

Scale

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Semester 1, 2014

1 Introduction

Welcome to Scale. This project focuses deeply on the concept of synthetic realities, insofar as it aims to create an entirely familiar environment that can then be used to toy with the audience's perception of what is directly in front of and around them, creating an entirely new way of exploring their surroundings..

To do this we are using the Oculus Rift DK1 virtual reality headset to facilitate a full and immersive view of the audience's surroundings. This is taken quite literally, however, as what is displayed on the Oculus Rift is a near-direct facsimile of real objects that are placed directly in front of the user in the same position as they are in the game environment. Therefore, instead of transporting the user to a new world as in most VR media, we use the capabilities of the Oculus Rift to show our audience the *same* world, but from an entirely new perspective – that of the immensely small.

In Scale, the player starts off in a near-direct copy of the BCT studio. They are able to walk around explore this space, however not all is as it seems. One of the far walls is removed, and it is revealed that what at first seems like a regularly sized studio is, in fact, extremely small. This studio model itself is contained within a model of the terrarium seen on the table, which is again inside a larger model of the studio. Coupled with a small model of this in the original, small studio, we have created a space that implies an effectively infinite 'studio within a studio' effect that directly plays into our concepts of scale, and how it can be perceived as relative instead of absolute, depending on your perspective. In this way we call into question our own sense of reality with the implication that what one observes can be entirely different depending on their viewpoint.

2 Practice

For Scale we are employing a fairly standard low-budget hardware and software tool set to accomplish our goals, with explicit focus on price, performance and development speed above other factors such as increased graphical fidelity. The game uses, for example, the Unity game engine. This particular engine was chosen for a number of reasons, such as ease of integration with the Oculus Rift, as well as the ability to create, arrange and refine content extremely quickly. It also performs extremely well compared to newer or more complicated engines such as Unreal, which was considered for its price and feature set, as well as unmatched graphical fidelity. However, in practice, even the most simple scenes have the potential to be incredibly immersive, and so Unity's performance and speed of development took precedent over more superficial matters. The importance of this performance, of course, being the mitigation of motion sickness and other side effects of VR that are often induced by low framerates and input latency.

As was the case with my previous VR project, 'Andorfia', the platform of choice for 3D content creation is still Blender. Again, this program is extremely well-suited to our method of production as it is considered somewhat of a 'Jack of all trades', insofar as the wide variety of tools it presents to users that would normally need to purchase many different software packages in order to have a similar workflow – all whilst remaining free and open source. Besides both being free *and* eschewing license restrictions for content created with it, using

Blender allows for an extremely efficient pipeline that is managed all within one program, after which content can be exported directly to Unity with little impediment.

Perhaps the most important piece of Scale, however, is the Oculus Rift itself. While still only a relatively barebones development kit, the Rift allows for extremely immersive experiences through stereoscopy and direct 1:1 head tracking. Accordingly, we do not aim to simply *show* our audience a different view of their surroundings; one might argue that this would be fairly trivial to accomplish with naught but a camera. Instead we aim for our audience to be thrust *into* the world of Scale in order to experience a new take on what is familiar to them, albeit from a relatively unfamiliar point of view.

Asset creation duties in Scale were reasonably distributed between James and I. Most of the in-game models are made by me, however the terrarium and its contents were made by James in order to study the basics of 3D asset creation. This means that whilst I made more models, James was free to take care of programming and music. Most of the scripts used in our Scale are freely available either as a standard Unity asset or through their forums and wiki. Many of these were then heavily modified to work with our particular combination of Unity components and control schemes.

Once again taking the majority role of modeller for a 3D game has presented a fresh set of challenges and allowed me to further hone my craft not only through practice, but also through teaching. James, to his credit, has picked up the basics of Blender extremely fast, but is still most certainly a newcomer (seeing as this project was the first time he had used the program). To that end, it was my job to help him out where I could and make sure he was on the right track to creating quality models. Not only did this allow him to pick up modelling quicker than one might do on their own, it also allowed me to further explore the ways in which I make models and solve problems by passing knowledge on to someone else. Though I have a long way to go myself in terms of modelling, I feel that teaching another person how to do it is an extremely effective way to reflect on one's own methods and refine them in the process.

All of the elements in our environment were meticulously created in order to reflect the physical world around our audience. While there is a good deal of artistic license taken in order to make the game functional in the Rift, in-studio objects have been precisely arranged to accurately give the impression of being in the same place you were when you put on the headset. Besides raising the question of where one might draw the line on how much detail to include in the game world, this presents a very interesting set of technical problems – do you make the spawning area extremely small, or perhaps make the environment extremely large? Each has its own set of pros and cons. Often these come down to sheer numbers and mathematics; too small and it becomes near-impossible to make fine adjustments to objects and behaviour due to the unit increments becoming relatively larger compared to such tiny assets. Similarly, a large environment is limited by numeric variables as well. Huge objects and distances can cause very strange behaviour as they are prone to overflowing on their 24-bit depth buffers, causing visual artifacts and sluggish performance. Ultimately, though, we went with large, making the 'miniature' studio environment approximately 1:1 scale with our real BCT studio in the process. While this does create issues in the far off areas of Scale, these can be mitigated by clever manipulation of clipping planes and layers. This is far easier

than attempting to position objects and operate the character controller in such small increments.

Stylistically, we have deliberately made a departure from real-world aesthetic in order to both optimise for our limited production time, as well as create a cohesive experience within the Oculus Rift devkit. This is primarily because of the kit's low resolution; most fine details and textures are lost on a screen that is essentially 640x480 pixels per eye. This lack of fine detail also allows for our game to perform extremely well, running at well over 60 frames per second. This is extremely important when dealing with virtual reality, as any latency or disconnect between what the user expects to see when they move their head, and what they actually see, can significantly contribute to motion sickness. This is known most commonly as the 'cue conflict theory'. (Lewis-Evans, 2014)

With this in mind, we have paid gratuitous attention to ways of dealing with motion sickness in *Scale*. While forward movement is faster than what is generally accepted for games designed specifically for virtual reality (due to the sheer relative size of our level), we have taken steps to ensure that it is a reasonably comfortable experience. One of our methods is to add walk and run buttons to the control scheme - for example, if the player wishes to slow down they may hold down the left trigger to essentially halve their pace. Once again, we have also made sure that the project framerate is above 60 at all times through careful optimisation of assets in the game environment. Additionally we have also incorporated the lens correction, chromatic correction and prediction plugins from Oculus VR.

One of the great advantages to using the Oculus Rift in this way is the complete isolation afforded to our audience when they are inside the experience. It is not simply viewing what we have created while still 'occupying' the original environment. Rather, it serves to completely 'transport' the user into a new perspective without interference from the outside world. This is supplemented by use of closed-back headphones which serve to further isolate users through dampening of outside noises. This both increases immersion and provides a very useful orientation method for players using the headset by incorporating another sense that provides spatial awareness. This also has the upside of helping to mitigate motion sickness by way of reducing mixed and/or mismatched sensory input.

3 Context

The concept behind *Scale* stems from a shared personal interest between James and I in the exploration of new and interesting environments with video game technology. We see the medium not only as it is today, but a platform for delivering rich and interactive *experiences* as well as traditional games. This is only furthered by the capabilities of the Oculus Rift to provide total immersion in a rendered environment; instead of simply looking at an image on a screen, the user is transported *into* the world itself. Imagine, for a moment, being so much a part of a game world that you would find yourself compelled to sit and watch the sun set from a hilltop in *Grand Theft Auto*, or to lay back and watch your favourite movie in a virtual theater... This is the kind of 'synthetic reality' we aim for. Not one burdened by the confines of combat, competition or puzzles, but a world to be *experienced*. This is not to say that this is a fault of the current status quo in gaming – far from it. However it does suggest that there is a huge opportunity for a much wider range of applications and experiences than we see today,

as well as serving to highlight contemporary video gaming's oft-underutilised capacity to embody art over entertainment.

Part of our concept for Scale stems from a very common desire we observed among people (ourselves included); during our formative presentations it was abundantly clear that the aspect of exploring the world as something very small was an alluring concept for most. Therefore we seek to embody this desire in the most literal way possible, short of actually shrinking a person or creating an environment many times the size of anything ever built.

Having originally based our idea on the potential for spatial resolution afforded by the Oculus Rift's stereoscopic nature, we had planned for the juxtaposition of huge vistas and tiny details, to be experienced one after another – discretely. It is fitting, then, that this was effectively turned into one environment that still exhibits these same ideas. The starting studio environment shows things as regular-sized and therefore reasonably small in comparison to the rest of the world. And, subsequently, when players exit this studio, they are greeted with an even larger one outside. This creates an almost infinite 'fractal' effect, supplemented by the presence of a tiny studio inside the small terrarium model. Most interesting, however, is the presence of an actual human model wearing the Oculus and a pair of headphones. Though it lacks animation (it was originally designed to move its head as the player looks around with the Rift) and fine features (omitted both to speed production and to allow players to assume the role with a more neutral model), we use it to imply that the player is in fact looking up at themselves when inside the world of Scale.

We aim to provide this experience by setting up a diorama of reasonably benign objects that then form a huge and varied landscape when re-created in the Rift. Now the audience does not simply see the computer running Scale, but are able to walk around *inside* of it. This is based very much on the idea of seemingly inconsequential things being much more when observed closely - to quote Feynman (1979) "...everything is interesting if you go into it deeply enough".

And truly, we do go very deep in Scale. By toying with the way our audience sees and explores their surroundings, we prompt users to question their perceptions of what they generally regard to be familiar or unremarkable. Much as starting out in Scale's studio model belies the relative vastness of the objects around it, seemingly benign things in real life may be much larger and more complex than we originally see. We seek to make users question their perceptions – because after all, what is reality to each of us but what we can see, hear and feel? Our vision of what is real, no matter how accurate or inaccurate, is dependent entirely on the input from our senses... So what happens when you change that input? If it looks and feels real... Is it?

It is also important to note that Scale does not aspire to be a game, so to speak. Though it is referred to as such on occasion in this document, our project is more akin to the previously described *experience*, rather than a game. Such experiences are an important aspect of synthetic reality and game development if video games are to truly be legitimised as an art form, and take on a deeper role than simple entertainment. Similarly, we both value the idea of observing game environments without the confines of combat or narrative – in many ways similar to titles such as *Proteus* (Key & Kanaga, 2013) or *Dear Esther* (*The Chinese Room*, 2012). This also illustrates the cross-disciplinary aspects of the Oculus Rift; while its main

focus is quite clearly gaming, the applications for virtual reality technology are near-endless for both artistic and professional endeavours, including medical areas such as treatment of psychiatric disorders (Good to be a Geek, 2013). For example, VR is often cited as an effective way of treating Post Traumatic Stress Disorder, as it is perceived by the brain more as a real experience than something shown on a screen (Wiltz, 2013).

This sentiment towards VR's application as a potentially revolutionary medium is reflected in a statement by Spike Jonze, tech enthusiast and director of *Her* (2013). Towards the end of the article "*Spike Jonze Reveals His Favorite Ad and How to Stay Creative With Clients Around*" (Adweek, 2014) Jonze describes the Oculus Rift as "inspiring", going on to state that he "...can imagine doing something with it. It's so compelling. The emotional experience for the viewer—it's just another way of being able to connect". We see, then, that the potential of this technology far exceeds its shortcomings, and though it is a burgeoning industry, there is much consideration to be made about the way we implement it in our lives.

4 Reflection

Scale is unique among Oculus Rift experiences in that the key to its overall impression is the physical presence of the player in the BCT studio; it relies on the environment around its audience in order to create a sense of familiarity within the gameplay itself. This experience is often nothing short of surreal, though such feelings are common with most new virtual reality media. We have certainly seen good feedback from our peers during playtesting, with many marvelling at the meticulous arrangement of furniture and object in the studio model.

Though it is certainly a far cry from our original ideas, our final product still does embody the sense of exploration and scale that we set out to achieve with the Oculus Rift. It effectively achieves the sense of being extremely small and actually *looking out* at your immediate surroundings from a completely different viewpoint. Effectively, we have embodied a shift in perspective that allows audiences to see everyday things in an entirely new way.

As with any project, there are things that we would have liked to do but had to omit due to time constraints, and details we would have changed. Things like the head of the seated player model moving as the user turns their head in real life were originally intended to further the notion that our audience is looking at themselves from the viewpoint of something so tiny as a grain of rice. Additionally, while the world in Scale is a fairly convincing approximation of its real-world counterparts, there are always more details that can be added to make what we have built a more accurate simulacra of the real world.

5 Conclusion

With Scale, we allow players to explore familiar objects and environments in an entirely new way. Not only does this experience give the impression of being very small, it also supplements it by providing direct reference to its surroundings. With this, we have achieved a sense of never actually leaving our environment – rather, we simply see it from a different perspective. This allows for an unprecedented sense of connection to the objects in the game itself... After all, players will have just looked at the environment from above before they entered Scale. This provides an unparalleled familiarity and connection with the two environments that is seldom seen in other forms of media.

What we have created is not simply a game, or even a discrete VR experience, but a platform with which to explore the world in an entirely new way. It is a piece that spans multiple mediums and multiple realities - one which does not seek to distract with fantasy, but rather to enthrall with a new perspective on reality and the audience's perception of it.

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