**Design Proposal Youwei Jiang**

**Updates are colored in Red**

Project Name: 8 Ball Pool Game!

**Project Description: Project Description: A fun 2 Player 8 Ball Pool Game that follows the general rules of 8 ball Pool Game. The Player could choose to move the mouse to find appropriate force and angle, and press the mouse to release the cue stick to hit the cue ball. Whoever first knocks in all the pool balls(without violating the general 8 ball pool rules) wins. There are two game modes: Two Player Mode(Player 1 vs Player 2), and One player Mode (Player 1 vs Adversary AI). The AI mode will utilize simulations and optimizations.**

**Competitive Analysis:**

**The similar projects that I have seen online are mainly 1 player pool game, with crude designs of the physics module of balls and the graphics. Also, it did not include any Game AIs.**

**My project will be similar to those projects online in terms of general pool ball graphics and rules. All moves in my project will be following the general 8 ball pool game rules. All the graphics of balls drawn will be following the general 8 ball pool game rules( in terms of ball size and ball color).**

**My project will be different from the projects online in terms of:**

1. **The addition of two player mode**
2. **The addition of Player vs AI mode**
3. **The enhanced user experience and improved physics module**

**Structural Plan:**

**Only One main Python File is used. Additional Pool Ball images and music files are added in the zip file.**

**Algorithmic Plan:**

**The trickiest part of my term project will be the Physics Model and Adversary Game AI part. I have completed the physics model using inelastic collision, the law of conservation of momentum, and trigonometry calculations.**

**I have utilized the algorithmic methods taught in The Game AI mini Lecture, such as Monte Carlo, Heuristic, Optimization and Simulation methods to implement my game AI. For different difficulties of Game AI, I plan to randomly select some combinations of forces and degrees from all the simulations, and pick the best simulation out of the random simulations to set the AI hit.**

**Timeline Plan:**

**Already Implemented:**

1. Pool table
2. Game Menu
3. Obeying the basic 8 ball pool game rules (Drawing different colors of balls and numbers on it, balls in)
4. 90% The Physics Module (Collision, friction, speed, position, angle, trig functions… Use of mouseDragged and mouseReleased to generate force of the cue stick to hit the cue ball, the force will be reflected by the length of the cue stick and the initial speed of the cueBall)
5. Finishing Up the Drag, Release of the cue stick and the implement of forces (By Nov 19, Friday)
6. Finishing Up all the basic Physics Model (By Nov 20, Saturday)
7. Finishing Up The basic features that needs to be implemented for a 2 Player Mode (Hopefully By Nov 21, Sunday, deadline by Nov 22, Monday)
8. Improving the user interface and stability of 2 Player Game Mode (By Nov 22, Monday)
9. Finished between TP1 and TP2
10. Have a good start on the basic algorithms of Adversary Game AI (By Nov 23, Tuesday 10pm TP2 due time)
11. Finish up all the adversary AI implementation on Thanksgiving Break (By Nov 28, Sunday)
12. Refining the physics model (implementing rotational friction and the graphics of rotating pool ball) (By Nov 30, Tuesday)
13. Adding Additional Features (Listed Below) (Nov 28 – Dec 1) TP3 Due on Dec 1 5pm
14. Revise the Physics Model (Nov 28 – Dec 1) TP3 Due on Dec 1 5pm

**Additional Features (Post MVP):**

1. **Automatically, two player mode**
2. **Finish designing the Adversary AI**
3. **Background sounds(3 sounds) simulation using pygame**
4. **Improved User Interface**

**Version Control Plan:**

**I have uploaded all the files of my Term Project in a folder, to Google Drive.**

**Graphical user interface, text

Description automatically generated**

**Module List:**

**I have used cmu\_112\_graphics.py to design the game, and I used pygame after reaching the MVP to play background sounds.**