

CSCE VetMed Vaccine Hesitancy Game

Final Report

Members/Roles

- Scrum Master: Drake Johnson
- Product Owner: Mary Julian
- Team Member: Aniket Patel
- Team Member: Kaushal Tungaturthy

GitHub Repo - https://github.com/RedHead17/CSCE_606_Project

Pivotal Tracker - <https://www.pivotaltracker.com/n/projects/2556119>

Deployment: <https://vaccine-hesitancy-game-606.herokuapp.com/>

Poster and Demo Video: <https://youtu.be/TP7ljwogJEI>

Slack: seteam11.slack.com

Motivation and Summary:

The main customer need for the VetMed Vaccine Hesitancy project is to help parents overcome their hesitancy toward vaccines by exposing students to an educational game that provides a non-threatening view of the Covid vaccine and vaccines as a whole. By getting the middle school students educated and excited about the vaccine, they will go back and educate their parents on the vaccine. This will make it so that the parents become less hesitant of vaccines and hopefully increase vaccination rates as a result. Our application will provide a fun opportunity for the students to learn about and feel less threatened by vaccines through a few arcade-style games. There are a few stakeholders for our project. The primary stakeholder is the parents of the middle school students. The main goal of this project is to lessen their vaccine hesitancy therefore they are our primary stakeholder. Another of our stakeholders is the children themselves as they are the group we are directing the information toward. Dr. Walker is another stakeholder as he is the customer for this project. Lastly teachers are a stakeholder because they are the ones who likely will oversee, or even promote, the students playing these games while in school.

The project resulted in two separate games based on older arcade games (Mario, Space Invaders). We took these ideas and themed them to fit the issue of vaccine hesitancy. The first game is a platformer based on Mario we called Vaccine Adventure. In this game the player is a doctor trying to get past the various virus particles. The doctor can shoot these particles with a vaccine syringe to destroy them. The doctor can also collect masks throughout the level to get a higher score. The second game is based on space invaders and called Viral Invaders. In this game there are viruses coming down to attack the player and the player is tasked with destroying them all before they come in contact. The viruses shoot down at the player that can also destroy the player. The player shoots back at the viruses to destroy them and advances once they are all destroyed. The player also has four lives available to them so that they have a chance to continue

playing even if the viruses shoot them. Our games meet our customer needs by showing the destruction of viruses through vaccines in both of the games.

User Stories

Feature: Game Selection:

As a player

So that I can choose a specific arcade game

I want a page that shows me all available games

Final:

Vaccination Arcade



Behavior: The games should load when the user selects from the Arcade

Feature: Playable Maps

As a player

So that I can navigate and play through a level

I want a map that is navigable for each level

Final:



Behavior: A new map should be loaded once a level is completed

Feature: Controls

As a player

So that I can navigate and play the game

I want easy to use controls that are documented

Final:



Behavior: The player should make a move left, right and jump using arrow keys and using the buttons for Touch enabled devices

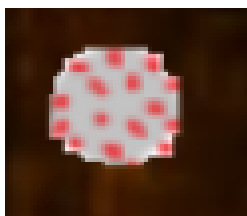
Feature: Mini Enemies

As a player

So that The player has an antagonist to defend against

I want A moving enemy, virus particles, to float and attack the main character.

Final:



Behavior: The enemies should move and attack with set speed when the player is in range

Feature: Collect Masks

As a player

I want to improve my score

I want to collect masks to increase the score

Final:



Behavior: When the player collects masks, the masks should disappear and score has to increase

Feature: Player Score

As a player

I want the score and level information to be displayed

I want the level and score to change as the game progresses

Final:



Behavior: The score and level information should be positioned at the top left corner and they should change as the game progresses.

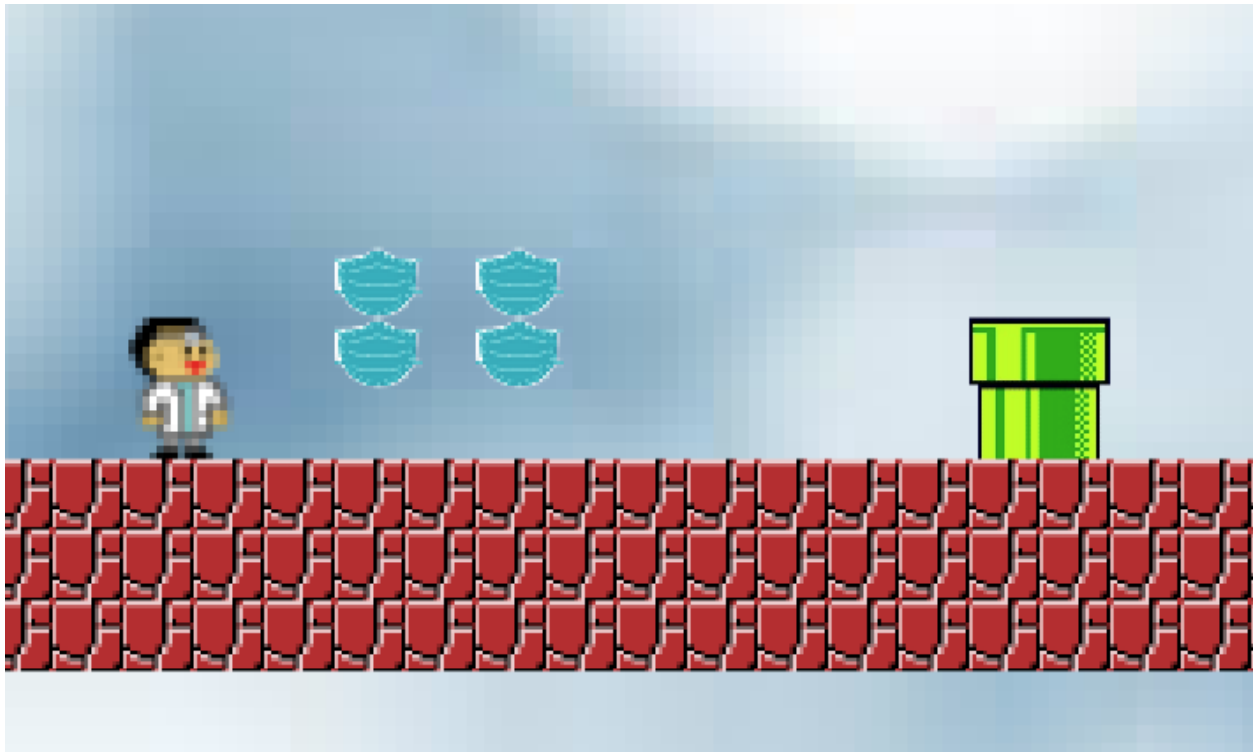
Feature: Finish Line (The Pipes are the finish)

As a player

So that I can advance to the next level

I want a finish line at the end of each level

Final:



Behavior: The game level should change when the player reaches the finish line(pipe) and all his upgrades should be retained

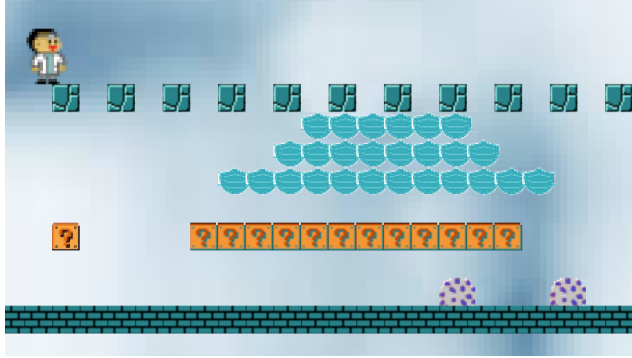
Feature: Enemy Aggro Range

As a player

So that enemies only attack me at a certain range

I want enemies to have an aggro range

Final:



(Enemies are not in aggro range, so they won't attack - Only affects the blue enemies)

Behavior: The enemies should attack only when the player comes in their range that is defined in the game

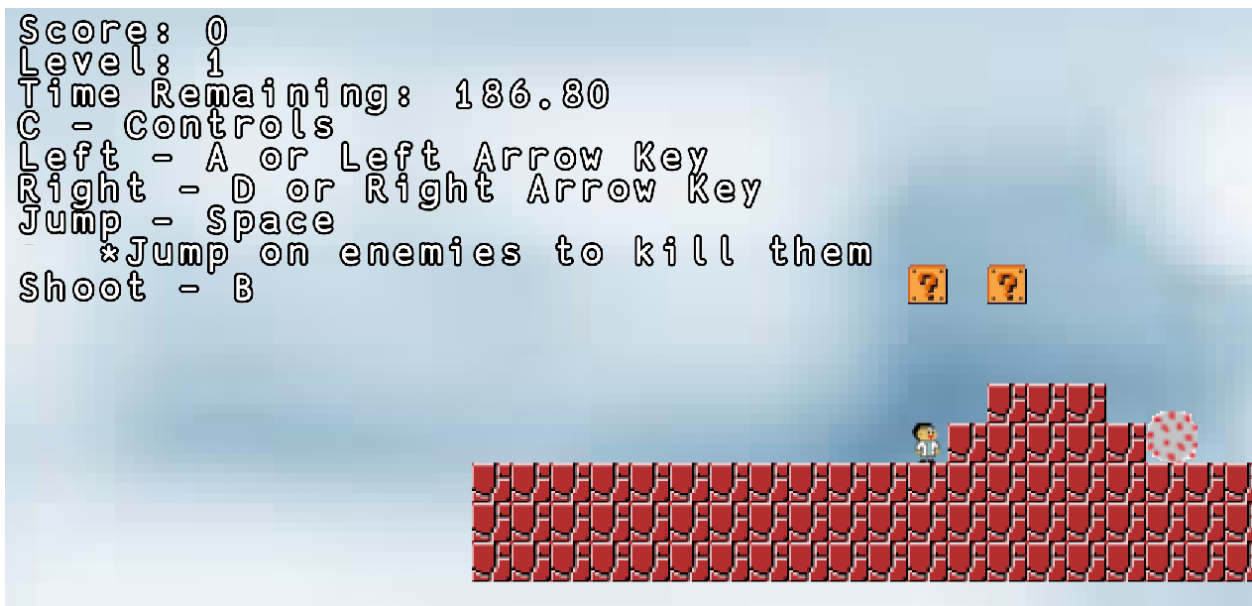
Feature: WASD Controls

As a player

So that I have a choice for different controls

I want to be able to use WASD as well as the arrow keys

Final:



(Controls info in top left if the player presses c)

Behavior: The player should move with either arrow keys or WASD keys

Feature: Change Opacity for Mobile Controls

As a player

So that I don't see the mobile controls on desktop

I want the opacity of the mobile controls to be 0 while on desktop

(As seen in other images there are no mobile controls appearing at the bottom)

Behavior: The buttons should not be visible in Desktop and should only be visible in Touch enabled devices

Feature: Adjust Framerate (Game has low framerate after updating enemy movement)

As a player

So that I have a smooth gaming experience

I want the game to run above 10 frames per second.

Behavior: The game should run smooth and fast with the adjusted framerate.

Feature: Add Congratulations Screen After last level

As a player

So I know I have completed the last level and so that I feel good for completing the game

I want to be congratulated for completing the game.

Final:



Behavior: The player should be congratulated and score should be displayed once the final level is completed.

Feature: Add Backgrounds to the Games

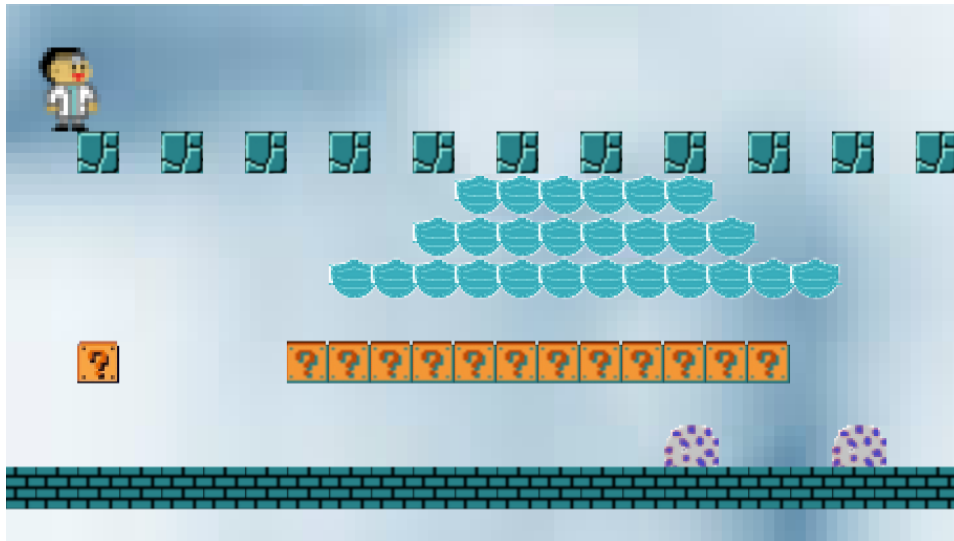
As a player

To increase enjoyment of the game.

I want to see a background while playing the game.

Behavior: When the player enters a game, the background on the screen should be a predefined, game specific picture.

Final:



(Background became an out of focus lab scene)

Feature: Add Music to the Games

As a player

To increase the enjoyment and immersion of the game.

I want to hear music while playing the game.

Behavior: When the user selects a game to play, the game specific music should be heard on a loop as the user plays.

(Can't see music)

Feature: Add a JavaScript Error Page

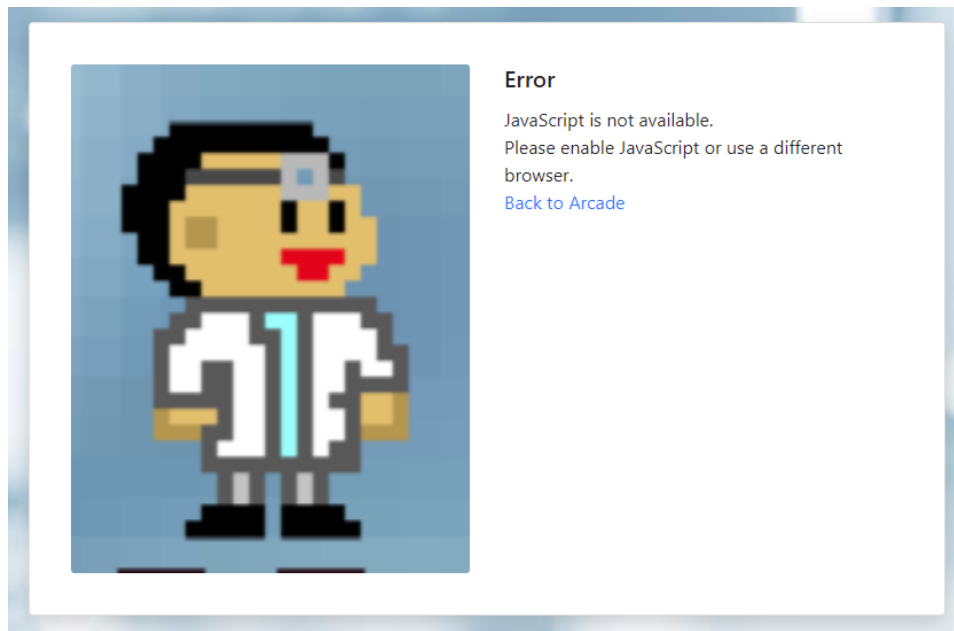
As a player

So I know why the games won't load.

In order to have a good experience and debugging information to use, I want an error page that displays the issue (Javascript not enabled) and next steps, enable Javascript or use a different browser.

Behavior: When the user disables JavaScript on the browser, or does not have JavaScript installed, the user should be taken to a JavaScript error page when they attempt to start the game.

Final:



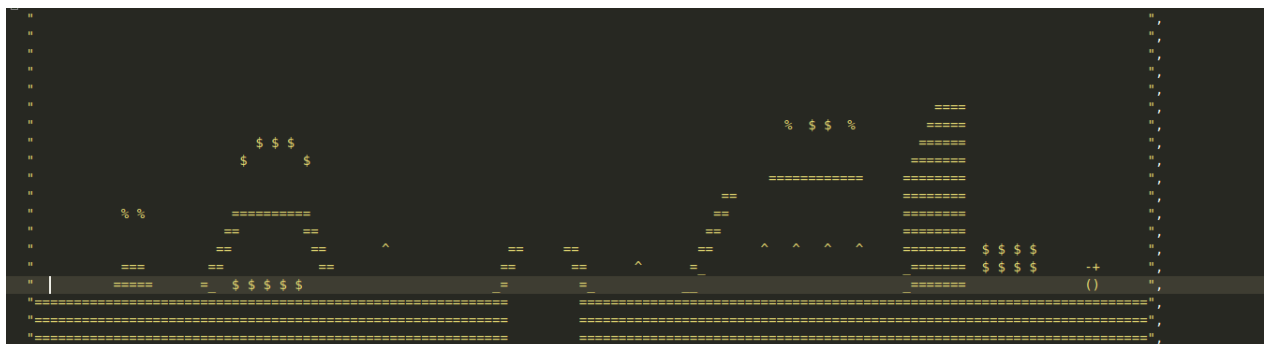
Feature: Mario Map design

As a player

So I have an enjoyable gaming experience

I want well made level maps to play

Final:



Feature: Update enemy animation

As a player

So I have enjoyable experience defeating enemies

I want smooth enemy animations

Behavior: For both ‘Vaccine Adventure’ and ‘Viral Invaders’, enemy movement will be smooth (updates per second > 10)

Feature: Invaders - add enemy shooting

As a player

So I have a challenging experience playing

I want the enemies to shoot at my character

Behavior: While playing the ‘Viral Invaders’ game, the enemy characters will shoot bullets towards the player character. As bullets hit the player, the total lives count will decrease. Upon the life count reaching zero, the player will be taken to a game summary screen.

Final:



Feature: Vaccine Information

As the client

So the player can learn about vaccinations and overcome their hesitation

I want information about vaccines displayed after every level

Behavior: While loading the next level of the game, vaccine and health information should be displayed on the transition screen.

Final:

Kill that hesitation regarding vaccines or that hesitation
will kill you

Loading next Level..Please Wait...

Feature: Menu and Info scenes for Space invaders

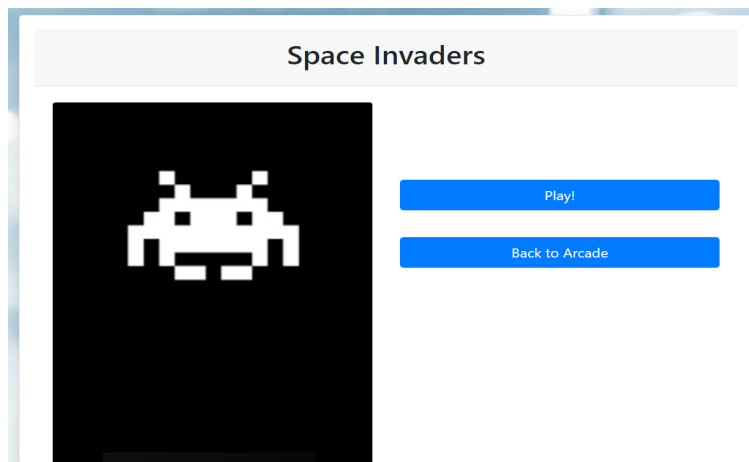
As a player

So I can choose between different games to play

I want a menu screen for the space invaders game

Behavior: After selecting the game from the arcade menu, or returning from the loosing/congratulations screen, a menu page specific to the selected game should be displayed allowing the player to enter the game or return to the arcade.

Final:



Feature: Invaders - Advance to next level

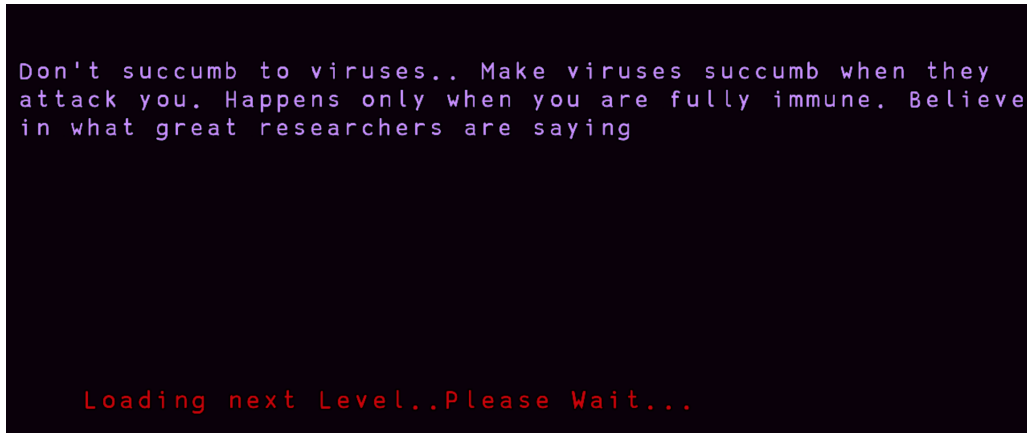
As a player

So I can advance through the game

I want different levels to the game so I can progress through the game

Behavior: Once the character has defeated all enemies in the level, they advance to the next level with a loading screen displayed between. The level number at the top left will be incremented.

Final:



Feature: Mobile Update:

As a player

So that I have mobile controls

I want to play the game on any mobile or tablet device

Behavior: The user is able to play all arcade games on a touch enabled device.

Feature: Invaders Level Progression:

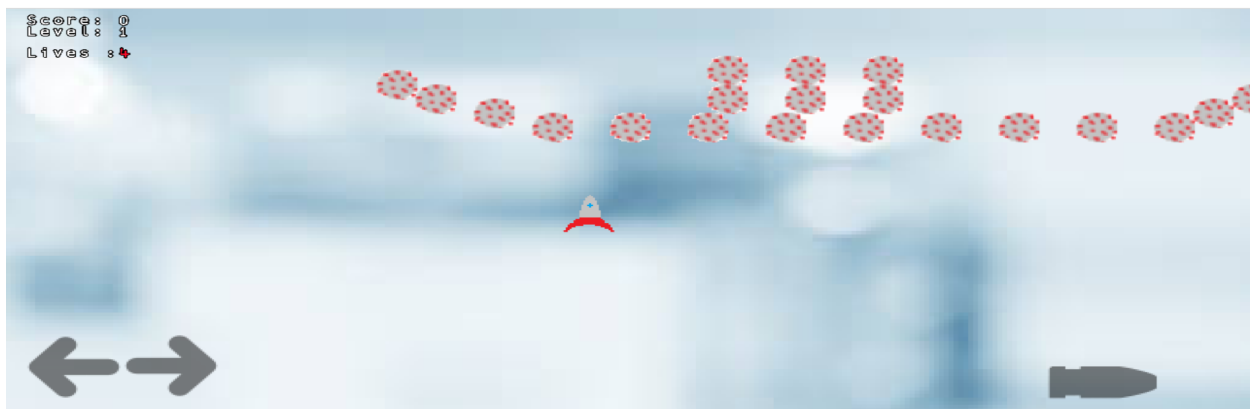
As a player

So that I want to progress through various Levels

I want to go to next Level when all the invaders are destroyed

Behavior: When all enemies are destroyed, the game advances to the next level.

Final:



Feature: Invaders- Make Enemies Centered

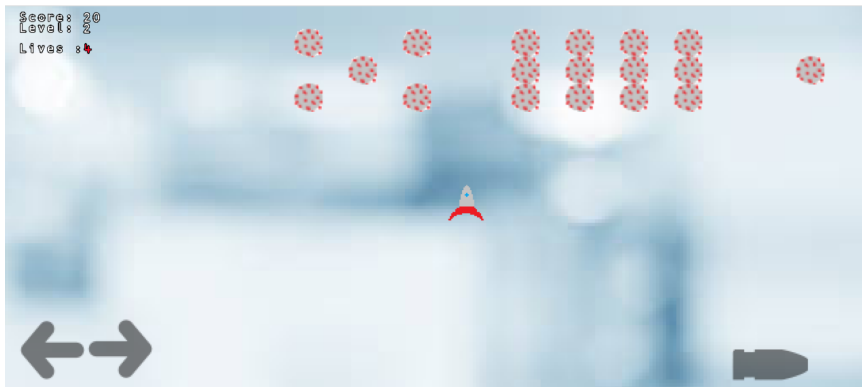
As a player

So that I want the invaders to be centered in the screen

I want the enemies at the end to be moving to the center when the enemies at the center initially are destroyed

Behavior: When the Space Invader game is loaded, the enemy particles are centered on the screen.

Final:



Feature: Space Invaders- Lives

As a player

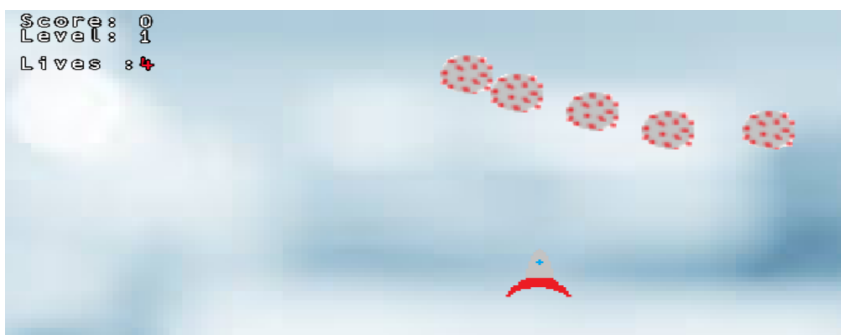
So that I have definite number of lives for each level

I want to continue playing the game even when hit by enemies till all the lives are exhausted.

I want to refresh the lives once a new level is loaded

Behavior: When the character gets hit with an enemy bullet or sprite, and has more than 1 life remaining, a life is removed and play continues.

Final:



Feature: New Levels To Mario:

As a player

So that I have more difficult levels

I want the game to have increasing difficulty and much more complex decision taking requirement

Behavior: When the character reaches the pipe at the end of the level, a new level is loaded.

Final:



Feature: When Mario is Big, Only reduce size on collide with dangerous

As a player

So that I want the player to be small initially

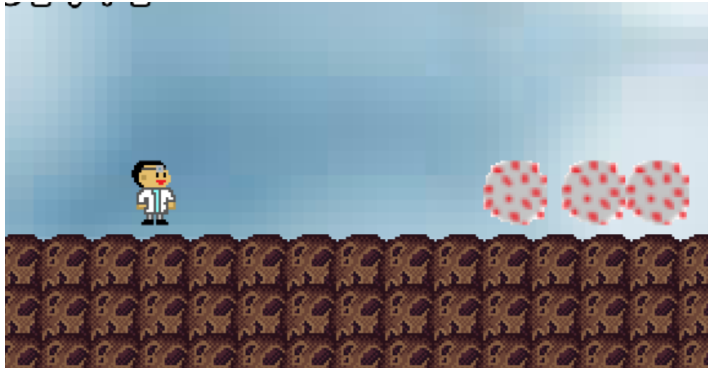
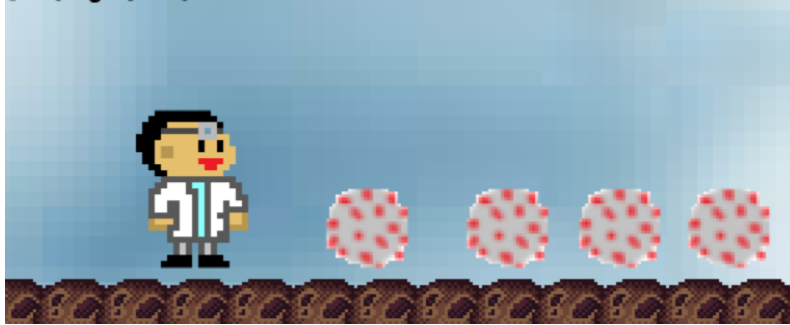
I want to the player to become big in size when vaccines are collected

I want the player to become small on collide with dangerous

I want the player to die when he is small on colliding with enemies

Behavior: When the character is upgraded, as shown with a scaled image, upon collision with an enemy particle, the character loses the upgrade and reverts to original size.

Final:



Feature: Enemies should be on top of blocks

As a player

So that I want the enemies to be on top of blocks

I want them not to coalesce with each other or blocks and clearly visible while playing

Behavior: When the Mario game is loaded, the enemy particles are always visible above the block map background.

Final:



Feature: Character Upgrades

As a player

Shooting ability after collecting vaccine

So that The character will receive bonus skills/buffs, incentivizing vaccine

I want The character to have increased abilities when collecting shots/boosters/masks/etc...

Behavior: When the player character collects a vaccine sprite, the character should increase in size, have higher jumps, the ability to shoot bullets, and only decrease in size upon collision with an enemy character.

Final:

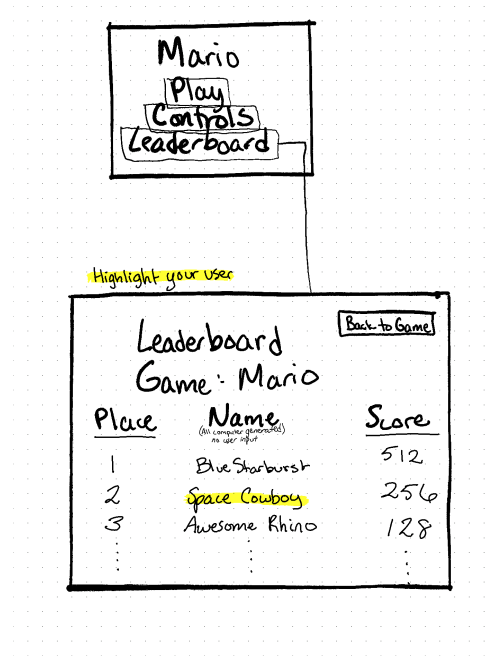


Removed User Stories

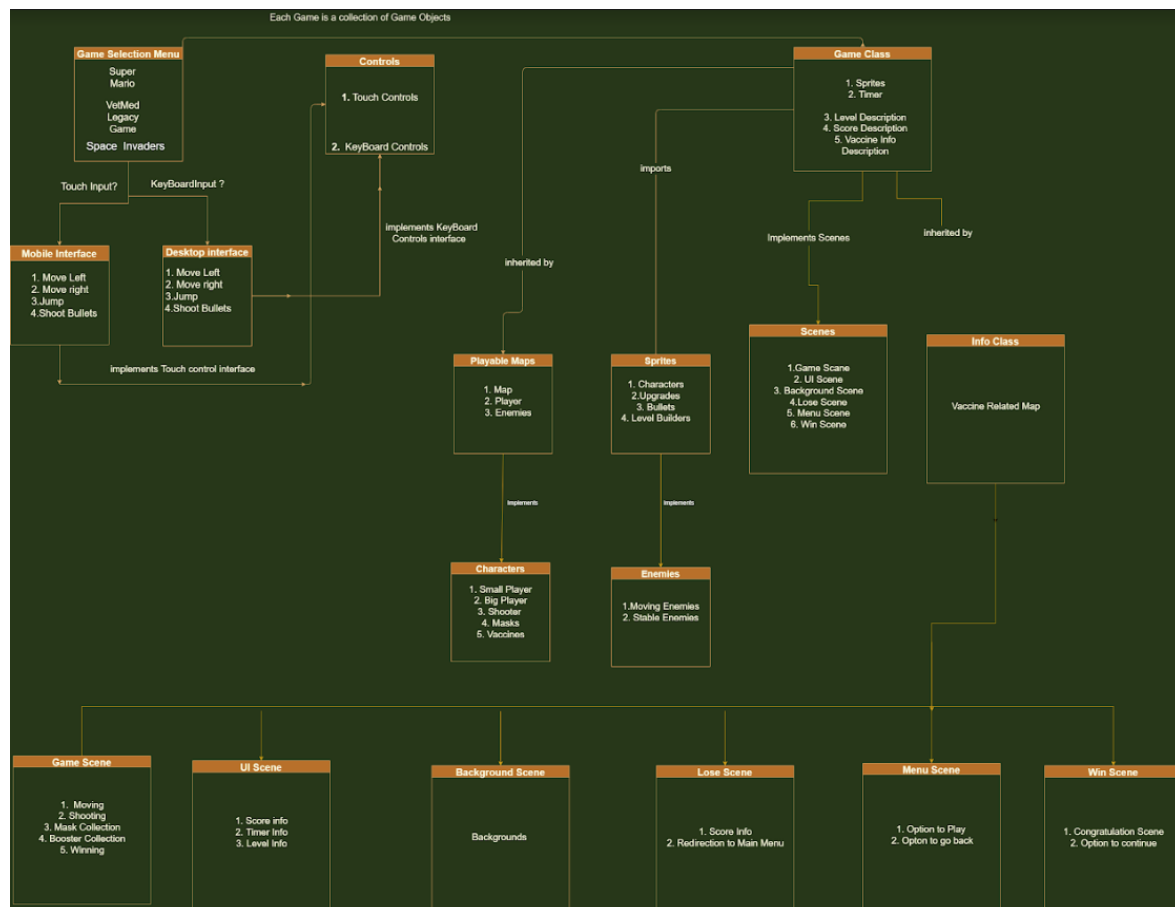
Leaderboards (Removed)

This was removed based on recommendation from Dr. Walker. The implementation would require some sort of database and there currently is none for the vaccine hesitancy site. Therefore, Dr. Walker recommended that we not worry about making a leaderboard.

Initial Design



Final Design Diagram



Scrum Iterations:

- Iteration 0: We met with Dr. Walker, explored game ideas, created mockups, created potential user stories for iteration 1
- Iteration 1 (10 points): Finalized Framework, designed a basic menu, maps and enemies that are quintessential for the game
 - Game Selection
 - Controls
 - Mini Enemies
 - Playable Map
 - Level Descriptions
- Iteration 2 (9 Points): Accomplished design of basic game with 2 levels, featuring enemies that attack only when in agro range, implemented flexible controls and information at the end of each level about vaccine hesitancy. Showed a small demo about our first game to Dr. Walker and considered his feedback for next iteration
 - Collect Masks (Coins)
 - Finish Line
 - Enemies should have an aggro range
 - Change opacity of mobile controls on desktop
 - Controls WASD and space to jump
- Iteration 3 (20 Points): Showed a basic demo of the new game to Dr. Walker, fixed framerate, added new levels, added Win screen, Music and Error messages, updated enemy animation to both games, made the invaders shoot when the player is in range
 - Congratulations Screen after last level
 - Framerate Fix
 - Mario Map Design
 - Update Enemy Animation
 - Invaders - Add enemy shooting
 - Vaccine Information
 - Menu and info Scenes for Space Invaders
 - Invaders - Advance to next level
 - Add Error Screen When Javascript Disabled
 - Character Upgrades
- Iteration 4 (18 Points): Accomplished the Mobile Controls functionality, checked its compatibility with most devices being used, polished the games, added new level, tested rigorously each and every feature, Added Player lives to Space Invaders and made the invaders centered. Also added the ability of shooting only when vaccine is collected to our first game. Exchanged series of emails with WebMaster about the deployment to VetMed Site
 - Update Sprites, Background and Music
 - Add Back and Forth Enemy
 - Mobile Optimization
 - Upgraded Mario Reduces size on collision

- New levels to Mario
- Invaders - Level Progression
- Invaders - Make enemies centered
- Ensure Compatibility with WordPress

Customer Meetings

2/25/22: We discussed what Dr. Walker would like for us to complete by the end of the semester. We also discussed with Dr. Walker where the last group left off. He said that the previous group completed their game, and we should begin work on a separate game(s). Dr. Walker also gave us access to the previous group's source code and documentation so that we can possibly reuse elements in our game(s). Dr. Walker didn't have any specifics in mind for a game and is allowing us to come up with the idea ourselves.

3/3/22: We presented Dr. Walker with the various user stories and UI mockups, as well as our general plans for the remainder of the semester. One point made was to ensure that the games are working on mobile as well as on a desktop. We also removed our leaderboard user story based on Dr. Walker's recommendation. Similar to the first meeting Dr. Walker reiterated that we don't need to worry about the game that was made from the previous group and only need to focus on ours.

3/17/22: We presented Dr. Walker with our current version of the first arcade game we are making. We also showed a very early demo of a second game that will be made after completion of the first. Dr. Walker is allowing us to determine how many games we should make, and we have currently landed on at least 2 and a possible third if time permits. Dr. Walker's main comment on the games is to make sure the core game works properly then polish the game with things like new sprites and backgrounds. He mentioned that we should contact the webmaster of the VetMed site to discuss what they need to deploy our games on the main site. We plan on contacting them early during the next iteration.

3/31/22: We had a brief meeting with Dr. Walker where we updated him on our progress for the project. We demoed the mario game and explained some of the things we had changed or added since our last meeting, such as having a proper ending for the game. We explained our plan to create a space invaders type game, our ideas and early plan for it. He suggested that after we finish making space invaders, that we focus on testing and making sure the existing 2 games we have work correctly and smoothly instead of adding

(4/14/22) - We had a brief meeting with Dr. Walker where we updated him on our progress for the project. We demoed the mario game, space invaders and explained some of the things we had changed or added since our last meeting, such as having a proper ending for the game. We also showed him our second game-"Space Invaders", and implementation details and the game in action. He suggested that after we polish the games to a greater degree and then focus on testing and making sure the existing 2 games work correctly on ServerPress. He suggested that we

contact the Webmaster and demo about the two games. He told us about the event where the demo of the games takes place in the first Week of May.

Understanding Legacy Code:

Our project was listed as a legacy project, but our work was completely independent of the original group's work. This was based on what the customer wanted from us. We also used a different game framework for our project therefore we didn't need to understand the previous group's code. We did however take their documented advice that testing frameworks have issues working with the game frameworks and decided that manual testing was the best way for us to test features.

BDD/TDD Process:

Tests are usually written before implementation, but for a game that was built with the Kaboom framework with evolving implementations dependent on customer input, we could not actually use TDD. We had to have users manually test and document the features in the game because normal testing frameworks (e.g. Mocha) do not work with Kaboom. Thus, less TDD and more rigorous BDD was used in testing.

Testing is essential in making the game work as implemented; however since it is not compatible with TDD, we had to manually test each element and use mostly BDD, then document it in the test.md file. Testing by playing the game ensures that the features work as implemented, makes finding glitches faster and helps gain knowledge on possible improvements to the game.

Code Tests and Evaluations

To reiterate, our testing is done manually as testing frameworks cause issues when implemented with our game framework. All manual tests can be found in the GitHub repository under tests2022.md.

For code evaluation we used JSHint as the entirety of our game scripts are written in JavaScript. The .jshintrc.txt files in both games' source directories are used to configure JSHint to the correct version. Evaluation tests were run on the two game.js files in the respective game source folders. For the space invaders game there were 0 errors and 3 warnings. These warnings are related to the functions that update the players remaining lives. The evaluation for the mario game source code resulted in 0 errors and 2 warnings. These warnings were related to the timer functionality.

The code evaluation reports can be found in the tar file as 'invaders_codereport.html' and 'mario_codereport.html' for the Space Invaders and Mario games respectively.

Configuration Management Approach:

We used GitHub, Heroku, ServerPress/WordPress, and Cloud 9 along with VSCode to manage our code and allow real time collaboration without having to worry about installing dependencies and other installation issues. After collaborating on code in Cloud9, it gets pushed to GitHub. Once an iteration was complete, the code was tested a final time and pushed to Heroku. We didn't do any spikes. We decided beforehand what needed to be done, we equally divided independent tasks and were able to make progress. We had 19 branches, 36 pull requests, and 4 releases by the end of the iterations and one final release. The final release was copied to the WordPress VetMed Vaccine site using File Manager.

The production site is the VetMed Vaccine Hesitancy, a WordPress based website. In order to verify that the code worked on WordPress, we first hosted the code locally on the DesktopPress version of the site.

Issues:

We have not had any issues with the production release process to Heroku, AWS Cloud9, or GitHub. In order to run the Node.js content on Heroku, a Heroku postbuild script was added to the package.json file. We also needed to remove the "type='module'" lines from the html files to run on Heroku. It took a while to adjust and become familiar with using Kaboom. When testing, since we used Kaboom, we could not use frameworks like Jasmine and Mocha for BDD, so we relied on manual testing.

When moving our code to ServerPress to ensure that it worked on a WordPress site we ran into some issues. First, we needed to update every path in the html pages to be relative, the absolute paths from root were not located. Next, the import statements at the top of the JavaScript files were also unable to be located. Changing them to relative paths did not work, so we moved the code from separate files to the game.js files. This may be looked at in future iterations. Finally, Kaboom would not load as a downloaded package from the node_modules folder although it worked locally. We added a module script block referencing "<https://unpkg.com/kaboom/dist/kaboom.js>" to load Kaboom in the html page.

Other Tools:

Kaboom is an open-sourced JavaScript framework for making 2-D games. It is beginner-friendly and has many tutorials and a large active community. The documentation for the framework is strong and clearly explained with real examples which has a benefit in dealing with errors and bugs especially in case of games when manual testing needs to be severely performed to ensure the proper running of the game.

Imgur was used to host the images of sprites for the games. Bootstrap was also used in the construction of the html UI elements in the Arcade selection and game menus. Specifically cards and flex grid to make sure it works on a variety of device layouts.

Since our code is written in JavaScript we used JSHint to run our code evaluations. This was not done until later in the project and was an oversight on our part. JSHint runs a script that evaluates the JavaScript file and produces an HTML file that highlights any issues in the code.

Repo Contents:

The repository (https://github.com/RedHead17/CSCE_606_Project.git) has all of the configuration required to run the code. The folders 'src_mario' and 'src_invaders' contain the files required for those games respectively. The package.json file the node.js scripts and dependencies required for the site.

The game.js files in the 'src_mario/src' and 'src_spaceinvaders/src' folders are the main javascript files that run each game.

In order to start the code, follow these steps. The ReadME describes the process in more detail:

1. Install node.js and parcel on the machine
2. Open a command window at the repository root directory
3. Install the dependencies:
 - a. npm install -g parcel-bundler
 - b. npm install kaboom
 - c. The dependencies will be installed to the 'node_modules' folder
4. Execute command "npm run start"
5. The site should be running at localhost:1234
6. Some machines throw an error with the 'type="module"' line in the html files. The error would look like 'error "parcelRequired is not defined"'. Remove 'type="module"' from the files 'src_mario/src/mario_game.html' and 'src_spaceinvaders/src/invader_menu.html'
 - a. Note: the module type is retained to support the WordPress site.

In order to run the JSHint code evaluator:

1. Ensure that JSHint is installed
2. Navigate to the src directory in the desired game folder
3. Run "jshint game.js"
 - a. Note, you may need to specify the path of the jshint executable if it has not been added to your path.