Robert Bailey

Done for IGME 202.05, as a reskinned Human vs. Zombie assignment.

**User functionality:**

Numbers 1-6 are assigned to debug lines in the code.

1 – Toggles a display of the left and right vectors for each agent.

2 – Toggles a display of the evade/pursue targets for each agent

For TIE Fighters (Zombies) a red line and circle points to their target.

For X-Wings (Humans) a green line and circle point to their evasion target

3 – Toggles a display of the vectors to detected obstacles, and the vector the vehicle is attempting to follow to avoid the obstacle.

4 – Toggles a display of the velocity of the agent.

5 – Toggles a display of the acceleration of the agent.

6 – Turns off all debug lines, and sets mouse back to placement mode.

R key – Toggles placement/remove mode. In placement mode, the mouse adds new vehicles at the location. In removal mode, the clicks remove the oldest vehicle of the given type.

Left Mouse Button (Mouse 1) – Places (at location)/removes (oldest) TIE Fighters (Zombies)

Right Mouse Button (Mouse 2) – Places (at location)/removes (oldest) X Wings (Humans)

**Reasoning behind design choices:**

I decided to go with a Star Wars theme because I got excited over the new trailer. X-Wings and Tie Fighters seemed like the sensible choice for the vehicles. Since zombies always win, I made them TIEs, also since TIEs canonically are less maneuverable. The X-Wings were the best choice to oppose them that I could represent with PShapes. I used PShapes since I find it more satisfying to have my own artwork moving, and it kept it visually consistent. The TIEs call in reinforcements from a nearby but off screen Star Destroyer when an X-Wing is captured, and the X-Wings are just trying to survive until assistance arrives (it won’t). I used bounding circles as collision detectors to easily account for rotation and rapid movement.

Obstacles are circular to easily line up with bounding boxes and have easily seen radii, and are slightly distorted to look like asteroids and allow slight overlap since there are points on both the X-Wings and TIEs that stick slightly out of the circle.

The radii were determined through testing over trial and error, and what lined up best with the “sprites” I made. The TIE points slightly out of the top and bottom, while the X-Wings are a tad wide. However, it does lead to tenser moments by allowing closer maneuvering on turns.

The speeds I used were chosen because it allowed me to run a simulation fairly quickly, while still being viewable and allowing interactions to take place (obstacle detection tended to break at higher speeds).

The amount of TIEs and X-Wings was arbitrary, as was the placement. This is even more so in that the vehicles can be removed easily through mouse clicks. The obstacles count was higher because I wanted to watch more vehicle/obstacle interactions under fleeing/seeking behavior influences. The obstacles were placed to prevent too many straight-aways, which showed the downsides of the evade behavior, and pushed humans back into zombies.

X-Wings and TIE max speeds/max forces were also arbitrary but I settled on values that still allowed the zombies to catch the humans, while letting the humans panic and turn into obstacles. The TIEs are less maneuverable, and the X-Wings are faster/more maneuverable.

The weighting of the evasion/fleeing behavior vs. the obstacle avoidance was because I wanted the emphasis to be on avoiding/catching the other party, rather than steering clear of every obstacle. This does lead to odd behavior when a TIE is seeking an X-Wing exactly opposite of an asteroid, but the X-Wings wander fixes that over time. The current weighting allows a higher chance of escaping in the more obstacle laden arena, while allowing the TIEs to easily corner X-Wings once they get numbers.

I used an array for input as it wouldn’t change much between versions. I used an arraylist for the zombies/humans because I wanted to be able to easily add vehicles to the program.