Gravity Pong Post-Mortem

Pong is not a very interesting or challenging. Figuring out how to make Pong interesting, however, is challenging. One of the most exciting Pong games I have played is Plasma Pong, which uses fluid dynamics on the field to move the ball along player generated currents. Plasma Pong was an inspiration to me and helped me pick a direction for my variant of Pong, which replaces fluid dynamics with the concept of dynamic gravity. My main goal was to create a chaotic version of Pong, called Gravity Pong, where players could charge up and launch gravity balls from their paddles that pull the Pong ball toward them. Different combinations of gravity ball strengths and positions could then be used to by players in many strategic ways. I completed my initial vision for the game with plenty of time to spare and spent my remaining time dreaming up and implementing new ideas and features. The end result is a truly chaotic game of Gravity Pong that I am proud to call my own. Despite the good results I faced many challenges, there are several things about the game that need improvement, and I have a few more features that I would really like to see implemented in the future.

I wanted to avoid as many limitations as possible in development so that Gravity Pong could be the best game I could make in the given amount of time. This meant I needed to find libraries that would suit my needs for graphics, sound, and input. The libraries I chose to use were GLFW for a window system and input, FreeImagePlus for image loading, FreeType for text rendering, IrrkLang for sound, and GLEW for OpenGL extensions. Building and linking these libraries for Visual Studio was time consuming for me as I have had little experience doing so. I managed to get them all working for Visual Studio 2013, but the game was required to be a Visual Studio 2015 project, so I had to seek help from Esme in order to setup everything correctly. I have used most of these libraries in the past so utilizing them in my project came easily except for FreeType and IrrkLang, which I had no previous experience with and had to look up outside resources for and view their documentation to use effectively.

It is cumbersome to create a game if the structure of the engine it is using is not done well, and coming up with how to setup and engine is a difficult task on its own. I wanted to focus more on making Pong fun than making a well thought out pong engine. For this reason I looked into ways to implement a 2D OpenGL game engine before I ever started implementing Gravity Pong. I found an amazing resource that described how to create the game Breakout in OpenGL at learnopengl.com and followed the implementation step by step, making sure to understood it as I implemented it myself. It should come to no surprise then that when I did start the implementation of my game I used much of what I found at learnopengl.com modifying it as necessary, and even used many of the same libraries such as GLFW, FreeType, and Irrklang. The implementation I followed did go into some detail about collision detection and resolution, a necessity for most games. The collision detection was very simple however, and did not suit my needs for determining if rotated rectangles representing projectiles collided with other rotated rectangles or circles. Figuring how to calculate whether these collisions occurred was very time consuming and required me to look into the Separation of Axis Theorem and other online collision detection resources.

All of this was necessary in order to make my time implementing the game mechanics optimal, and it was worth it. I completed basic 2D Pong with the additional feature of being able to shoot gravity balls very quickly. From there, I proceeded by adding the ability to alternate between gravity balls and

repulsion balls (reverse gravity balls that push instead of pull) and the ability to shoot missiles that lock onto the ball. Then came the implementation of an energy system used to fuel player abilities, and a punishment system that penalizes those that use their energy recklessly. A leech attack was added as another layer of complexity which enables players to target the opponent's energy to force the punishment system to act on them. Finally, the most interesting move was implemented last. The grapple attack launches a tether from your paddle to the opponent's paddle in an attempt to grab them and manipulate their movements. The combination of all these abilities and mechanics sum up to a chaotic game of pong that requires excellent strategy and reflexes to win, just as I intended.

Gravity Pong does have many shortcomings that I would have liked to address if given more time. First and foremost, the visuals and sound effects are lacking as I am not experience in creating or working with either. Some of the player abilities also did not meet my original vision. For example, the missile's lock on mechanism is unpredictable and often does not work as intended, but is undeniably fun to watch. Also, the grapple ability was intended to function like a rope with slack between the two paddles, but was compromised to be a straight line for ease of implementation. One of the worst issues with the game is the current control scheme. The abundance of player abilities allows for greater player strategy, but also increases control complexity. Each player needs 8 keys on the keyboard to make use of all of the abilities, which can lead to confusion and discomfort when the keyboard is being shared. Resolution scaling is another issue that needs to addressed still, as the game only works as intended at a resolution of 1920 by 1080 pixels.

There is plenty of room for growth for Gravity Pong that I hope to achieve soon. Many of the issues with the game that I have mentioned need fixes, especially the issues of game resolution and control complexity. I hope to fix the controls soon by adding gamepad support for the two players. Gravity Pong in its current state also lacks a game menu. I believe this is necessary in order for the game to be perceived as a completed product. My most ambitious desire for the future of gravity pong is to add online multiplayer mode and a ranking system so that it can be shared and enjoyed by anyone regardless of location.