so he can update the controller design pdf for the teams making games for the cabinet.
- Built more front end functionality.
 - Added the ability to refresh a file for .png file for game logos and game descriptions.
- Downloaded XAMPP for Windows 10.
 - This is to set up the database backend for the application
 - Got necessary plugins and attachments necessary for windows.
- Set up a flow chart for the application.
 - Charted out the necessary windows needed for the end user..
 - Planned out the communication between front-end, database, and cabinet.
 - Researched necessary components required to make the network connection work
- Coded the HTML sign-in page.
 - Edited the main logo to be transparent with the window.
 - Researched necessary CSS coding styles to make the form work.
 - Found out how to configure the background/foreground layout of the images.
- Coded the User HTML page.
 - Linked the front sign-in page form to the user page.
 - Put together the necessary form inputs to upload a game onto the cabinet.

- Coded the Admin form HTML page.
 - Put together the necessary information that an admin will need to manage games, accounts, and create new team users.
 - One of the features still to be implemented is the ability to activate/deactivate team accounts for future years.
- Set up a database for the XAMPP server.
 - Made necessary columns and rows for the database
 - Set up a connection PHP script for each PHP file.
- Turned each HTML page into a PHP file.
 - This was necessary to function with the database.
 - Did some tweaks to the HTML for code cohesiveness.
 - Researched necessary functions for data transfer
- Cut out the Marquee from PlexiGlass
 - Researched how to cut plexiglass.
 - Ended up using a jigsaw with a very fine metal blade for cutting.
 - Needed to break the edges.
 - Required hauling the cabinet to the Marker's Space located in the basement of the MUB.
- Downloaded Cricut for Vinyl Cutting
 - Needed to figure out how to use the software.
 - Put together a template file to do the cutting of the letters and HGD logo.
 - Used free black vinyl pieces supplied by the Marker's Space in the basement.
- Placed Vinyl Pieces on the Marquee
 - Hand placed each letter and [tps://docs.google.com/document/d/11TkB](https://docs.google.com/document/d/11TkB) he logo.
 - Took multiple attempts because of limited space and unfamiliarity with vinyl.
- Installed Bluetooth Dongle
 - Simply installed the dongle.
 - Did not set up the network connection to transfer files or anything.
- Set up wifi ports for XAMPP server.

- Made necessary edits to the settings file.
 - Set up proper connection to port 8080 on the cabinet.
- Built on the HTML app.
 - Added a help page function.
 - Completed the submission form.
 - Tested live on localhost.
- Installed the wifi module in the local computer for Cabinet testing later.
 - This was done because the bluetooth communication did not work out.
 - Installed wifi on local machine.
 - Local machine is running the same version of Windows 10 as the cabinet.
- Disabled Bluetooth Dongle
 - Bluetooth signal did not communicate properly as previously researched.
 - Found that there would be some extra coding involved to build a full http stack that would not be worth the time to be compatible with XAMPP.
- Put some finishing touches on the application functionality
 - Replaced some images and form placements in the html.
 - Changed the screen size definitions to fit most laptops comfortably.
- Created the PHP backend to handle game submissions.
 - Researched ways to use the client-server nature of php to handle text boxes and file submissions.
 - Hooded everything together with the HTML front-end interface.
- Constructed the client-side app admin features.
 - Had to figure a way of moving file directories.
 - PHP does not handle moving directories, researched some Unity3D single exe solutions.
 - Ended up using Zip files to move from client to server, then having the server unzip in a proper created directory for the cabinet.
- Tested client-side app on home laptop
 - Booted up cabinet software on home pc.

- Local machine is running the same version of Windows 10 as the cabinet.
- Tested Wi-Fi access point for server side on home pc
 - Made sure the Wifi module was capable and in working condition.
 - Had it on hand to do extra testing on the network.
- Updated database with additional variables for admin features
 - Had to make a way for admins to delete games on the system using correct file pathing..
 - Added a column that correlates not just file paths but directory names on the server-side of the cabinet.
- Github repository.
 - https://github.com/mpspencer93/Arcade_Cabinet_GUI

Appendix

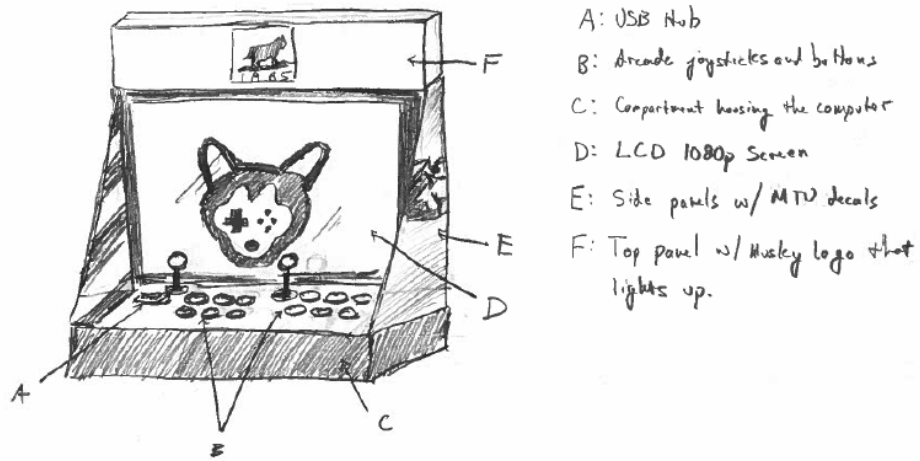


Figure 1: Arcade Cabinet Sketch

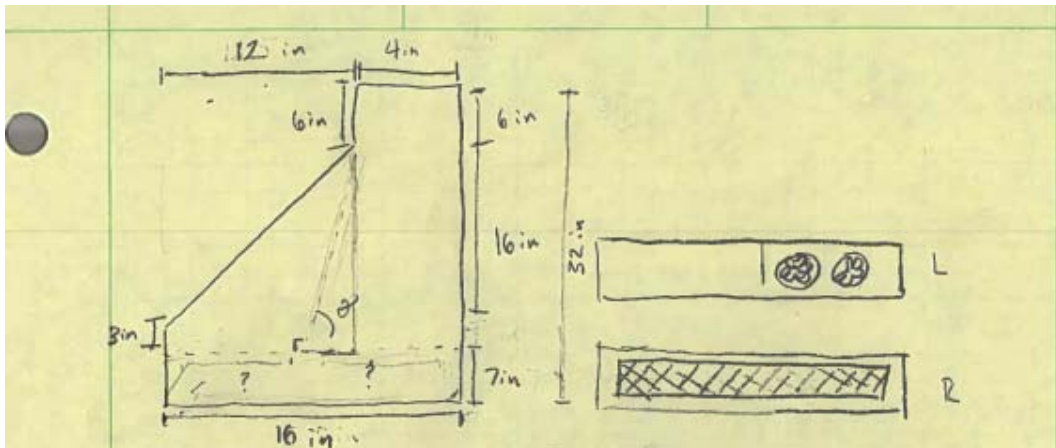


Figure 2: Arcade Cabinet Dimensions

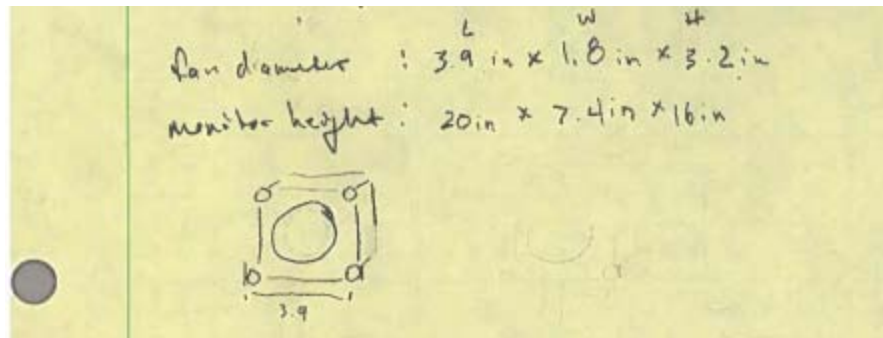


Figure 3: Arcade Dimensions Continued

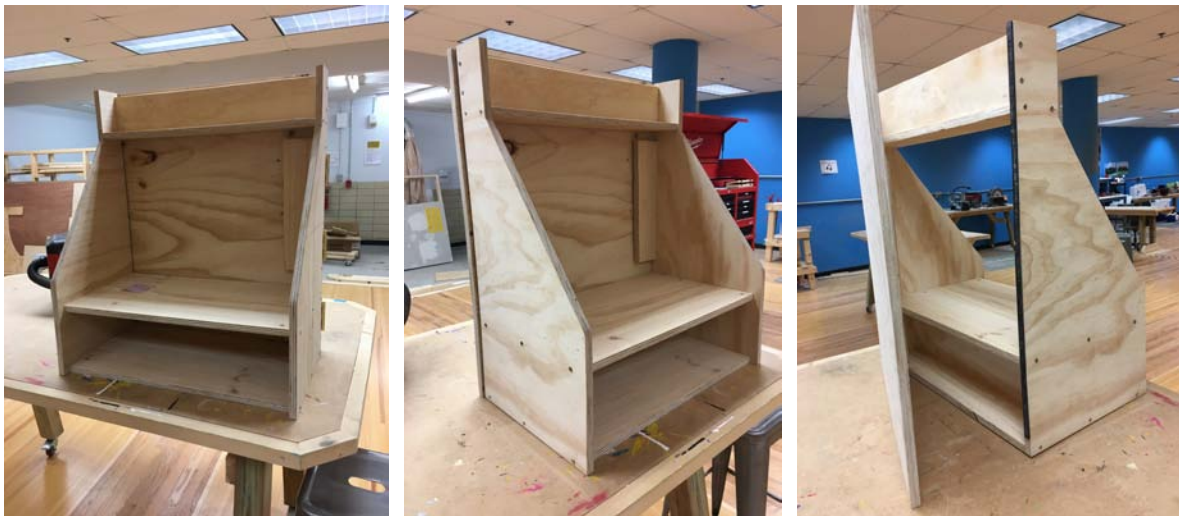


Figure 4: Arcade Cabinet fall 2018



Figure 5: Controller and Fan Holes Cut



Figure 6: Finish Applied to the Cabinet

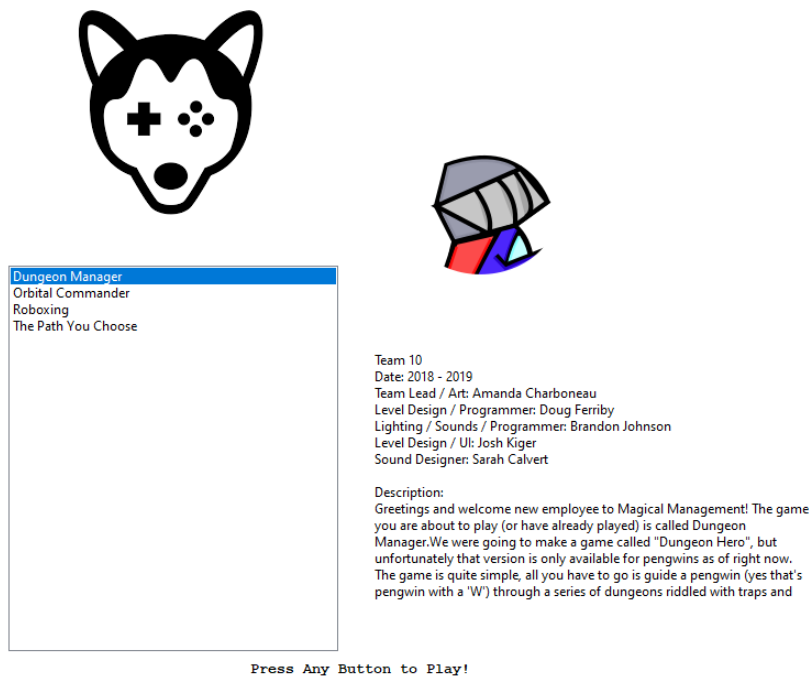


Figure 7: Arcade Cabinet GUI Application

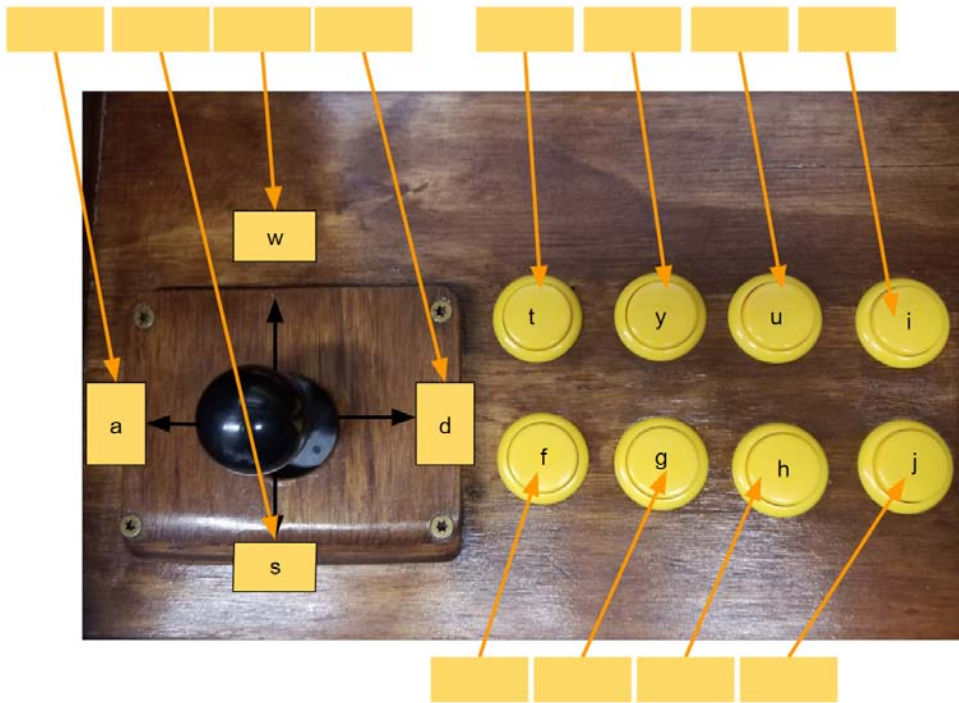


Figure 8: Player 1 Keyboard Bindings

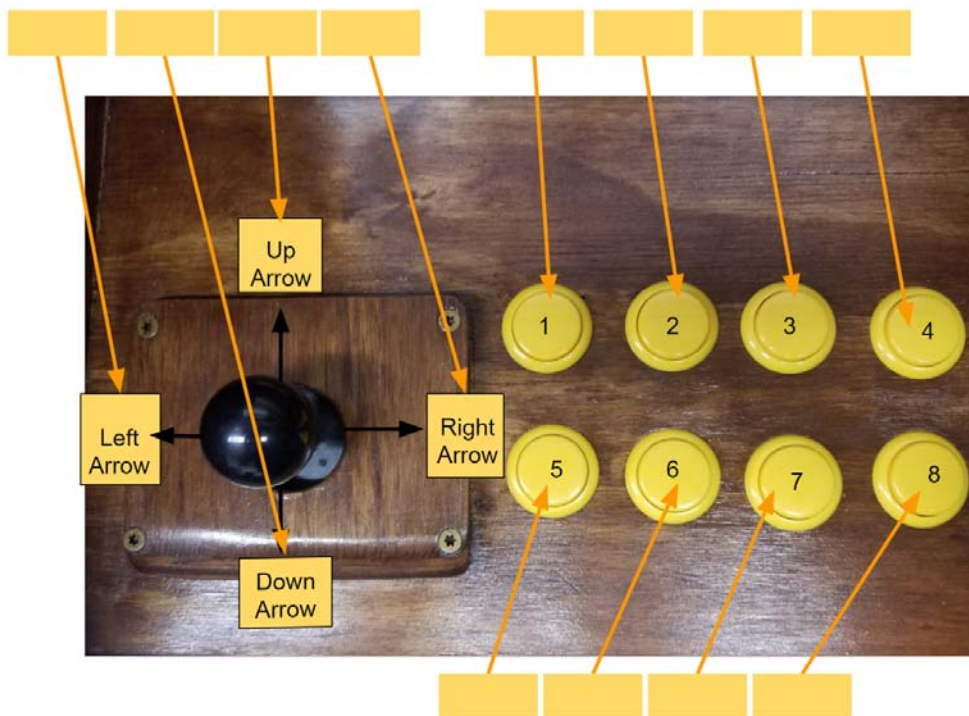


Figure 9: Player 2 Keyboard Bindings

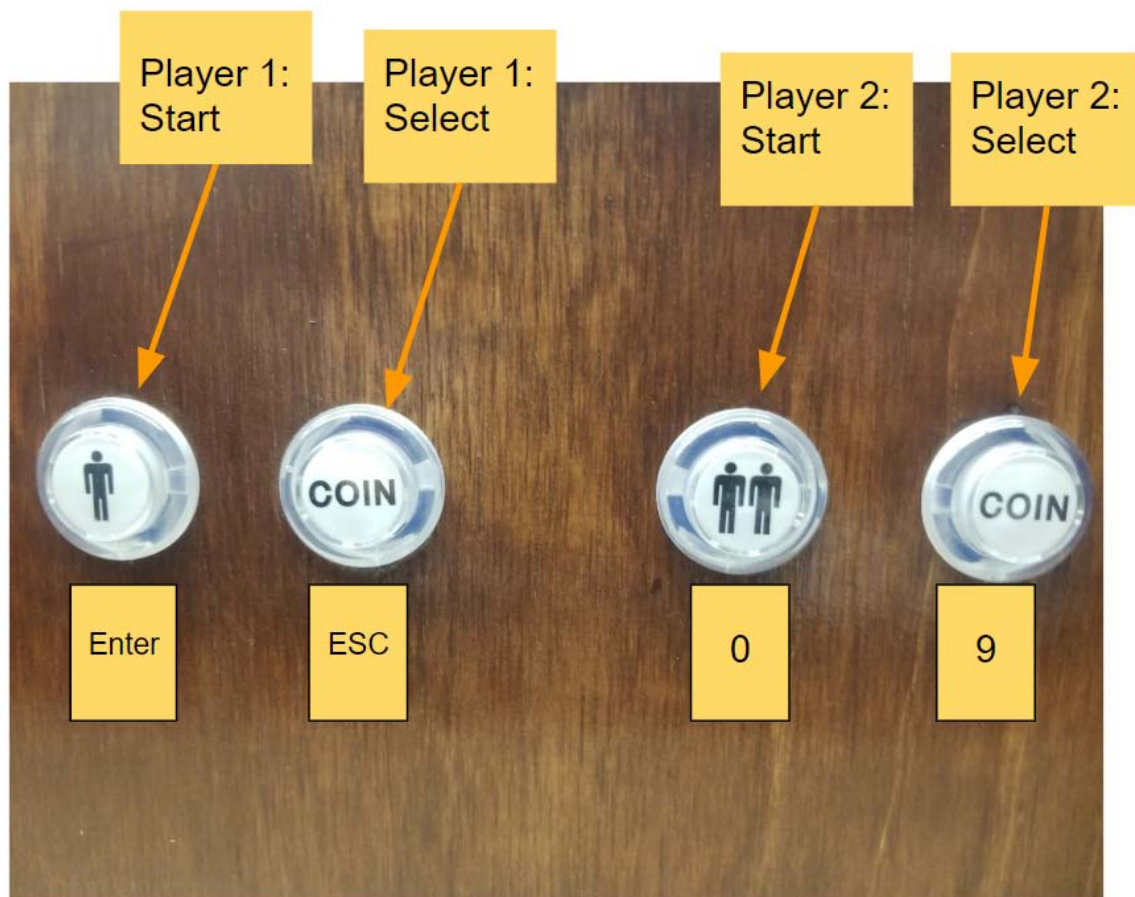


Figure 10: Start/Select Button keyboard Bindings

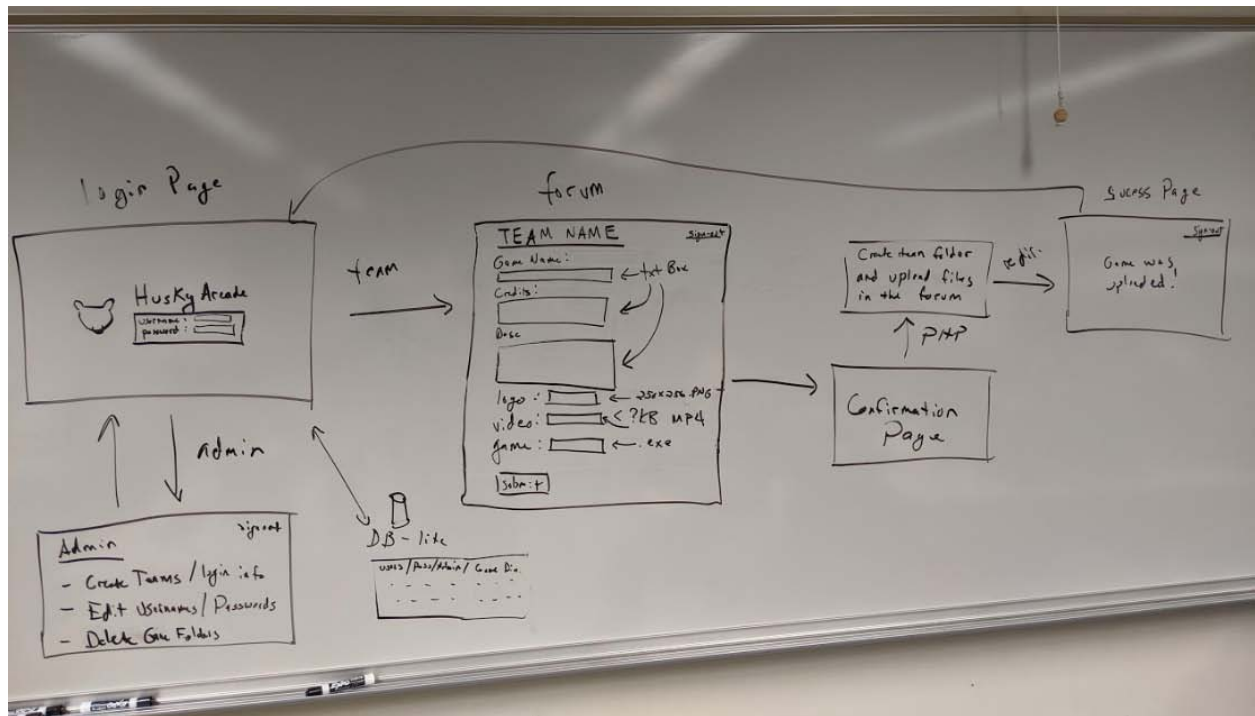


Figure 11: Design Flow Chart

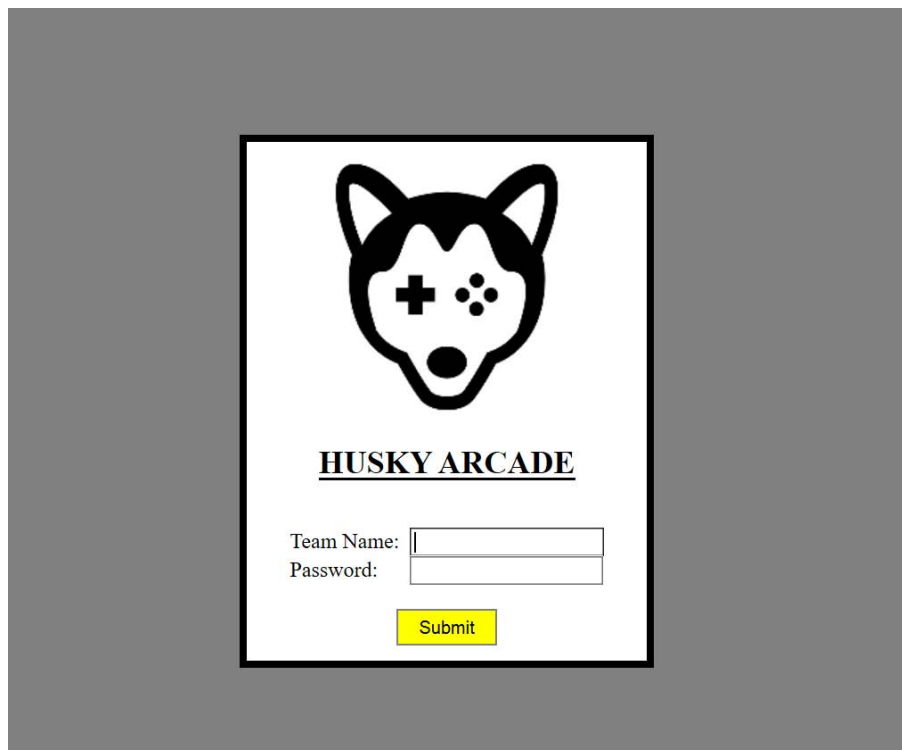
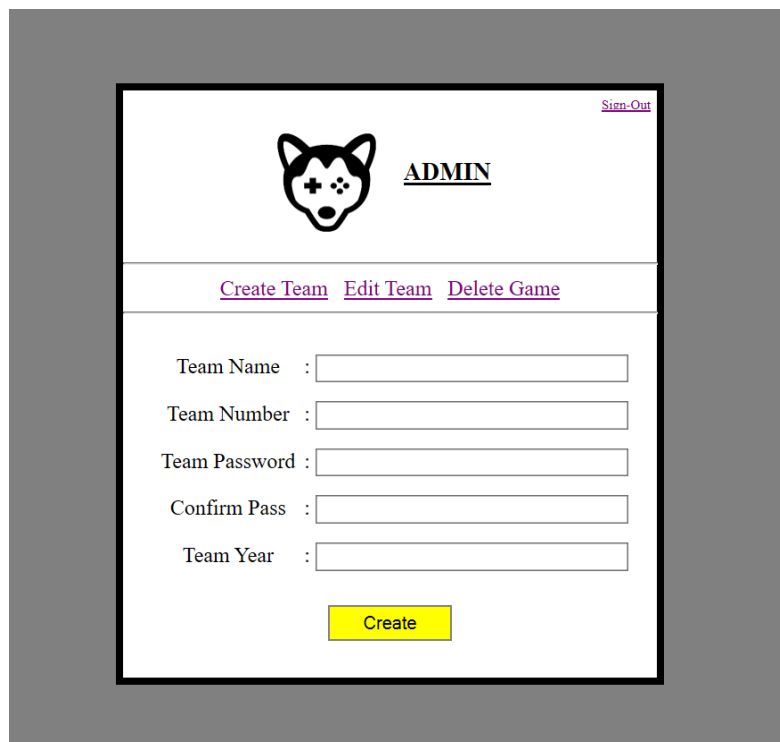


Figure 12: Game Loader Sign In Page



The screenshot shows a web interface for a team named "Team 11". At the top left is a logo of a husky head with a game controller overlay. To the right of the logo is the text "Team 11". In the top right corner, there are links for "Sign Out" and "Help". Below the header, the following information is displayed: "Year : 2020", "Name : Husky Arcade", and "Submitted : No" (where "No" is in a red box). The main form area contains several input fields: "Game Name" (a text box), "Game Zip Folder" (a text box with a "Browse..." button), "Game Logo" (a text box with a "Browse..." button), "Controls" (a text box with a "Browse..." button), "Game Description" (a larger text area), and "Credits" (a text box). A vertical scrollbar is visible on the right side of the form.

Figure 13: Game Loader Team Page



The screenshot shows a web interface for an administrator. At the top left is the same husky logo. To the right is the text "ADMIN". In the top right corner, there is a link for "Sign Out". Below the header, there are three links: "Create Team", "Edit Team", and "Delete Game". The main form area contains five input fields: "Team Name", "Team Number", "Team Password", "Confirm Pass", and "Team Year". At the bottom of the form is a yellow button labeled "Create".

Figure 14: Game Loader Admin Page



Figure 15: Arcade Cabinet with Marquee