REPO NAME: szou0814/imPACt

APCSA Design Document

1. Intro

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Period 2

Group Name - Sarahbyte (like "Terabyte" :))
Project Title- ImPACt: A Pac-(Wo)Man Inspired Game Empowering Girls Who Code

2. Description

ImPACt is an action maze chase video game inspired by the classic Pac-Man, but with a feminist twist to empower girls who code—along with girls in other S.T.E.M. fields: instead of the regular Pac-Man avatar, the user is represented by a girl avatar who traverses through the maze, which represents her journey of fighting and escaping obstacles to achieve her goal of becoming a programmer; the food represents various coding achievements such as successfully completing lines of code and winning competitions; and the ghosts represent damaging negative thoughts. The game features numerous modes and levels that vary in difficulty.

The game was influenced after seeing how few girls were in our APCSA class and how classic video games were generally only marketed or seen as "for boys" in the past.

Functionalities:

- Start/End Screen:
  Booleans will be used to determine the current status of the game and switch between the start, game, and end screen. These screens will be designed utilizing PFont and PImage. The start and end screen will also have buttons to start and restart the game that will be created using mousePressed and by tracking mouseX and mouseY.
- Avatar Customization:
  The start screen will allow players to customize the hair and skin color of their avatar using keyPressed and booleans to switch between hairSelectMode and skinSelectMode with arrow keys.
- Difficulty Selection:
  The start screen will allow players to choose the difficulty of the game mode, stored within an array, using keyPressed. There are three modes: easy (2 ghosts, slow speed), medium (3 ghosts, moderate speed), hard (3 ghosts, fast speed).

  Possible Added Functionality: for each difficulty, there will be a different number of lives before the game is lost
- Random Maze:

A random maze will be generated at the start of each level; some of the logic and code that we learned and implemented in our maze lab will be used to help with this.

- Power-Ups:
  Generated randomly, some of the foods will have different power-ups that will be applied to the avatar or the ghosts using PVector. Some possible power ups may be: immunity, speed boosts, and score multipliers.

  Possible Added Functionality: these power-ups will be time-sensitive, and will disappear if they are not eating after a certain number of ticks have passed.
- Levels:
  Once all the food in a map has been eaten, the level has been won and a new level will be generated (a maximum of 3 levels). With each level, the game will become more difficult: the ghosts may become faster as their speed increases through adding PVectors, or the effects of the power-ups may decrease.
- Score and Timer:
  The score will be the sum of points gained from the food and power-ups and it will reset once the game is lost. The timer will be calculated through the amount of ticks.

Possible Functionality:

- Different Types of Ghosts:
  Each ghost will have different aspects to them: for example, one ghost may be faster but more affected by power-ups and give more points, and another ghost may be slower but more immune to power-ups.

Libraries:

- Sound by The Processing Foundation
  This library will be used to add background music and sound effects (for power-ups, winning, losing, etc,) to the game.

  This is tentative and may not be included in the final version because the sound files take a long time to load, especially as more are added. I am currently researching if there are any ways to make this more efficient.

3. UML Diagram

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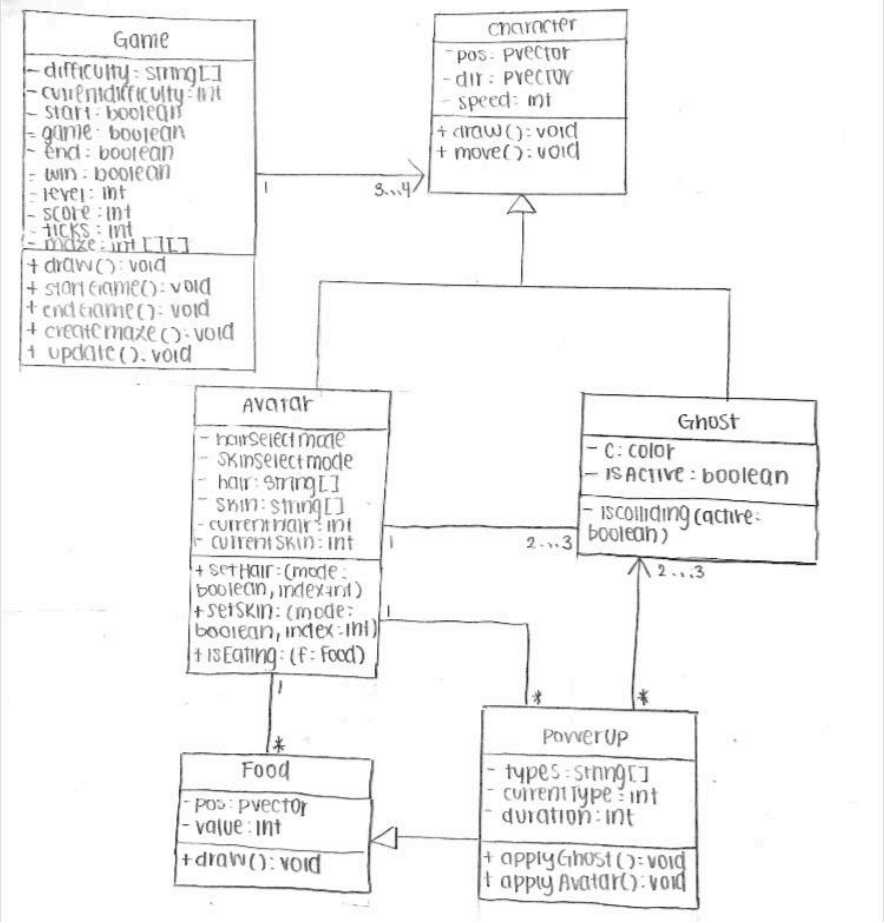

This is tentative as the diagram will be changed once I start coding and figuring out what variables, methods, and classes that I will actually need. I drew the diagram by hand because the websites kept crashing my computer and causing me to lose my progress.

4. How does it work?

The objective of the game is to successfully become a programmer by passing all levels and receiving the highest score possible within the least amount of time. Similar to the original Pac-Man, to complete a level, the avatar must eat all food and increase their score through power-ups without being killed by a ghost.

When players first run the game, the game may take a while to load due to the processing of sound files. Players can use their mouse to click on the start page's button to start the game.

- To customize avatar: press the key "h" to set hairSelectMode to true and use arrow keys to navigate through all the hair color choices; press the key "s" to to choose skin color. Only one mode can be selected at one time; press the key again to set it to false and to select another mode.
- To select difficulty mode: press the keys "1" (easy), "2" (medium), and "3" (hard).

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- To move the avatar in the game: press the keys “W” (move up), “A” (move left), “S” (move down), and “D” (move right).

Once the game is over, players can again use their mouse to click on the end page’s button to restart the game.