Modeling Virus Spread in a Modern Environment

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Abstract

This project explores the development and use of a real-time simulation to model the spread of a virus through the hallways and confined walking areas in a modern environment, such as schools and other public places. In addition, it explores the use and creation of various pathing algorithms used for real-time simulations.

Background and Introduction

-Languages-
This project is written Java with Java2D for the display and control.

-Pathing-
After experimenting with various pathing systems for the people in the simulation, some systems have been deemed not applicable to this project and some seem possible. By itself, a potential field AI is not the best choice for a simulation of people in a building with tight areas. Potential field AIs work best in open spaces and not the tight hallways of a school or building. However, when used to get the general direction of movement and combined with another pathing system, it can be very useful. In this case of this project, I implemented the "probe point" system for pathing as the main pathing system, while the potential field will provide directional assistance.

-The virus-
The virus is currently a simple airborne virus with an infection chance from a person to another person dependent on the distance from the infected person to the non-infected person. I have tried to put in as many random aspects to the spread of the virus as possible, including changing the max infection distance slightly and giving a random chance to become infected.

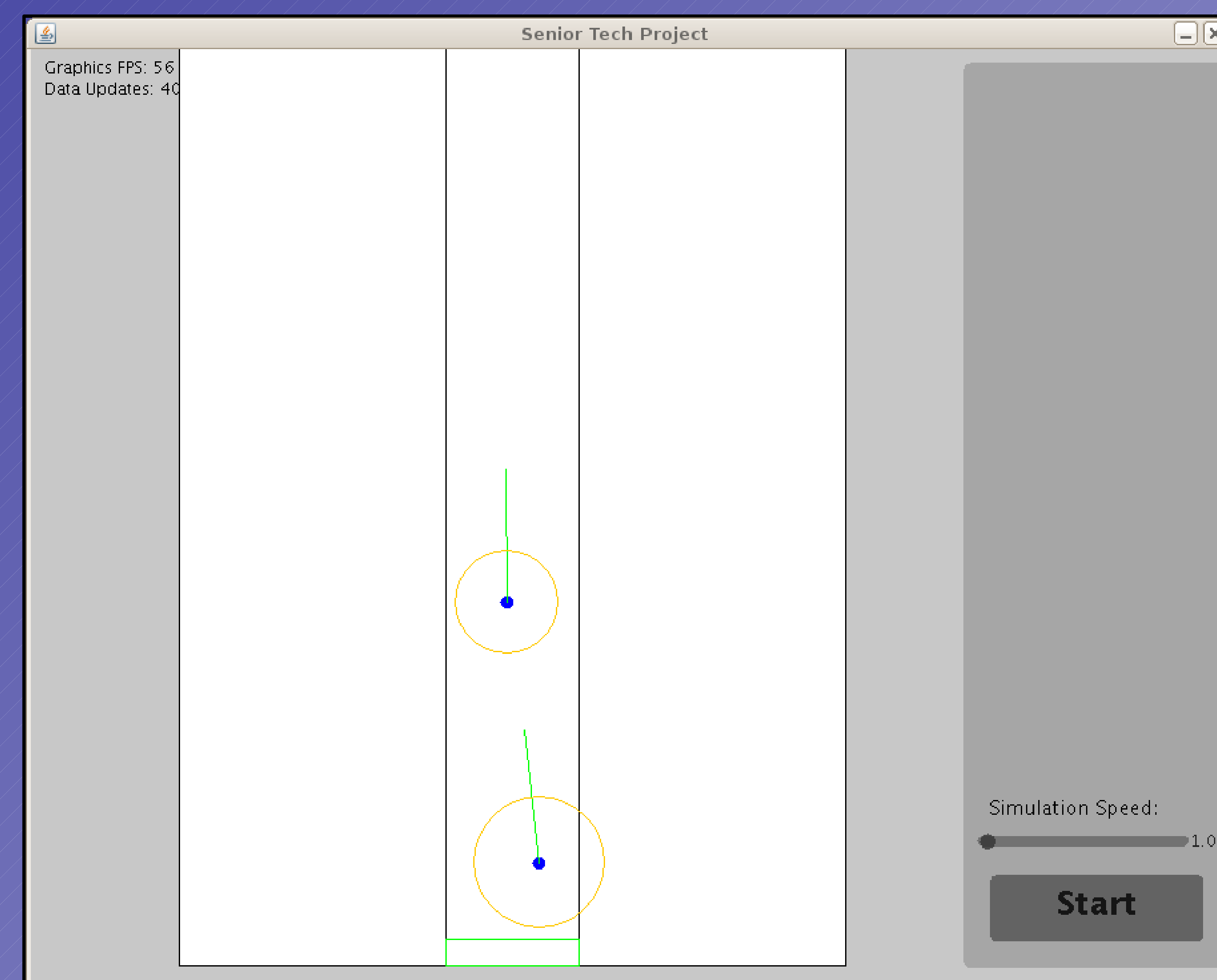

Fig. 1: The main simulation screen

Discussion

The project is a real-time simulation, where virtual people walk through the hallways in a building outline. The buildings are modeled after actual buildings such as the TJ building. As the people walk through the building, there is a virus, starting in one or more people, spreading between the people. The closer an uninfected person is to an infected person, the higher chance the uninfected person has of being infected by the virus. The simulation takes note of these infections and displays the concentration of infections along the hallways of the building. Some areas of the halls will have a higher concentration of infections than others.

Results and Conclusions

No results yet!
I hope to get results linking various aspects of a building's design to the chance of a virus being spread.

The simulation itself is almost complete. It is just lacking a fully functional pathing system and a way to display the concentrations of infections.