Game Design Document

An Ant's Life

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Overview

Introduction

This first person interactive simulation game places the player in the body of Annie the ant throughout her life from hatching to death in the colony. As she matures, the ant grows and her role in the colony evolves.

In order to progress in the game, the player must ensure her immediate well-being as an ant, interact with her sisters, and fulfill the tasks that characterize the roles she comes to take over her life.

The player experiences the world as an individual ant. The game's interface maps the dominant senses of the ant, smell/taste and touch, to a first-person interactive audiovisual display.

The game takes place in a fully accessible and interactive simulation of the colony and its natural and artificial environment. The universe is populated by other ants, and critters.

A multi-player version of the game allows several players to interact in the same universe as distinct ants.

Game Structure

Control

The player experiences the world as Annie the ant, through a first-person rendering of the mapping the ant's senses in the human visual and auditory domain (see Ant-Human Interface). The player can move about freely in the world, where objects are subject to the physical laws and effects that dominate at the ant's scale.

The game is organized in levels that correspond to the different stages/roles in the life of the ant. The player progresses in the game by accumulating experience and points in return for accomplishing simple tasks. Each ant role has its own objectives and tasks. All tasks involve picking-up, transporting and delivering objects from and to specific areas.

The player must at all times ensure its immediate well-being as an ant, interact with its sisters, and fulfill the tasks that characterize the roles it comes to take over its life.

The world is populated by sister ants and other critter. The player interacts with other agents through its normal ant interaction modality: offering, exchanging or receiving food.

Scoring

Health Points and Life Points

Health and Life points can be gained and lost throughout the game. Health points indicate how healthy Annie is as an ant. The player must ensure Annie's well being at all times, by making sure she has access to food, keeping her safe from predators and not leaving the nest for too long. Life Points indicate how Annie has helped the growth and strength of the colony. While Annie won't be able to affect the entire colony, her work for her sisters will be shown as her Life Points. These points will increase and decrease as Annie collects food for the colony, shares food with others, wards off enemies, or help larvae. Annie is responsible for her own life; however she must also protect and help her sisters in the colony.

Task Points

Annie will earn points for accomplishing tasks in each level or stage of life as an ant. Although these points are not displayed during the game, they are used to measure when Annie has completed the current level. A summary of the points won and lost during each level will be displayed at the end of the game. These points will also contribute to the total Life Points score that is displayed throughout the game.

Ant-Human Interface

The player experiences the world as an individual ant. The game's interface maps the dominant senses of the ant, smell/taste and touch, to a first-person interactive audiovisual display.

Perception

Chemical - Smell and Taste

Chemical signals mapped to clouds of particles. density indicates strength (concentration), color indicates type of signal.

Chemical signals range between 3 poles: good - bad - need.

Color mappings should play to existing color-value associations of humans (although there might be cultural differences). Green will indicate good, red will indicate bad, blue will indicate need, and gray is neutral.

The color coding of chemical properties applies to materials, objects, etc. For example, a friendly insect's surface will be green, an unknown insect or agent's surface will be gray. A dirt surface will be gray, a leaf surface will be green, an asphalt surface will be red. Volatile chemicals, left as trails or exuded during interaction between Ants (and possibly other insects and animals), follow the same color coding: green for positive (e.g. have food), red for aggressive (e.g. fight), blue for need (e.g. scared/hungry). These chemicals are represented as particles in the game.

The colors scales represent Annie's personal classification of tastes and smells, and will evolve over time to reflect her maturation. The items that Annie perceives as good while in the Nest Keeper Level will be different than the perceived good items in the Soldier Level.

Touch

Surfaces that are within reach are materialized with texture and colors that represent the type of material and the kind of smell/taste information it carries (same color coding as for chemicals). Basic (visual) texture patterns distinguish soil, food (vegetation), wood, concrete, asphalt (roads), etc.

Other senses and self-assessment

Gravity:
Gravity will be represented by an intensity gradient in the background.

Health/Hunger:
Annie's antennae, which are displayed on bottom middle of the screen, will be used to assess overall health/hunger. Using the 3-pole system mentioned above: blue for need, green for good/plenty/satiated, red for aggressive/unhealthy/bad. Intensity of a particular color will represent the level of that "mood."

Temperature:
The background color represents temperature: red for hot temperatures, blue for cold temperatures. The intensity of the color will reflect (intensity of color will be used to represent different levels of hot and cold temperatures) . Annie also moves slower in colder temperatures.

Actions

Movement:

Annie can move along any surface in the world. Her controls allow her to rotate and move slowly or quickly either forwards or backwards.

Pick-up/drop:

The user can choose to pick up any item that they are standing near. This item will appear between their mandibles on the screen to indicate that the user is holding something.

Fighting:

This is a user action based on how much aggressive chemical the user chooses to release. The other creature the user is fighting with will fight harder when Annie releases more aggressive chemicals. Whether or not Annie wins will be based on her Health Points at the time as well as the overall health of the colony.

Communication:

Annie communicates with her sister ants by releasing chemicals into the world. Chemicals that relate to Annie's health are released automatically as she moves. These chemicals will form a trail as Annie walks. This trail will allow Annie to find her way back to the nest as well as show other ants the trail she used to find food. When Annie is interacting with other ants, the user can choose to release friendly or aggressive chemicals.

Perception:

Like touch, Annie gathers information from her antennae, and objects will be represented similarly. Therefore, she understands a little bit more than just what she can touch. However, an object is not as clear as it would be if she could see it.

Universe Simulation

Physical Universe

Surfaces

The physical universe is represented by a series of surfaces areas that annie can walk on. These surfaces have specific textures, which determines several factors, such as the likeliness of finding food or other ants.

Particles

Particles represent the various chemicals that Ants release through their lives. Particles have different types and intensities. There are two kinds of particles, trail particles and interaction (AI) particles. Trail particles are left by ants when they find food around the world. Trail particles are either good or bad (red or green) depending on how much food was found at the end of the trail. AI particles are released by ants as they interact. Ants who are interacting release particles depending on whether they need food or have food. Ants can also choose to release friendly particles or aggressive ones when interacting in order to convey their feelings toward the other creature.

Trail and scent particles age with time and will eventually disappear. They can be reinforced if another ant walks in the same place and leaves the same kind of particle.

Terrain - Vegetation - Materials

This table shows the texture/color scheme that is used throughout the game.

Material	Color
soil	neutral
food - vegetation	green scale
ambient particles	green - blue - red
trash	red

Ant Colony

Very complex behaviors can emerge from the interaction of very simple individuals.

The game world features an open-ended ant colony simulation that the player experiences and influences through Annie's interaction modalities. AI simulates the various types of ants and their behavior. However, Annie only experiences the world locally, through touch and taste/smell.

The world simulation of the colony is based on the numbers of each type of ant, the amount of food in nest and the outside environment, and the amount of threat from foreign creatures. Ants within the colony die and are born throughout the game, and the ants transition through their lives just as Annie does. For example, soldiers die if there is a high level of threat from other creatures, and the amount of food in the nest for the ants to eat is linked to the number of foragers. Food is also added to the environment depending on the weather and season in the game.

Annie has no control over these colony statistics, the fact that the colony can die on its own without the user's input shows how little each ant can affect the strength of a colony. Although Annie's help is useful by gathering food and tending to the nest and the larvae, the entire colony cannot survive just because of her.

Trail Ants

Trail ants are looking around the world for food and then creating the trails that other forager ants can follow to find food. Trail ants wander away from the nest in random directions until they find food. If they find a trail that was left by another trail ant, they follow it until it ends or until they find food. Even if the food at the end of the trail they are using is gone, they are more likely to find more food in areas where ants have been successful in the past.

Once they find food, they walk back to the nest leaving trail particles as they walk. These trail particles indicate to annie and other trail ants where to go to find food. When trail ants arrive back at the nest with the food, they go out in search of more food in order to leave more trails.

AI Ants

AI ants are the interaction ants. These are the only ants in the game that the User can interact with through Annie. These ants do exactly what the trail ants do, they walk around finding food and leaving trails of particles, however if they encounter other AI ants or Annie they stop and interact.

When an AI ant engages in interaction with another ant, it first looks to see if the other ant needs food or not. This exchanging of food happens automatically between both ants. For example, if one ant has food, it will give the food to the ant if they need it.

The ants can also interact by releasing friendly or aggressive chemicals. If an AI Ant is interacting with Annie and the user chooses to release friendly chemicals, the AI ant might give Annie more food as a friendly gesture. If Annie mistakenly releases aggressive chemicals to one of her sisters, Annie will lose Life Points and the AI Ant will leave the interaction.

When AI ants are finished interacting with Annie, they will walk away. They can choose to follow Annie around the world, or continue looking for food.

Game Elements

Ants

Types of ants (castes) and their characteristic chemical properties, actions, goals, and behavior.

- Queen: lays eggs (AI only)
- Egg: hatches (AI only)
- Nurse: takes care of the newborns and of the queen
- Nestkeeper: takes care of the nest
- Forager: looks for/brings back food to the nest
- Soldier: defends the nest

The numbers of these ants in the colony simulation is statistically controlled by the ant colony simulation.

Other Critter

Other NPC elements populate the game universe: other insects that may interact with the ants in various ways, and larger animals or predators.

Predators:

- Antlion - the larvae hide in sand pit traps (3" wide). Ants who go into loose sand on the sides of the pit can fall into it
- Ants from other colonies who find Annie or her sisters wandering alone. These ants will be recognizable by their red color and aggressive particles.

Inanimate objects

Anything that can be interacted with in the world that is inanimate: rocks, soil, pieces of vegetation, etc. Everything has a basic physical presence (touch) and a taste.

- Rock: construction material/rubble
- Food piece: food for the ant and for the colony
- Trash: mildly toxic elements - must be removed from the nest/paths of interest

Landscape

Elements of the universe that cannot be acted upon, but that can be perceived...
Characterized by touch and taste properties. Actual geometry is of very limited relevance.

Levels

Nurse phase

This is the first stage of Annie's life. Once she is born, Annie is told to follow the other ants back into chamber with the eggs. Annie is shown that it is cold and the eggs need to be moved. The eggs have a "need" smell, experienced nurses leave a "good" trail that leads from the queen to the nursery. Some nurses who are bringing food to the nursery also leave a trail that will lead Annie to the food repository.

As ants move eggs, they lose energy and need to get food from other ants. Ants will lose energy all the time, and become hungry if they do not get food from other ants or go get food themselves and bring it back. An ant that gets food from a repository will have enough to satiate its own hunger, and store extra food to share with other ants.

If they have completed the task of moving the eggs and feeding the larvae , prompt them to feed and wash the larvae. After Annie has successfully taken care of several larvae and eggs, there is a prompt to move to the next stage.

Scoring/progress measurement: number of eggs delivered to the nursery, number of other ants fed.

Nest-keeper phase

Indicate to Annie that there is a piece of trash or pebble or dead ant that needs to be moved out of the nest. This is expressed by the encounter of pieces of trash (small objects that are slightly toxic), and pieces of rubble (soil objects that are not toxic, but clutter the place). Annie must pick these up and move them out - either directly out of the nest and outside of the nest perimeter, or to some intermediate chambers/hubs where they are picked up by other ants. Ants leave trails of scents that lead outside and to the trash piles. An ant can find its way out of the nest by following other ants that are holding trash.

Annie should be shown where to drop the garbage by the other Ants. She should not see an indication that her task is complete until she has dropped the piece of garbage in the right place. As Annie goes back in to the nest, she sees a seed and has to take it and find her way to the store of seeds and drop it there.

Annie will follow the lead of other ants in order to see that she should keep doing this, eventually the store room will be full and ants will start to pick up dirt and bring it outside to make more room in the nest for food. Additional difficulties might include cave-ins in the tunnels, which Annie needs to take care of. During this level it is also important that Annie remembers to eat herself, she will not be able to continue if she is too hungry.

Some nestkeepers are "undertaker ants" who clear away dead ants, which would release oleic acid (pathogen) if allowed to remain. There are dead ants with slightly to very toxic taste lying around.

After Annie reaches a score in this level for the number of tasks that she has accomplished the game will indicate that she has finished this stage of her life.

Scoring/progress measurement: number of objects picked-up in the nest/nest area and delivered to a dumping area outside the perimeter, and amount of food successfully stored in the food room.

Forager phase

Foragers must explore around the nest. They can either follow trails left by others, or create their own. Any ant must eat when hungry, otherwise they would die. when Annie finds food, she first eats (max up food level/no more hunger), also stores some food for exchanging in interactions. She can also pick up pieces of food (objects) to bring back to or towards the nest. Doing so, she will leave a "good" trail that others might follow. Interacting with ants following the trail (and sharing food) increases the chances that they will follow the trail, reinforce it, and bring more food to the colony.

In this level Annie will get points based on how often she finds food and brings in back to the colony. She will get more points if she follows a trail to find food, therefore reinforcing it. She will also get more points if the trail she leaves on her way back to the nest is followed by other ants. She can achieve this by sharing the food she has found with others. This will show them that she has found food and they should follow her trail. Annie will die if she wanders too long without finding any food, she is not allowed to wander away from the nest and not help the colony. Annie will also not be able to move very quickly when it is cold so she should keep track of the temperature, as indicated by the background, in order to make sure she is not outside at the end of the day.

After having brought back a good amount of food in one day, Annie will move on to next stage. Annie will repeat this “day” of the level until she brings back to the food.

Scoring/progress measurement: number of food units brought back to the nest, number of ants fed, number of ants who follow her trail, number of trails she follows.

Soldier phase

Soldiers must defend the nest against attackers, or go to war to take over some other colony's nest. Soldiers defend the entrance to the nest. They do not leave to go get food. When the ants that are guarding the nest scent something that is dangerous (red) they follow that scent, search for enemies, fight and then come back to guard the nest again. Annie will have to defend the nest a certain amount of times from attacks in order to complete this stage.

It is important that Annie continues to eat food regularly during this stage so she has enough strength to fight against their enemies.

Scoring/progress measurement: number of attacks successfully fought with the other ants.

Sixty Seconds of Play

This is the story of Annie the ant.

The egg hatches, a wave of chemical scents first overwhelms Annie the newborn ant. She instinctively takes a few minutes to get used to moving around and sensing the world. She already has some sense of comfort and confidence, associates the tastes and smells around her with good. She is swiftly attended to by other ants that give her food, reinforcing the association of the smell of others in the nest as "good".

Annie is a nurse, so she starts taking care of the queen, the eggs, and the new hatchlings. She fetches food in the nearby food depot to feed the queen and newborns, transports new eggs to the nearby nursery. Through interactions with the queen and the other ants around, her understanding of chemical signals gets refined. She now understands need and hep signals (need attention vs. offer help).

She starts moving around the world, following the other ants and doing what they are doing. She feeds the newborn larvae, moves the eggs and eventually moves herself up to be a nest keeper. As Annie starts her life as a nest keeper she follows other Ants around the nest to discover how to succeed in this new role.

References

- Ant - Wikipedia entry
- Myrmedrome: a real ant colony simulator
- Phermone Simulator