

Emergence and AI

Premise:

Simulation of the Bubonic Plague, using Fleas, Rats, and Humans as artificial entities.

Research and Citation:

<https://www.orkin.com/rodents/rats/rat-behavior/>

<https://www.terminix.com/pest-control/fleas/life-cycle/>

<https://www.cnn.com/2018/01/16/health/black-death-plague-spread-by-humans-intl/index.html>

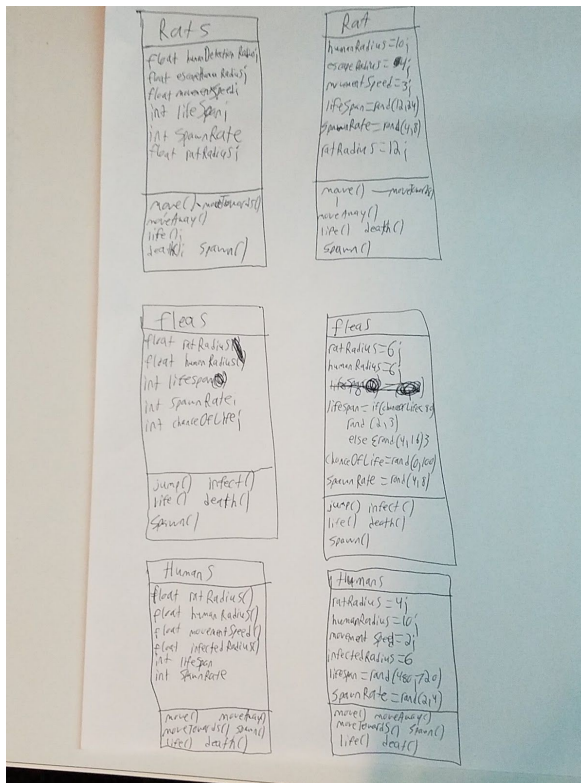
<https://www.medicinenet.com/script/main/art.asp?articlekey=141316>

<https://animals.howstuffworks.com/insects/flea.htm>

<https://www.ratcentral.com/whats-the-lifespan-of-rats/>

<https://www.cdc.gov/plague/transmission/index.html>

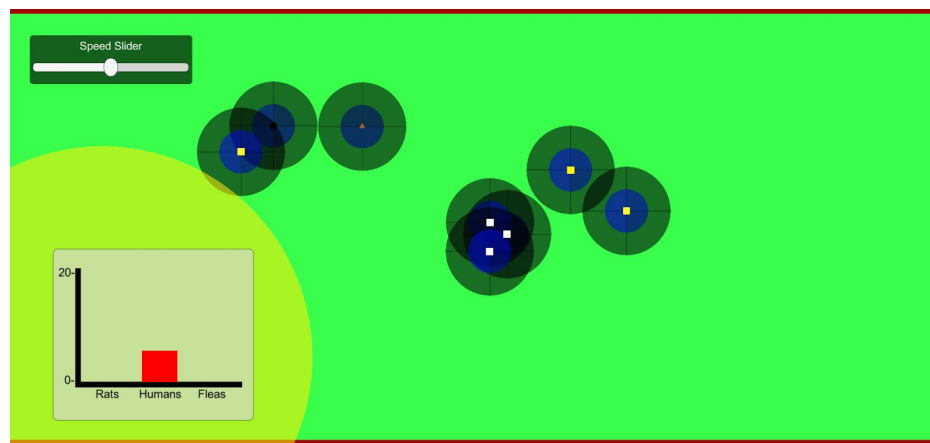
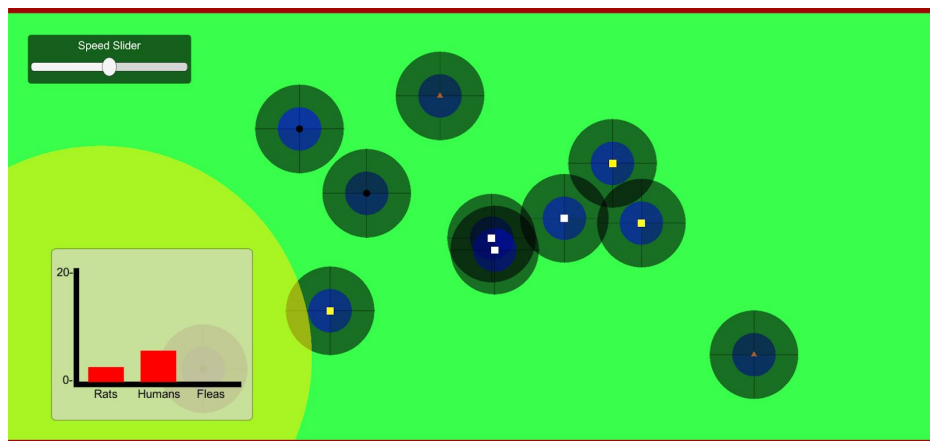
UML:



Design Decisions and Rationale:

We decided to use randomized movement for the rats and humans, with there being a higher chance for them to move towards or away from other humans or rats. We chose to do this to try to make the simulation realistic. Humans tend to group up and join other humans, but they have freewill. Our design makes it more likely to happen rather than just be guaranteed. Rats tend to move towards other rats or humans; this mimics rat populations in reality, the humans provide a food source for the rats. The humans tend to move toward other humans, but move away from rats and infected humans. Fleas jump from rats to humans when the rats are close to them. Once a flea is on a human, it spreads the disease to the human.

Screenshots:



Contributions:

GitHub Commits: <https://github.com/hhoare/BlackPlagueAI/commits/master>

Evan:

I started the rat and human movement script before Ian and I branched off and both tried our own ideas. We ended up going with Ian's movement. I touched up that movement. I did a lot of bug fixing. I made the in-game UI, the dynamic slider and bar graph. I wrote the paragraph on design decisions.

Ian:

Worked with Evan on the rat and human movement. Created the scripts for population, slowing terrain, and death of creatures. I drew the UML.

Henry: Created the flea behavior, then adapted to work similarly to rat and human movement logically. Created the title screen and button functionality. Improved performance by implementing composite colliders in Unity to decrease frequency of collision checks. Created final build for submission.

Assets and Sources:

Title Font sourced from:

<https://www.dafont.com/old-london.font>

Button UI image sourced from:

<https://assetstore.unity.com/packages/2d/gui/icons/simple-ui-103969>

Title Screen Background sourced from:

<https://assetstore.unity.com/packages/2d/environments/2d-platformerassetsspack-117179>