Space Journey

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Abstract

This project is a game that I designed and developed. The title of the game is Space Journey. The main purpose of the game is to move the main character around the screen without hitting any of the enemies. The main character is a UFO ship that needs to find its way through space. The user becomes the UFO ship and can move around the screen using the arrow keys. The UFO can move up, down, left, and right at a certain speed. The main point is to avoid crashing into other space objects. Those enemy space objects include asteroids, shooting star fireballs, and other spaceships. If at any point, the UFO hits one of these objects, a Game Over screen appears and the game ends. The main goal for the user would be to try and survive for as long as possible without getting hit. If the player hits the squirrel, they win the game. The user should be able to accomplish this goal by moving around the screen quickly and avoiding all of the obstacles. This program uses various algorithms to make the gameplay simple and efficient. These algorithms include a way to load in data from a file, an algorithm to create player and obstacle animation, and collision detection to check for game-ending crashes. These coding developments make this game work effectively to allow the player to actively play the Space Journey game.

Project Description

This project is a space game that can be played by the user. There is a story behind the game, Space Journey. The alien race, Sciuridae, which closely resembles a flying squirrel, is traveling the galaxy in search of a missing alien friend that needs to be rescued. Thus, the main point of this game is to travel the galaxy in a UFO spaceship to try and retrieve this lost colleague. The player needs to move around space, find the squirrel alien, without getting killed by flying space objects. The main character of the game is an alien flying around a UFO ship. The user would play this alien by flying around space in the UFO. The UFO ship is the main sprite character of the game. It can be moved around the screen using the arrow keys. It can go up, down, left, and right all around the screen. If the UFO character moves off the screen in any of the directions, it moves back from the other side. For example, if the character moves off the screen on the right, it reappears on the left side of the screen. If it goes off the top, it appears on the bottom. The main point of the game is to avoid hitting the flying space obstacles. If the UFO hits another object, a game over screen appears and the game is over. The goal to win the game is to survive as long as possible without hitting another object and capture the missing squirrel alien. When the player hits the squirrel a You Win! Screen appears. So the user can play the game by moving the UFO on the screen, avoiding the enemies, and try to save the squirrel by hovering the UFO over it.

Project Highlights

Movement

The UFO can move all around the screen using the four arrow keys. It can go up, down, left, and right. If at some point it moves off screen, it will come back on the other side. All of the enemy objects move around as well. The obstacles can move up, left, and right depending on the object. If the UFO hits one of these objects, the game is over with a loss. The squirrel is located in the upper left corner for level one. The main goal of the game is to hit the squirrel with the UFO and the player wins the game.

Win

To win the game, the player must hit the squirrel with the UFO. The squirrel is in the upper left corner. When the squirrel is covered by the UFO and a collision occurs, the game has been

won. A large, You Win! Screen will appear and the game will be over.

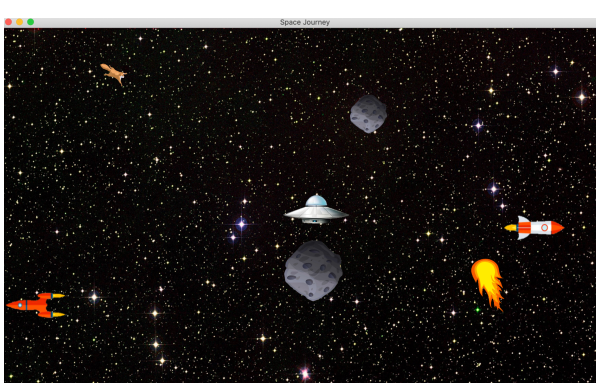
Loss

To lose the game, the player must hit an enemy obstacle. The obstacles include other flying spaceships, rockets, asteroids, and meteors. These obstacles all move across the screen in different speeds and directions depending on the object. If the UFO collides with one of them, the ship is now dead and the game is lost because the squirrel was not rescued. When a collision with one of these objects is detected a Game Over screen is displayed and the game will now be over.

Technology/Algorithms

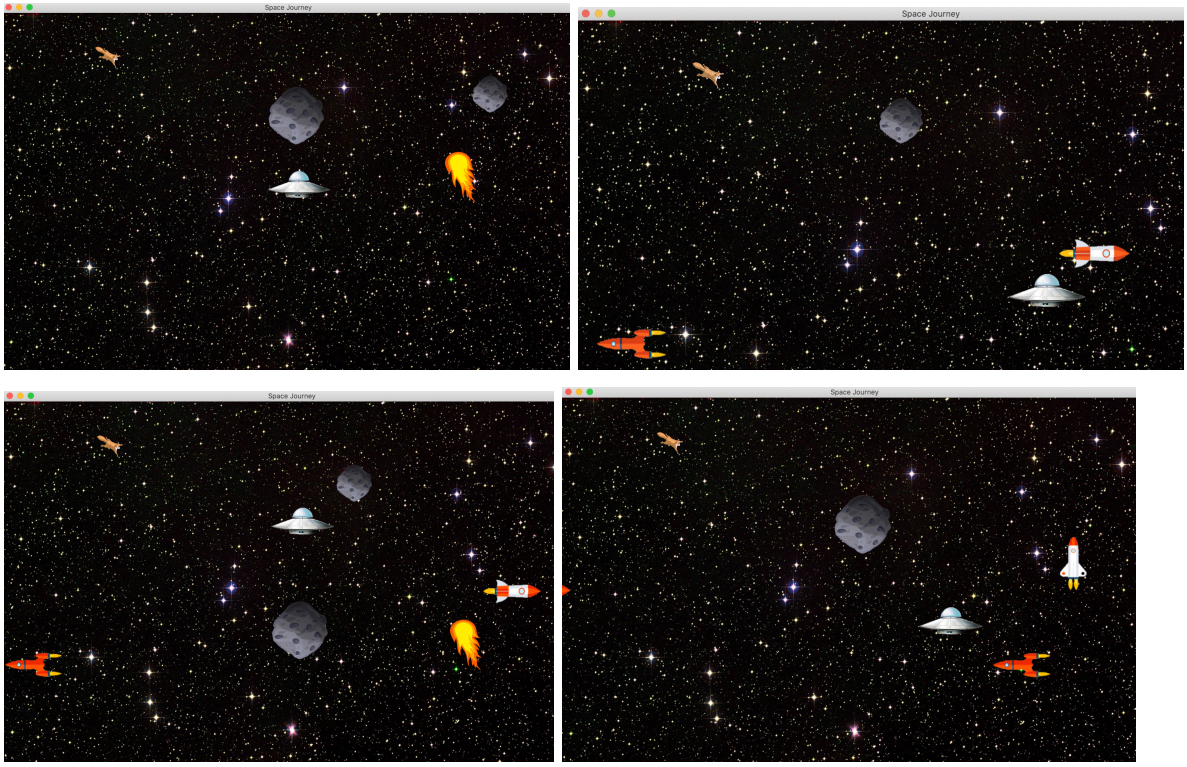
For this project, I implemented the program using the MAC OS 10.15.7 operating system using Java JDK version 16 with JOGL version 2.4. I used several different algorithms to incorporate

all of the necessary collisions for the game to function properly. Some of the algorithms I incorporated were a collision detection algorithm and an interval-based animation algorithm. I made all of the necessary objects move as they needed to by updating the position according to each rendering time. I also set up the UFO sprite to be able to move according to keyboard commands. I also used a collision detection algorithm to be able to check if the UFO collided with another object.



- The collision detection algorithm was the main challenge for this program. For collision detection, it was difficult to calculate how to create a border that would move at the same rate and direction as the moving object. It was also challenging to find a way to make the Game Over screen appear whenever said collision was detected. I also found it challenging to find a way to check for all the collisions but only have the game won when one specific collision occurred. When the squirrel collision occurs, the YOU WIN

appears but all of the other collisions, GAME OVER appears. It took me a long time to figure out how to approach this challenge.



- Another challenge I had was animating the objects. I needed to make several objects that would be able to move around the screen and be able to have a collision boundary around them that would be able to be detected. I ended up needing to develop a separate boundary class to animate in addition to the individual objects in order to have moving objects that could be detected by the collision algorithm. This challenge resulted in several hours of work and ended up being much more difficult that I initially believed.

Project Contribution

For this project, I chose to work on my own individual project and not in a group so all of the following contributions were done solely by me.

- Created object classes for each of the characters and objects on the screen, including getting graphics and resizing them to be able to work in the project.
- Animated the enemy objects to move around the screen.
- Created the sprite character UFO to be able to move up, down, left, and right at the same constant speed.
- Developed the collision detection algorithm to be able to detect when the UFO sprite is within a boundary of another object.
- Set up the GAME OVER screen to appear when a collision with an enemy occurs.
- Set up the YOU WIN screen to appear when the UFO sprite is within the squirrel object.
- Tested the code for any necessary improvements, captured the screenshots for this paper, and recorded the demo video.