Interim Report

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1 Progress Overview

1.1 Layered Development Progress

We've reached week 9 and are pretty close to our initial schedule, which means that we have finished the low target completely and already completed a lot of the desirable target.

Below we present the layered development schedule until the desirable target and highlight the features we have already done (green), the features we are working on at the moment (yellow) and the features that are not yet implemented (red).

- **Functional minimum**
  - A pizza (plane) with objects (spheres) that can bump into each other and die if they move too far away from the center
  - Very simple physics
  - Minimal GUI
  - The game allows to determine and show a winner.
- **Low target**
  - 2 toppings
  - Jumping
  - A simple default attack (kick)
  - "Good enough" physics, that make the game fun to play
  - Minimal graphics to show that it is a pizza
  - Splash-, player select and winner screen
  - Simple AI
- **Desirable target**:
  - 4 toppings
  - One individual attack per topping
  - Air circulation
  - Dynamic camera
  - Sound effects
  - Good physics
  - Nice models and textures, animations (rigging)
  - Base toppings (cheese and tomato sauce)
  - Better AI
  - Music

2 Interface

2.1 Controls

For the sake of debugging, Pizza War can be played with controllers and keyboard & mouse at the same time. We plan to remove the keyboard feature for the final version.

The keymapping for the controls are hardcoded at the moment. If there is still time, we might move it to the options screen.

2.1.1 GUI Controls

	Keyboard & Mouse	**Controller**
Start	Enter	Start
Left	A	DPad Left
Right	D	DPad Right
Down	S	DPad Down
Up	W	DPad Up
Select	Space	A
Back/Exit/Pause	Return	Back
Up Left	Q	Left Shoulder
Up Right	E	Right Shoulder
Reload Configuration (Debug)	F5	-
Toggle Fullscreen (Debug)	F11	-

2.1.2 Fighting Controls

	Keyboard & Mouse	**Controller**
Move Character	W,A,S,D	Left Joystick
Move Camera (Debug)	Mouse Drag	Right Joystick
Jump	Space	A
Attack 1	Enter	B
Attack 2	Right Shift	X

2.2 Screens

Our game is divided several screens which are shortly described here.

2.2.1 Splash Screen

A simple splash screen is shown in the beginning to show the game's title.

2.2.2 Menu Screen

The main menu. It is shown after the splash screen and when a player presses pause ingame. It lets the player see the credits screen, the options screen, start a new game, resume a running game or exit

2.2.3 Credits Screen

It shows the credits of the game and gives attribution to used assets that are not created by our team.

2.2.4 Options Screen

The options screen has currently only options to change the sound and the music volume.

2.2.5 Player Select Screen

This screen shows the four player slots. If all gamepads are connected, there are four players and if, for example, only 2 gamepads are connected, it shows those two and additional free AI slots.

Player one has the possibility to fill the free slots with several AI bots. At the moment, we have three simple AIs to choose from. If everyone is ready, a player can press start and the fight begins.

2.2.6 Game Screen

The most important screen, that's where the action happens. A GUI bar shows the names and lives of the players currently playing. The toppings that are lying on the ground are those extra lives, which will spawn when a player loses his current life.

2.2.6.1 Winner Screen

Not really a screen, but rather a different view of the game screen. After a player has won, the camera eases out and rotates around the pizza, while a lot of the winners topping spawn on it – the pizza's topping is decided.

2.3 Physics

We implemented a simple physics engine to achieve moving, kicking and jumping. The collision is still very basic, all hitboxes are spheres.

2.4 AI

There are three different AI bots implemented at the moment.

- **Idle AI:** An AI that does literally nothing.
- **Jump in circles AI:** This AI runs in a circle around the center and jumps occasionally.
- **Move to the center AI:** An AI that tries to stay in the center of the pizza. This AI is currently the hardest one to defeat - especially when it plays a heavy topping.

2.5 Game Mechanics

2.5.1 Attacks

Attacks are currently implemented as spheres that travel in a certain direction for a certain time (since the physics engine doesn't support anything else), and push everything except the attacking topping into a specific direction. When the physics will be improved, the attacks will get a proper shape and location relative to the attacking topping to make them feel more appropriate. They will keep their force in a specific direction though, since that turned out to be

the best kind of attack type we found (for example, a proper physical attack or one that depends on the relative positions of characters were difficult to land correctly, though the tomato will have one such attack most likely).

Currently the tomato does not have its intended attack (it should first jump when performing it), and the salami doesn't have a proper attack either, since we first have to make it flying as we intended.

2.5.2 Air Circulation

Air circulation is still very basic, since first the movement and attacks have to be fleshed out before this. Currently it turns on 10 seconds every 30 seconds, and simply pushes everything except attacks in the same direction with the same force while turned on (which includes a short build-up and fade-out time). A simple sound and an icon indicate that is is currently turned on, with the sound's volume being proportional to the air circulation's speed.

2.5.3 Base Toppings

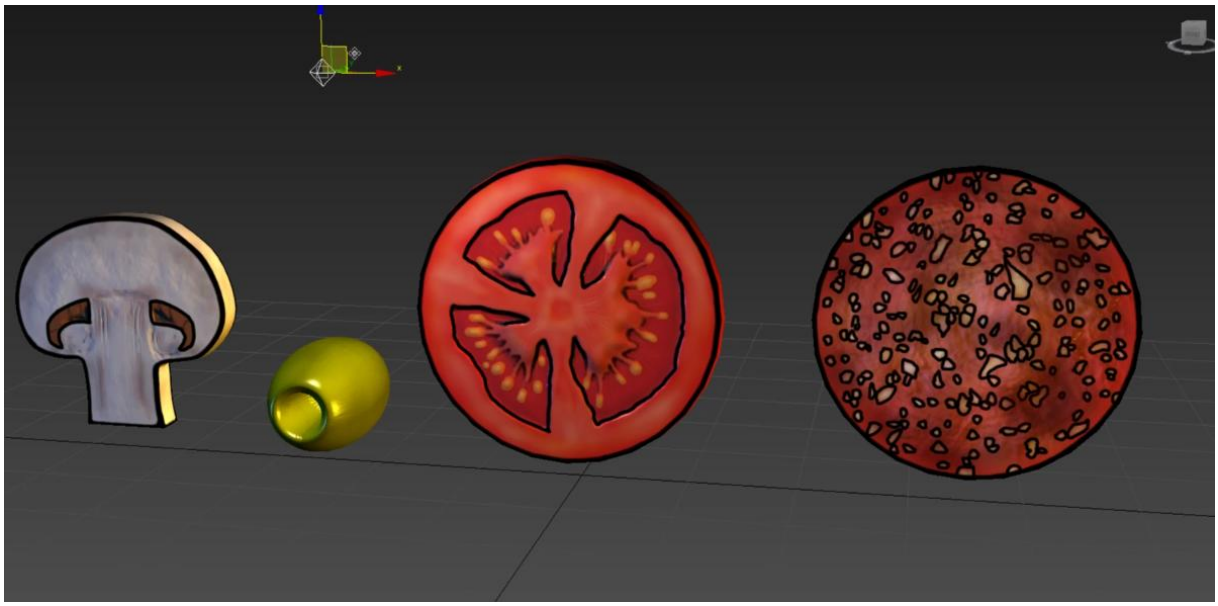
Base toppings (tomato sauce and cheese) are currently implemented with a simple Perlin noise. Places on the pizza where the Perlin noise's value is above a certain threshold are covered with tomato sauce, and values less than another threshold are covered in cheese. Both toppings are made to fade out towards the end by using two thresholds and linearly interpolating between them.

To render the sauces, a special shader was written for the pizza which takes three textures of the pizza, one with no sauce, one with tomato sauce on it, and one with cheese. The shader also gets a texture detailing how much tomato sauce and cheese is where, and blends the other three textures together appropriately.

2.6 Graphics and Animations

2.6.1 Animated Models

To import animations from .fbx, we've written our own animation importer and a shader to render the animation. Each topping is going to be rigged and textured. Currently, only the mushroom has animations (idle, jumping, attacking, running).



2.6.1.1 Shaders

We wrote a custom shader to support both animations and normal, specular, and gloss maps for the characters together with simple lighting. The shaders will be improved further, e.g. when the oven model is ready to make sure that the lighting looks fine.

2.6.2 Rendering

We render the game at twice the display resolution to make up for the missing anti-aliasing support of Monogame on DirectX (converting the project to OpenGL, which has anti-aliasing support, has been unsuccessful). The actual amount of downsampling used can be configured easily (at compile time only though).

2.6.3 Skybox

The surrounding oven is a skybox and has its own shader. We are planning to remove it though in the final version and replace it with a modelled oven (with possibly an animation for the ventilator).

2.7 Music and Sound

2.7.1 Music

There are two tracks in the game, a menu theme and a battle theme. Both are not composed by us and their composers are attributed in the credits screen.

2.7.2 Sound

We've recorded sound effects for the topping (a happy sound when selected, jumping, dying, attacking, being hit). Currently only the olive has its own sound effects but the others will follow soon.

The GUI has also sound effects which gives the player feedback when he selects an option or starts the game.