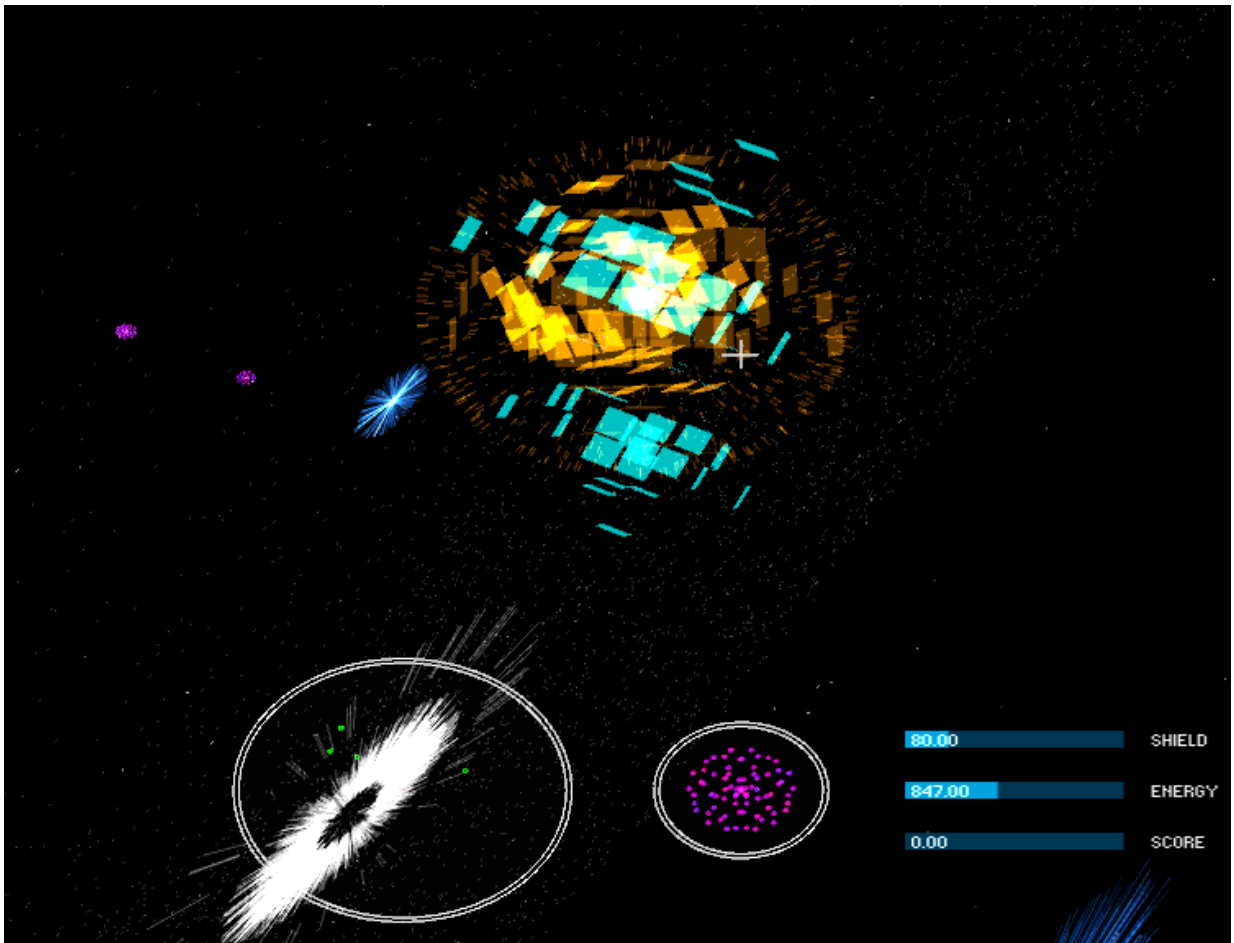


Audio Driven Games

Masters Thesis

User Guide



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1) About

The game is essentially a modified, 3D Asteroids, music game. The character finds themselves adrift and without locomotion in space. Periodically and in some unison with the music played, large, beating structures appear out of nowhere surrounding the ship and set a collision course with it. Using the missile weapon system available, with limited energy before depletion, the player is tasked with shooting down all possible hazards and staying alive before the music ends, at which point the character is teleported to safety.

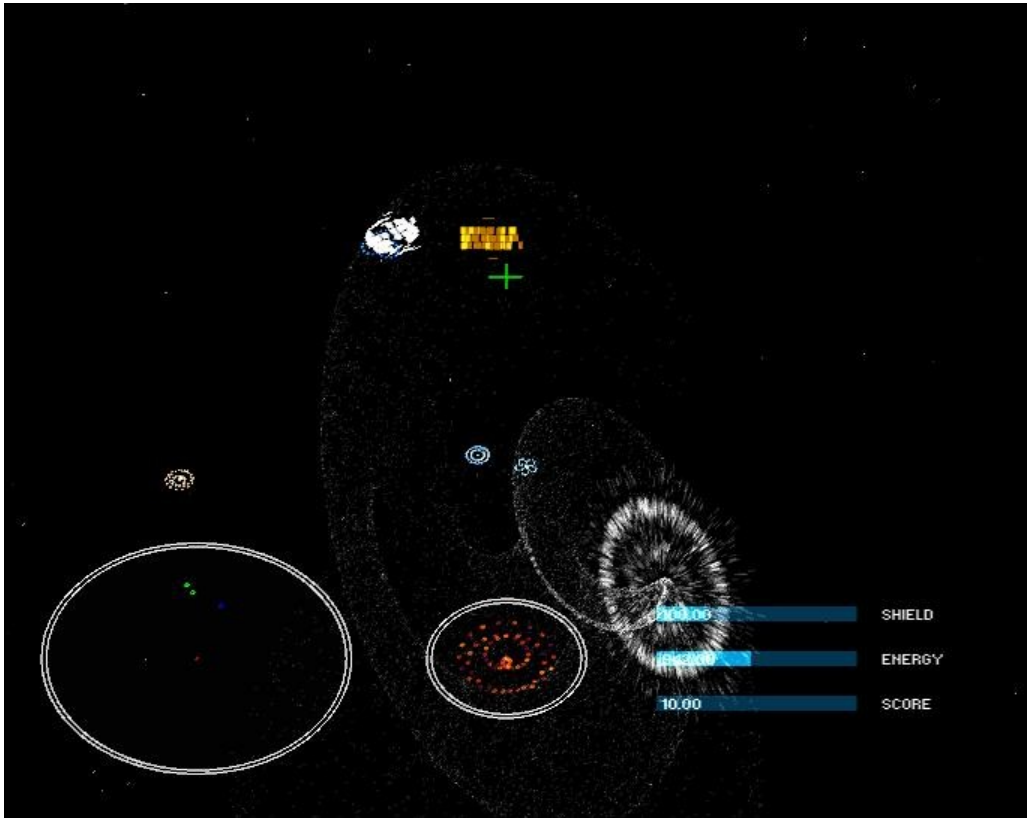


Figure 1.1 – Random Attack Shot.

2) Type of Game & Influences

The idea of needing to shoot down asteroid like objects on a collision course with the player to survive and gaining points by doing so is taken and extended from the original Asteroids arcade game. This spawning of objects is connected with the beat of the music played meaning the game is also about the player synchronising their actions with the sound as well.

3) Aims

The gameplay is divided between three types of aim, short, mid and long term. The short term aim is to shoot down all asteroids in order to remain alive, all of which are on a collision course with the player.

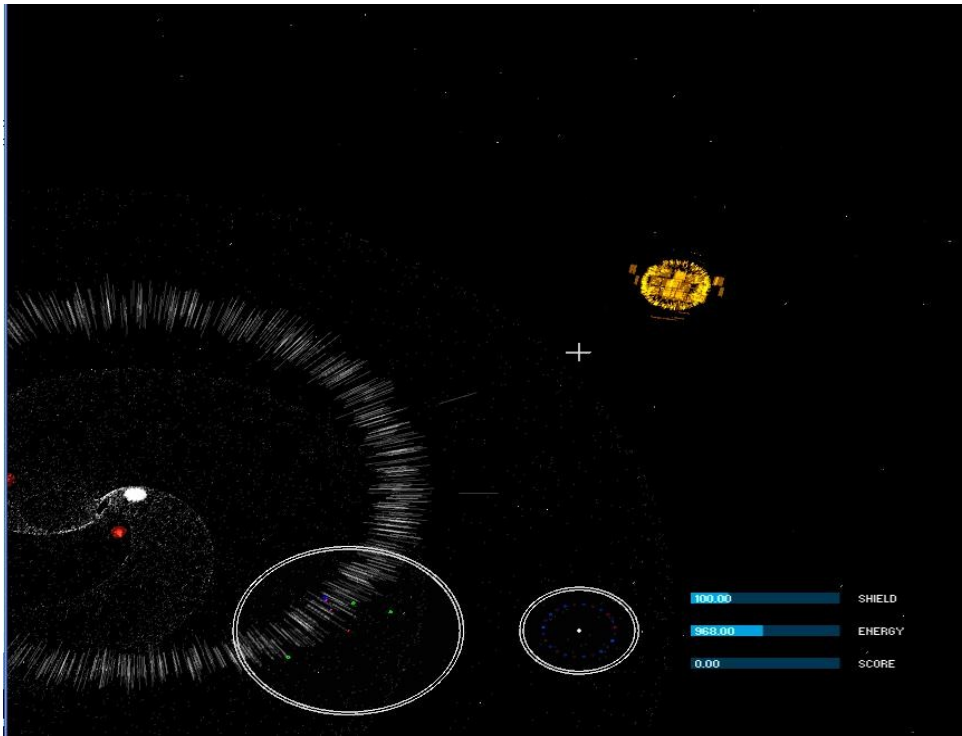


Figure 1.2 – Asteroid Explosion.

The mid term goal is to use the other “ability” the game offers which is that of an attractor beam of sorts, used to pull item drops towards the player to collect boosts towards the player stats. This attracting of item drops also depletes the same weapon energy value that the normal weapon fire does, meaning a strategic decision may need to be made as to what is more necessary at any given moment to remain in the game. The item drops only exist for a limited time before they're destroyed by the space anomaly nearby.

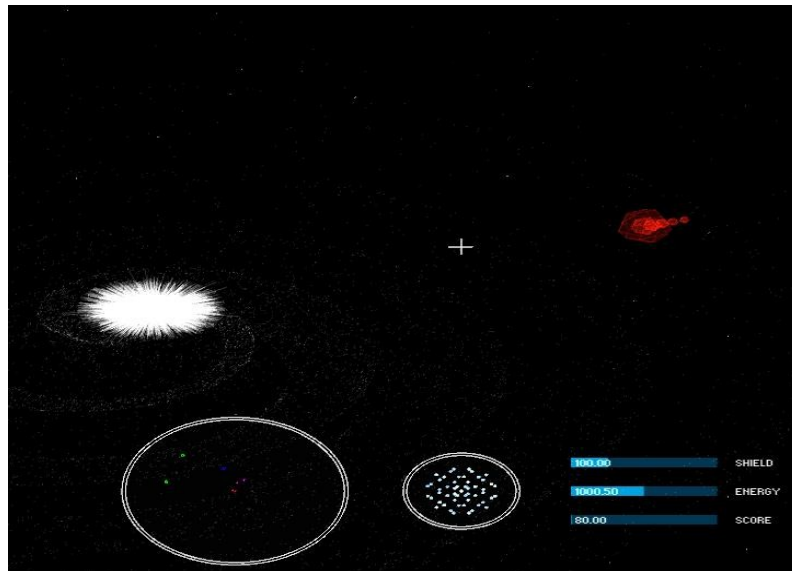


Figure 1.2 – Player-Item Interact 1.



Figure 1.5 – Many Enemies built up by the duration of the song.

Failure to destroy the asteroids before collision results in a depletion of the shield value, when this value reaches zero, the game ends.

4) Controls

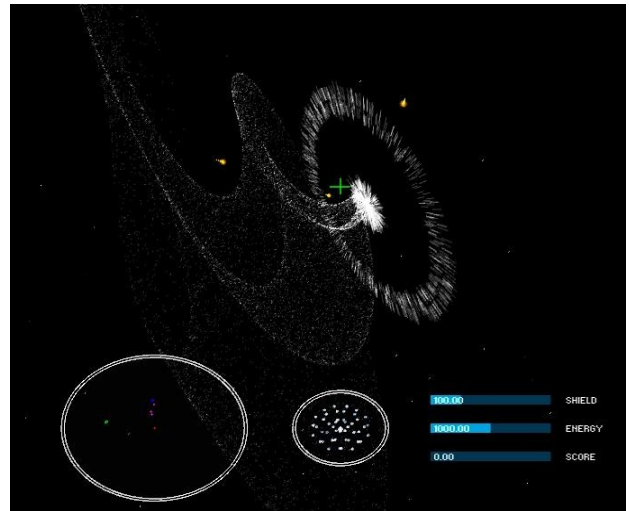
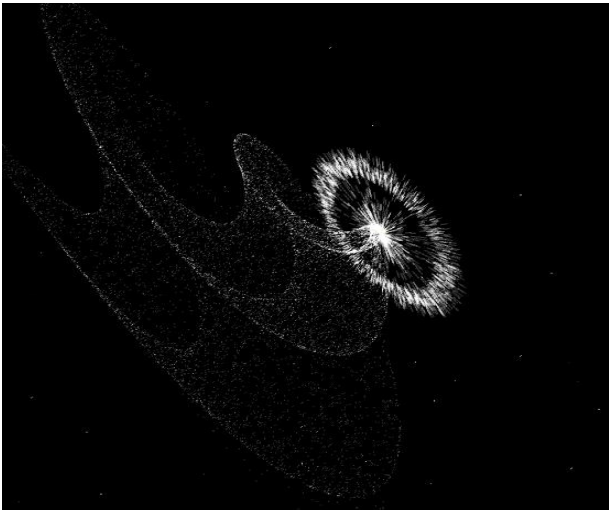
The basic controls are:

- i) Mouse movement to freely rotate around a point.
- ii) Mouse left click to fire the weapon.
- iii) Mouse right click and hold down to attract an item drop.

Within the game, shortcuts are:

- i) TAB to show/hide the game settings.
- ii) SHIFT to show/hide the heads-up-display (HUD)
- iii) ENTER returns the player to the main menu.





Figures 1.6 – Alternative Shots of the in-game, from options, no HUD and HUD shown.

On the main menu:

- i) TAB is also used to show/hide the main game settings.

On the end-game screen:

- i) ENTER returns the player to the main menu.

5) Features

- i) HUD

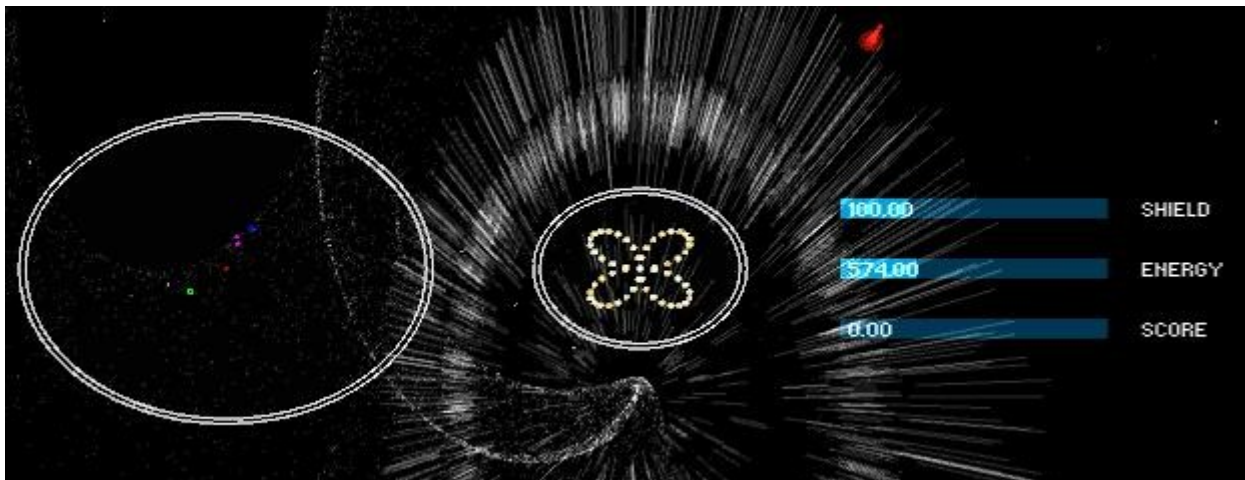


Figure 1.7 – HUD displayed in full.

In-game, the HUD displays three distinct player stats, the score, the shield value and the weapon energy value. The score will be increased either via destroying the asteroids or via collecting the red type of item drop. The shield can be boosted by collecting the yellow type of item drop and is negated by having the asteroids collide with you. Lastly the weapon energy value is depleted by both firing the weapon and attracting items towards yourself. It can be boosted by collecting the blue items.



Figure 1.8 Closer look at the Player stats.

Next on the HUD, in the centre, is the weapon pattern display. This is a preview of the current missile pattern to be deployed if the weapon is fired at that moment. The amount of damage done to the asteroids is proportional to the number of points that make up the pattern and this pattern is generated in part by the music. At times of greater noise, the pattern will be most complex, at times of quiet or silence it will be the most simple and hence ineffective.

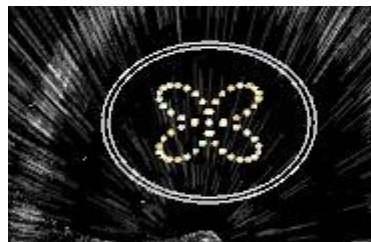


Figure 1.9 – Closer look at the Weapon pattern generated.

Lastly on the left side of the HUD, is the basic radar system. This draws the positions of the asteroids, item drops and the space anomaly around a central point representing the player. Objects directly in front of the player in the game will appear directly above the centre point on the radar. The radar is helpful for two main reasons. One, it is an easy way to know when objects are spawned and where without needing to see it directly in the 3D view. Secondly, it is an indicator of how close/far an object is allowing some estimate to the danger it represents.

On the radar:

- i) Green dots – Asteroids
- ii) Blue dot – Space Anomaly
- iii) Purple/pink dots – Item drops
- iv) Red dot – Player position

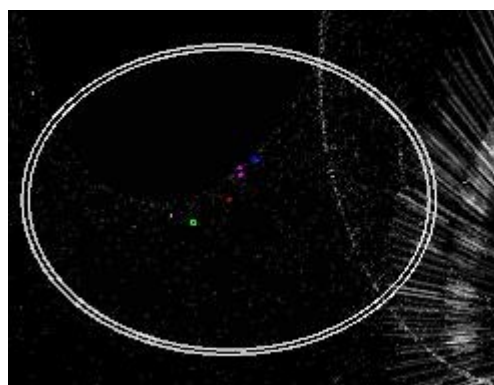
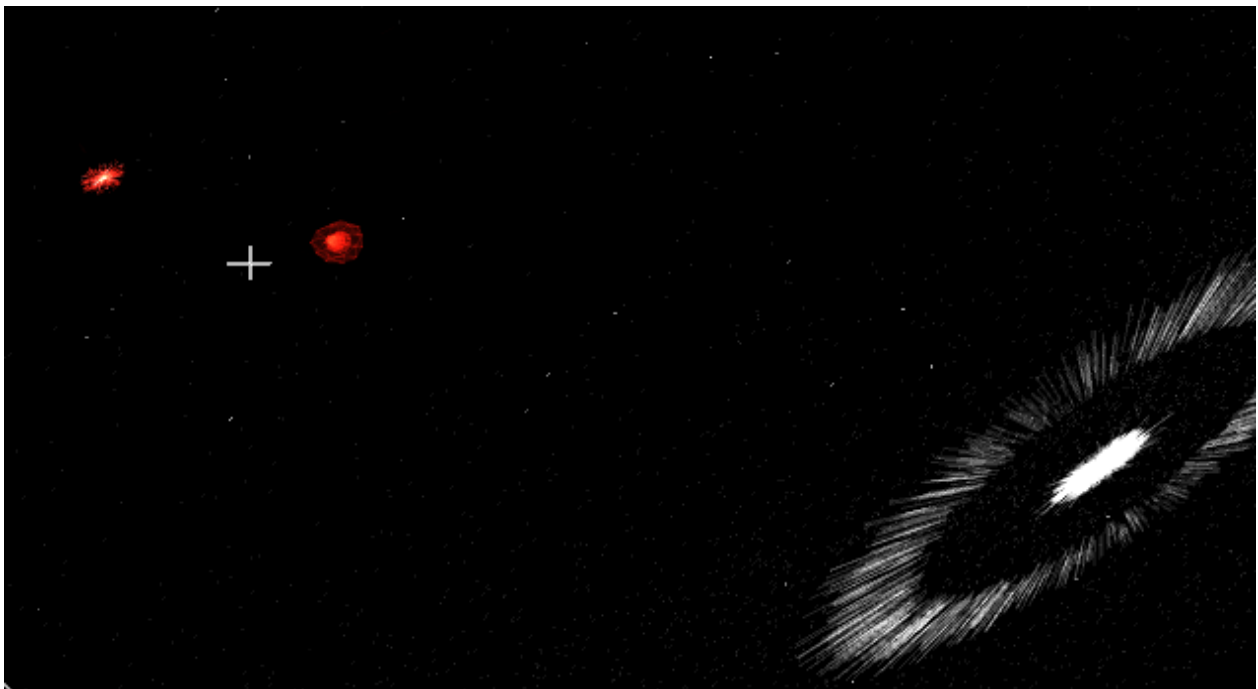
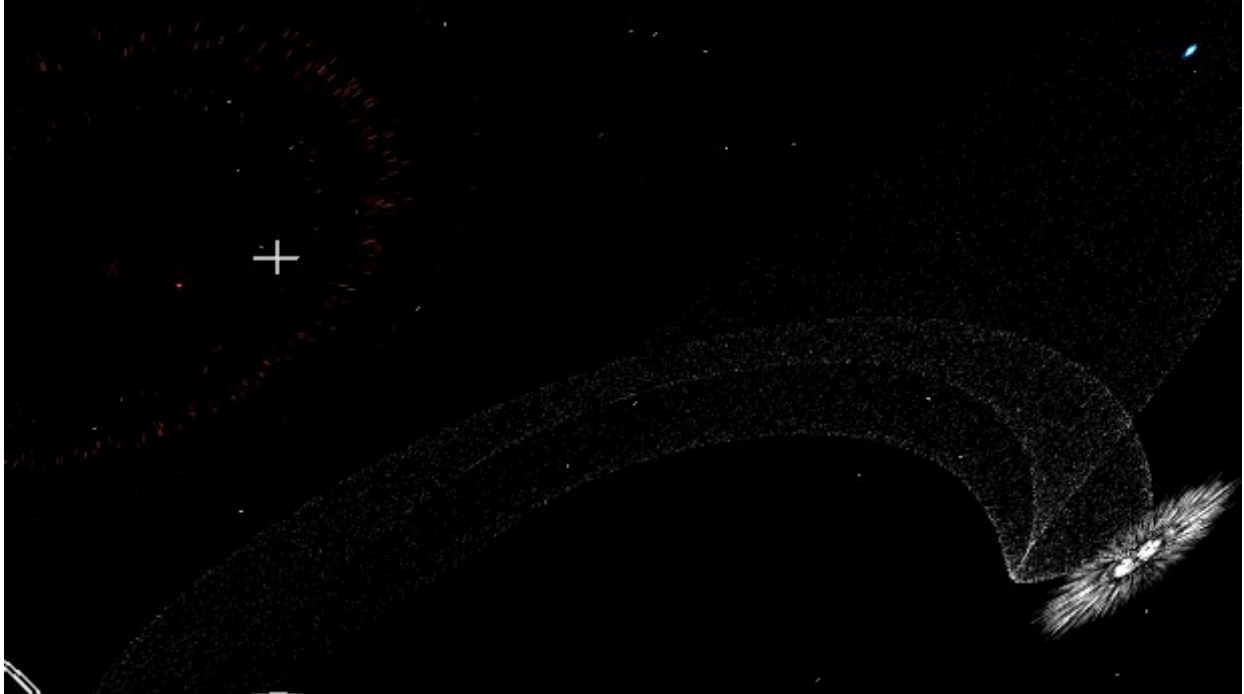


Figure 2.0 – Radar in full, showing asteroid to left/behind, wormhole to right/front.

- ii) Asteroid & Item drop Generation/Life span

Both asteroids and item drop spawns are connected with the sound in different ways. Item drops are more specifically connected with three types of beat, a kick, hat and snare which each spawn one of the three types of item drops. The location of the origin is based upon the pulsing phenomena that are also of three types relating to the types of beat. These phenomena surround the player as well. Once spawned, if unimpeded, the items will make their way to the anomaly, the blue dot on the radar. Once there they will automatically be destroyed.



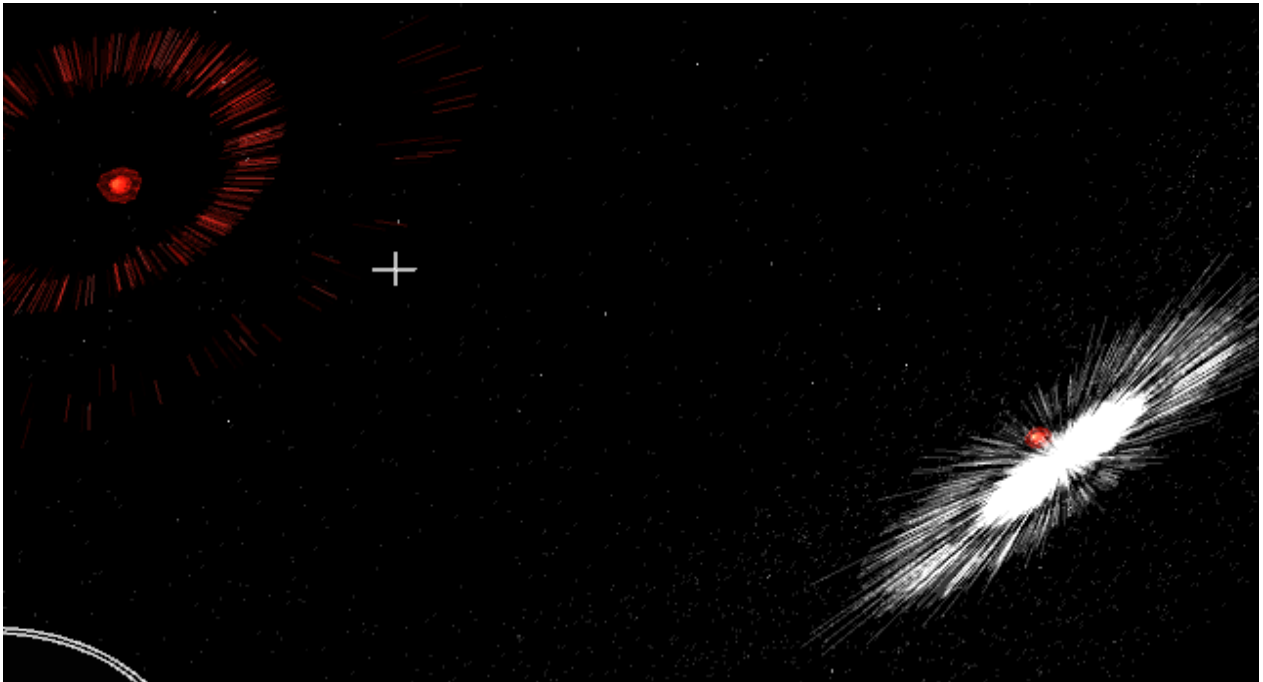


Figure 2.1 – Shots of Item drop spawn and eventual destruction before wormhole.

If the player lines up the cross-hair with either item drops or asteroids, the cross-hair will turn green. If this is the case an item drop can be attracted if the right mouse button is held which leaves the item under the player control. On impact with the player, the relevant boost is obtained.

On the other hand, asteroids may be moving at different rates and in different directions so more of an estimation is needed. On easy difficulty, most asteroids will be parallel to the player and directly facing them meaning lining up the cross-hair should be enough. On hard difficulty, missiles may need to be fired ahead of the asteroid to take velocity into greater account. The damage a missile deals is negated from the “health” of the asteroid and when zero, the asteroid will explode or explode and spawn two new, smaller asteroids depending on normal/hard difficulty respectively.

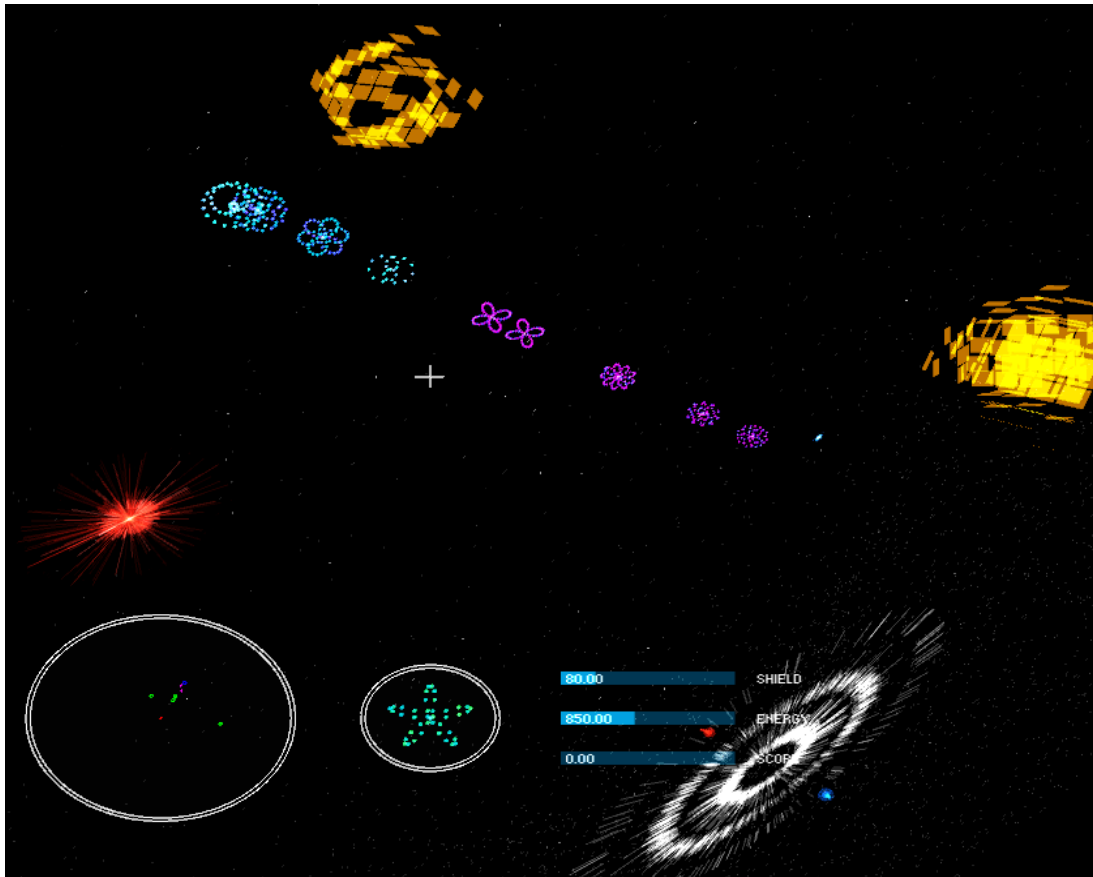


Figure 2.2 – Firing several missiles at fast moving asteroids.

The asteroid generation is more simply based upon sound energy peaks which are easier to detect by the ear as clear thuds or beats of the music.

iii) Finish

When the shield is depleted to zero or the play lasts until the end of the song, the game over screen is shown. If the ship has been destroyed this will appear instantly, if the game/song has successfully been completed it will be via a fade to white. The screen prints 'GAME OVER' as well as the score obtained. A high score could be a greater priority over surviving until the end of the game or vice versa.



Figure 2.3 – Game Over screen.

iv) Difficulty

The difficulty option changeable both on the main menu and in-game affects the following:

- 1) The dimensions from which asteroid positions are offset from the player by. Normal, positions asteroids on the same value in the Y direction, hard varies this value meaning the player is attacked from a wider variety of angles.
- 2) Whether asteroids split when destroyed meaning yellow asteroids spawn two new green ones increasing the difficulty significantly.

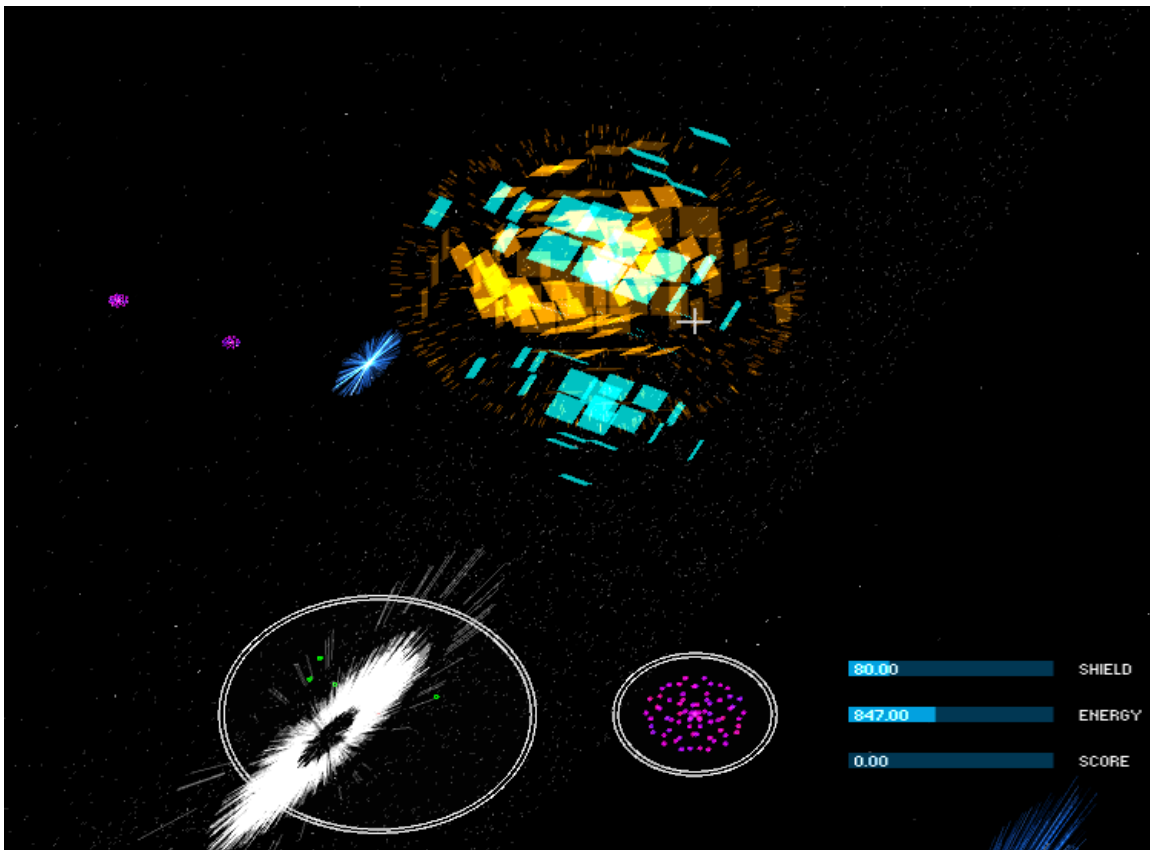


Figure 2.4 – Asteroid Splitting.

Also, the beat sensitivity alters the difficulty of a game the most significantly by limiting the number of beats that are detected and hence the number of asteroids spawned at all. The greater this value, the higher the peak in energy will need to be to cause a beat detection and an asteroid spawn. In-game options to alter the max speed of asteroids and items can also affect the difficulty quite a bit as well, particularly the former.

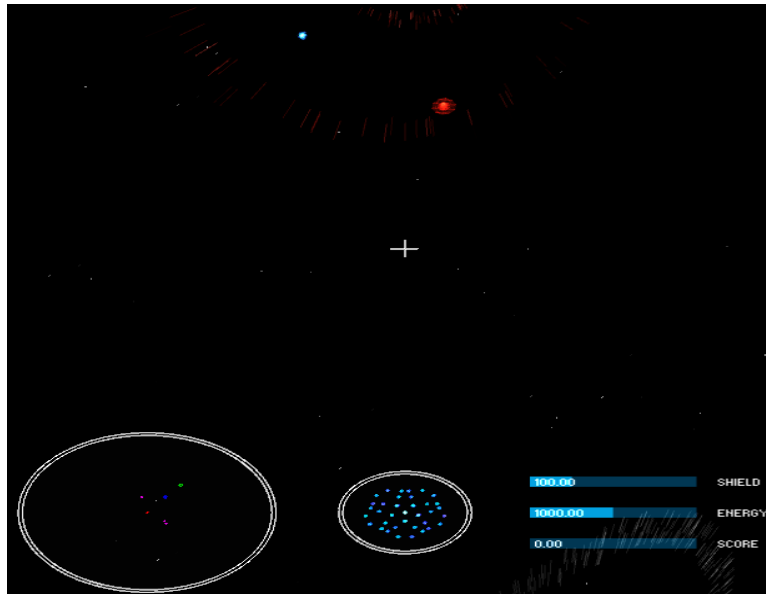


Figure 2.5 – Shot after opening 10 seconds – beat sensitivity=5000

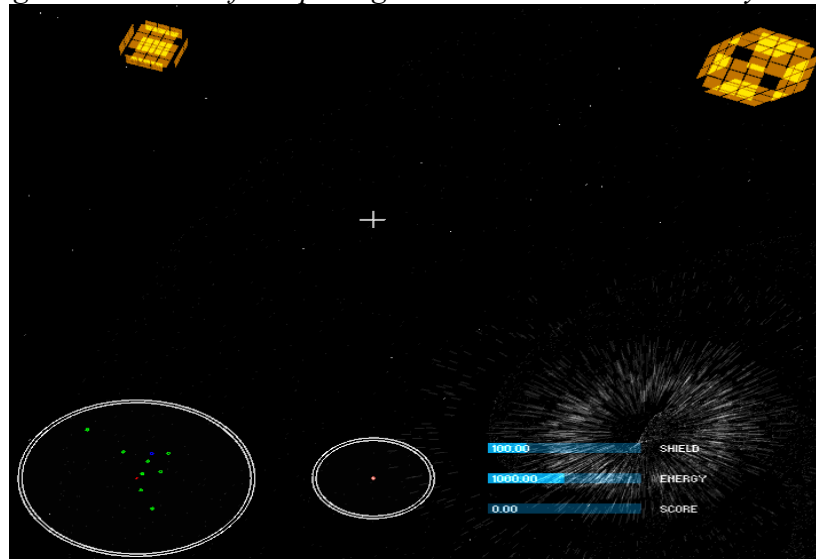


Figure 2.6 – Shot after opening 10 seconds – beat sensitivity=0

v) Missile Bonuses

If the firing of missiles is done so in unison with the detection of a beat, two extra missiles are also deployed either side of the original, causing extra damage for the original cost in weapon energy. A blue circle is drawn around the cross-hair when a beat is detected for this purpose.

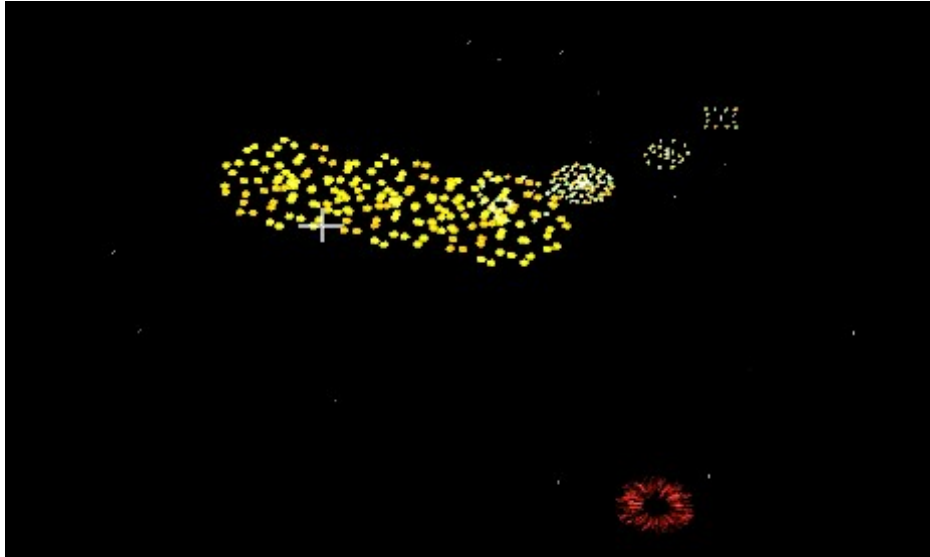


Figure 2.7 – Bonus Missiles Strike.

6) Settings

The game allows two sets of setting options to be customised, firstly on the main menu which mostly contain options that cannot be changed without restarting and secondly in-game options like difficulty or beat sensitivity. Some of the options are duplicated between the two. They are laid out below:

1) Main Menu

- 1) **Number of Galaxies** – Number of objects used to spawn the item drops
- 2) **Number of Stars** – Number of static/non interactive stars for background
- 3) **Space Radius** – The radius of the sphere to distribute asteroids/items around.
- 4) **Wormhole No. Stars** – The number of stars to make up the space anomaly.
- 5) **Wormhole Radius** – The base radius of the space anomaly.
- 6) **Galaxy Particle Count** – The number of points making up the object spawning item drops. See Pulser class in code/documentation.
- 7) **Galaxy Radius** – The radius of these objects.
- 8) **Difficulty Option** – Either hard or normal.
- 9) **Mode Option** – Either 'game' or 'vis', short for visualisation (shield meter not depleted and no HUD displayed, just look around and fire missiles)
- 10) **Sound Option** – Sound effects for firing missiles and colliding with asteroids, on/off.
- 11) **HUD Option** – Displaying the radar, missile preview and player stats.
- 12) **Beat Sensitivity** – The dampening value applied to detecting beats, the greater this is, the fewer beats that will be detected and the fewer asteroids generated. Affects difficulty of the game considerably.
- 13) **File Chooser** – File browser for selecting a song to play in-game that will drive the gameplay. (only .wav or .mp3 allowed)
- 14) **Volume** – Meter to change the volume of the menu song.

15) **Play Button** – Button, if pressed, that will start the game.

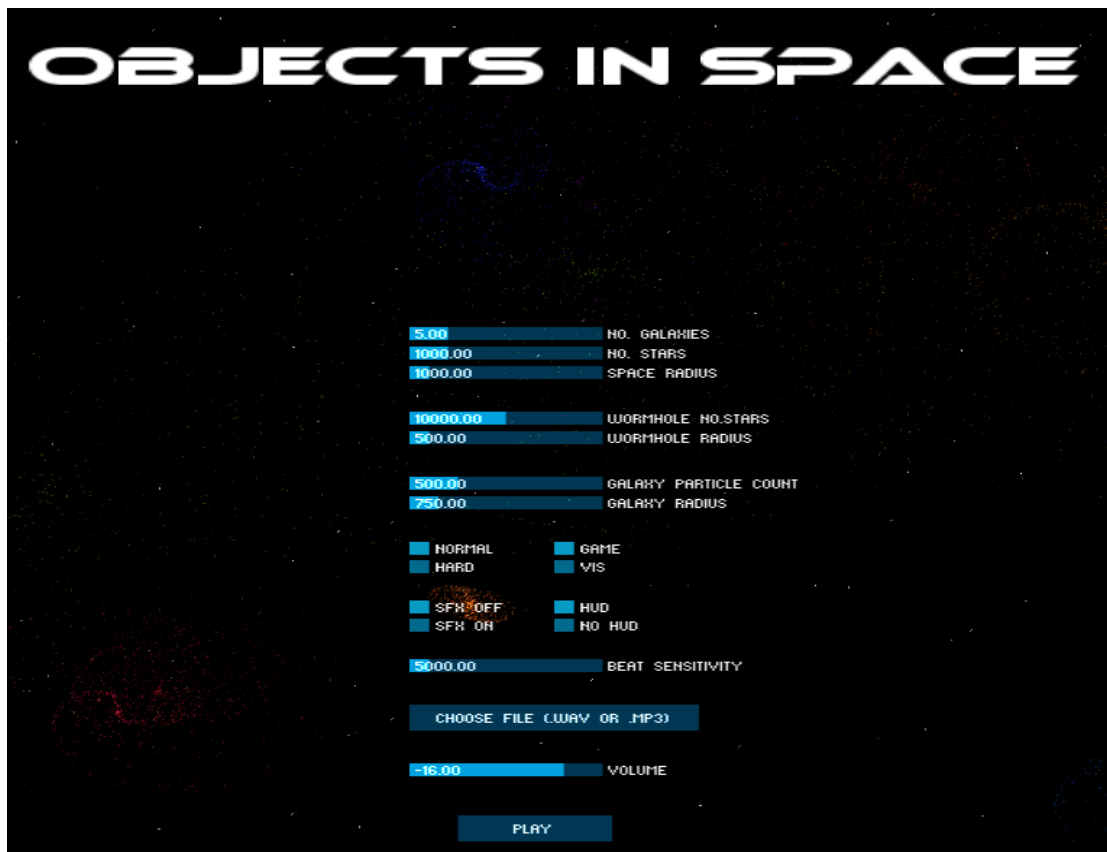


Figure 2.8 – Main Menu Settings.

2) In-Game

- 1) **Difficulty Option** – Same as above.
- 2) **Sound Option** – Same as above.
- 3) **Beat Sensitivity** – Same as above.
- 4) **Item Drop Max Speed** – The maximum speed item drops can travel at while being pulled by the player, will also affect difficulty.
- 5) **Asteroid Max Speed** – The maximum speed asteroids can move towards the player at, will also affect difficulty.
- 6) **Volume** – The volume meter for the song currently playing.

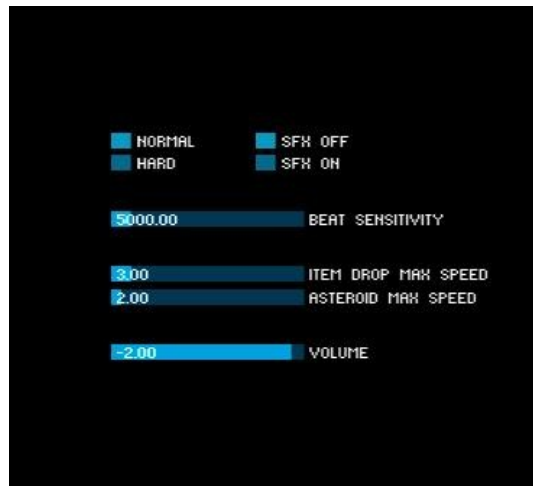


Figure 2.9 – In-Game Settings.

System in Operation

Some of the elements of the system not directly related to how to play are noted and demonstrated below:

1) Main Menu Background Visualisation





Figure 3.0 – Background Visualisation Comparison Shots.

2) Explosions

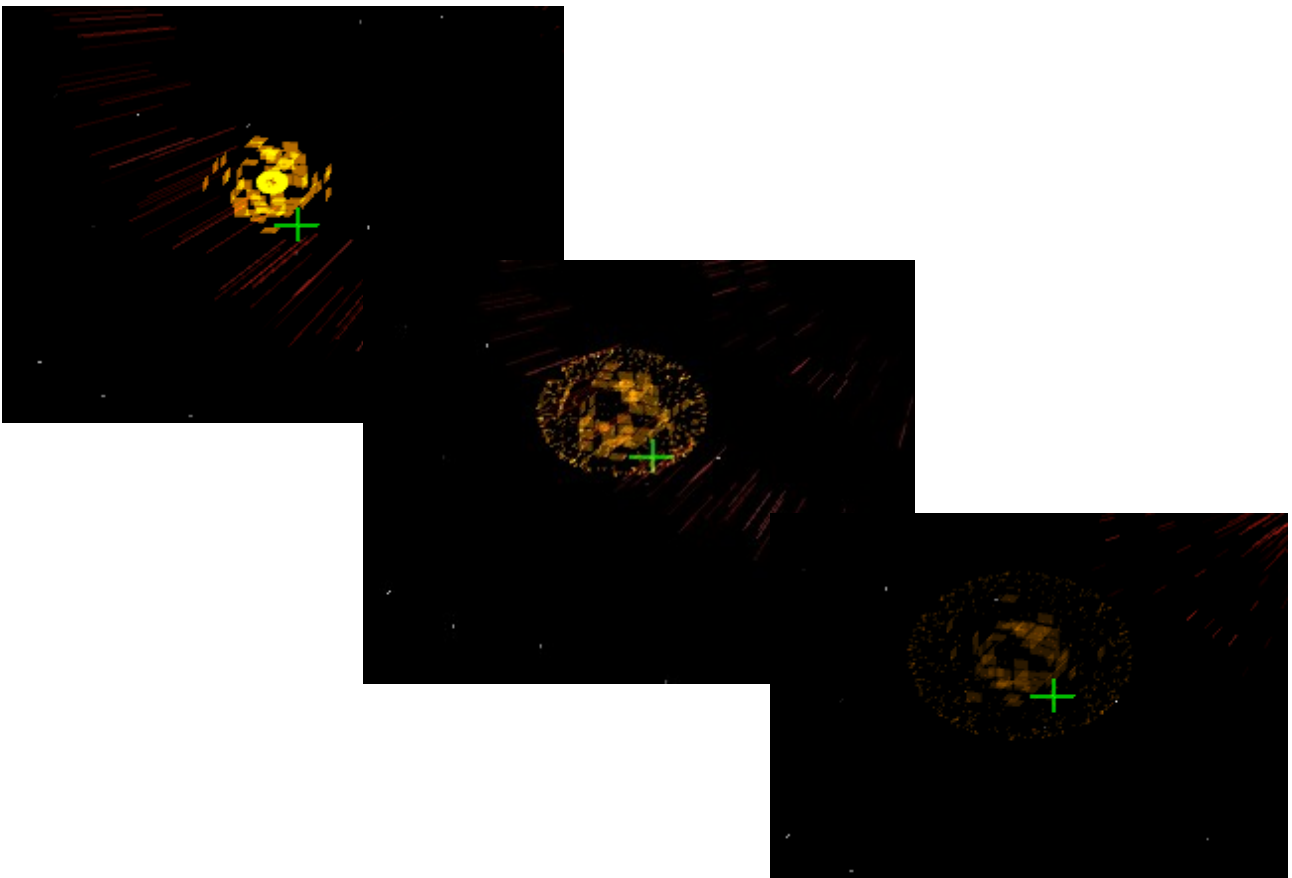


Figure 3.1 – Explosion Development.

3) Item Drop Audio/Size Relation

In section 5.2 of the user guide, the item drop size is also manipulated based on the frequency spectrum meaning greater noise, greater size. The extension in size is also based on the type of item drop and the sub band of the spectrum which is checked.

4) Types of Beat Detection & Usage

The three beat detection types used in this system and demonstrated through game mechanic purposes previously are one for the menu visualisation in developing the spiral galaxies. Another in the spawning of asteroids and lastly one in the gravitation call for the Pulsar objects depending on the type of beat it is.

5) Missiles



Figure 3.2 – Development of Missiles over small duration.

Here you can see the development of the pattern of missiles fired in a stream from right to left, in this instance, the noise level was high, became quieter slightly mid way through and rose again at the end, mirroring the shapes shown.

6) Pulsars

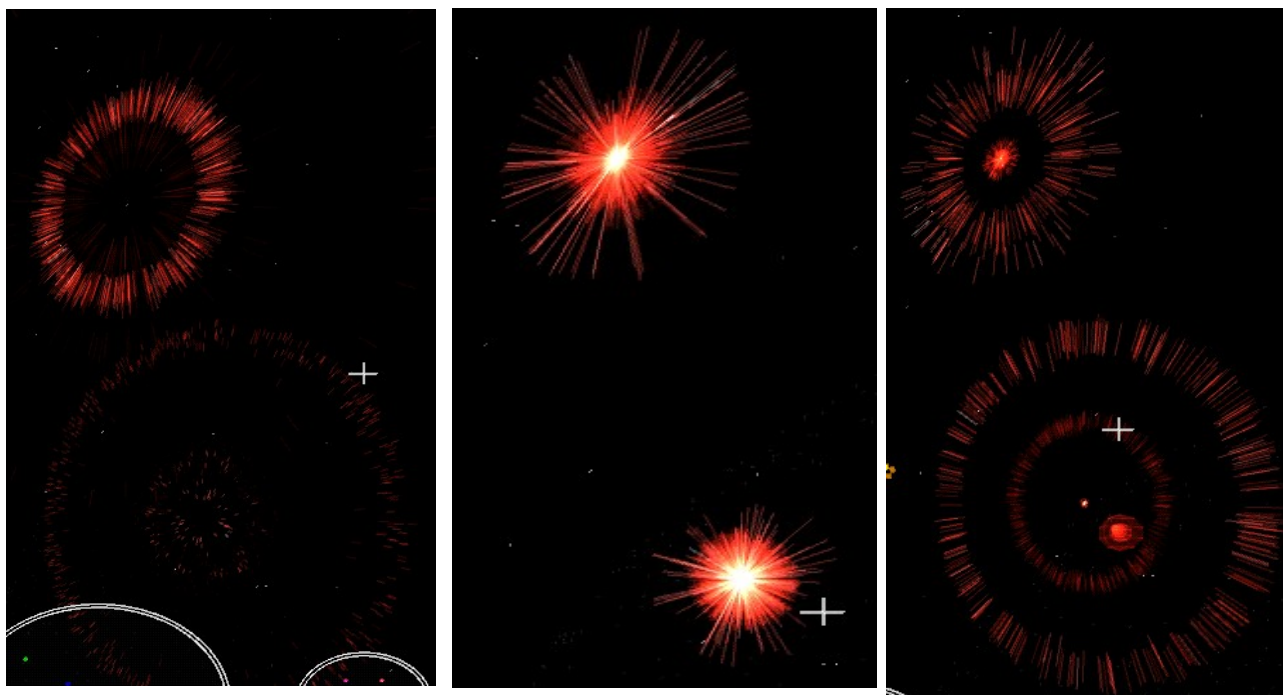
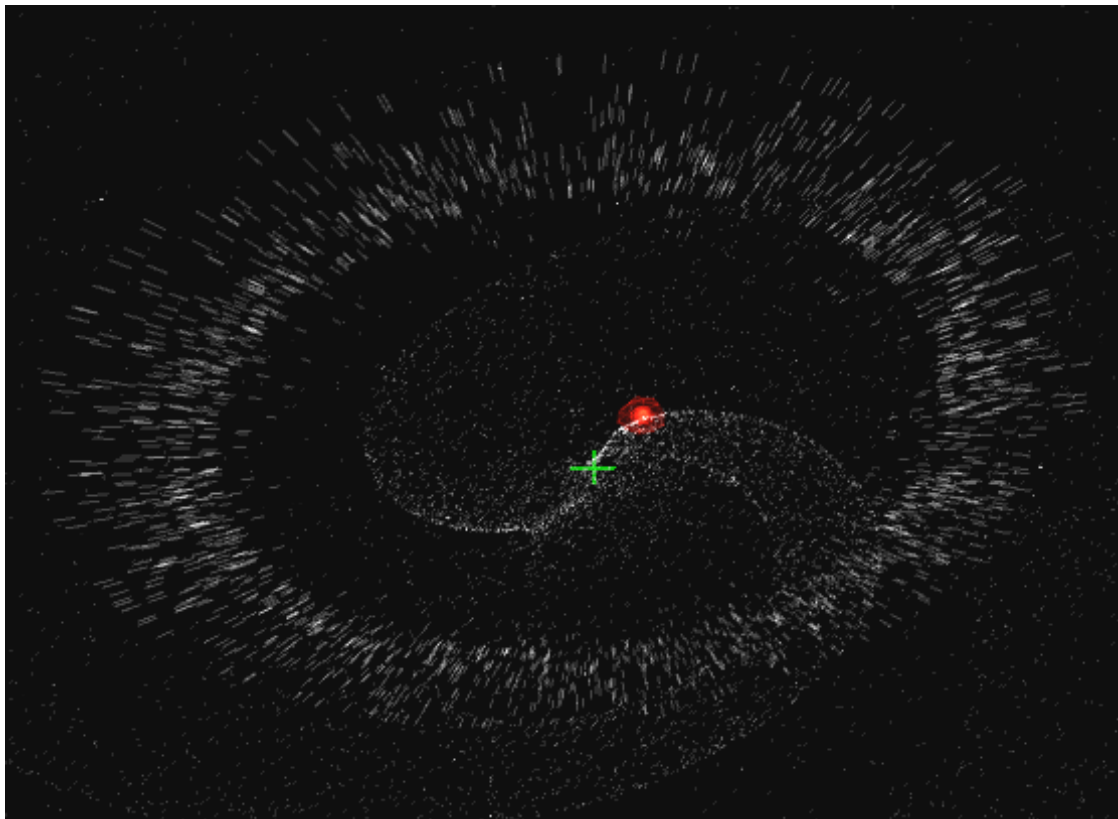
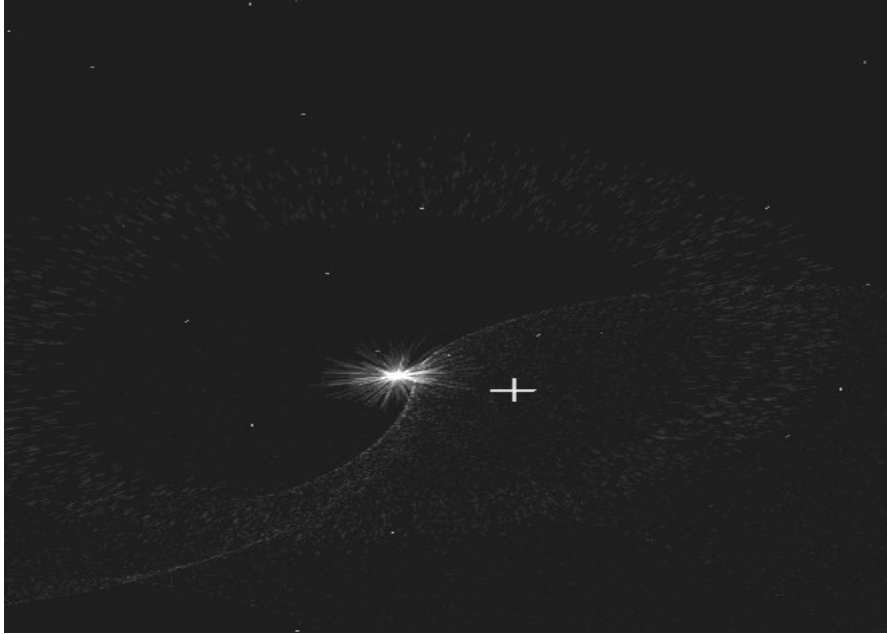


Figure 3.3 – Two Pulsar objects during gravitate calls.

7) Rose Pattern – Missile/Audio Link

The rose patterns are adjusted in two main ways, the number of curves is connected with the average of any spectrum reading and the number of dots is dependent on the maximum peak value.

8) Wormhole Audio/Visual Links



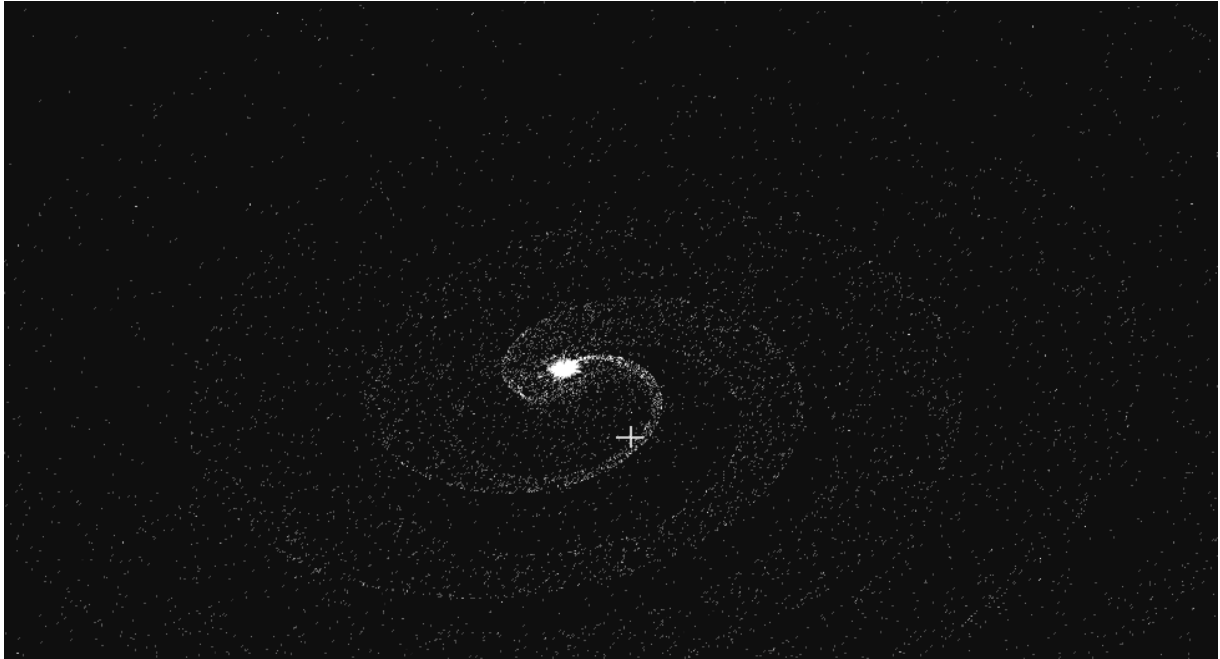


Figure 3.4 – Sequence of Wormhole shots throughout gameplay.