HSKRY.

Team Arcade

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Our Goals:

Through play children are perhaps the greatest explorers, discovering things about the world for the first time and being constantly amazed at what they find. Our team is interested in how children learn from their discoveries. We would like to see whether it is possible to create an interactive digital experience that provides these same emergent opportunities for learning.

Our aim is to create a fun and immersive experience for kids ages 8 - 14 that provides emergent learning opportunities. To do this, we will be using structured exploration that leads to a sudden realisation or what we like to call "a sense of wonder".

Semester 1:

> *Todd hears a sound and wonders where it is coming from, searching for the source he finds it is a small insect hidden behind a rock. It is a cricket but he doesn't know that. Reaching for it the cricket jumps away. Surprised, Todd laughs and gives chase.*

Rather than approaching it from the standpoint of "we are going to teach kids 'x' through making a system that does 'y' " we instead looked at it from the perspective of the child. What motivates them to look somewhere or to pick up something? What are they interested in doing and what would be boring for them?

Our first prototype was a collection of different experiences such as the one with Todd that we thought the child would be able to discover. It was mostly about observing an environment and seeing how the creatures in it behaved. But it lacked something that natural exploration and discovery has in abundance: interaction. **Children learn through interacting with the world not just by observing it** but the only interaction we provided was really just the control of a camera.

What we were trying to do was design completely unstructured play. This is very hard and linking that to a desired learning outcome is impossible because it implies some form of structure. Furthermore, the results of our first user study showed that people really do like to have some sort of goal. We then thought, perhaps it is possible to have unstructured activities inside of a structured game environment? This would allow us to provide a goal without sacrificing much of the exploration.

We also hadn't yet tackled the question of what exactly we wanted children to learn. **We needed to demonstrate our idea within a specific context.** This got us to thinking that maybe our project could be leveraged to teach abstract or complex concepts that aren't readily available in the natural world.

Semester 2:

We decided to make a game. And we decided to focus on how a game environment could be used to describe and let players interact with math, facilitating a new approach to learning.

In a game, not only is exploration possible, but it is satisfying since finding what you seek is often fun and rewarding. We've designed our game using "Structured Exploration" (Morrison, 2011) to let the player explore while still making progress towards the end goal.

The problem of interaction was solved by deciding to use a more robust input device. We chose the Wii-remote and nun-chuck attachment.

"Edutainment": Where do we fit in the game spectrum?

Entertainment ------------------- Our Game -- Education

This isn't a new idea. The space between "educational" and "entertaining" has been explored quite a bit already. Our game could loosely fit into the category of "Serious Games" but with a focus on informal learning through experience.

Inspiration: thatgamecompany

They craft experiences. One comes to feel strong emotions after learning how to play their games without the game having to say anything explicitly. The result is an experience with limited distraction, producing a deeply immersive connection between the player and the game world.
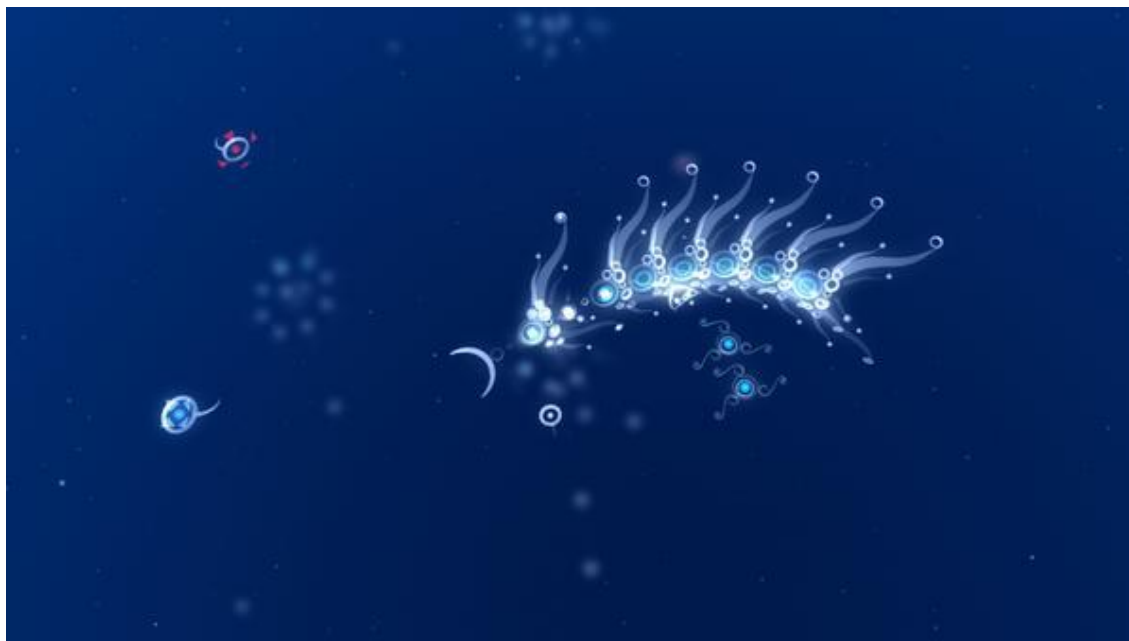
flOw by thatgamecompany (2006)

flower by thatgamecompany (2009)

Journey by thatgamecompany (2012)

Previous Prototype and User Study

You control a fish-like creature using the Wii-remote. You can swim around and complete patterns by tracing them out with the movement of your character.

The purpose of our user study was to evaluate our game's core mechanics. We wanted to see whether players could use our control scheme to follow the path of the curve and complete patterns. We also hoped to get some general feedback on what they thought of the game so far. Once again, we focused on the experience of the player as first priority.

We tested 7 children ranging from the age of 11 - 13. Although in general the response was very positive, we identified many issues. A full list of our observations is available in the user study report. The most notable problems are listed below:

Problem Areas:

- The core mechanic of the game was unclear. Nearly all participants needed guidance in order to know how to complete patterns.

- Easy to get lost in the game world and hard to find the patterns

- Bubble collectables didn't do anything in the game (but were fun to collect)

- Hard to identify the edges of the game world. Players were frustrated that they were pushed away when they reached the boundary.

- Boosting was hard to do and wasn't very rewarding since you could always do it for free

- The frame rate was dropping during image effects
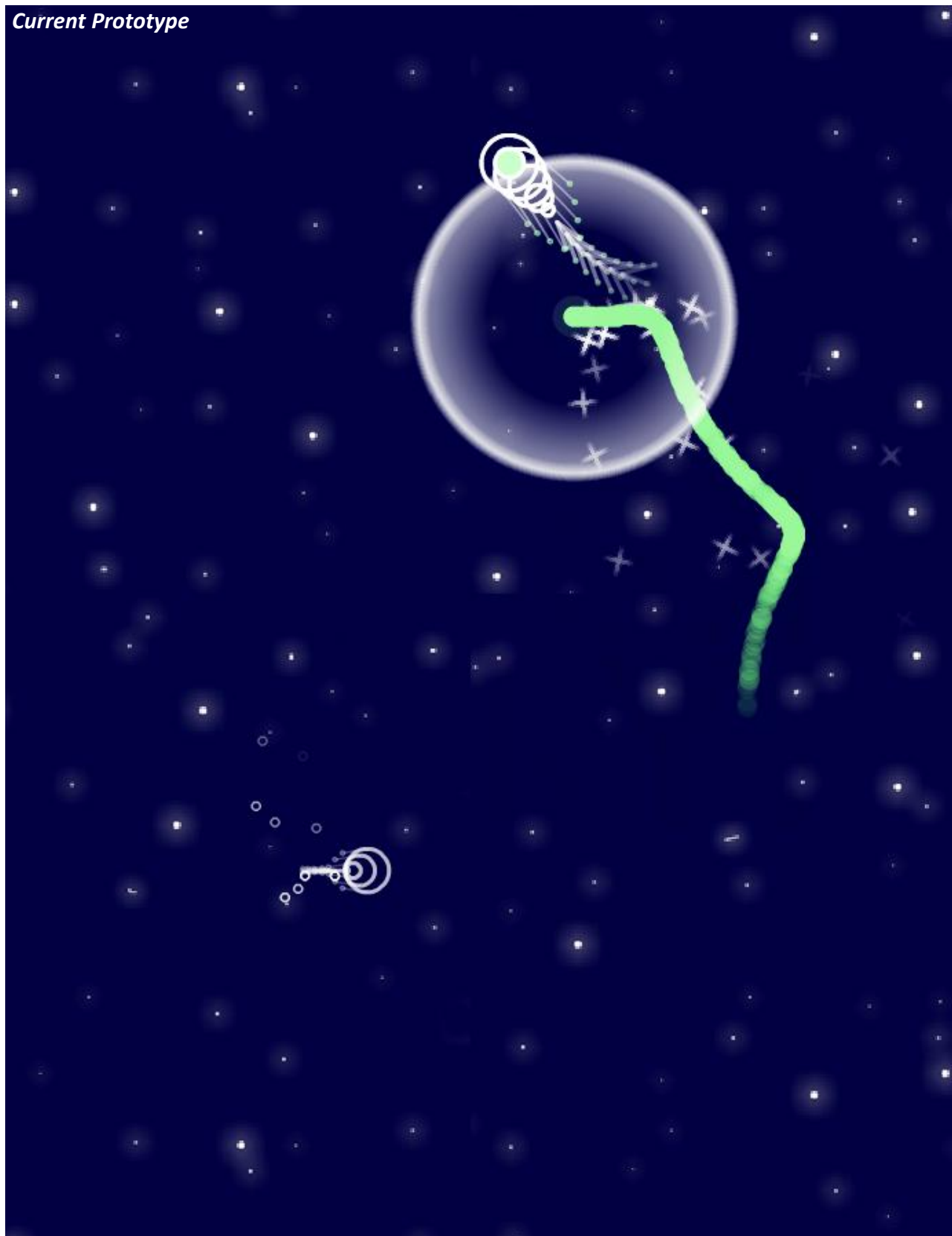
Game Design Document: Skry

Stars in the night sky reflect on the surface of a pond. Fish-like creatures live there in peace until some unknown force disrupts their home. Use the Wii remote to control one of these creatures. Working together with others of your kind, follow the patterns of parametric curves to gain the strength needed in order to restore the pond.
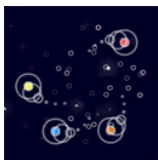
World and Objects:
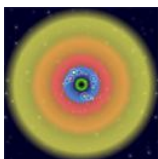
The Pond: This is the player's home. It is damaged and its powers sealed into crystals. The goal of the game is to restore the pond. It will slowly update its appearance as the game progresses.

The Player Fish: The character that represents the player in this game looks and behaves similar to the other fish but has more behaviour.

Other Fish: There are 4 other fish in the game. Each one corresponds to a type of pattern and a color.

Patterns: There are 4 patterns of a mysterious nature that hold the other fish prisoner. They start as a traced outline only showing a portion of the pattern at a time. They are represented by a mathematically accurate parametric curve.

The entire image is revealed when the pattern is completed.
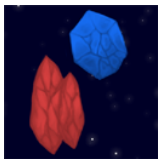
Crystals: There are 4 colors of crystal, each corresponding to a part of the pond that needs to be restored. Once all crystals of a certain type have been destroyed, that color in the pond is restored.
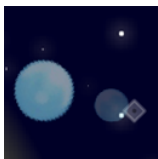
Bubbles: Replenish your boost when it depletes. They spawn at small bubble emitters throughout the game world.

Power-ups: These are triangle-shaped glyphs that permanently increase your boost by 1 and also fully replenish it.

Mechanics:

Following Patterns: The player follows the path of curves and must complete 1 full rotation of the path to complete it. They then free the fish who is stuck following that path and are able to smash crystals of that color.

Boosting: When the paths of some patterns become too quick the player can use a limited amount of boost to speed themselves up. The amount of boost they have is represented by a series of triangles on their tail.

Smashing Crystals: The player can smash crystals by boosting into them.

Communication: All fish including the player can communicate with each other by sending out a radial pulse or "shout". Fish respond with a pulse even when off screen and this helps you know where they are.

Sound:

Layered Audio: The music in the game is separated into tracks. When a pattern is completed a new track fades in. This also works as feedback to tell the player whether they are following a pattern correctly, whether they are boosting, or if they are venturing too far into the dark unknown.

Tones: When the player sends a shout, the distance it travels is based on the pitch of the sound. A tone that travels further has a much lower pitch. All the tones together form a chord.

When the NPC fish respond, we also control volume and pan based on distance and the left/right direction of the sound.

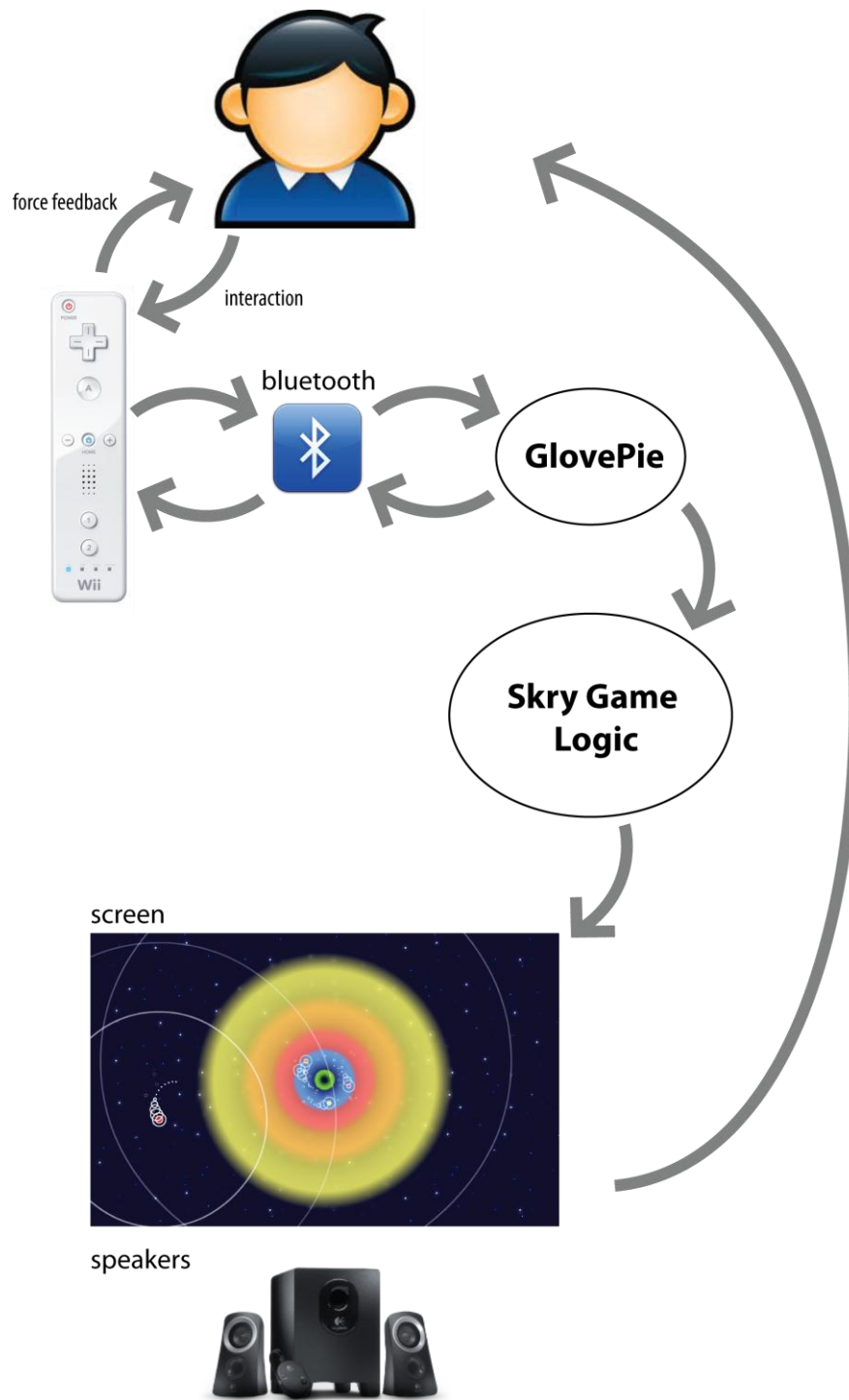Tutorialization: (the first 2 stages of the game are also tutorials)

Stage 0: "Staying inside the circle does something." If the player stays in the pond a circle will progressively get smaller. The other fish will mirror your movements. If the player wanders away from that task the other fish will find him and pester him to return by sending small shouts.

Stage 1: "With communication I can find my way" The player starts in the dark with no way to orient themselves. They are gently instructed to send a long shout and a fish replies off-screen. They can then find their way.

Because of what the player learned in stage zero (mirroring and staying inside the circle), they can then guess that they need to complete the circular pattern in this stage to progress.

Technical Specifications

Our prototype was coded in actionscript 3.0 using the FlashDevelop IDE. To interface with the Nintendo Wii-remote we used the remote's Bluetooth protocol and a scripting language called GlovePie to design our interactions.

Gameplay Screenshots
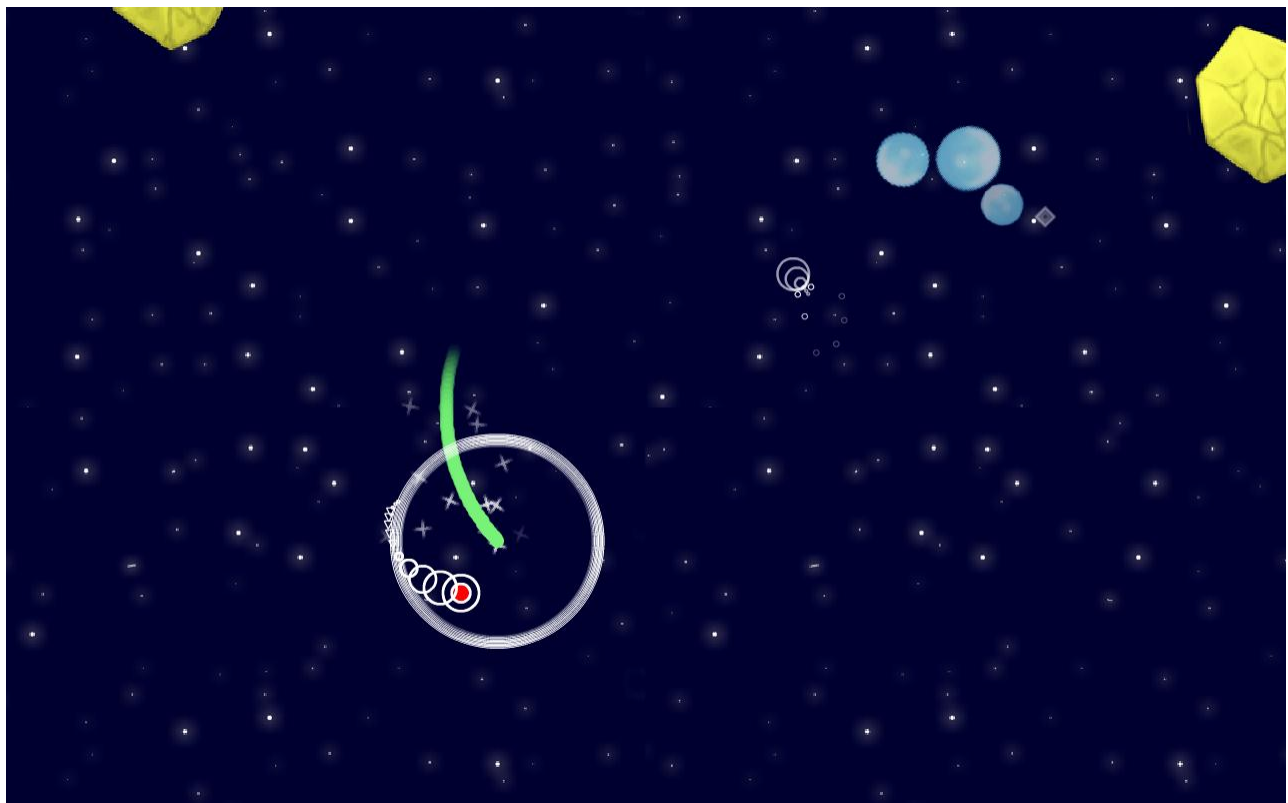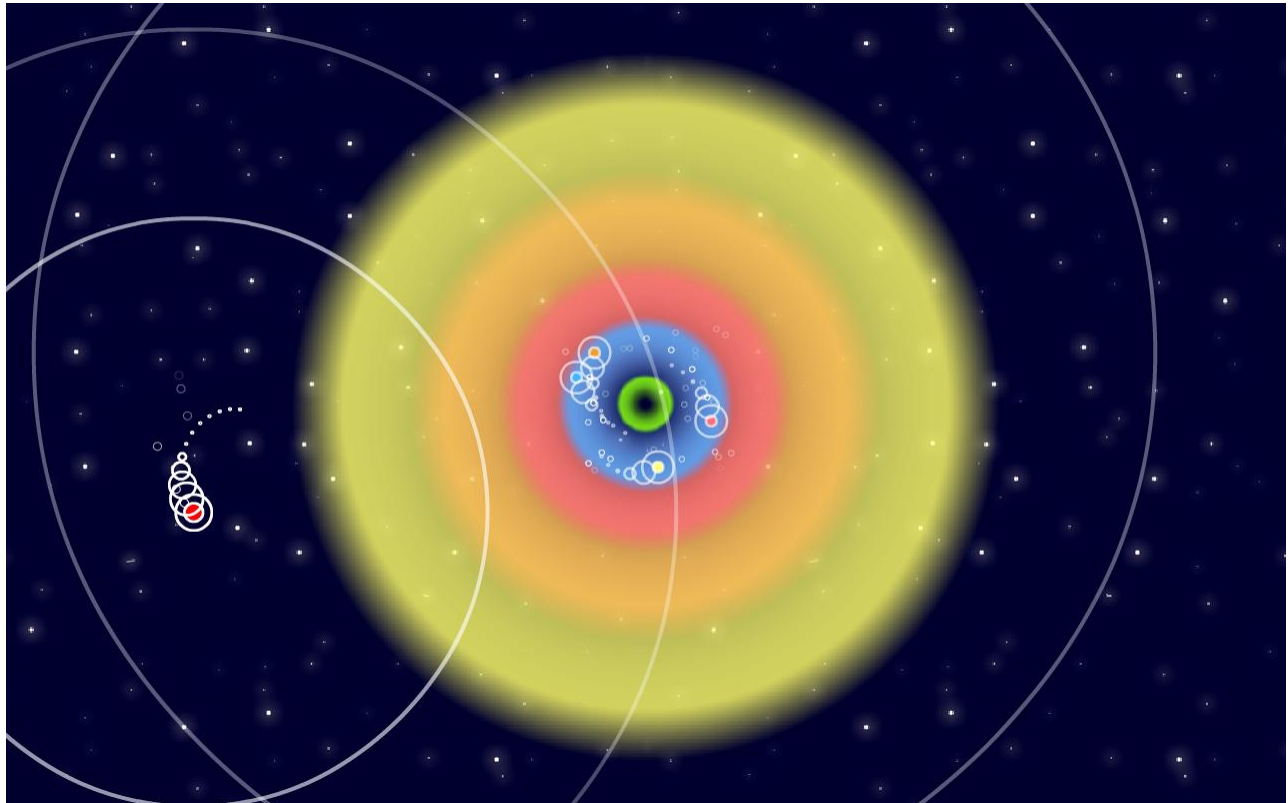
Summary of Revisions:

- Frame Rate Dropping: rewrote the entire game in Actionscript 3.0

- Explaining the Main Objective: The first two stages of the game represent carefully crafted tutorials that guide the player and draw them into the game.

- Identifying the Game World Edges: We added a lattice that fades to black at the world's 4 edges. To emphasise the boundary, we fade-in the melody (music) when the player is in the game world and fade it out when they venture out too far.

- Boosting: In addition to making boosting more responsive than before, we designed a system of upgrades and resource management that support the boost mechanic. The player needs to collect bubbles to recover boost. They can also permanently increase their boost by getting power-ups.

> Boosting is also used to break crystals which progresses the game. The player needs it for considerably more than just getting around and thus it is a more meaningful action.

- Getting Lost and Finding Patterns: The fish can communicate by using echo-location. The player sends out a shout a long or short distance and they will receive a reply in the direction of other fish. This lets them locate themselves in the game world and also helps them to find patterns since each fish is associated with one.

> The fish also communicate with the player later in the game if they find nearby crystals of their color. This helps promote a feeling that the creatures are working together rather than just following the player.

Reflection:

Working on this project was an incredible experience. The many stress-filled transformations our idea evolved through were sometimes hard to handle but we do not regret the process because it led us to discover something wonderful (at least in our opinion). We learned to be willing to scrap large portions of work when things aren't working and to focus on the strengths of the team. For most of the team, game design is something we are very familiar with and so it is no surprise that the project naturally took this form in the end.

Current Problems:

- Visual hierarchy: we still need to polish the visuals to make it more clear what game objects are interactive and which ones are part of the background. We should also try to find a more unified art style for all the visual elements.

- Control Mapping: The Wii motion controls are still not as responsive as they could be.

- Fixing: there are a host of bugs and efficiency issues in the code that we need to repair.

Future Directions:

- A focus on learning: We've crafted an experience but have not fully explored its potential for education. If we could provide approachable access to math and let children explore and learn at their own pace that would be exciting for us. The Games and Learning Alliance (GALA, 2012) has many interesting and relevant discussions on topics such as this. One series of talks focuses on the idea of exploiting artificial intelligence technologies in games that can adapt to the learners. Becoming part of this community and submitting our game for peer review is something we are considering.

- New Content: We are considering ways we could add to the game such as different game modes. One particular mode could be a pattern editor that lets players use their fish to interact directly with the underlying algorithms and then test out what they create in real-time.

- Sharing: Because we've written the game in Actionscript 3.0, we should write a mouse and keyboard based version and upload it online to get feedback from a wider audience.

- Testing: At some point we'd like to bring the game back to our user group and get another round of feedback. It would be great to see whether their reactions have changed.

- Sound: We are very interested in how sound can be used to provide immersion and to aid the player in exploring the game world. We would like to explore the use of 5.1 surround sound and more directional audio cues to better immerse the player.

References

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