


# IEEE GameSIG Intercollegiate Game Showcase 2018

## Game Overview: Hive: Armada Date: 4/8/18

|  |  |
|--|--|
| One-Sentence Description                         | Take control of your Starchaser gunship and take up arms in the ongoing fight against the Hive Armada in this VR bullet hell action game.  |
| List of Team Members and Their Schools           | Kara Mendez – Chapman University – mende122@mail.chapman.edu<br>Perry Sidler – Chapman University – sidle104@mail.chapman.edu<br>Miguel Gotao – Chapman University – gotao100@mail.chapman.edu<br>Chad Johnson – Chapman University – johns428@mail.chapman.edu<br>Ryan Britton – Chapman University – britt103@mail.chapman.edu<br>Marc Karam – Chapman University – karam105@mail.chapman.edu<br>Main Contact: 949-562-9919  |
| School Level                                     | <input checked="" type="checkbox"/> College/University <input type="checkbox"/> High School  |
| Target Platform and Audience                     | PCVR (HTC Vive)<br>Target Audience: hardcore audience, bullet hell fans, ages 16-35  |
| One-Paragraph Summary of Gameplay and Objectives | Hive Armada is a virtual-reality bullet hell shooter where players control a gunship attached to the controller, facing off against a multitude of enemy drones across multiples waves of unique challenges, all while collecting in game iridium to buy more unlockable weapons and ship skins.   |
| Key Features                                     | <ul style="list-style-type: none"> <li>• Playable room-scale and standing.</li> <li>• Three unlockable weapons and five support powerups.</li> <li>• Six different enemy types with varying attack patterns.</li> <li>• Five intense waves of bullet hell action in Standard mode.</li> <li>• Test your skills in an unending gauntlet in Infinite mode.</li> </ul>  |
| Thumbnails of Game Art                           |    |
| Software Libraries and Packages Used             | Project built in Unity3D, libraries used:<br>Reorderable Inspector:<br><a href="https://github.com/SubjectNerd-Unity/ReorderableInspector">https://github.com/SubjectNerd-Unity/ReorderableInspector</a><br>Shader Forge:<br><a href="https://assetstore.unity.com/packages/tools/visual-scripting/shader-forge-14147">https://assetstore.unity.com/packages/tools/visual-scripting/shader-forge-14147</a><br>iTween:<br><a href="https://assetstore.unity.com/packages/tools/animation/itween-84">https://assetstore.unity.com/packages/tools/animation/itween-84</a><br>Models built it Maya, textures with Substance Painter, Photoshop.<br>Audio mixed in Audacity.] |
| Third-Party and Ready Made Asset Credits         | Mirza Beig – UVFX packs for particle textures, texture sheets.<br>Audioblocks – miscellaneous audio<br>Full List below   |
| Faculty Member Name & Contact Information        | Chris Boyd – Chapman University – cboyd@chapman.edu – 657-234-0027   |
| YouTube Link                                     | <a href="https://www.youtube.com/watch?v=723LBMpei-Q&amp;feature=youtu.be">https://www.youtube.com/watch?v=723LBMpei-Q&amp;feature=youtu.be</a>  |
| Misc. Notes                                      |  |

Submitted by: Miguel Gotao – gotao100@mail.chapman.edu – 949-562-9919

## Summary of game assets not entirely made by the team. Full asset list on next pages

1.) Ultimate VFX – pack of different textures, texture sheets prefabs of particle systems.  
Created by Mirza Beig – Unity Store link:

<https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26701>

Most prefabs we used have been retooled to work in VR (see billboard problem below). Prefab Particle Systems have been altered via emission, color and size over lifetime, noise, etc. Base textures/texture sheets have also been used to make some emitters from scratch.

2.) Battlecruiser: Spaceship Sound Effects – sci-fi spaceship sound effects

Created by Bluezone Corporation – package link:

<https://www.bluezone-corporation.com/samples/battlecruiser-spaceship-sound-effects-download>

Sound effects from this pack were used for the menu room located on a ship. None of the audio has been unaltered.

3.) Audioblocks – royalty-free sound effects library

Created by Storyblocks – website link:

<https://www.audioblocks.com/>

Most of the ingame audio was taken from Audioblocks. Some audio has either been trimmed, lengthened, or edited to suit our needs.

Misc assets:

Fonts (Alien Encounters, Orator, Arial – individual sources found below)

SteamVR scripts (have been altered slightly to suit our needs, included below)

## Full list of assets, along with how we modified them if we did, are included on the next pages

What were the top technical challenges that you encountered in the project?

Unity does not have built-in support for billboard with particle systems in VR, so emitters would rotate awkwardly with the VR camera. This problem was solved by changing the rendering modes on each individual component of the particle system. Smaller, round particles can stay billboarded, for most others, we switched them to render with quad meshes, as well as change the render alignment to World, Local, or Velocity.

We also encountered some problems with optimization because the sheer number of projectiles onscreen would create a great deal of slowdown. We were able to implement an Object Pooling system that will reuse objects currently in the scene rather than destroying and instantiating new entities that increased performance drastically.

We did not have a dedicated animator in our team, which led us to the use of the iTween library, but implementation of the system took an arduous amount of effort to get it working. It ultimately worked in our favor, as it solved our problem of lacking animations.

How did the design evolve during development? What changed, and what didn't?

Visual design of the game started out to look very low-poly ut changed to a more cartoon-ish visual aesthetic. We ended up settling on a semi-realistic sci-fi approach to visuals in terms of our models and visual effects.

Gameplay went through small iterations but stayed mostly the same. A powerup was changed late in development (bullet clear bomb to time slow), which was deliberated as a more interesting game mechanic. One of the weapons was created by accident during game testing (Plasma Cannon) and was further developed into its own entity.

List of Particle Systems from Mirza Beig UVFX we used:

| Description                    | Source     | URL   | Prefab name   | Modified   |
|--------------------------------|------------|---|---|--|
| Menu room talking particle     | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26701">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26701</a> | pf_vfx-ult_demo_psys_loop_solar   | changed size   |
| Enemy death explosion          | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26702">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26702</a> | pf_vfx-ult_demo_psys_oneshot_criticalHit2   | removed pieces, resized, changed colors and size   |
| Powerup spawn                  | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26703">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26703</a> | pf_vfx-ult_demo_psys_oneshot_rift   | removed all pieces except electrons, changed colors and size   |
| Wave room ceiling ambience     | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26704">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26704</a> | pf_vfx-ult_xp-titles_psys_loop_royal  | changed size and particle count  |
| Wave room play platform lights | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26705">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26705</a> | pf_vfx-ult_demo_psys_loop_atom  | removed all pieces except one Dotted Lines, changed colors and speed   |
| Wave room rear smoke           | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26706">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26706</a> | pf_vfx-ult_xp-titles_psys_loop_ice  | removed distortion, changed colors   |
| Splitter child spawn           | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26707">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26707</a> | pf_vfx-ult_xp-shockwaves_psys_oneshot_shockwaves, pf_vfx-ult_demo_psys_oneshot_stargate | removed most pieces from shockwaves, add 'points' from stargate  |
| Powerup pickup                 | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26708">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26708</a> | pf_vfx-ult_demo_psys_loop_warpGate  | removed some pieces, changed colors and size   |
| Player health pod explosion    | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26709">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26709</a> | pf_vfx-ult_demo_psys_oneshot_ultraMissile, pf_vfx-ult_demo_psys_oneshot_ultima          | used 'stargate-ultima' from ultraMissile and tweaked its size, used 'shards' from ultima and tweaked size and velocity |
| Score emitters                 | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26701">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26701</a> | pf_vfx-ult_demo_psys_loop_atomic, pf_vfx-ult_demo_psys_loop_twinkle                     | used twinkle and lensflares to accentuate base score emitters  |
| Player death                   | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26702">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26702</a> | pf_vfx-ult_demo_psys_loop_fireflies, pf_vfx-ult_xp-shockwaves_psys_oneshot_shockwaves   | changed color and size   |
| Enemy death (early version)    | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26703">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26703</a> | pf_vfx-ult_demo_psys_oneshot_criticalHit  | used hitting component for enemy death   |

|                               |            |   |                                       |  |
|-------------------------------|------------|---|---------------------------------------|--|
| Powerup spawn (early version) | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26704">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26704</a> | pf_vfx-ult_demo_psys_loop_cybershield | changed color, size, and emission        |
| Hit spark                     | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26706">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26706</a> | pf_vfx-ult_demo_psys_loop_glamour     | changed color and lifetime               |
| Platform lights               | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26707">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26707</a> | pf_vfx-ult_demo_psys_loop_loading     | changed color gradient                   |
| Damage boost (early version)  | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26708">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26708</a> | pf_vfx-ult_demo_psys_loop_orgonica    | changed color and render mode (velocity) |
| Warp emitter                  | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26702">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26702</a> | pf_vfx-ult_demo_psys_loop_savzone2    | color and lifetime changed               |
| Player hit (early version)    | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26704">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26704</a> | pf_vfx-ult_demo_psys_loop_sparks2     | change color, add burst                  |
| Enemy spawn (early version)   | Mirza Beig | <a href="https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26707">https://assetstore.unity.com/packages/vfx/particles/ultimate-vfx-v3-1-26707</a> | pf_vfx-ult_demo_psys_loop_virus       | change color, lifetime                   |

List of audio sources taken from third-party packs:

| Description           | Source   | URL   | Filename   | Modified   |
|-----------------------|--|---|--|--|
| Enemy explosion 1     | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/radio-impact-glitch-blast.html">https://www.audioblocks.com/stock-audio/radio-impact-glitch-blast.html</a>   | radio-impact-glitch-blast_fJx9-KVu.mp3                     |  |
| Enemy explosion 2     | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/radio-impact-glitch-pulse.html">https://www.audioblocks.com/stock-audio/radio-impact-glitch-pulse.html</a>   | radio-impact-glitch-pulse_zJQhWYEO.mp3                     |  |
| Enemy explosion 3     | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/radio-impact-hit-power-down-digital.html">https://www.audioblocks.com/stock-audio/radio-impact-hit-power-down-digital.html</a>                     | radio-impact-hit-power-down-digital_f1E4GY4_.mp3           |  |
| Enemy explosion 4     | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/radio-impact-slam-laser.html">https://www.audioblocks.com/stock-audio/radio-impact-slam-laser.html</a>   | radio-impact-slam-laser_fkNSMFEO.mp3                       |  |
| Laser gun shoot       | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/laser-cannon-shots-04210_laser_cannon_shots.html">https://www.audioblocks.com/stock-audio/laser-cannon-shots-04210_laser_cannon_shots.html</a>     | laser-cannon-shots_MJVm_HNd.mp3                            | edited to a single shot, added reverb, lowered pitch |
| Menu button highlight | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/flash-element-window-movement-high-tech-88903.html">https://www.audioblocks.com/stock-audio/flash-element-window-movement-high-tech-88903.html</a> | flash-element-window-movement-high-tech-88903.mp3          |  |
| Menu button select    | Audioblocks  | <a href="https://www.audioblocks.com/stock-audio/digital-shimmer-delay.html">https://www.audioblocks.com/stock-audio/digital-shimmer-delay.html</a>   | digital-shimmer-delay_fJaecdNd.mp3                         |  |
| Menu room ambience    | Sonniss.com GDC 2018 - Game Audio Bundle, Bluezone Corporation | <a href="https://sonniss.com/vendor/bluezonecorp/">https://sonniss.com/vendor/bluezonecorp/</a>   | Bluezone_BC0240_background_command_center_ambience_002.wav |  |
| Menu room             | Audioblocks  | <a href="https://audioblocks.com/stock-audio/not-from-this-world-">https://audioblocks.com/stock-audio/not-from-this-world-</a>   | not-from-this-world_z1Fsz8Su.mp3                           | edited with others to                                |

|                            |   |   |  |  |
|----------------------------|---|---|--|--|
| music 1                    |   | 93627.html  |  | create longer, looping track                                   |
| Menu room music 2          | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/resurrection-planet-ambience---looping.html">https://www.audioblocks.com/stock-audio/resurrection-planet-ambience---looping.html</a>   | resurrection-planet-ambience-looping_zy0bwrEO.mp3  | edited with others to create longer, looping track             |
| Menu room music 3          | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/trailer-hit---alien-surprise.html">https://www.audioblocks.com/stock-audio/trailer-hit---alien-surprise.html</a>   | trailer-hit-alien-surprise_MJw9tSEO.mp3  | edited with others to create longer, looping track             |
| Minigun shoot              | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/gun-machine-gun-automatic-5-56-caliber-heckler-and-koch-g36-single-shot-distant-perspective-94068.html">https://www.audioblocks.com/stock-audio/gun-machine-gun-automatic-5-56-caliber-heckler-and-koch-g36-single-shot-distant-perspective-94068.html</a> | gun-machine-gun-automatic-556-caliber-heckler-and-koch-g36-single-shot-dist_MyduJ9EO.wav |  |
| Player hit                 | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/explosion-firework-boom-single.html">https://www.audioblocks.com/stock-audio/explosion-firework-boom-single.html</a>   | explosion-firework-boom-single_GkEtCiv_.mp3  |  |
| Player death               | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/radio-impact-glitch-hit-power-down.html">https://www.audioblocks.com/stock-audio/radio-impact-glitch-hit-power-down.html</a>   | radio-impact-glitch-hit-power-down_fkRibYNd.mp3  |  |
| Rocket trail               | Sonniss.com<br>GDC 2017 - Game Audio Bundle, Digital Rain Lab     | <a href="https://sonniss.com/vendor/archos/">https://sonniss.com/vendor/archos/</a>   | Gas Burner Stereo 4.wav  |  |
| Room teleportation         | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/radio-impact-stinger-crescendo-hit-delay.html">https://www.audioblocks.com/stock-audio/radio-impact-stinger-crescendo-hit-delay.html</a>   | radio-impact-stinger-crescendo-hit-delay_MyF8GKNd.mp3                                    |  |
| Shield deactivate/activate | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/mechanical-malfunction-wav-102827.html">https://www.audioblocks.com/stock-audio/mechanical-malfunction-wav-102827.html</a>   | jg-032316-sfx-mechanical-malfunction.mp3   | trimmed for length, reversed to create shield activation sound |
| Shop purchase              | Sonniss.com<br>GDC 2018 - Game Audio Bundle, Bluezone Corporation | <a href="https://sonniss.com/vendor/bluezonecorp/">https://sonniss.com/vendor/bluezonecorp/</a>   | Bluezone_BC0233_sound_effect_014.wav   |  |
| Wave room ambience 1       | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/a-haunted-space-station.html">https://www.audioblocks.com/stock-audio/a-haunted-space-station.html</a>   | a-haunted-space-station_fy8rYEE0.mp3   | edited with others to create longer, looping track             |
| Wave room ambience 2       | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/trailer-hit---space-resonance.html">https://www.audioblocks.com/stock-audio/trailer-hit---space-resonance.html</a>   | trailer-hit-space-resonance_M1dHsBNd.mp3   | edited with others to create longer, looping track             |
| Wave                       | Audioblocks   | <a href="https://www.audioblocks.com/">https://www.audioblocks.com/</a>   | bcc-031814-tension-and-suspense-   | edited to  |

|                                |   |   |   |  |
|--------------------------------|---|---|---|--|
| room music                     |   | stock-audio/tension-and-suspense-music%C2%A0-99034.html   | music-184.mp3   | loop for 3:26m up from 54s   |
| Hologram shader                | andydbc   | <a href="https://github.com/andydbc/HologramShader">https://github.com/andydbc/HologramShader</a>   | Hologram.shader   | 3 variants:<br>1. increased scan tiling range;<br>2. increased tiling range and emission texture;<br>3. removed scan, glow, glitch, and flicker functionality for the shield powerup and windows |
| LB Hologram Shader             | Rispat Momit  | <a href="https://assetstore.unity.com/packages/vfx/shaders/lb-hologram-shaders-86027">https://assetstore.unity.com/packages/vfx/shaders/lb-hologram-shaders-86027</a> | HolographicShader_LightBased_Tr.shader, Map_Horizontal.psd, Map_Horizontal2.psd, Map_Horizontal_2.psd, Map_Horizontal_3.psd, Map_Horriizontal_Blur.psd, Dissiolve Map.psd |  |
| Area bomb powerup explosion    | Audioblocks   | <a href="https://www.audioblocks.com/stock-audio/dirt-explosion.html">https://www.audioblocks.com/stock-audio/dirt-explosion.html</a>                                 | dirt-explosion_GJqL3rVu.mp3   |  |
| Plasma explosion               | Sonniss.com GDC 2017 - Game Audio Bundle, MatiasMacSD | <a href="https://sonniss.com/vendor/matiasmacsd/">https://sonniss.com/vendor/matiasmacsd/</a>   | Weapon Bomb Explosion Sci-Fi Plasma-04.wav  |  |
| Menu room armada preview (map) | The French Monkeys, TFMSTYLE - Asset Pack             | <a href="https://gumroad.com/tfmstyle">https://gumroad.com/tfmstyle</a>   | [13-08-16] - Isotope.obj  |  |

SteamVR scripts we modified:

| Description        | Source                | URL   | Filename              | Modified  |
|--------------------|-----------------------|---|-----------------------|---|
| ItemPackageSpawner | Valve Steam VR Plugin | <a href="https://assetstore.unity.com/packages/templates/systems/steamvr-plugin-32647">https://assetstore.unity.com/packages/templates/systems/steamvr-plugin-32647</a> | ItemPackageSpawner.cs | change pickup prompt string                                   |
| SteamVR_LoadLevel  | Valve Steam VR Plugin | <a href="https://assetstore.unity.com/packages/templates/systems/steamvr-plugin-32648">https://assetstore.unity.com/packages/templates/systems/steamvr-plugin-32648</a> | SteamVR_LoadLevel.cs  | change loading progress bar to text and tweak text appearance |

|                      |                                |   |                         |                                   |
|----------------------|--------------------------------|---|-------------------------|-----------------------------------|
| SteamVR_LaserPointer | Valve<br>Steam<br>VR<br>Plugin | <a href="https://assetstore.unity.com/packages/templates/systems/steamvr-plugin-32649">https://assetstore.unity.com/packages/templates/systems/steamvr-plugin-32649</a> | SteamVR_LaserPointer.cs | add scaling factor to the pointer |
|----------------------|--------------------------------|---|-------------------------|-----------------------------------|

Fonts we used:

|                  |                       |   |                              |
|------------------|-----------------------|---|------------------------------|
| FONTS            |                       |   |                              |
| Alien Encounters | ShyFoundry Fonts      | <a href="http://www.1001fonts.com/sf-alien-encounters-font.html">http://www.1001fonts.com/sf-alien-encounters-font.html</a>           | SFAlienEncounters-Italic.ttf |
| Orator Std       | Adobe, John Scheppler | <a href="https://typekit.com/fonts/orator">https://typekit.com/fonts/orator</a>   | OratorStd.otf                |
| Arial            | Monotype Corporation  | <a href="https://docs.microsoft.com/en-us/typography/font-list/arial">https://docs.microsoft.com/en-us/typography/font-list/arial</a> | arial.ttf                    |

Entry Form