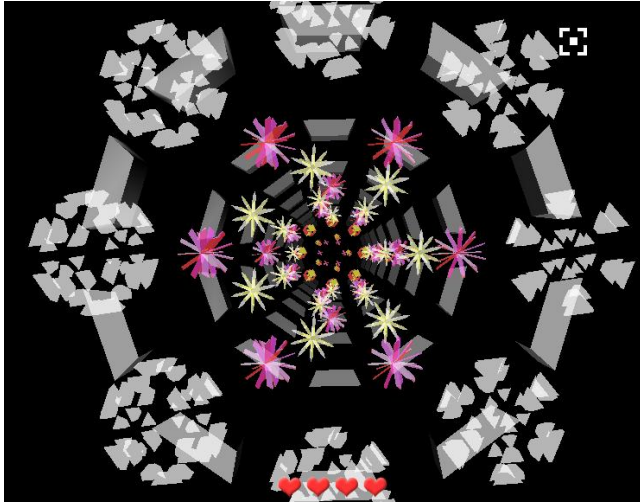


# Audiotron



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## I. Artist Statement

Audiotron is a game which engages the player in a full-body and full-sensory gaming experience. By utilizing a player's natural, real-life movements we not only stimulate the user's sense of touch, but also promoting a healthy gaming experience. By tying both graphic and gameplay elements to a music track we hope to engage the player's visual and aural senses in a way that has more impact than most games. By combining these tactile, visual, and auditory cues into one cohesive whole we hope to create a more immersive and accessible gaming experience.

## II. Influences

Our initial concept for this game was influenced by a large variety of things including prior gaming experiences and current game research. At the onset of our brainstorming we, as a group, were committed to bringing a gaming experience that made use of a user interface apart from the traditional controller. This is an idea which has been experimented with throughout gaming history with successes like the [Nintendo Zapper](#)<sup>4</sup> and failures like the [Sega Activator](#)<sup>5</sup>. More recently, [Konami's arcade line](#)<sup>6</sup> has included a variety of games featuring innovative control systems employing motion capture, light sensors, and even dance mats while the Nintendo Wii has brought accelerometers and IR sensors to the home market.

In specific we were greatly influenced by a [video](#) we saw on YouTube of a Ph.D. Graduate Student of Human-Computer Interaction at Carnegie Mellon University. In

this video he demonstrated how the Wii Remote could be used to "accurately track the location of your head and render view dependent images on the screen."<sup>1</sup> This can effectively cause your "display to properly react [to] head and body movement as if it were a real window creating a realistic illusion of depth and space."<sup>1</sup> Since we are using this technology to create a shooter on rails, this project is somewhat similar to Konami's Police 911 (2001)<sup>7</sup> which also used infrared sensors to determine a player's location.<sup>2</sup> Apart from its interesting controls Police 911 plays a lot like Time Crisis, even borrowing the timed element of the game;<sup>2</sup> this type of gameplay is something we are avoiding in this project.

Rez is another game which we were influenced by in the making of this game. The way it tied music into gameplay was stunningly done;<sup>3</sup> this is an aesthetic that we will be trying to reproduce in our project. Deviating from what Rez did, we are adding 3D VR interaction via our head tracking control interface and two-player versus play.

### III. Target Audience

The target audience for this game is everyone. Specifically we are targeting current shooter and music game players, but the intuitive control scheme and non-violent nature of the game should open it up to a much wider audience than the average shooter. Moreover, since we are targeting music gamers we start with a very large pre-installed audience which consists of males and females of all ages. Since the equipment only involves two IR sensor's, it could easily be changed to accommodate various heights and movement capabilities. We really just want to make this a fun game...and *everyone* likes to have fun!

### IV. Introduction & Story

No story to this game. It is purely goal driven.

### V. Immediate & Long-Term socio/cultural impact

This game is being made as an exploration of highly interactive gameplay. This includes not only an experimental control system, but also intra-game interactions between multiple forms of sensory stimulation. By working towards as many points of interaction as possible we hope to create a game which is healthier, more immersive and more accessible than most of today's games. We can only hope that this game can help in bringing higher levels of interactivity to other games.

### VI. Delivery System & Requirements

The two-player game will require each player to have:

- A networked PC with Bluetooth
- Two Nintendo Wii Remotes

- One USB powered IR emitter bar
- One pair of IR emitting glasses or headgear

Setup for each player includes:

- Placing the IR emitter bar and one Wii Remote in front of their display; these are used to enable head tracking and 'gun' control
- Putting on their pair of IR glasses; for head tracking
- Holding onto one Wii Remote and pointing it at the screen; for aiming and 'shooting'
- Turning on their computer, sensors, and Wii Remotes and then running the game

For development requirements please see the 'Program Structure' section [Section XIV]

## VII. Interface

### User Input

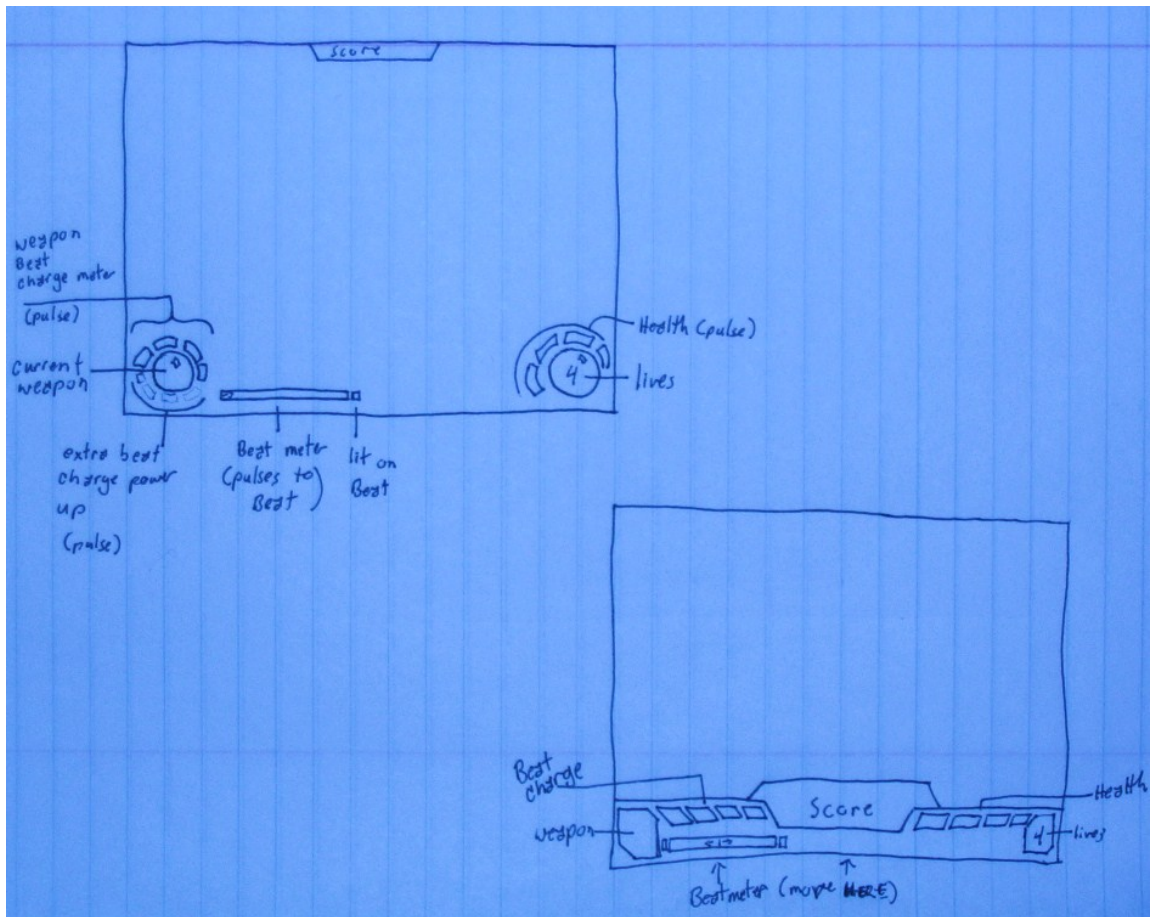
Audiotron will gather user input through the player's own natural movements and actions. The only input device that requires conscious use is the Wii Remote; this is used by pointing it at enemies and shooting them just as if you were shooting them with a real gun or pointing at them with your hand. Other information, such as camera position will all be gathered via the position of the player's head. This will be used to generate your first person view of the game based on your actual position relative to the screen. Using these controls, Audiotron should be able to provide a game play experience that is more accessible and engaging than current games.

### Visual Interface

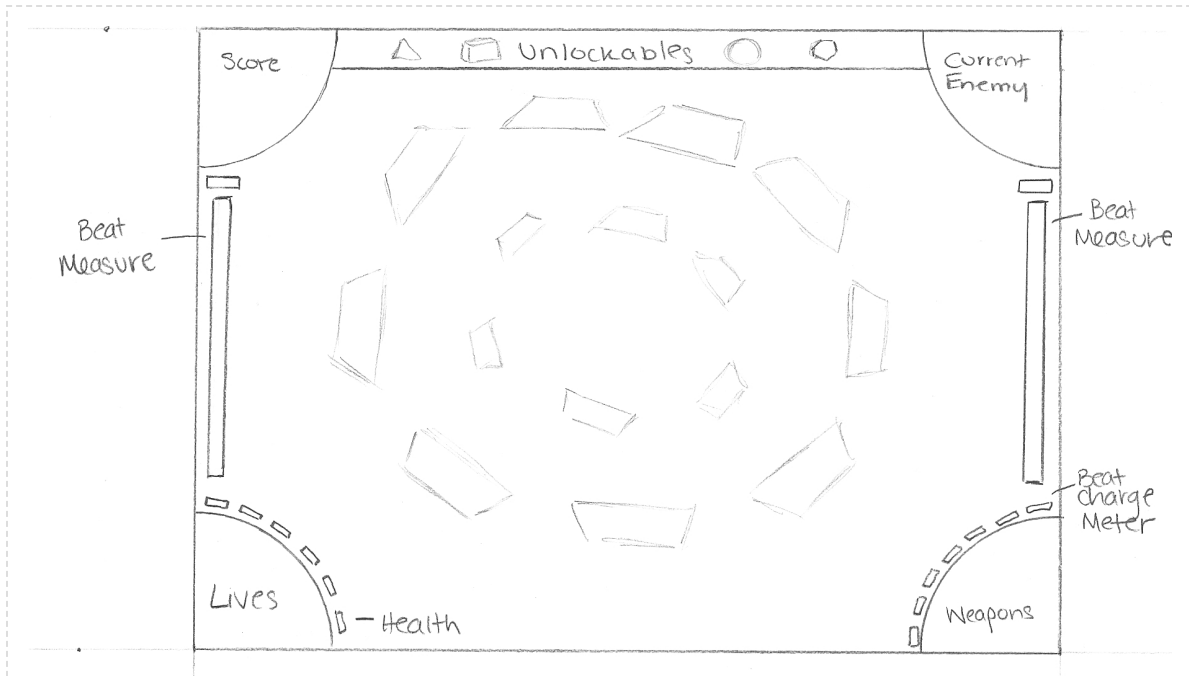
*Environment* - As a part of Audiotron's visual interface, the environment will interact with the background music in a way which cues the beat of the music. As a visual cue of the beat, Audiotron's entire environment will pulse in time with the base music track. As a visual and interactive cue of the beat, environmental hazards in Audiotron will reach the player in time with the background music. This will not only provide an extra visual cue to the beat of the music, but also require the player to actually move in time.

&nbsp;

*Graphical User Interface* - Since music is going to be significant a significant part of Audiotron's game mechanic the beat should also be present in certain aspects of the in-game HUD. Similar to the HUD in games like Dance Dance Revolution and Rez, Audiotron will feature status bars that pulse with the music. Supplementing these, there will also be a bar whose only purpose is to visualize the beat of the music. Also, since shooting will charge in time with the music, Audiotron's HUD will feature a visual representation of the completeness of this charge. We will also implement auditory cues as to the success, completion, and hits.



[2 rough drafts of possible HUD layouts]



By tying multiple aspects of Audiotron's visual interface to the beat of the background music we hope to increase the visual and auditory effect of these elements on the player.

The HUD includes:

- Player health/lives
- Shooting measure (shown by the cursor changing from red to white on a scale basis)
- Score
- Unlockables
- Current Enemy
- Beat Charge Meter

**Player Health -**

This decreases as the player collides into the enemy.

**Player Lives -**

This isn't the main focus of game so it will be amount that should be easy to make it through without dying. Clearly visible at the bottom of the screen.

**Shooting measure -**

You get added points for shooting on the beat. This will be a visual on both sides of the screen for the player. It will also determine the length in which you have to choose targeted enemies.

**Score/time -**

Score will allow the player some sort of goal and competitive option.

**Unlockables -**

These are enemies you have unlocked represent the various instrumental tracks that can be unlocked.

**Current Enemy -**

Featured enemy(s) you are trying to unlock.

**Beat Charge Meter -**

If you shoot the the enemy on the beat, it keeps track of the length of time you have to select enemies.

## VIII. User Interaction

**Point of View and Introduction to Environment**

The player will view the game from the first person point of view and will be in an environment which is similar to standing in a long, narrow, 3D corridor. The player should feel like they are floating/flying through this corridor which, to aid in level design, will be circular.

**Movement**

The player can move their avatar using their own normal real life movements. Technically all of your movement will be dependent on the placement and orientation of your own head in relation to the Wii Remote in front of the game screen. For example, if you jump your head will be higher...as a result your avatar would also 'jump'. If you move your head to the right, your view of the world on the screen will be from a right-shifted perspective. Moreover, if you move closer to or further from the screen you avatar will move further into or out of the corridor.

Note (z-axis movement): *Movement on the Z axis will be limited to a visible point on screen. Environmental objects will reach this point on the beat as yet another visual musical aid.*

Note (head tracking limitations): *There are some restrictions as to how a player can move; these are related to how the user's movements are being tracked. Since user movement is tracked completely through head tracking, someone playing this game must always be facing the screen. If the player is looking away, there will be no head to track!*

**Object Interaction**

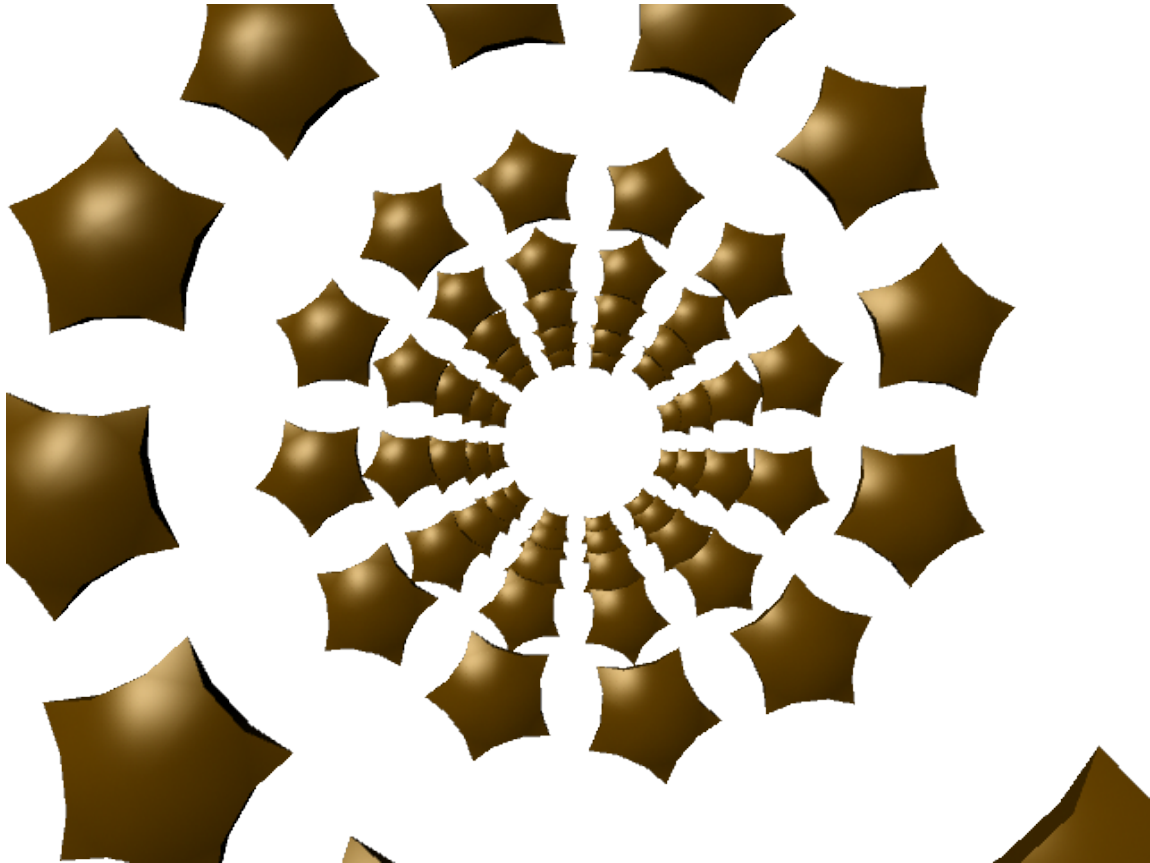
Players ultimately wish to avoid colliding with the objects in game and the dismantling of the objects are the goals for the players.

The only other way to interact with your environment is through use of the Wii Remote which you should be holding and pointing at the screen. By pointing you Wii Remote, made visible by some type of cross-hair on screen, at objects you press the trigger button to 'dismantling' them.

## IX. The World Layout

The world in our game is made up of very simple brightly colored geometric shapes which all "deform" to the beat of the music. Moreover, the entire game will take place in a narrow hallway of sorts where you are at one end and your opponent is at the other. This aesthetic was chosen to compliment the music aspect of the game as well as the VR head tracking.

By putting our players in a long corridor, the effect of head tracking should look stunning. Moreover the simple geometry lends itself to having cool effects run on it without looking cluttered. For the end result we are looking to create a simple world which will show off our VR gameplay and interact with the music almost organically.



## X. Level Design

The levels consist of a long corridor in which enemies are produced at the end and come towards you in various geometric processions. The combinations of enemies that are selected allow the player to achieve gameplay goals. Levels are demonstrated as players unlock combos of enemies and the instrument tracks

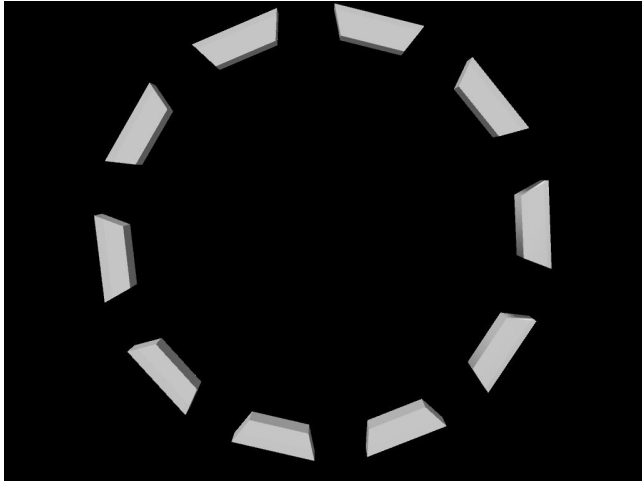
associated with them. The pattern of enemies, frequency, and number of enemies that spawn are the modified features.

## XI. Visualization - Art

### Enemies



### Backgrounds



HUD



## XII. Flow Charts

**Start ->**

**Level 1 (1 enemy to unlock, combo 4) ->**

**Level 2 (1 enemy to unlock, combo 5) ->**

**Level 3 (two enemies, combo 6) ->**

**Level 4 (2 enemies, combo 7) ->**

**Level 5 (2 enemies, combo 8)**

If you collect combos not necessary to unlock, they just add to your score. If you miss a combo, your multiplier decreases and lessens your score. Combos are both necessary for high scores and to progress through the game.

## XII. Music/Sound Design

### **Goal**

Music in Audiotron will be dynamically generated based on the state of the game. Player attributes of health and combo-based skill will effect the instruments being played as well as the enemies currently being shown. Sound effects will be a cue to the player as to success of combos and collision of enemies.

The music is an original composition performed by an independent band. Each instrument track will be able to be implemented individually. This will allow the goal of the player to create a complete soundtrack by associating a instrument with an enemy. As the enemies combos are completed, the tracks of music will be become a constant in the game. Thus the goal of the game is to create music.

### **Original thinking**

As it stood originally, music could go one of two ways. Either music could be completely dynamically played in-game. This would lead to a more organic music experience that would have the ability to speed up, slow down, add or remove musical themes all in real time depending on current game play. If done well this would be an optimal way to handle the music in game. The cons to this approach are that someone would actually have to create this music from scratch, and that the music would not be instantly recognizable.

Instead of creating our own dynamic music tracks we could also use a pre-existing track to be integrated into our game. In this case speed changes might be out of the question, because they could affect the pitch of the music. Furthermore, any dynamic in-game sounds would probably stand out from the track as foreign;

even if these sounds were created to be played on beat as an addition to the original track. On the up side, we gain instant recognition and do not need to spend time creating game music.

### **Music Tracks Recorded**

- 3 Drum tracks (really simple to not so much simple)
  - Noticable
  - Perhaps points?
- 2 violin
  - track health
  - negative noise
- 3 harmony
  - 2 vocals at beginning 1st half
  - 1 trumpet 2nd half
- 1 accentuating guitar part in 2nd half
- 2 melodies (if played at different times, a plus)
  - 1 guitar
  - 1 trumpet
- 1 bass
- 1 vocal rhythm
- 2 rhythm guitars

## **XIII. Rules & Gameplay**

**Setup** - see section VI.

**Overview** - Players are positioned at the end of a corridor in which enemies approach them. It is the player's goal to select enemies with their cursor to dismantle them and achieve necessary combos. If a player selects the first enemy on beat, they will have the maximum amount of time to create a combo from the other enemies. Once an enemy is selected, they dismantle sequentially on beat with the instrumental track. As the player progresses through combos, they achieve more instrumental tracks to make up the completed soundtrack.

### **Player Controls**

Your view is controlled by the position of your head in regard to the screen. Use movement to avoid enemies (holograms) that are hurtling towards you.

To unlock music you must target multiple holograms at a time; do this by pointing the Wii Remote at the screen and holding the trigger (B button on the bottom) while dragging your cursor over multiple holograms. Targeted holograms will dismantle when you let go of the trigger or when you run out of targeting time.

### **Gameplay**

You can target holograms for eight beats if the trigger is pressed on beat, or four beats if the trigger is pressed off beat. (On beat presses color the cursor gold while off beat presses turn the cursor red)

Each hologram type contains a music track that is added to the soundtrack when the necessary combo (noted on the top right of the screen) is reached!

## **How to play**

### **Setup**

Put on IR Goggles and stand in the designated area.

Hold Wii Remote in hand and aim at the screen.

### **Player Controls**

#### **With Wii**

Your view is controlled by the position of your head in regard to the screen. Use movement to avoid enemies (holograms) that are hurtling towards you.

To unlock music you must target multiple holograms at a time; do this by pointing the Wii Remote at the screen and holding the trigger (B button on the bottom) while dragging your cursor over multiple holograms. Targeted holograms will dismantle when you let go of the trigger or when you run out of targeting time.

#### **Without Wii**

Movement is controlled by the ASDW keys and cursor is controlled by the arrow keys. Avoid the holograms by moving around the corridor.

To unlock music you must target multiple holograms at a time; do this line up the crosshairs on the screen and drag your cursor over multiple holograms. Targeted holograms will dismantle when you let go of the mouse button or when you run out of targeting time.

### **Gameplay**

You can target holograms for eight beats if the trigger is pressed on beat, or four beats if the trigger is pressed off beat. (On beat presses color the cursor gold while off beat presses turn the cursor red)

Each hologram type contains a music track that is added to the soundtrack when the necessary combo (noted on the top right of the screen) is reached!

### **Goal**

The player must collect goal combos of a particular hologram in order to progress through the levels. A combo is a set of holograms of the same type that is collected by one charge release..

### **Scoring**

The player scores a set amount of points for each hologram collected.

There is a score multiplier that advances by completing a combo of the specific hologram needed during a level.

The score multiplier is reset if the player fails to get the needed combo of any hologram.

If this happens, build your combo back up to re-gain your score multiplier!

**End event**

The game ends when all tracks are unlocked or the player runs out of health.

## **XIV. Program Structure**

The program is implemented in Python with Panda3D 1.4.2 as the game engine. The Wiiuse library and PyWiiUse python bindings are used for Wiimote connectivity.

## **XV. Technical Specs**

A computer with Bluetooth to use the IR glasses and sensor bar with two Wii Remotes.

## **XVI. Implementation**

Each team member's contributions:

Brian: design, managed group/prioritized tasks, recorded/produced game music and SFX, coded music/timing structures, co-designed and implemented HUD

Dan: programming for Wiimote interaction, headtracking, enemy management, collisions, etc.

Jacob: IR glasses and sensor bar, poster creation, aided in presentation materials

Joseph: Models of enemies, hallways, and bonus (not implemented), HUD elements, Handout

Jennifer: design (GDD), textured and converted assets, HUD prototype, brochure

## **XVII. Production Time Frame**

**Time Frame:** 10 weeks

**Week 1** (130 - 2/6):

*Goals:* Come up with preliminary game concepts to be accompanied by art and research into needed technologies

*Tasks:*

- Jenn
  - Write a preliminary GDD for a game featuring finger tracking and capturing enemies
    - complete
  - Contact Prof. Lawson about using Wii Remotes on a PC
    - complete - talked to Dan about scheduling a meeting with prof. Lawson
- Brian
  - Write preliminary GDDs for games featuring head tracking and shooting 3D objects down a corridor
    - completed - left *story, visualization, program structure, and tech specs* blank
  - Contact Johnny Lee Chung about the use of his research in head tracking
    - completed - we can use Johnny Lee Chung's code base
- Joe
  - Draw concept art featuring 3D geometric shapes
    - ongoing - art featured 3D wire-frame geometric shapes; need to put these in a corridor
- Jacob
  - Research ways to block IR light
    - complete
  - Design IR emitting glasses and hats
    - ongoing
- Dan
  - Research how to implement networking between 2 computers in Panda3D
    - ongoing - put on hold until Wii Remote support is complete
    - moved - Jenn
  - Research how to implement head tracking using the Wii Remote in Panda3D
    - ongoing - found WiiUse, a well documented C library for connecting Wii Remotes to computers

*Tasks Completed:* After week 1 we have formalized multiple game concepts and researched the technical requirements of each

**Week 2** (2/6 - 2/13):

*Goals:* Choose a game concept and nail down the initial concept to a presentable stage

*Tasks:*

- Jenn

- Email prior Game Dev 1 group about information on networking in Panda3D
  - Previous team members failed to respond to email/contact.)
- Knit a cap for IR emitters or buy a baseball hat
- Brian
  - Help Dan with Panda3D
    - complete - gave Dan a CD of my prior Panda3D projects & suggested some tutorials to do
  - Update GDD
    - complete
- Joe
  - Draw concept art for presentation
    - complete
- Jacob
  - Design LED glasses
    - ongoing
- Dan
  - Implement head tracking in Panda3D
    - ongoing - acclimated self to Panda3D with tutorials

**Week 3 (2/13 - 2/20):**

*Goals:* Work on the core necessities of Audiotron: head tracking, initial 'enemy' models, core gameplay mechanics

*Tasks:*

- Jenn
  - Go to GDC and look out for any new ideas that we can incorporate into Audiotron
    - ongoing
- Brian
  - Create a production schedule
    - complete - this is a tentative schedule
  - Update *Influences* section of the GDD
    - complete - 7 references added
- Joe
  - Start work on 3D 'enemy' models; create a wire-frame cube out of cylinders
    - ongoing - started work on a cube and other models
- Jacob
  - Make an initial pair of IR glasses
    - ongoing
  - Research the cost of work goggles with pre-installed LED lights
    - ongoing - saw a pair for \$13
- Dan
  - Implement head tracking in Panda3D
    - ongoing - got Wii Remote support to work in Windows Panda3D, but there are lag issues to work out

**Week 4 (2/20 - 2/27):**

*Goals:* Keep working on the core necessities of Audiotron: head tracking, initial 'enemy' models, core gameplay mechanics

*Tasks:*

- Jenn
  - Add ideas from GDC into the GDD
  - Work on designing core gameplay mechanics
    - complete - figured out player movement/shooting & music/game interaction
- Brian
  - Work on designing core gameplay mechanics
    - complete - figured out player movement/shooting & music/game interaction
- Joe
  - Work on 3D 'enemy' models
    - complete - all enemy models are modeled
- Jacob
  - Build a finished pair of IR emitting glasses
    - ongoing - IR LEDs were too close together
- Dan
  - Implement head tracking in Panda3D
    - complete

**Week 5 (2/27 - 3/5):**

*Goals:* Start implementing gameplay and music elements

*Tasks:*

- Jenn
  - Start composing in-game music
    - moved - music will be composed and produced by *The Sirens of Titan*
  - Convert Joe's Maya models to .EGG format
- Brian
  - Code Audiotron's basic music & timing structures
- Joe
  - Finish 3D enemy models
    - completed last week!
  - Work on the 3D corridor models
- Jacob
  - Build a second & third pair of IR emitting glasses/headgear; we should have 3 wearable IR options finished at this point
  - Design a (possibly USB powered) IR emitter bar
- Dan
  - Code the player and enemy class; create a test suite where the player can shoot at enemies (like duck hunt or something)
  - Start looking into networking
- Everyone
  - meet to re-evaluate schedule (try to do this during class Wed.)
    - talk about hazards vs. power-ups
    - music genre (fast vs. slow & how this affects approachability vs. mastery)
    - general re-evaluation of project scope

**Week 6 (3/5 - 3/19):**

*Goals:* Create more immersive gameplay...and enjoy Spring Break!

*Tasks:*

- Jenn
  - Moved - Brian
- Brian
  - Record music over Spring Break with band
- Joe
  - Create a repeatable 3D corridor; [exact specs still need to be decided]
- Jacob
  - Build two IR emitter bars
- Dan
  - Keep coding!
    - Finish player code; head tracking, shooting, life, etc.
    - Enhance enemy code; movement, shooting AI, etc.

**Week 7 (3/19 - 3/26):**

*Goals:* Create Auidotron Alpha

- + player should be able to shoot basic moving enemies in a corridor
- + basic music elements should be present in game

*Tasks:*

- Jenn
  - Design player interface; menu, HUD
  - Upload converted assets
  - Meet with Brian about implementing the player interface
- Brian
  - Add music elements into game play (demo completed)
  - Get the environment to be game related
  - Progress music
  - Meet with Jenn about implementing the player interface
- Joe
  - Bonuses (4)
  - Explosions (1 enemy)
- Jacob
  - Continue refining IR glasses
  - Create IR Bar
- Dan
  - Keep coding!
    - Make everything (including the corridor) move like it's in a moving corridor
    - Shooting working (enemies disappear)
      - Count number and kind of enemies killed
      - Visually show shooting

**Week 8 (3/26 - 4/2):**

*Goals:* Polish alpha & add two player support

*Tasks:*

- Jenn
  - Convert final explosions, hallways, enemies to final form
- Brian

- Polish game/music interactions
- Add environmental music cues; pulsing & lights
- Start coding the user interface
- Joe
  - Finish modeling environmental hazards
  - Start work on explosion animations
- Jacob
  - Start working on designing Symposium poster; create How to Play
- Dan
  - Keep working on enemy movement & shooting AI

**Week 9 (4/2 - 4/9):**

*Goal:* Create a pre-beta Audiotron release

*Tasks:*

- Jenn
  - Review Audiotron & create a list of needed changes
  - Pamphlet for Fest
  - Make sure everything is textured and converted
- Brian
  - Review Audiotron & create a list of needed changes
  - Finish coding user interface
  - Polish game/music interactions [including environmental cues]
- Joe
  - Finish explosion animations
  - Create/update Flyer
- Jacob
  - Make sure IR equipment is working
  - Create Poster for Fest
- Dan
  - Add environmental hazards into game
- Everyone
  - Meet at the end of the week to discuss what needs to be done before the symposium

**Week 10 (4/9 - 4/23):**

*Goal:* Finish the first Audiotron beta in time to present at the RPI Games Symposium

*Tasks:* Tasks for this week will be decided in a meeting at the end of week 9

## **XVIII. Research**

Looked up Wii Head Tracking research from Carnegie Mellon  
 Looked up many different PC Wii Remote Libraries  
 Spent extensive amounts of time at arcades  
 Played video games

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