LeafBlaster

Project Documentation

Revision 1.4 / 10 December 2004

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2. History

Revision 1.0, September 2004
Full write-up but no figures. Animation estimates are pretty sketchy.

Revision 1.1, 12 October 2004
Simplified some aspects of the game, got more specific about animation sequences, and performed some edits. Updated schedule.

Revision 1.2, 24 October 2004
Changing format of document per recommendations on the rough draft.

Noxi can now point his leaf blower in twelve directions (previously eight).

Revision 1.3, 22 November 2004
Implemented rough render of backyard scene.

Placed fence segments throughout perimeter of the yard.

Implemented basic neighbor AI.

Added turbo to hero.

Implemented rough leaf physics.

Implemented dashboard progress bars.

Implemented game end functionality.

Implemented collision events between characters and between characters and gates.

Implemented help file.

Documented key changes to game and document.

Documented schedule changes.

Revision 1.4, 8 December 2004

Final revision.

3. Future

Future directions for LeafBlaster are discussed in §12.2.3.

4. Overview

You are Noxi, a young hipster with a leaf blower. You'd as soon drive a minivan as use a rake. LeafBlaster takes place in your backyard during a three day weekend in October (each level is one day, with the game ending on completion of the third level). Your neighbor doesn't like leaf blowers since they're loud, polluting, and "just

blow the leaves around." Naturally, then, the object of the game is to blow your leaves into his yard.

LeafBlaster is a single-player office shooter. A demonstration of passalong ("viral") marketing, the game must be easy to configure, easy to learn, brief, and just small enough to be passed around via email. It must not require special hardware to run (other than a contemporary Windows PC), depend on a network during gameplay (due to firewall restrictions), or cause the user's computer to crash.

LeafBlaster aims to fill the void in the bleak corporate workday with a small, entertaining, and hopefully humorous diversion that people may play for only a few minutes but will want to pass along to friends. Thus it must also have appealing graphics and music. Central to Blaster's style of gameplay, though, will be believable but exaggerated "leaf blower physics" which shall produce frustratingly erratic leaf and hero movement.

5. Features

- An arcade game presented as a Story in Three Acts.
- Unlike some arcade games, LeafBlaster *can* be "Beat."
- Leaf Blower Physics produces erratic leaf and hero movement.
- Music by Alset—custom loops donated to the game.
- Funny Cut Scenes at the end of each level give player a reason to go on (Release 2).

6. The Game World

LeafBlaster is a 2D game that shows its characters from above. It consists of three levels, each of which is implemented as a GameMaker room. To complete a level Noxi must blast all leaves (papers) out of his yard (house) before time runs out; to finish the game he must beat all three levels.

Time pressure is the primary threat in LeafBlaster. As Noxi you'll need to fill the neighbor's yard with leaves before he fills your yard with leaves. You do this by blowing leaves out of your yard and completely off the screen, far enough into his yard that they're there to stay.

LeafBlaster does not make use of an explicit clock and does not use score or health, all of which disrupt the illusion of the game. Instead, your progress (and your neighbor's) is shown on two bar graphs, red for him and blue for you. The imprecise nature of the blower combines with time pressure to make the game appropriately frustrating—getting every last leaf will be tricky and blowing them everywhere will be a constant threat. Acutally, y*ou don't need to get every last leaf; just make sure to max out the blue progress bar before he maxes out the red bar.* See Figure 7: The game screen.

6.1. Movement

Noxi can move in four directions and can point his blower in twelve directions (three directions for each of his four directions). When he's moving and his blower is running hard it actually affects his movement, making him harder to control.. Leaves are implemented with GameMaker particle systems. The leaf blower can move leaves rapidly but with less than total finesse; when run hard it blasts leaves everywhere, slowing the hero's task. Walls and fences prevent characters and leaves from passing.

6.2. Room Layout and Levels

LeafBlaster has the following three levels. Each level is implemented as a room with views to allow scrolling beyond the borders of the game window. We will determine the exact size and arrangement of each level during play testing.

- Level 1: "Friendly Friday"
- Level 2: "Clean Your Room!"
- Level 3: "Bloody Sunday"

Implementation Note

A screenshot of Level 1 and sketches of Levels 2 and 3 are shown in Appendix B: Level Design.

6.3. Characters

Noxi, a hipster with a leaf blower, is the central character in LeafBlaster. He encounters the following characters:

- The Curmudgeonly Neighbor, who runs around throwing leaves into your yard.
- Woodland Creatures, which provide bling (style points).
- The Impish Child (optional), who closes doors and gates when you're not watching.
- The Idle Dog (optional), who "marks" leaves; marked leaves can't be blown until they dry.
- The Wind (optional), which spreads leaves.

Some sprites will be several times as large as the typical 32x32 pixel sprites found in many games. This departure is primarily to convey detail and to encompass the wide sweeping movements of some characters.

Specific characters shall be rendered as follows.

6.3.1. Noxi

Figure 1: Noxi publicity shot (not a sprite).

With four animation states and ten transitional animations, Noxi is the most detailed character in the game. Since he's the one the player will see throughout the game he must look good. Fortunately, intermediate frames will be drawn by Poser, an animation program. Noxi is a 96x96 pixel sprite though GameMaker drops transparent pixels down to yield a smaller sprite. Sprites appear in Appendix A: Sprites.

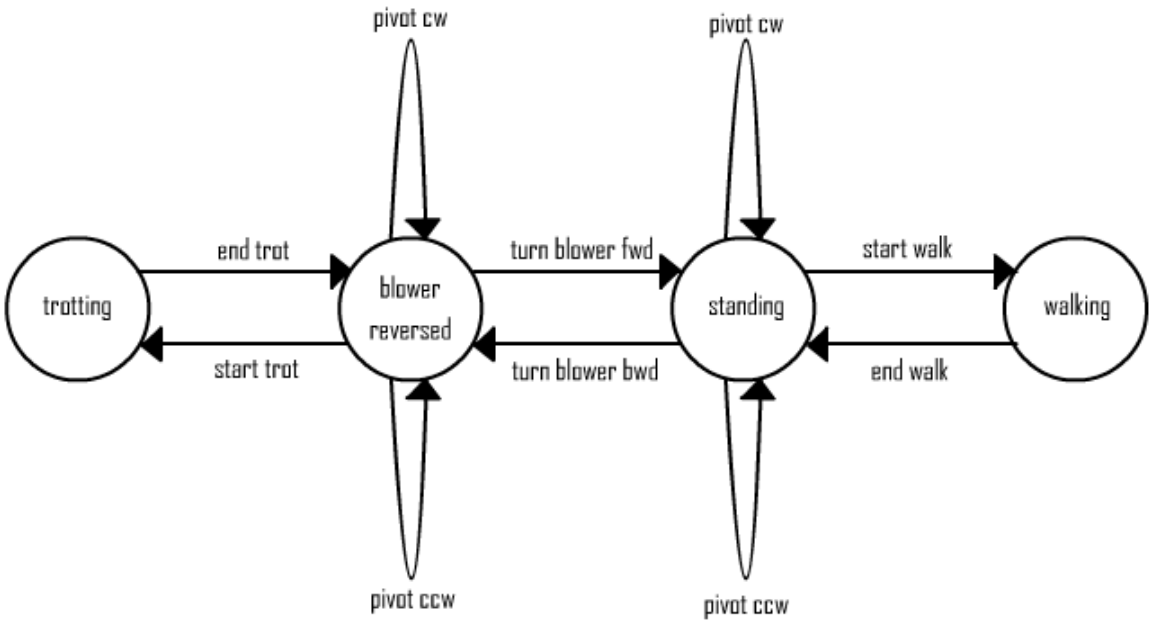


Figure 2: Noxi's animation states. To make Noxi more responsive we may cancel some transitional animations.

6.3.2. Curmudgeonly Neighbor

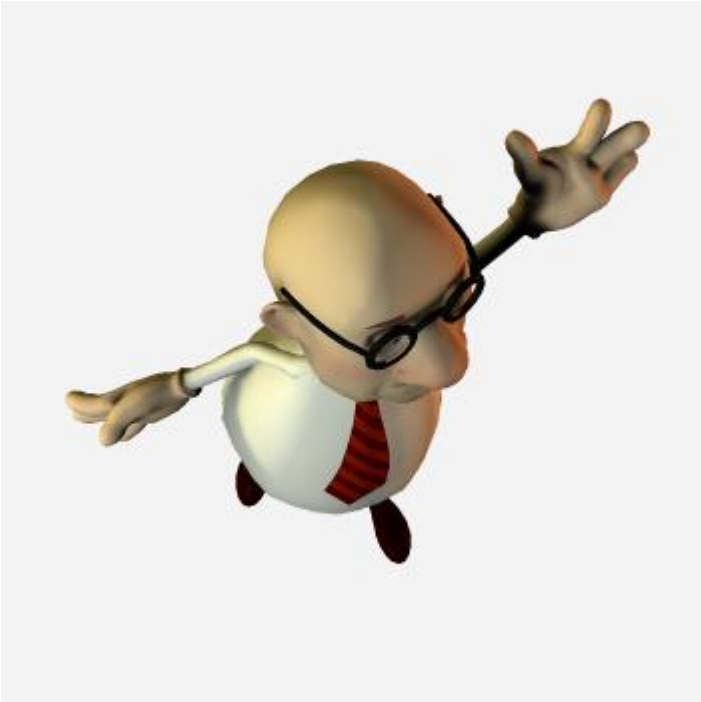


Figure 3: Neighbor publicity shot (not a sprite).

The Curmudgeonly Neighbor has three states and four transitions. Because he isn't the focus of the game we'll omit some states and transitional animations; doing so will reduce the workload. The Neighbor sprite is 64x64 pixels minus dropped transparent pixels. Sprites appear in Appendix A: Sprites.

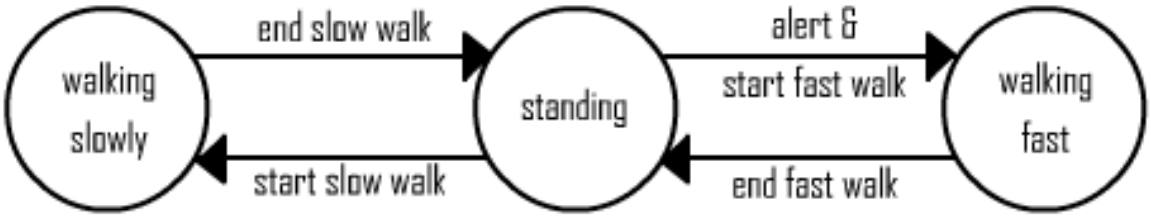


Figure 4: The Neighbor's animation states.

6.3.3. Woodland Creature

Figure 5: Woodland creature publicity shot (not a sprite).

The Woodland Creature (multiple instances of which may appear in the game) has three states and no transitional animations. The Woodland Creature is 64x64 pixels minus dropped transparent pixels. Sprites appear in Appendix A: Sprites.

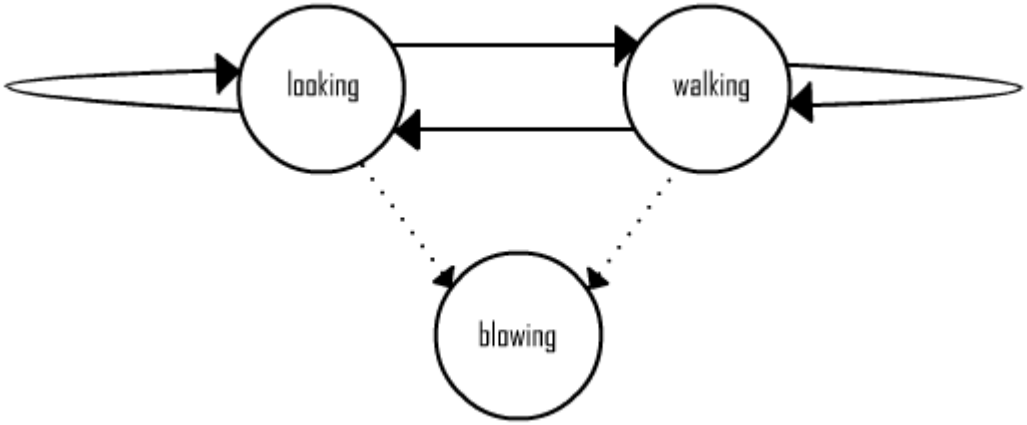


Figure 6: The Woodland Creature's animation states.

6.3.4. Optional Characters

The Impish Child, the Dog, and the Wind are optional characters. I may implement them in Release 2.

6.4. Weapons

Noxi's tool of choice is a leaf blower. It allows him to blow leaves out of his hard but it can also blow a Woodland Creature right off the game board (see below). Noxi can even use his leaf blower to propel himself forward at nearly twice his normal speed, allowing him to cross the game board with ease.

Blowing Woodland creatures around would be pointless but for the fact that Noxi earns bling each time he blows one off the game board. Bling can be used at the end of levels one and two to purchase a superior leaf blower. The following leaf blowers are available:

- The Basic Blower
- The Junior Hipster
- The Mega Blaster

Bling points won't be redeemable until Release 2, available sometime after CS 350R.

7. Game Controls and GUI

Being an office shooter, LeafBlaster must have a simple GUI, like that of an arcade game. Thus LeafBlaster has only three screens: the Game Screen, the Leaf Blower Selection Screen (Release 2), and the Intro Screen (in Release 1 it will instead be a simple help screen, activated by pressing <F1>).

- The Game Screen is where the user spends most of his or her time.
- The Leaf Blower Selection Screen appears at the end of levels one and/or two if the player has collected enough bling to upgrade his leaf blower. Look for this feature in Release 2.
- The Intro Screen appears at the beginning of the game. It explains the premise of the game as well as the game's controls. Look for this feature in Release 2. In Release 1 it will be implemented as a simple help screen, activated by pressing <F1>.

7.1. The Game Screen

Figure 7: The game screen.

This is where the player spends most of his or her time.

<LEFT> moves the hero to the left.

<RIGHT> moves the hero to the right.

<UP> moves the hero up.

<DOWN> moves the hero down.

<MOUSE POSITION> orients the leaf blower. The leaf blower always points towards the mouse cursor.

<MOUSE BUTTON 1> revs the blower's throttle. The longer the button is held down, the more the throttle revs, until its maximum is reached.

Notice that the game screen does not display a health meter or a score meter, neither of which apply in GameMaker. Nor does it display a time meter, since time affects GameMaker implicitly: the board will become choked with leaves if Noxi doesn't keep up, ending the game when a certain number of leaves are in Noxi's

yard. That could take any amount of time but the rate at which leaves drop (time pressure) will increase throughout each level.

<F1> shows the help screen.

7.2. The Leaf Blower Selection Screen

Figure 8: The leaf blower selection screen.

This screen is shown at the end of levels one and/or two if the player has collected enough bling to upgrade his leaf blower. Look for this screen in Release 2.

<UP> or <RIGHT> shows the next leaf blower. A tone provides feedback when the button is pressed.

<DOWN> or <LEFT> shows the previous blower. A tone provides feedback when the button is pressed.

<ENTER> selects the leaf blower. A tone provides feedback when the button is pressed.

7.3. The Intro Screen

This screen is a text screen shown at the beginning of the game. It explains the premise of the game and its movement controls. Look for this screen in Release 2. Until then players will instead view the help screen, shown by pressing <F1>.

<ENTER> takes the player out of this screen and into the game. A tone provides feedback when the button is pressed.

8. Music and Sound Effects

8.1. Music

Music sets the mood for the game. In LeafBlaster, we'd like to convey "fun and silly" but also "time pressure." To do so we'll use the following themes:

Theme 1: "Belabor the Style" by Alset.

Theme 2: "Oh Shit, I'm Running Out of Time" (look for this loop in Release 2.)

Theme 3: "You'll Pay. Oh Yes, You'll Pay Dearly" (look for this loop in Release 2.)

8.2. Game Sound Effects

Sound effects are central to any game. We'll use them as the primary method to help the player perceive blower upgrades: better blowers will make more aggressive sounds.

[IDLING LEAF BLOWER] X {Basic Blower, Junior Hipster, Mega Blaster}. Basic blower implemented for Release 1.

[LOW TO MEDIUM REVVING] X {Basic Blower, Junior Hipster, Mega Blaster}. Basic blower implemented for Release 1.

[MEDIUM TO HIGH REVVING] X {Basic Blower, Junior Hipster, Mega Blaster}. Basic blower implemented for Release 1.

[BLOWING LEAVES]

[GRIPING NEIGHBOR]

[CHUCKLING WOODLAND CREATURE]

[IMPING CHILD] (Optional). Look for this sound effect in Release 2.

[PEEING DOG] (Optional). Look for this sound effect in Release 2.

[WHISTLING WIND] (Optional). Look for this sound effect in Release 2.

8.3. GUI Sound Effects

Audible feedback will make the LeafBlaster GUI easier to use. Only two sounds are needed, both of which will be obtained from a free site like FlashKit.com. Look for these sound effects in Release 2:

[BROWSING TONE] Played when the user presses <UP>, <DOWN>, <LEFT>, or <RIGHT> to browse through different leaf blowers.

[SELECTION TONE] Played when the player presses <ENTER> to selects a leaf blower or to start the game.

9. Single Player versus Multiplayer

LeafBlaster cannot be all things to all people. To satisfy the objectives stated in §4 Overview, no multiplayer option shall be developed. This decision is primarily due to the restrictions placed on networked computing in a corporate environment; the other alternative, multiple players at one computer, is also impractical in a corporate environment since they'd need to share a keyboard (most corporations do not provide joysticks to their employees).

10. Architecture

LeafBlaster will be implemented in GameMaker 6.0 and will make some use of GML, the GameMaker Language.

Aside from a large number of global variables and functions, GameMaker is very object oriented. LeafBlaster will exploit this style of programming by grouping most real-world object behaviors into GameMaker objects. (These objects will make use of utility functions defined in the Scripts section).

LeafBlaster will use a small number of shallow objects hierarchies where polymorphic behavior is most appropriate. Other objects probably will make no use of polymorphism. Here are the key objects that make up LeafBlaster:

- Leaf blower object (no sprite), which will need to bind different sounds and different particle parameters to the blower. Variants won't be needed until Release 2.
    - Blower0, Blower1, Blower2 (the "brand" names may vary so we'll keep our programmatic names simple).
- Hero object and TurboHero object, which respond differently to the mouse. Hero is the parent of TurboHero.
- Gate object.
- Generic solid deflector objects of whatever sizes needed to match the illustrations.
- Neighbor object, whose behavior may vary (transparently) on different levels.
- Woodland Creature object, whose behavior may vary (transparently) on different levels.
- Child object, whose behavior may vary (transparently) on different levels (optional). Look for this object in Release 2.
- Dog object, whose behavior may vary (transparently) on different levels (optional). Look for this object in Release 2.
- Wind object whose behavior may vary (transparently) on different levels (optional). Look for this object in Release 2.

10.1. Background Tiles

LeafBlaster has three levels, two outdoor in the (same) two backyards and one inside of the hero's house. For performance reasons we may need to switch to tiles in Release 2, but using one object per screen entity is immensely easier so tiles will be a last resort.

11. Risks

LeafBlaster faces three primary risks. First, will particles perform as expected? Ineffective particle physics will spoil our intended style of gameplay. Particles must also allow us to count leaves as they are "destroyed" or the game won't function as planned. As of Release 0, particles are performing surprisingly well.

Second, how we obtain the music and sound effects that will make LeafBlaster appealing? The first loop—and hopefully future loops—was mad available by Alset (Dan Young), an up and coming musician.

A third consideration, which is not a showstopper for the initial version of LeafBlaster, is the file size and performance considerations for the game. In particular, music files and graphic files can take up a lot of space, and particle systems can make some computers drag. Layering foreground objects like trees between the dashboard (bar graphs) and lower entities forces us to implement it with a sprite, which significantly slows performance versus a "foreground-background." And GameMaker .gm6 files seem to retain old versions of some resources, causing significant bloat in file size, which affects the objectives in §4.

So far the first and second risks have not been a problem.

To solve the third risk, we'll probably need to look for utilities or advice on the GameMaker boards. For Release 1 we'll ignore size and performance problems (though we've attempted to minize them).

12. Schedule

12.1. Hard Deadlines

13th October 2004: Hand in draft Design Document.

25th October 2004: Hand in final Design Document

22nd November 2004: Hand in Release 0, the Technology Release.

8th December 2004: Hand in Release 1, the Graded Release

12.2. Release Stages

LeafBlaster will be released in two stages, with deluxe features relegated to an optional Enhancement Release.

12.2.1. Release 0: Technology Release

The Technology Release of LeafBlaster will use simplified graphics, sounds, and physics and will have only one level.

- Limited animation.
- Simplified illustrations in some places.
- Preliminary particle physics.
- No leaf-blower upgrades, though for debugging you can change leaf blower parameters in a .ini file (don't do this during testing!). Only one leaf blower graphic.
- Basic sound effects. One musical score.
- One untuned level.
- Simple goal-driven character AI using the path planning feature of GameMaker to seek a random gate.

12.2.2. Release 1: Graded Release

The Graded Release will feature final graphics, sounds, and physics and will have three levels.

- Make all obstacles solid deflectors.
- Precisely place all solid deflectors.
- Fix dropped repellers bug.
- Fix hero stuck bug.
- Possibly use masks to shrink and rectangularize the solid part of the hero sprites. This would however make the leaf blower poke through walls etc.
- Ensure that neighbor always walks outside of fence.
- Render (with shadows) the background scene.
- Possibly brighten the background scene, making it less realistic but more cheerful.
- Possibly redo leaf blower sound effects.
- Possibly make multicolor leaves—or use sprites—for a more realistic effect (gives depth and naturalism). There are performance considerations for this effect, however.
- Add graphical feedback for leafblower speed so user can play with the sound turned off.

12.2.3. Release 2: Enhancement Release

The optional Enhancement Release will have three levels and could feature graphical enhancements, a humorous movie trailer, and/or stylized sound effects.

- Three levels.
- Possible graphics enhancements.
- Upgradeable leaf blowers. If you get enough bling (points) you can upgrade to a snazzier leaf blower with better physics.
- Possibly an enhanced leaf-blower selection screen, parodying the car-selection screens found in many racing games.
- Possible humorous "movie trailer" at start of game (a tease to get people to take notice of the game). Alternative: title screen photo or illustration.
- Possible stylized sound effects, using instruments to represent each effect *Peter and the Wolf*-style. The primary reason for this is that the sound of a leaf blower running throughout the game is unappealing and interferes with the main music loop.
- Possible added characters (Impish Child, Wind, and Dog).

13. Appendix A: Sprites

Table 1: Primary Noxi sprites

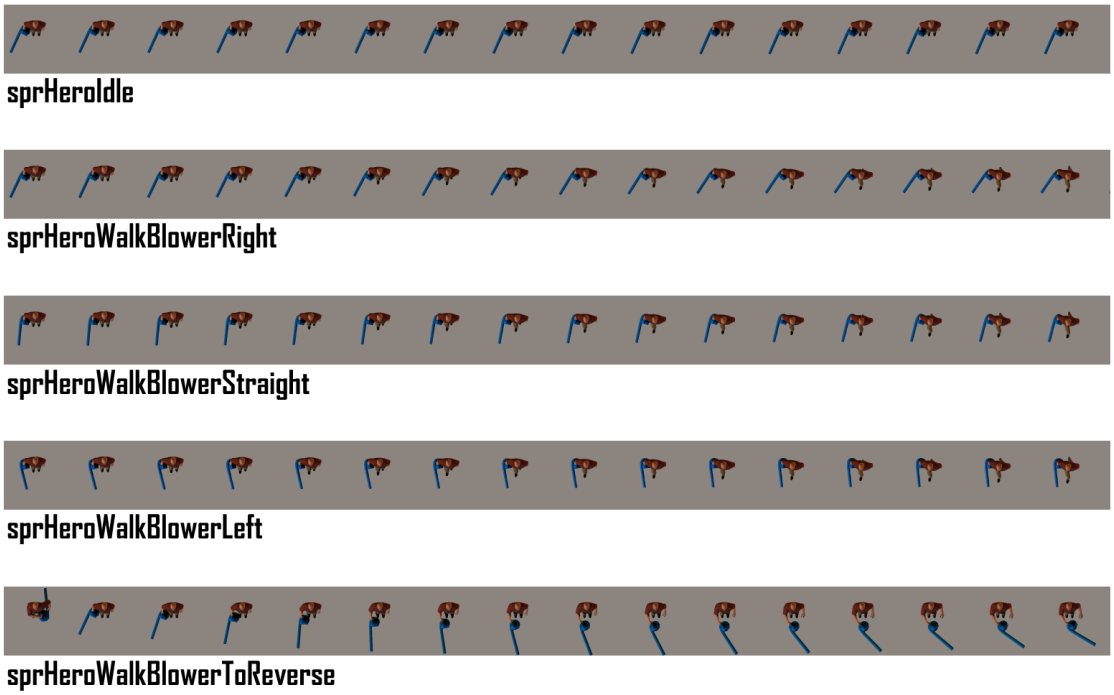


Table 2: Neighbor Sprites

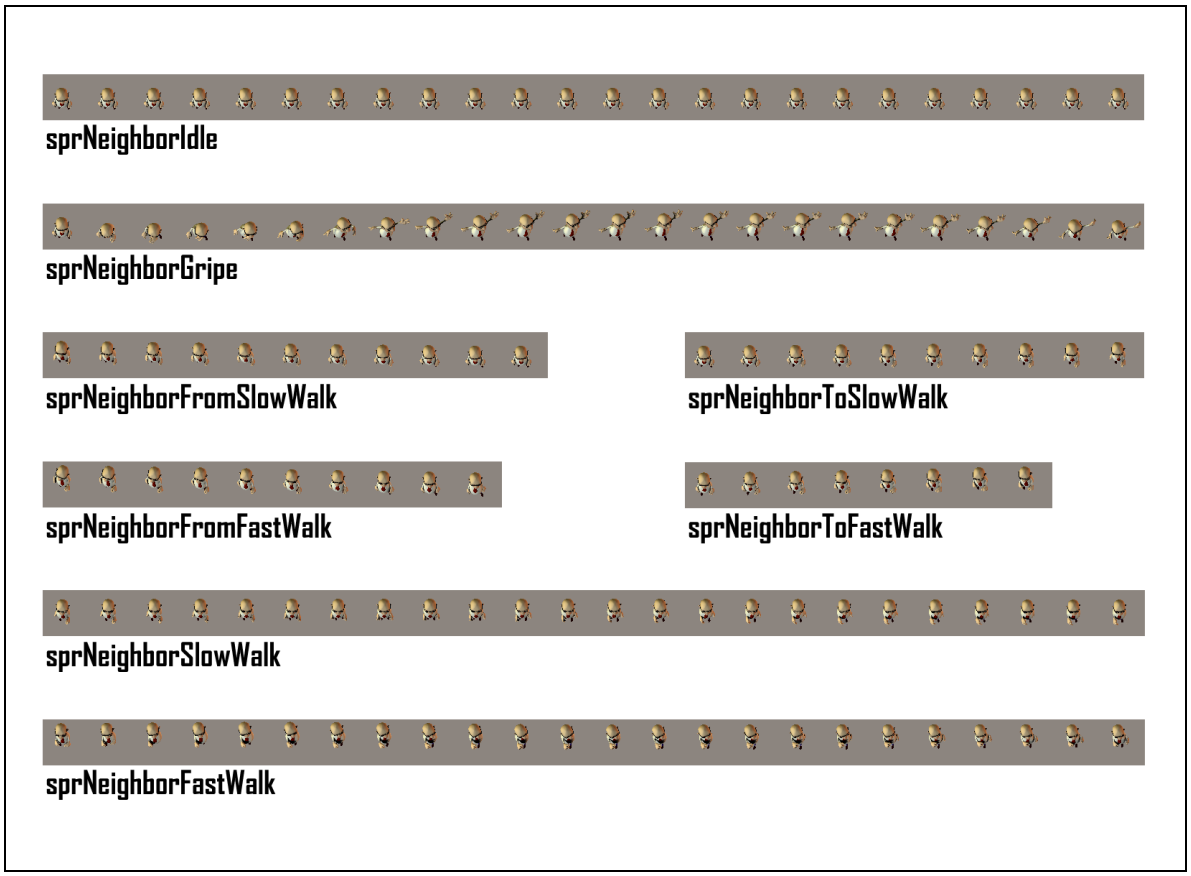
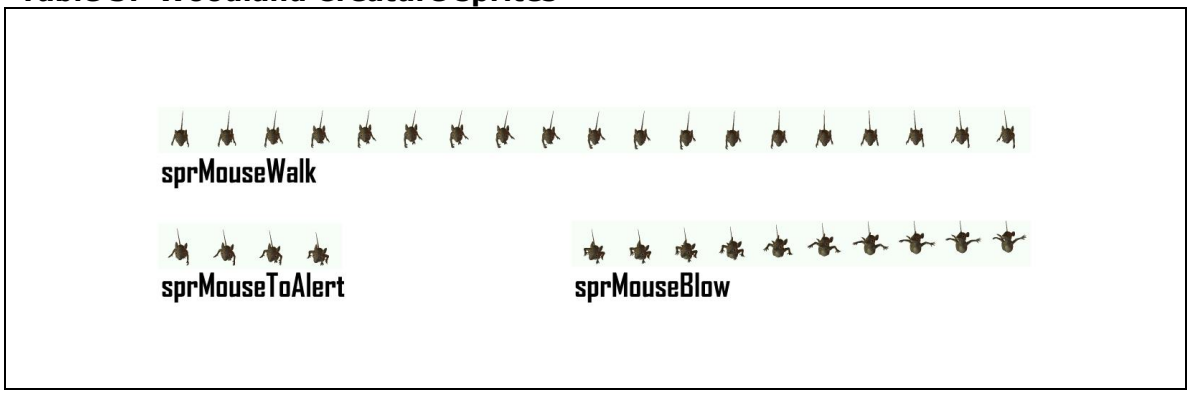
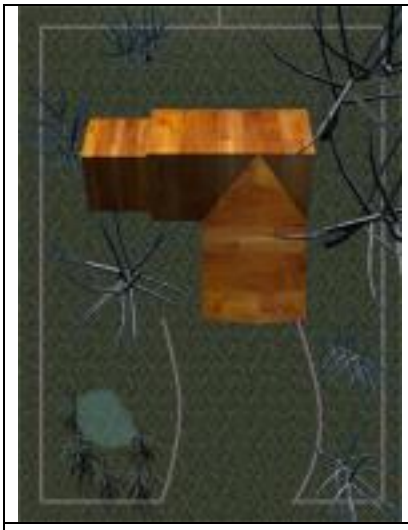
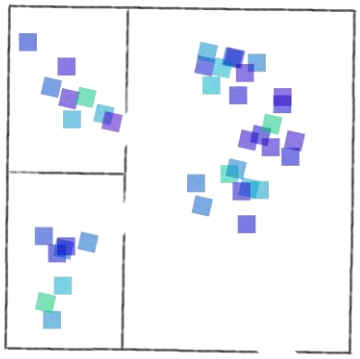
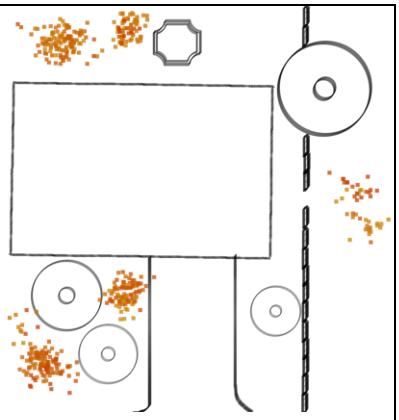


Table 3: Woodland Creature sprites



14. Appendix B: Level Design

Level 1 is the actual room. Levels 2 and 3 are approximations.

		
Level 1: "Friendly Friday"	Level 2: "Clean Your Room"	Level 3: "Bloody Sunday"

15. Appendix C: Collision (Stuck) Handling

Getting stuck is a constant risk in LeafBlaster because elements are not aligned to a grid. To handle this problem we use timers and count the number of collisions that occur before a timer expires. Too many collisions means that a character is stuck (often permantly) and must be moved. The following table shows LeafBlaster handles specific cases.

	Noxi	**Neighbor**	**W-Creature**	**Gate**	**Trees Etc.**
Noxi	-				
Neighbor	-	-		done	
Mouse	-	-	-		