Project 2 Report

A-BLOB-ACADABRA by Sarah Kite, Jessey Fung, Meric Ungor and Austin Lancaster

Link to video

https://www.youtube.com/watch?v=M5BCyQrGurw

Brief explanation of the game

You are an old, forgetful wizard who has forgotten how to make his potions. Meanwhile, there is a blob invasion going on in the forest. Your job is to collect ingredients and relearn how to make your potions so that you can destroy the blobs and defeat the boss Big Blob.

How to use the game

- Press 'P' to pause the game
- Use 'WASD' or the arrow keys to move.
- Move over an ingredient to collect it. To find ingredients:
    - Explore the level and collect caterpillars, flowers and leaves from the ground
    - Kill blobs to gain a blob eye
    - Wait for chickens to lay eggs
    - If your eyebrows are fully grown they can be harvested by pressing 'Y'
- Try making potions by combining ingredients with keys (1,2,3,4,5,6). Incorrect combinations will end up as a useless black potion. You can see which recipes you've collected on the pause screen.
- Heal yourself with 'H'. Your health will increase by 5.
- Throw potions with 'E'. You need to make potions before you can throw them.
- Once you kill all the blobs the boss area will open. Defeat Big Blob to win!

How we modelled objects and entities

The **wizard** was modelled using Blender. A number of different drawing versions were made until the final look was decided upon. A drawing from the front and the side were imported as a background image to Blender in order to make modelling easier. Primitive shapes were created and extended/resized/tweaked to make the final model. The normals were at first set for flat shading, however this didn't work as well once the toon shader was introduced, so the normals were changed to smooth shading. The model is animated programmatically by displacing the y-position of the object over time according to a sine function.

The **blob** and **potion** models only involved simple shapes so were modelled in Blender without a reference. The animation of the blob was implemented programmatically in the script

“BlobbingBehaviour”. The object is scaled in the x and z axes over time according to a sine function. The z axis is offset by half a period which creates a “blobbing” effect.

The **caterpillar** and **egg** models were made by reshaping and combining spherical primitives in the Unity editor.

A number of additional objects (e.g. trees, mountains, chickens) were downloaded from the asset store.

How we handled the graphics pipeline

Our project uses the standard Unity graphics pipeline. Our customer shaders define vertex and fragment shader functions. How lighting is applied and which Passes of the shader are used depends on which Rendering Path is used. Each pass in a shader communicates its lighting type via Pass Tags. For example a ShadowCaster pass is used for any objects that cast shadows.

How the shaders work

The toon shader works as thus:

1. The world normal and light direction are calculated.
2. The dot product of these two values is calculated, which gives a continuous diffuse light intensity.
3. A step function is used to create bands of discrete color, giving the object a “cartoon” look.

A custom Phong specular shader was reused from project 1. It calculates the color according to the following equation:

$$I_\mathrm{p} = k_\mathrm{a} i_\mathrm{a} + \sum_{m \in \text{ lights}} (k_\mathrm{d} (\hat{L}_m \cdot \hat{N}) i_{m,\mathrm{d}} + k_\mathrm{s} (\hat{R}_m \cdot \hat{V})^\alpha i_{m,\mathrm{s}}).$$

A custom shader “Target” was created in order to create an animated target on the ground for potion throwing. It works as thus:

1. In the fragment shader, a vector is calculated pointing from the centre of the circle to the pixel position.
2. The radius (length of vector) and angle are calculated.
3. The step() and fract() functions are used to create a stripe pattern moving out from the centre.

A custom shader “WoodProcTexture” was created for the background of the inventory slots UI. This was an original idea based on perlin noise, which creates a procedural wood-like pattern. It works as thus:

1. The noise function is called with the position as arguments and the result is saved as “jx”, which will be used for warping.
2. The noise function is called again with the y argument displaced by “jx”. This gives the wood its distinctive warped appearance.
3. A fract() + step() function is called in the y-axis which creates a stripe pattern with different shades of brown.
4. The texture can be sampled at different points so that different sections get a unique segment

Querying and observational methods

For our playtesting, we employed 10 people who play tested at different stages of the game’s development and mainly consisted of the young adult demographic, however there were 2 participants in their 50s. Five of these individuals participated in playtesting using a querying method while the other half participated in an observational method of playtesting, with both helping to find the strengths and weaknesses of the game.

The querying technique used for gathering feedback from playtesting was the interview method. This involved having participants play the game for a while until they felt they had a good understanding of how the game worked and its mechanics. Then, a series of questions were asked and their responses were recorded in a document as bullet points using computer logging. The main questions that were asked during the interview included “What did you like about the game?”, “What would you improve about this game?” and “What was your favourite game mechanic?”, among others.

On the other hand, there were two observational methods that were used with playtesters, these being thinking aloud and cooperative evaluation. To start, players were asked which method they would rather prefer using, with explanations about each being given if needed. For thinking aloud, the participants were instructed to play the game and say their thoughts out loud, for example why they were doing and action or any questions they were thinking. These thoughts were then recorded with computer logging and afterwards condensed into steps for improving the game. This method also proved most popular among individuals, being requested to be used more.

Cooperative evaluation consisted of having the participant play the game but also with one of the team members helping them along, answering any questions if needed and helping them with understanding the game if they were having any issues. Then, while the participant was playing the game, the feedback they were giving and issues that were being observed were recorded using computer logging.

Some of critical feedback from these sessions included that it was hard to tell where abouts in the forest the player was, that an explanation of the controls needed to be included in the main menu and the mouse should be removed from the main game screen since it makes the player

think they were able to use it in-game. However, participants did indicate that they enjoyed the “eyebrow shaving” and potion mixing aspects of the game, as well as some enjoying the game’s aesthetic style. The full feedback from the playtesting sessions can be found in Appendix 1.

Changes made in response to feedback

Changes that were made in response to feedback include:

- Fixing of occlusion, so the player can be seen when obstacles are in front of the camera
- The inclusion of an explanation of the game controls in the main menu, so the player knows the controls going into the game
- The implementation of a minimap so that the player can tell where they are located and where they are going
- Removal of the mouse from the main game screen, so that the player does not get confused and think that they can use the mouse in the game
- Increase the amount of damage that the enemies inflict on the player, so that they feel like they are in more danger
- Show the location of the boss on the minimap, so the player knows where it is located
- Changing the spawn location of the player when the game starts, so the player is not spawned inside a mountain
- Putting a background behind the text in the user interface so that the black text can still be read as the player is moving around the environment
- Implemented a counter that shows the number of blobs that are left to defeat, so the player knows how many they have to go
- Spawn some items more frequently, so the player is still able to make some potions
- Changed the blob count user interface count down so that once you get to zero blobs it then tells you to defeat the boss, so the user knows the game is still going and not over or broken

Code sourced from the internet

The “Toon” shader is sourced from this tutorial by Erik Roystan Ross.

Contributions made by each team member

Sarah: Implemented camera behaviour. Implemented user interface. Implemented player inventory mechanics. Implemented enemy health and enemy collisions with potions. Carried out playtesting.

Jessey: Implemented player movement. Implemented player and enemy collisions. Implemented scenes and scene controllers. Implemented pause UI. Implemented potion action

and messages. Implemented egg and caterpillar power ups. Implemented health potion. Implemented sound.

Austin: Modelled and animated player, blob enemy and potions. Implemented potion throwing. Created potion particle effects. Implemented specular, wood and target shaders. Implemented chickens. Implemented eyebrow shaving.

Meric: Implementation of enemy movement, a number of level designs, randomized spawning of foliage, spawning of the enemies for every level, combining these for a randomized level generation to some extent, boss room design and boss behaviour.

Appendix

Appendix 1

Observational methods

Jessica K.- cooperative evaluation

- Fix occlusion
- Need to explain controls
- Blobs not moving towards player
- Explain potion making more
- Mini map
- Stop throw

Aninda- think aloud (train of thought)

- Working out movement
- Not sure what shaved eyebrows do
- Clicking blob
- How do I attack?
- Assume throw potion- right click?
- Need explanation of controls at start
- Why shave eyebrows
- How to target potion
- How to get rid of mouse- makes player think they can use it
- Collect eyebrows too big- need to be on the side of the hud
- When pressing E- pick wrong target going to still throw potion
    - Way to see where potion will land without throwing first
    - Way to back out of throwing
    - Like throwing grenade in FPS
- How do i get hurt
- Health hardly moving- not much danger
- Are these the only enemy?
- Bug- got stuck on black potion
- Minimap
- How do you find out the potion menu exists
- Items in spell book too small? Hard to see what they are
- Discovered potions good idea
- Lines in caterpillar
- Eyeball looks more eyebally
- Minimap show boss- where it is
- Know how many blobs left
- Clipping issue
- Explosions stopped working after getting stuck on failed potion

Heng Ling- think aloud

- Start with instructions
- Instructions don't say controls
- Player spawned in mountain
- Can I change the perception/camera?
- Better if colour of text white due to black background
- Did I just shave my eyebrows?
- How do I shoot?
- Do I press potion?
- Do I press ingredients?
- (tried pressing all keys)
- How do I mix it?
- (make numbers clearer?)
- Can you select potions to use? (with mouse)
- They have different effects! Cool!
- Can you win this game?
- I have to wander around and see where I am
- Can there be a map?
- Slimes don't attack
- Spamming keyboard
- (might have gotten stock on black potion again)
- Why did it turn grey? (still said 24 items left)
- How do I collect stuff apart from eyebrows
- How do I know when a potion is successfully made?
- No matter how much I bump into the slime I won't die
- More fun if I have 3 lives which are in fractions- can see health progress
- Can see some progress now- bar jumped down
- I want to see what the game over page is like
- When you die do you start from the level or all over again?
- I think it's better if you start all over again given that you have so many lives- it will suck so people will treasure life
- Will be nice if shows (?) what code you've found or shows which is which
- Nice to put spell book in instructions
- If the player doesn't pause the game they will never know
- Or include P for pause and spellbook
- (No game over screen on death)

Andoni- think aloud

- Only have 1 of 1 ingredient
- Aiming difficult
- Should start with some ingredients
- Can I pick up the eyes?
- How do I get out of the maze?

- Where are the boss' hit points?
- Targeting off- hard to fine-tune
- Hard to see if enemy in aiming area
- Can't bring target back
- Hitting key for caterpillar but it's not being added- player hitting it too soon
- Can't fine-tune turning- would be good if could turn less degrees

Shirley- think aloud

- What's the question mark?
- What are all these things
- Reading the story of the wizard
- Reading the instructions
- Now going to start a new game
- The game is kind of quiet- there's no sound or music or anything
- All the blobs are coming towards me! Getting swamped
- Good that you start with some ingredients at the beginning of the game
- Run out of leaves, how do I get more?
- Oh is it that stuff on the ground?
- Would be good if the camera could turn around
- Can't see the enemies when moving towards the screen
- What's that big red thing on the minimap
- All the blobs have been defeated
- Going to go to the big red thing now
- It's moving so fast! I keep getting swallowed up
- Run out of leaves- what now?
- Can't make any more potions
- Why won't this little blob die
- I can make other potions apart from the leaf and flower one
- Got stuck in the boss blob

<u>Query techniques</u>

Jessica W.- interview

- What did you like about this game?
    - Easy concept- just making potions
    - Colourful design
    - Fun- but should have a score and show how many blobs are left
        - Maybe different points depending on accuracy etc.
- What would you improve about the game
    - The graphics- cute but could be more
        - Difficult to tell which direction the wizard is moving and the direction it's facing for the potion throwing
            - Looks to similar on each angle
- What is your favourite mechanic about the game?

    - Mixing the potions- seeing what colours are coming out
- Were the controls intuitive/easy to understand?
    - Yes
- Did you know what you were doing?
    - Didn’t see the point of killing the blobs
- Anything to add?
    - Nothing
- Thought the game was really good

Mike- interview

- What did you like about this game?
    - Liked the movement- how the player moves around the map
    - Likes the graphic- clean
- What would you improve about the game?
    - Potion aiming
    - Mini map- know where going
    - Way to display controls- didn’t know what they did
    - More enemy variety
    - Taking more damage when getting hit- didn’t feel in danger at any point
- What is your favourite mechanic about the game?
    - Mixing the potions- could make it interesting by making AOE (Area of Effect) potions
- Were the controls easy to understand?
    - Not really- wasn’t sure what the keys did
    - Thought was able to aim with mouse
- Did you know what you were doing?
    - After about a minute figured out what as doing
- Anything else to add?
    - Nothing

Chantilly- interview

- What did you like about the game
    - Got to name the wizard
    - The potion effect- explosion
    - Also liked the effect when the wizard dies
    - Liked that you can shave eyebrows- new idea
- What would you improve about the game?
    - Include instructions in main start menu
    - Increase the amount of damage that enemies do to the player
- Favourite mechanic?
    - Shaving eyebrows
- We're the controls easy to understand
    - No

        - Needs to be an explanation at the start of the game
- Did you know what you were doing?
    - With the creators help, yeah
    - Instructions not clear enough- if not sure should be included in the instructions
    - Especially how to mix potions- most important
    - Unless you played Minecraft- might make more sense
- Anything else
    - Can the slime move
    - Wizard spawning in mountain right now
    - Better to show what level you're in so you know how many left

John- interview

- What did you like about the game?
    - Thought the blobs were cute
    - Liked how the big blob got smaller as it took damage
    - Liked having enough resources to fight the boss
    - The use of resources for different effects is good
- What would you improve about the game?
    - The current aiming system
- What's one aspect of the game that you found particularly out of the ordinary or funny?
    - Shaving the eyebrows to make potions
- Do you have anything else you'd like to add?
    - No

Constance- interview

- What did you like about the game?
    - The chickens were cute but kind of random
    - The eyebrow thing was really weird
- What would you improve about the game?
    - Takes a while for some of the items to start appearing and find where they are in the level
    - Change the blob count so that once you defeat all the blobs it tells you to go to the boss- don't know what to do otherwise
- What was your favourite mechanic?
    - Mixing the potions
- Were the controls easy to understand?
    - Not bad
    - Sort of hard to remember keys apart from numbers and movement once in the game however
- Did you know what you were doing?
    - Yes, more or less
- Anything else?
    - No