**Computer Science**

**Final Culminating Project – Greenfoot Game**

**Project Proposal**

**Jack Ding**

Game Name:

Deep Space Defenders

Purpose / Objective:

The purpose / objective of the game is to survive and avoid the asteroids and enemy saucers as long as possible

How Purpose / Objective is Achieved:

The purpose / objective of the game is achieved through many different ways:

1) Manoeuvring the ship around the asteroids and enemy saucers using ship controls

2) Using the ship’s guns to destroy incoming asteroids and enemy saucers

3) Collecting power-ups for the ship to aid it in avoiding and destroying asteroids and saucers

4) Collecting the minerals obtained from destroyed asteroids to build various turrets and defenses to help the ship avoid and destroy asteroids and saucers

\*\*The user is expected to go beyond simply avoiding and shooting the asteroid and saucers, and to actually take advantage of the features listed in 3 and 4 for the best playing experience

Incentive for Doing Well:

1) Getting a high score

2) Reaching different “stages” in the game: for instance, surviving long enough so that shielded saucers enter, or saucers arranged in increasingly difficult configurations

Core Features:

\*\* Please refer to the drawn image of what the game is expected to look like (with all of the additional features implemented)

1) SCORE COUNTER: Keeps track of the score that the current user is at. The score increases with the number of saucers and asteroids destroyed so far

4) HP COUNTER: Keeps track of how much life the ship still has. The HP of the ship is lowered when it collides with saucers and asteroids, and increases when the ship collects health power-ups

7) SPACE SHIP: The main actor in the game. It is controlled by the user, and must avoid asteroids and saucers. It also has the ability to shoot

11) ENEMY SAUCERS: One of the two enemies in the game. The saucer flies towards the ship, trying to destroy it. It can also be attracted to built defenses

Additional Features:

\*\* Please refer to the drawn image of what the game is expected to look like (with all of the additional features implemented)

2) POWER LIMIT: Keeps track of how many defenses are on the screen, and limits the user to a certain number of defenses in the game at once

3) ACTION BAR: Keeps track of what the ship is currently doing in terms of defenses. It will also show when the ship is unable to build defenses

5) PAUSE/HELP: Helps to either pause the game, or pauses the game to bring up a help menu, with the ability to look into each defense, and lists the basic objectives of the game

6) MINERAL COUNTER: Keeps track of how many minerals the user has collected

8) BUILDING: Allows the user to build different defenses at different places on the screen. When building, the ship is not able to shoot, and can’t move, leaving it potentially susceptible to enemy saucers or asteroids. More complex defenses require more time to build

9) MINERALS: When an asteroid is destroyed by the ship, minerals are released. These can be collected by the ship, in order to build defenses

10) ASTEROIDS: Pieces of rock that float through the screen. These are harmful to the ship, but can be destroyed from a distance to release helpful minerals

12) SAUCER CONFIGURATIONS: As the game progresses, enemy saucers may spawn in certain configurations

13) SHIELDED SAUCERS: As the game progresses, enemy saucers may spawn with shields, which require more hits to be destroyed

14) DAMAGED DEFENSES: If asteroids or enemy saucers collide with defenses, they can be damaged, and eventually destroyed after a certain number of hits

15) HEALTH POWER UP: Gives the space ship more health. It is temporary.

17) TIME POWER UP: Slows down time for everything on the screen to allow for greater accuracy and agility. It is temporary.

18) MORTAR POWER UP: Gives the ship a mortar missile, which can be shot and exploded either by impact or by the user’s control. It is temporary.

19) INVISIBILITY POWER UP: Enemy saucers can’t see the ship, and so don’t chase after the ship. It is temporary.

20) MISSILE TURRET: Defense that shoots bullets at saucers to destroy them. Missile Turrets are destroyed after a certain number of bullets are shot.

21) SHIELD DEFENSE: Defense that produces a shield with a certain radius. The ship is able to go inside of it, and the bullets can pass through it. Saucers are held at the shield’s edge, while asteroids bounce off. Shields are removed after a certain number of hits by asteroids or saucers

22) WARP GATE: Defense that allows the ship to warp to another warp gate. The warp gate will not be functional if there is only one on the screen. If there are more than 2 warp gates, the ship is randomly transported to one of the other ones. Warp gates are removed after being used (either transported into or transported from) a set number of times

23) NUKE DEFENSE: After being built, the nuke remains dormant. However, if triggered by the user, the nuke destroys all saucers and asteroids on the screen. The ship and other defenses are also damaged by the explosion

24) GRAVITY ORB: After being built, the gravity orb remains dormant until it is triggered. When triggered, the orb places a force of gravity on all saucers towards it. This is only temporary

25) POWER TECH: Increases the power limit by one, meaning that it increases the maximum number of defenses that are allowed on the screen at once. The ship is still able to move and shoot while the power tech is in progress, and other defenses can also be built. Power tech upgrades are triggered by double-tapping the 6 key.

26) MINE DEFENSE: After being built, the mine explodes if either saucers or asteroids pass over it. The mine can also be triggered by the ship itself. The mine also has a set blast radius that can also injure defenses or the ship

27) PLASMA TURRET: Plasma turrets act as upgrades to missile turrets already on the screen. This upgrade can be triggered anywhere by the ship, as it upgrades the closest missile turret from the ship’s location. However, plasma turrets can only be built out of a missile turret

28) PLASMA SHIELD DEFENSE: Plasma shields act as upgrades to shield defenses already on the screen. Similar to plasma turret upgrades, they can only be built over shield defenses, and can be triggered anywhere, as long as there is a shield defense already in play. Plasma Shield defenses have larger radii and also vaporize saucers and asteroids rather than deflect them

29) TAB MENU: The tab key can bring up or hide a list of defenses that can be built, and the number of minerals required. Does not pause the game.