**Term Project Proposal**

*Project Description: Tanks Battle*

This project is an 2D tanks shooting game with both single-player and multi-player modes. In the game, each player will control a tank in a maze and shoot at each other. The player who achieve the ultimate goal is the winner.

*Competitive Analysis*

There are many similar projects online and the ground rules are similar. A player loses one life when they get hit by the bullet. The battle happens in a maze with walls as obstacles so that the players can’t just wandering around freely. However, my project will add more features and modes. Players are born at a corner in the maze. Each player will have 8 lives. When a player gets hit, he will lose one life until the life number is reduced to 0. When a player has 4 kills, his weapon system will be updated with a more aggressive attack mode. There are also bonus features appeared randomly on the map. Each block of the obstacles will also have a random life and can be destroyed. Also, there is an airraid mode that for every two minutes there will be bombs dropping down randomly which also takes one life from the player if got hit.

*Version Control*

Back up on Google Drive.

*Module list*

Pygame, Sockets

*Timeline*

*TP1 (April 9 - 16):*

1. Get the tech demo ready. Incorporate sockets with pygame.
2. Complete the map, with both a maze mode and a random obstacle mode.
3. Try to add players in simple shape and make them interact in the map.

*TP2 (April 17 - 24):*

1. Have the players interactions completed.
2. Add an AI.
3. Add the attack feature and other bonus features.
4. Add the airraid mode.

*TP3:*

1. Refine the images and features in the main game.
2. Add menu and options (buttons).
3. Complete the Sockets interactions.

*Structural planning*

# frame

# object Character

# attribute name

# attribute location

# attribute angle

# attribute health level

# function move

# function rotate

# function collideWithBlock

# function makeBullets

# function collideWithBullets

# function draw

# object AI inherits from Character

# function chase(Character)

# function makeBullet(Character)

# function draw(Character)

# object Player inherits from Character

# attribute kills

# attribute PID

# function makeBullet

# function draw

# object Block

# attribute position

# attribute image

# attribute each block’s size

# attribute pattern

# function draw

# object Star inherits the Block

# attribute position

# attribute image

# function draw

# object Bullet

# attributes position, size, angle, speed, damage

# function moveBullet

# function collideWithBlock

# function isOffScreen

# function draw

# object specialBullet inherits from Bellet

# attribute speed, damage

# function draw

# object Bombs

# attribute position, speed, size

# function move

# function collideWithPlayer

# function draw

# object Missiles inherited from Bombs

# function move

# function draw

*Algorithmic plan for AI*

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# First: Make an AI player

# - the same as generate other players, at the top-left corner of the map

# - the AI has basically the same character as the player except the updated mode

#

# Second: AI’s movements

# - the AI can move horizontally, vertically, and diagonally towards the player

# - Incorporate A\* algorithm to determine AI’s movements:

# - open list & closed list

# - F = G + H

# -Using pacman algorithm.

#

# Third: Make the AI shoot

# - as long as the distance between the AI and player is within two block’s size, it automatically shoots at the player’s direction.

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*TP3 Update*

1. Features are regulated and some new added. The star can update the bullets. Players can make their own blocks when has a kill greater or equal to 4 and go through walls when has a kill greater than six.
2. Bombs: the red bombs are static and appear randomly on the screen, and the greens ones will be bouncing on the screen.
3. The start menu is added and a background music sill play along with it.
4. The images of players are added above the player blocks, and the blocks are replaced by the images. There’s also a background for the game.
5. Game end state is added.
6. There are modes of 3 and 4 players.