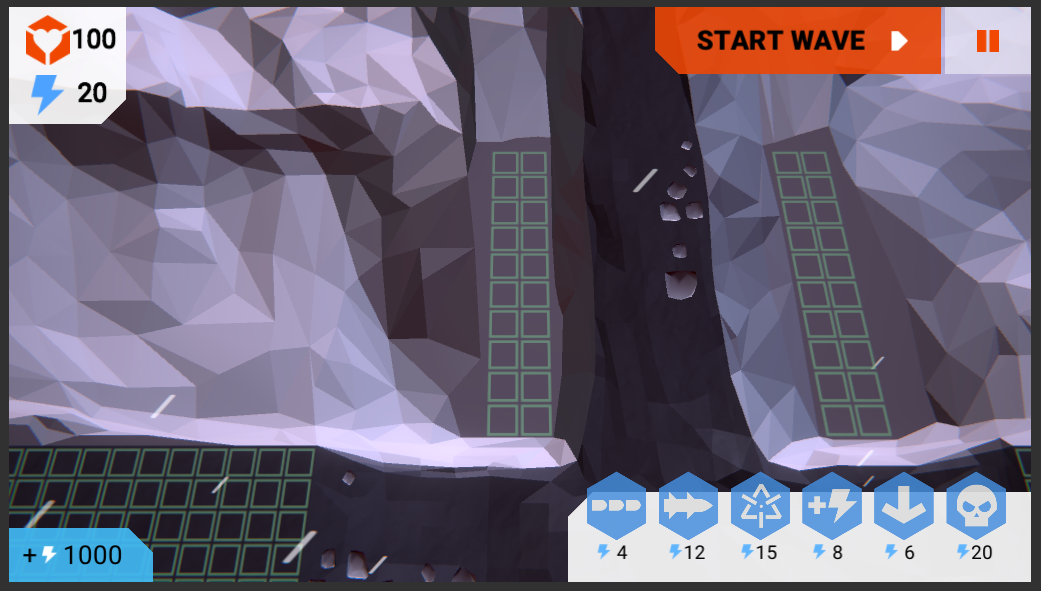
Audio Design Document (I’d wondered why we didn’t have something like this before)

Enan Munzar

# What’s my game?

It’s a tower defense game from a Unity tutorial. It uses 3D assets with a stylized sci-fi aesthetic and was originally fairly bright and cheery (for a tower defense game with tanks), but I made some changes to the aesthetic. It now features a dark, stormy level with intermittent distant lightning.



Screenshot makes me feel nostalgic

# What sounds, and why?

As a tower defense, the game needed few different kinds of sound effects. The majority of my work was split between making diegetic sound effects for towers, their functions and their firepower, and the enemy units on one hand; and UI sounds signaling the various actions the player can take. In addition to all this, there was the matter of ambience to consider, made all the more relevant by my introduction of turbulent weather.

In my design, as I’ve stated, I wanted to create a soundscape that leaned toward a gritty, somewhat realistic depiction of the… well, *violence* at hand, to put it bluntly. But, given that we have a world full of simple low-poly models in fairly vibrant colors, I would’ve been remiss to not try to represent the sci-fi-ness of the game in its sound.

In pursuit of the former, I sometimes avoided high-pitched and strongly tonal sounds somewhat (except when I didn’t, as described below). For instance, I chose a “click” rather than a “ding” for pointer-related UI events; the assault rifle still fires with what could be taken for a realistic gunshot; and I took care to include a low rumble accompanying the whistling of flying missiles.

In pursuit of the latter, I fully embraced the typical science fiction sound characterized by beeps and pew-pews, as demonstrated in the plasma lance’s sound. If something fired solid ammunition, I tried to make it sound gritty; but if there were effects with glowy laser beams going on, I made the sound reflect it.

# The power vested in me by FMOD Studio

Given that I only have three game parameters affecting the project, the programming in FMOD wasn’t terribly convoluted. However, the background tracks provide a sonic indication of both the base’s remaining health and how close enemies are getting to it, while the towers have idling sounds that are affected by their level.

There are several instances of small randomizations. The piano notes in the non-danger music track utilize several scatterer instruments (depending on health; the ones used at low health include more off-key notes and also fire more frequently). In addition, most projectile sounds have some pitch randomization (random modulation) so as to sound less mechanical.

# Mixing efforts

Given the genre (and its propensity to get loud fast) I felt it necessary to put simple compressors on both the groups for unit idling sounds and attack SFX. When there’s only a few units on screen, you want to hear them, but when you have ten towers within one camera view, you still need a reasonable sonic representation of what’s there. As such, the group busses have compressors on them (which I used Live Update to tune). Beyond that, mixing was mostly a simple process of trial and error (helped a lot by FMOD’s Live Update and its ability to support nested grouping of events into busses).

# About mastering

Of the tower defenses out there, many have some pretty wacky premises (Ian’s prototyping class saw crazed farm animals in one very recently). The one I found best imitated the sonic style of my game is a mobile one called Tower Madness 2, though I only got YouTube footage of the game.

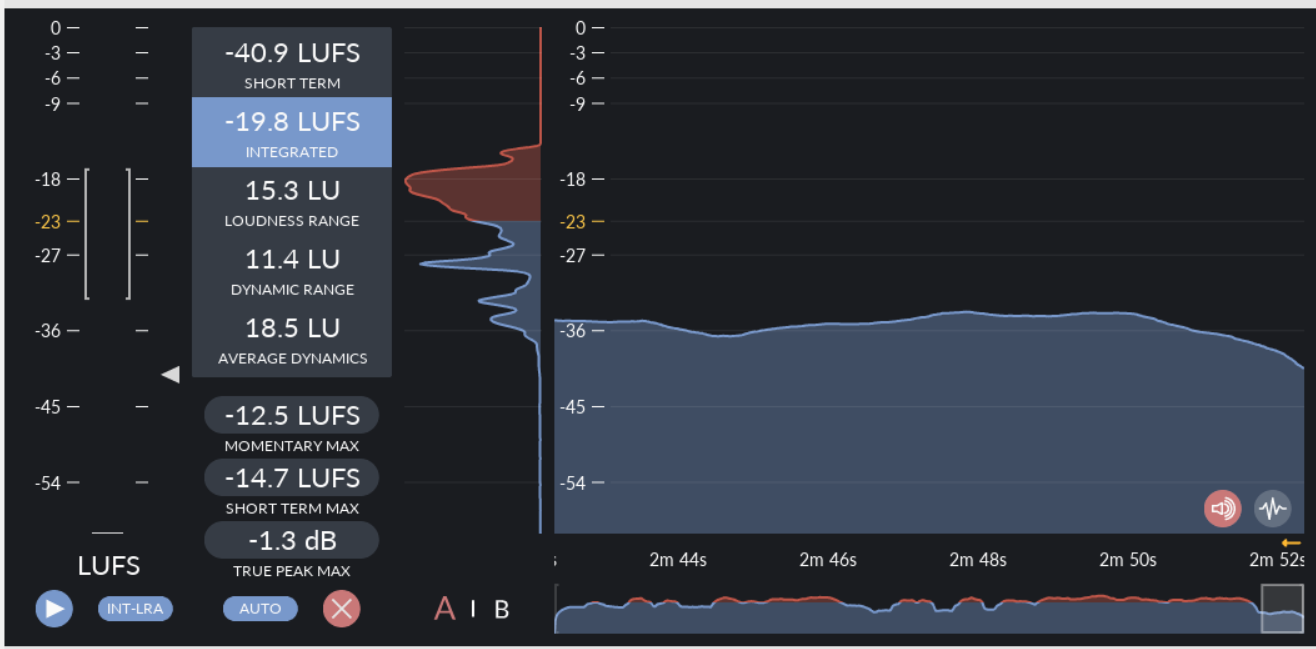
But wait, there’s more! One of the first games I came across when looking for tower defense games was Sanctum 2. I then discovered that a friend could let me play the game and record footage for this project. Though it has some very different mechanics from my project, I found that (with some manipulation of in-game sound settings) its sound felt very much like one that could’ve fit into the game I’ve used.

## Tower Madnesss 2 (from YouTube footage)



In analyzing these games I discovered that a defining feature of the sound of tower defense games is that there are often two distinct levels of energy in it. In the planning phase, before a wave of enemies is the game is rather quiet, with instantaneous loudness levels between −20 and −30 units for the most part. Sound effects from activities like building/upgrading towers raise it above −20 briefly. However, when the conflict starts (i.e. when the towers are shooting), in this particular game the instant levels hung about the −18 mark. The bulk of the footage included such conflicts, and the spike just above −18 speaks to this.

## Sanctum 2 (recorded gameplay)

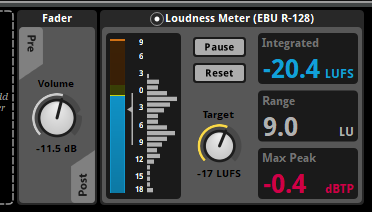


Sanctum 2 isn’t a very typical tower defense. The Unity tutorial I’m using is a pretty typical tower defense. In recording my gameplay I tried to contrive the situation somewhat to better resemble my game: I turned off dialog entirely, and kept my distance from the enemies (since my game doesn’t have FPS mechanics).

Momentary observations include that Sanctum 2 is *even quieter* (less than −30) when the baddies aren’t around. In comparison to Tower Madness 2, this is primarily because Sanctum features a much more serious soundtrack in its “idle” state. However, the sound effects of building towers brings up instantaneous levels to about the same value (−20) as when the waves start. Then again, this can be attributed mostly to the fact that the building takes place at a first-person distance. What’s perhaps interesting is that, even though my gameplay did involve a fair amount of dealing with enemies face-to-face, Sanctum peaked at very little higher than Tower Madness. The higher loudness range made the loud moments feel a lot louder, however.

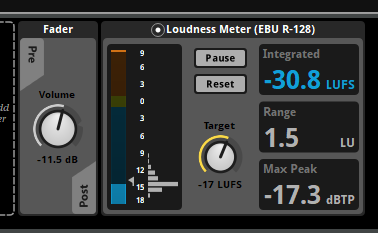
## My game

In my previous submission, as you mentioned in the feedback, my loudness level was very low when I started mastering. Having not explicitly tried to achieve this overall loudness before, I was generally testing the game with volumes turned up from the OS.



After augmenting several of the sound, I managed a playthrough of several minutes *in-game­* with the readings shown above. The true peak reading is slightly worrisome, but given that it’s still negative, I left it as is.

In the menu, where the (new) music track and a bit of ambience were the only things present (besides the occasional clicks), I got the measurements below.



My intent was to get the value of the “resting” state’s loudness to about the same as Sanctum 2 before deeming it good enough.

# Sound sources

All sounds obtained directly from external sources (and placed in the imaginatively named Obtained Sounds folder) are documented in the Sound Credits worksheet of Asset List.xlsx. The piano notes were rendered from Ableton Live 10 Suite, from the Grand Piano instrument that comes with it.

Tiny Ghost Returns, the menu theme, is a piece of my own creation ~~barely thrown together in an hour~~, made using Live again.