

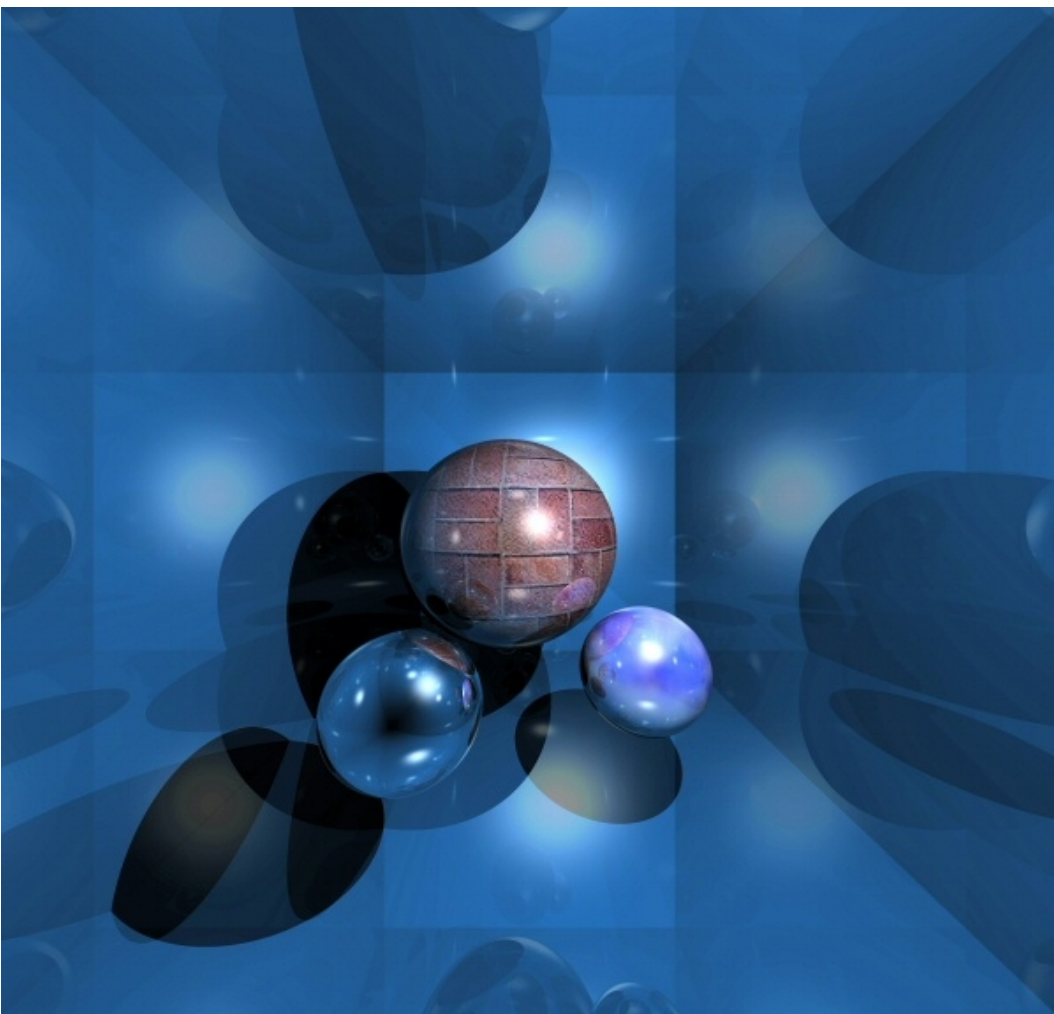
First-Person PacMan

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Abstract

The purpose of this project is to create a 3D, first-person version of the classic PacMan arcade game in order to learn more about the concepts of 3D graphics programming and rendering algorithms. The project will also include a basic AI to control the ghosts.



An image rendered with the ray tracing algorithm.

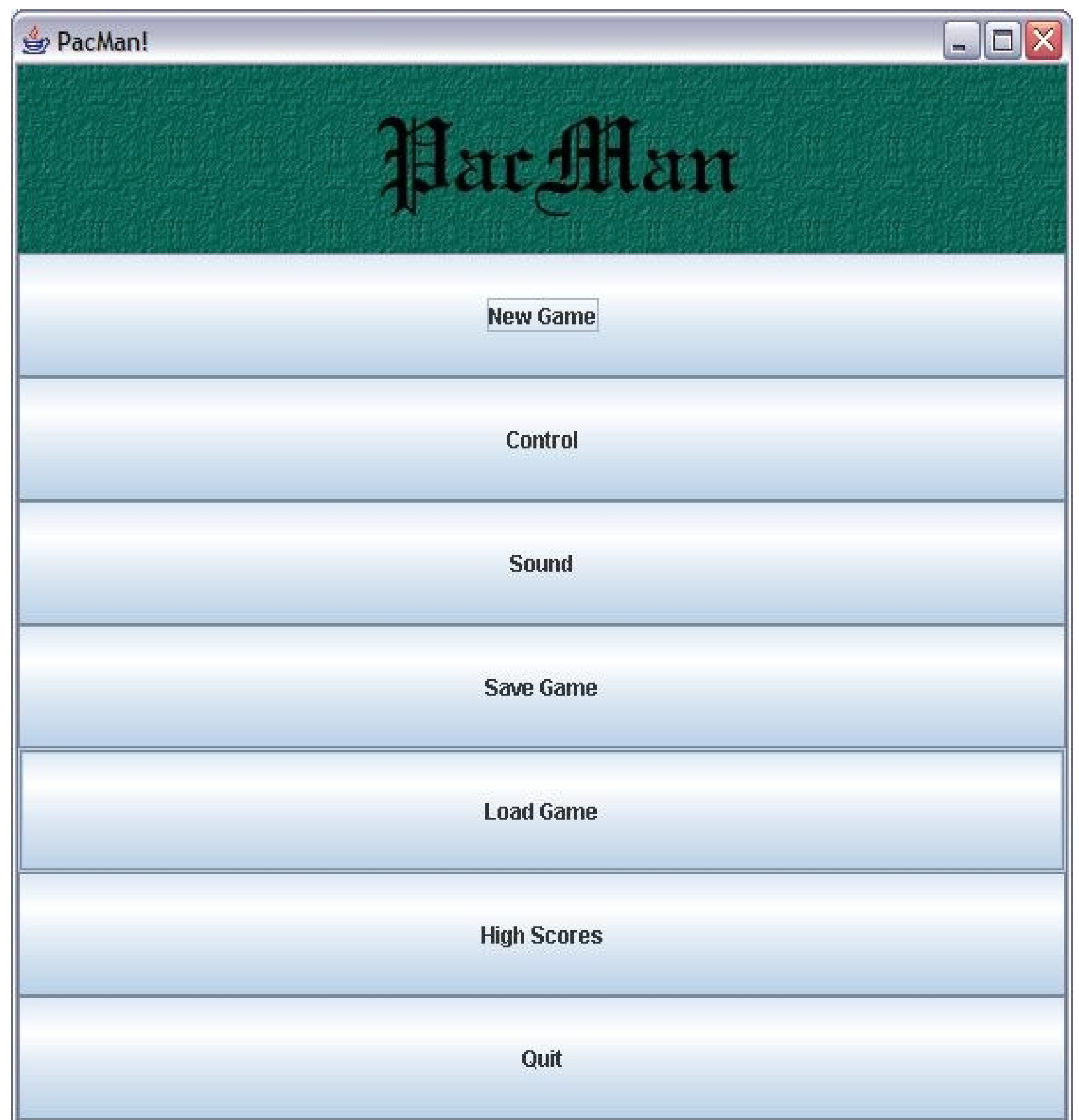
Background

The field of 3D computer graphics has been explored quite extensively, and comprises of three major parts: 3D modeling, animation, and 3D rendering. The first part, 3D modeling, refers to creating a 3D representation of an object. Animation, the second part, is moving the object through time. The final part, 3D rendering, is drawing the animated 3D model to the screen. 3D rendering is the most complex of the three parts, and is accomplished through several algorithms: polygon modeling, ray tracing, ray casting, or scanline rendering. This project will use the ray tracing algorithm, which casts a ray from the eye through each pixel of the virtual screen to the environment, calculating the length of the ray and using that to determine view distance, and using the piece of the environment the ray intersects to determine what to display.

Procedures/Methodology

The program will be coded with Java and Java3D using the jGRASP compiler. The main focus of the project will be the 3D graphics portion, which should be completed by the end of second quarter. Afterwards, coding the AI for the ghosts will commence, and once the AI is complete, most of the remaining programming time will be devoted to optimization/debugging, with the addition of the extra features of a game mentioned above if time permits.

The best test of the program is playing the game. Bugs that manifest themselves in the visible part of the program (such as ghosts moving through walls, walls in the wrong place, etc.) will become apparent by playing the game. Playing the game also provides a general idea for the runtime speed as well, as the game will be noticeably laggy if the code isn't efficient enough.



A screenshot of the game's main menu.