

Simulating a solar system with procedural generated inhabited planets

Background

This project revolves around procedural generation, gravity simulation, and the implementation of ecosystems. A solar system is a collection of celestial bodies orbiting a central star. The gravitational attractions between the bodies can be calculated through code and implemented in the game engine to result in a solar system where the bodies are orbiting around each other, with the sun as the center body.

Procedural generation is a method of creating data algorithmically, as opposed to manually. This can be done through a combination of different assets and algorithms, coupled with computer-generated randomness and processing power. There has been a lot of research on this and there are a lot of different ways to apply this to planets. The challenge however, is to optimize having multiple planets with randomly generated terrains in the game without putting a lot of pressure on the computer.

Project description

The project is about simulating a solar system that includes a sun and a few planets (can also include a moon, comets, etc). The gravitational attraction between the bodies will determine the movement of all the bodies in the solar system, the planets will be orbiting around the sun.

The planets will be procedurally generated to have unique planets to discover each time the user plays. These planets also need some life, so there will be a very simple ecosystem consisting of some creatures and plants for each planet. The creatures can simply be moving/jumping around the planet, or they can interact with their environment and eat the food the planet produces.

The player also needs to be able to explore these planets and the solar system. So there needs to be a way to transport between the planets and walk around on them.

The aim of this project is to study different ways of implementing the unique planets in a solar system while still maintaining good performance in the game, and the focus should be on creating interesting terrains on the planets for the player to explore.

Suggested reading material

Procedural world generation: https://www.mit.edu/~jessicav/6.S198/Blog_Post/ProceduralGeneration.html

Simulation of our solar system: <https://gravitysimulator.org/solar-system/the-solar-system>

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Target group

D, DV, IT. Students interested in computer graphics and how the universe works

Special prior knowledge

- Preferably more than a year of experience in some programming language.
- Experience in working with a game engine (such as Unity or Unreal Engine).
- Knowledgeable in fundamentals of
 - Algebra and geometry
 - Datastructures and algorithms
 - Analysis
 - Physics

Supervisor

Open for suggestions