

**GAME ALGORITHMS (TGD3351)**

**TRIMESTER 1 2020/2021**

**Milestone Report #2**

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| **Student ID:**  1171101517 | **Student Name:** Michelle Chai Mei Wei |
| **Student ID:**  1171100973 | **Student Name:**  Foo Fang Jee |

# Work Done

1. Boss

We have implemented finite state machines on boss where the boss has 3 states which are avoid, attack, attack faster. Boss will enter avoid state when the player starts firing. Boss will move to left or right depends on the player position. Boss will enter attack state after player stops firing. In this state, boss will move towards to the player and fire towards the player if the player is within line of sight at fire rate of 150 milliseconds. Boss will enter attack faster state once the life is less than 30% and the boss is in attack state at fire rate of 75 milliseconds. Currently, boss will stay in avoid state if the player keeps firing, we plan to change the state to attack if the player fires for more than 10 seconds.

1. All the enemies – enemy\_1, enemy\_2, boss

The line of sight algorithm for all enemies, except asteroid (since they do not fire bullets) are completed. It takes into account distance from enemy to player, the angle distance, and a Bresenham line check is performed to find any obstacles in between the enemy and player.

1. Missile

Player can shoot a missile with a cooldown of 10 seconds. We have implemented pathfinding for the missile’s path using A\* algorithm and Bresenham’s Line Algorithm.

1. Pattern movement

Implementation of a Catmull-spline curve is done, but the implementation of the curve to the positions of the enemies still needs more work.

1. Turret

# Upcoming Task

## Coding

1. Pattern Movement
2. User Interface (UI)
3. Powerup
4. Pause Scene
5. Level design

## Documentation

1. Final Report

# Problem Encountered

## Pathfinding causes the game to lag

When we first implemented the pathfinding algorithm through A\* algorithm, we considered all the coordinates in the game scene, as in every single pixel, and this had caused A\* algorithm to have many possibilities in exploring the nodes.

# Proposal Revision

1. **Powerup**

We plan to add some powerups such as changing the bullet pattern/invulnerability and such.

1. **Tutorial (pop up)**

The first level will be a super easy level, where we allow the player to learn the mechanics of our game, shoot (space bar), missile (z), move left, right, up, and down.

1. **Pause Scene**

We may also add a pause scene when the player presses the “Enter” key, where the player can choose to continue or quit the game.