Assignment IV – Report

Using one slip day to turn in by midnight 4 Nov 2022.

Features Implemented

Minimum Requirements

AI Agents	
Sheep	
Action	Description
Wander	Default state. The sheep wanders slowly and aimlessly around the world. This is implemented using momentum and time-coherent noise to randomly rotate the ground gradient vector. Each frame, the sheep's previous velocity is combined with the rotated gradient to produce a new velocity. This simple algorithm allows the sheep to move smoothly around the world in a natural, intelligent-looking way.
Flee	Triggered when near a goal. The sheep will actively move away from the goal(s) that are near. In situations where the sheep is running towards a wall in the flee state, once it touches the wall, it will also *flee* the wall in addition to the goal until an arbitrary distance that is modifiable through the editor (FleeAction.tscn). To detect if a goal, or even a player, is near the sheep, each sheep has an Area node to detect bodies.
Attack	Triggered when near a player. The sheep attempts to ram the player, altering the player's velocity to impact their movement. Once a sheep begins charging at a player, it is locked onto that player until the player is out of its attack radius. This is implemented by adding a normalized vector to the player to the sheep's current velocity. This has the effect of accelerating the sheep towards the player. On a player collision, the player's velocity (plus an additional vertical component) is transferred to the sheep, and the sheep's velocity is combined with the player's

	to affect their ability to control. This effect is hardly noticeable for a single sheep except for head-on collisions, but when multiple sheep swarm the player, the player's velocity is greatly limited.
Chicken	
Action	Description
Flock	Default state. Alternates with produce unless disrupted by a player for intervals of 10 - 25 seconds. Moves around with other chickens using the boids method of flock handling. Chickens group together and have cohesion around a central point, but also separate from each other.
Scatter	Triggered when the chicken is near a player or a goal. The chicken attempts to move away from entities it's scared of.
Produce	The chicken randomly walks at varying speeds, and enters intervals of being able to breed. If coming close enough to another chicken in produce, a chicken will attempt to be bred, and exit the period of breeding for 10 seconds.

Additional Features

Finite State Machine/Action Nodes	We created a single and flexible finite state machine (FSM) implementation such that it could be used on any node that required AI. Furthermore, we created Action nodes to establish a way for the FSM to execute the needed processes for the AI for a given state in the FSM.

What Went Well

JB created a robust state machine framework for us to rely on that made implementing the various behaviors as simple as dropping in a call to the appropriate method.

Skyler did a great job with the boid behaviors, and they turned out very well considering the dynamic state of the world and the relatively low density of boids in it.

Arik created a velocity control system for the animals after their conversion from RigidBodies to KinematicBodies. This system made it easy and intuitive to move the animals in different ways for each of their states.

What Could Have Gone Better

We, once again, should have begun this project earlier. Besides some early initial progress with the project cleanup and animal velocity control, nearly all of the functionality was implemented in the second week.

Division of Labor

Arik	JB	Skyler
Refactor animals to make them KinematicBodies	Clean up project structure	Chicken flock
Sheep wander	**State machine framework** (props to him for this, it was awesome) (+1)	Chicken scatter
Sheep attack	Sheep flee	Chicken produce

Demo

https://youtu.be/9uF7_9L10O0