'Nonahedra' Virtual Fashion Film

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Abstract

Virtual and mixed reality is a fruitful environment for the development of fashion and textile designs, as well as an approach in showcasing innovative two and three-dimensional work. The market sector in virtual reality (VR) is growing exponentially. As such, the technology is likely to become more accessible to the consumer through the continued advancement of technology and greater interaction between applications such as wearable and mobile technologies. The potential in developing new approaches for garment design, fashion production, and retail is limitless.

This project is a cross-disciplinary collaboration between academic staff who work within the Faculty of Creative and Cultural Industries, University of Portsmouth, United Kingdom (UK). One with a background in industrial and studio practice in fashion and textile design, working in partnership with a principal technician whose expertise includes motion capture, real time graphics, visual effects and virtual reality. Through a mutual interest in the exploration of how fashion and textiles intersect with digital technology the immersive virtual fashion film 'Nonahedra' has been created. This unique, interactive fashion film encompasses two-dimensional (2D) and three-dimensional (3D) imagery. Our aim for this film was to showcase the University of Portsmouth, BA (Hons) Fashion and Textile Design students' major collections in a virtual environment to be presented at Graduate Fashion Week (GFW). The film was generated via Unreal Engine, utilising visual components which included digital projection, 3D animation, motion capture, film and photography of the nine students whose work was selected. The virtual environment created includes nine stages, each stage was designed purposefully in order to showcase each student's work in a unique way and in connection with their design themes. The environment is playful and surreal, the audience is able to interact with the environment itself using virtual hands in order to view the work in greater detail.

Keywords: virtual fashion; fashion and textile design; undergraduate education; fashion presentation

Introduction

The accelerating transformation of digital technology and its applications are dramatically evolving. There are a wide range of opportunities that can be investigated and explored to determine how the fashion industry can utilise emerging digital technologies. These range from: exploring new approaches and discovering innovative methodologies, which can challenge the traditional approach to design; to how we can apply and utilise digital technology through virtual three-dimensional (3D) prototyping and interactive design simulations. Interactive design simulations may involve modelling design concepts at the early stages of the sampling process, ensuring that the garment fits and ensuring fabrication and colour are appropriate before the production of a garment. This could allow

the industry to become more transparent and sustainable throughout the whole design and production process.

This digital transition in the fashion industry to using virtual 3D simulations, by companies such as Marvelous Designer, Lectra Modaris and Clo 3D, prompted the questions: how could this type of technology be applied in a virtual reality (VR) environment? How could we modernise the way students' work is showcased? Could the traditional catwalk show be reinvented in an imaginative and creative platform such as an immersive VR experience? We want to challenge the perspective of our students in relation to the traditional context of a catwalk show and provide them with different experiences that may eventually become the conventional platform to showcase their work on.

Context

In 2014, lecturers on the BA (Hons) Fashion and Textile design course at the University of Portsmouth decided that producing a catwalk show was not a direction they wanted to continue: catwalk shows are expensive and only last momentarily. The future direction would be to showcase our graduates work by producing fashion films, which could be externalised to a wider international audience. Alex Counsell, from the School of Creative Technologies, University of Portsmouth, has technical expertise and experience in film production from working with the London Symphony Orchestra, SuperUnion and Imaginarium Studios, with a reputation that made Alex the ideal collaborator.

The first collaboration between Counsell and the Fashion Design course team involved using green screen technology. This was a very successful outcome and visually effective in showcasing graduate collections. From the success of our first course film, it was discussed how we could further develop the graduate show reels by applying digital technology, moving towards a virtual reality film. Counsell was the pivotal figure with the technical knowledge to achieve our goals in creating these types of fashion films.

In the second collaboration, between Counsell and the course team, we developed a virtual fashion film captured in real time. The film was shot across one day at a local Victorian theatre. The project was very theatrical, involving professional dancers and a variety of performers to create a fashion film that truly entertained the audience. The film was very successful in terms of the impact and reaction it had on the audience. The benefits of making digital films is that they are fairly cost effective in comparison to the production of a professional catwalk show. This immersive platform is an excellent way of showcasing student's collections at various shows including Graduate Fashion Week (GFW). After working on this project with other team members, the authors wanted to expand the idea of an immersive VR film generated through 3D animation software. Pushing the creative boundaries further into a multi-sensory experience.

Production

The initial intention was to generate an immersive VR fashion film that utilised a wide range of digital components. This could include traditional visual properties, such as photography and videography, and combine these with progressive technologies such as motion capture and 3D computer generated properties. All of the components could then be rendered using VR simulation software such as Unreal Engine.

Inspiration primarily arose from the fashion film 'There's Something About Mary', created by SHOWstudio celebrating Mary Katrantzou's five-year anniversary in the fashion industry. The film had been produced using a combination of photography, videography and 3D animation. The fashion films

characteristically produced by SHOWstudio are viewed on a two-dimensional (2D) platform which limits the visual impact of the 3D animation applied in the films. This raised the question: how could this format work as a VR experience?

The authors agreed on a brief that would explore a range of digital outputs in order to create an immersive VR fashion film, where the viewer would be capable of navigating between the graduate collections. This would involve developing a range of extraordinary environments for the audience, playing with scale, rotation of objects and moving imagery in order to generate a film that is very surreal and dreamlike. By using digital gaming technology, it is possible to build fantasy environments and achieve the seemingly impossible.

The primary reference point influencing the visual aspect of our production was the American film director Busby Berkeley (1936, 1934, 1933). His Hollywood films, from the mid 1930's, were extravagant musical productions, involving hundreds of chorus girls using complex choreography to create elaborate human kaleidoscopic geometric patterns. The advantage of using modern VR technology is the ability to notionally place the camera anywhere and so the experience can become even more 3D than those created by Berkeley.

The next stage was to agree on how we should approach this concept and what visual components were required in order to start. The technical development for the VR experience, was undertaken by Counsell. The process involved combining traditional visual components of photography and videography, with 3D computer generated effects and animated characters into a VR experience built in a game engine called Epic's Unreal Engine4. The technology used in the gaming industry is evolving and progressing rapidly allowing us to produce photoreal visualisations.

In November 2017, we organised a professional contemporary dancer to record a range of dance movements using the Universities motion capture studio with specialist Vicon hardware and software. We needed to document a range of dance movements, referring to classical, broadway and contemporary dance initially (illustrated in figure 1 and 2, documenting the motion capture).

Figure 1: Motion Capture, Dancer, Martha Canning, Bra Dance Company, November 2017.
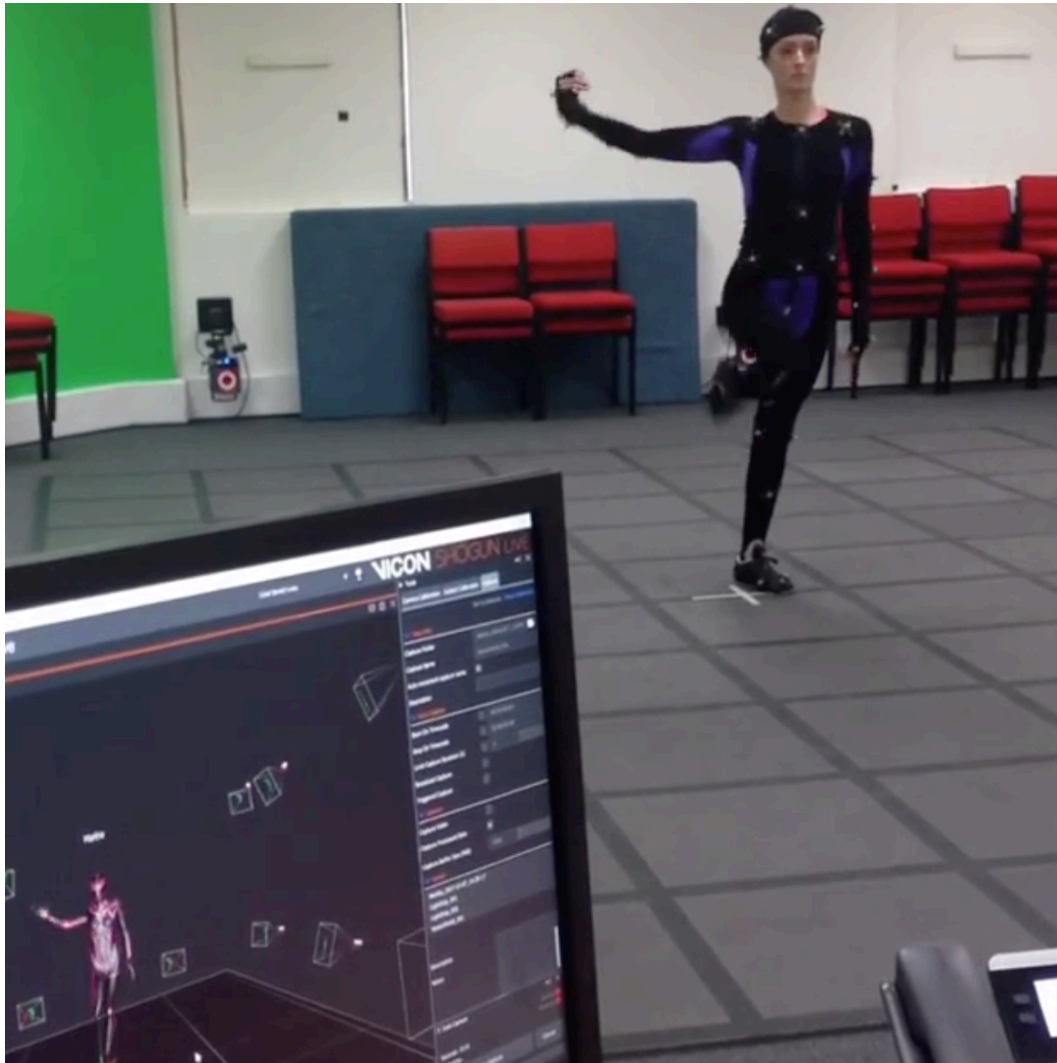
Figure 2: Motion Capture, Dancer, Martha Canning, Bra Dance Company, November 2017.

These movements were then processed and transferred to a faceted, crystalline digital character, created using Autodesk motion builder software. It could immediately be seen on screen, how the movement was being captured onto the digital avatar. With both staff and students on set, to direct the choreography, this was a very organic process and the dancer could also evaluate what was working well instantaneously.

The digital character was manipulated and multiplied in order to produce Busby Berkeley inspired human kaleidoscope patterns in VR, shown in figures 3 and 4.
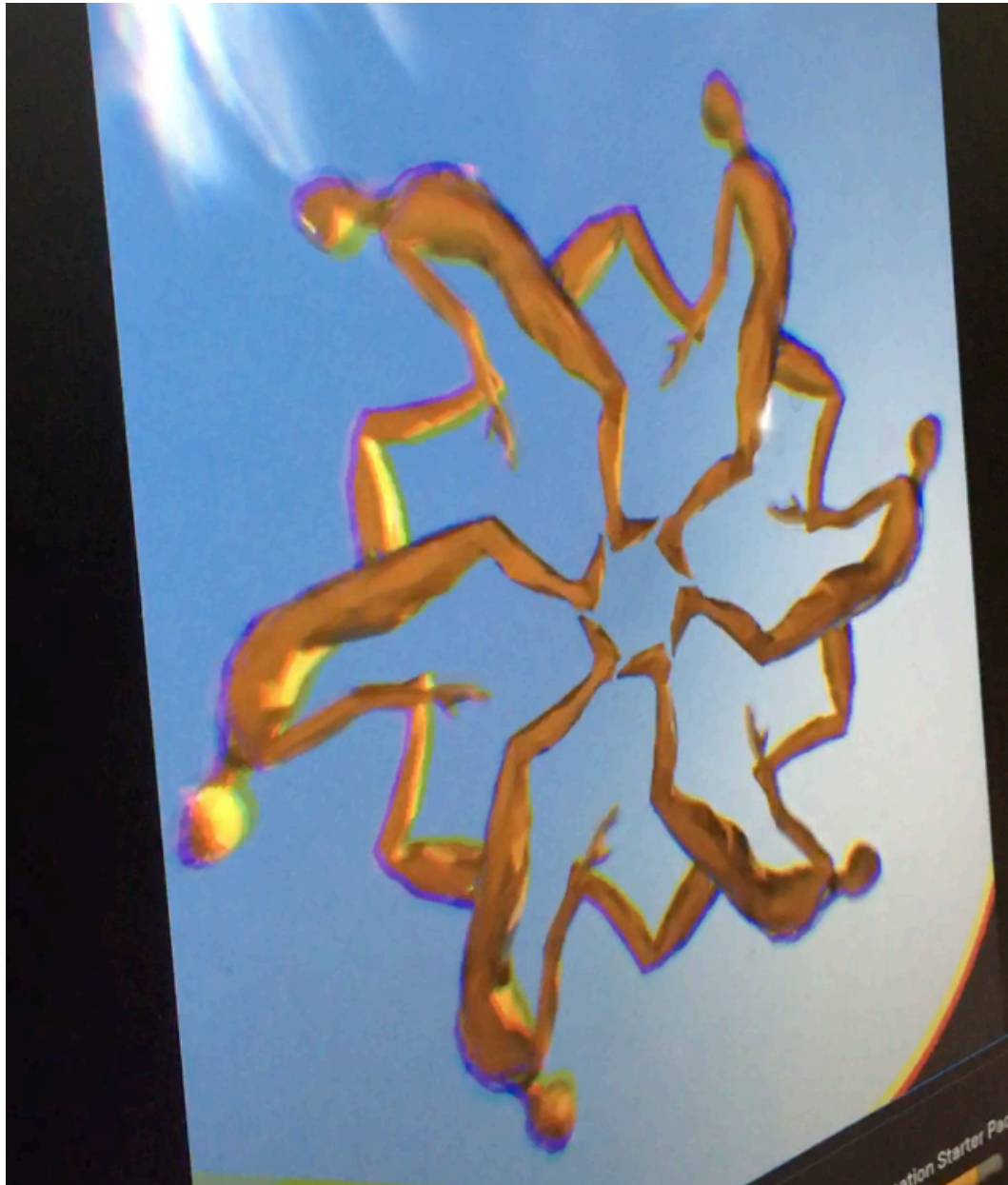
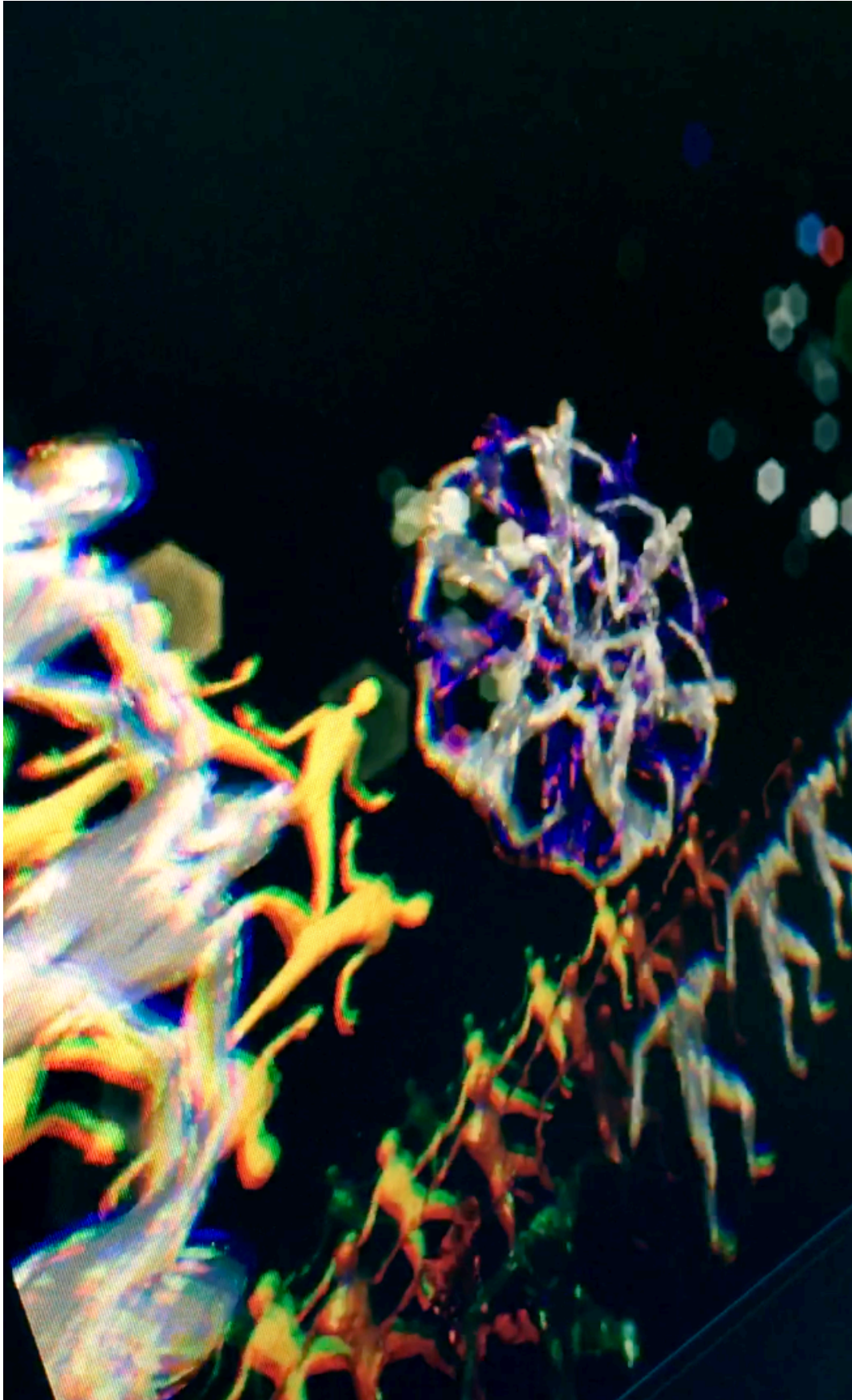*Figure 3: Applying motion capture in Unreal Engine, December 2017.*

Figure 4: Extending possibilities of motion capture in Unreal Engine, December 2017.

Testing out this process at this stage proved that motion capture was going to be successful, providing endless possibilities of how the footage and the various affects could be applied using Unreal Engine, a VR programming software.

The next stage of the production process was to start generating the photography and film content. Collaborations took place with Condé Nast College of Fashion and Design in order to generate high quality fashion photography, and with University of Portsmouth film students who created the videography content. The photoshoot and filming was produced over two days at Condé Nast College, London. To create a more immersive experience, live video projection was used while filming the models on a turn table, creating a 360-degree recording of all the garments.

The student's digital textiles were altered into kaleidoscopic animations using Adobe After Effects, which added more dynamism to the video content. The kaleidoscopic animations were originated in advance. This allowed experimentation with the creation of animations live on set to get the desired results, illustrated in figures 5 and 6.

Figure 5: Videography and digital projection, April 2018.

Figure 6: Videography and digital projection, April 2018.

Having generated all the assets, production of the VR film could be started. We created a variety of stages, all influenced by Busby Berkeley in some way. This involved building 'virtual stages' for each graduate's collection, using their individual themes to inform the overall aesthetic of each stage. Specifically, for each stage a number of shapes and tools were designed and built in the Unreal Engine software, that would allow the quick iteration of layout and animation of concepts. This included a tool to replicate a large number of characters and objects along curved paths, allowing us to mimic the kaleidoscopic nature of Busby Berkeley's films, with a minimal amount of development work, thus not interrupting the creative process.

Counsell also developed a range of tools that allowed us to place 3D objects on the various stages. For each object selected, digital textiles, photography and video content were applied, to generate the desired effect shown in figures 7 and 8.
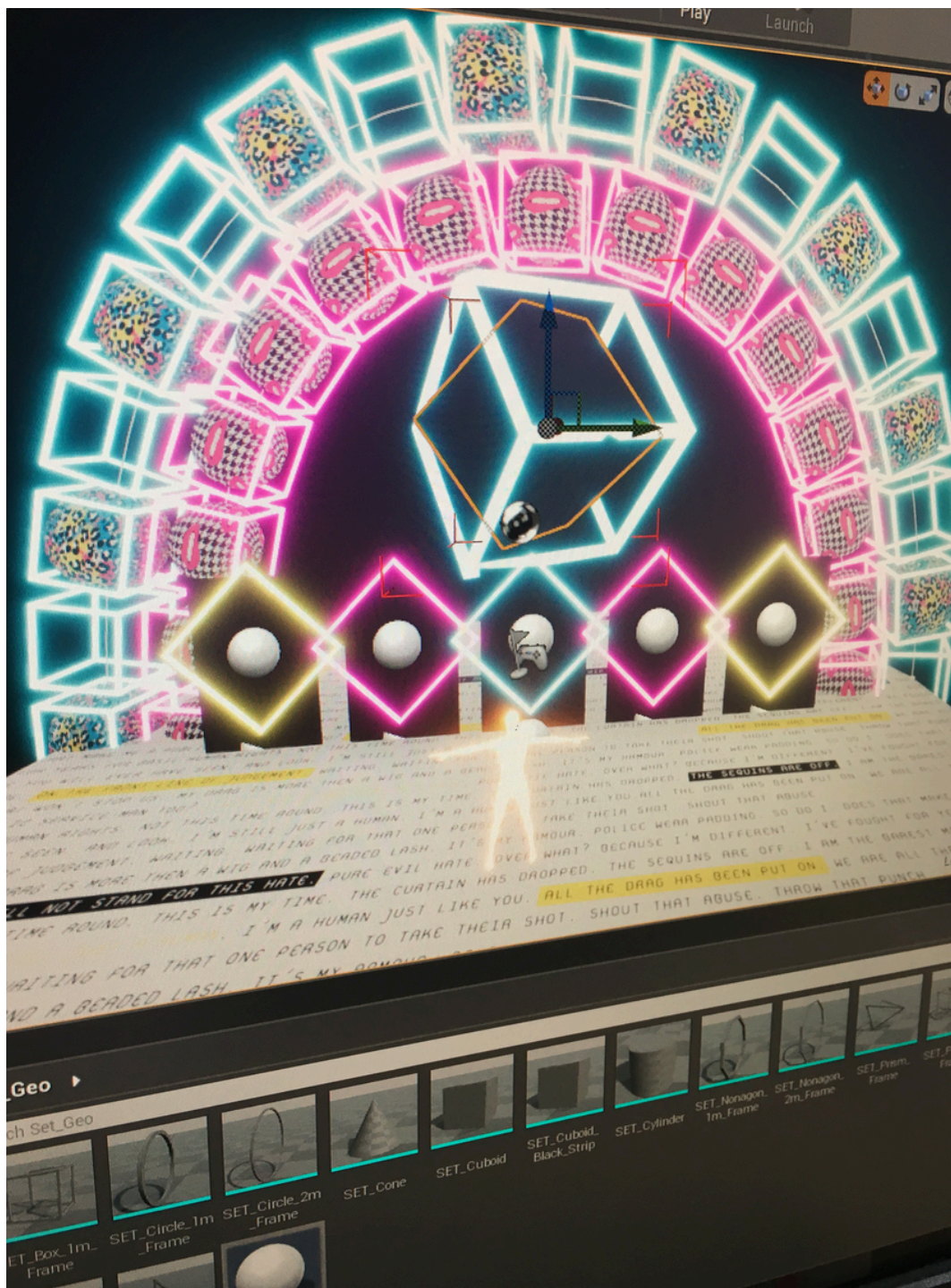
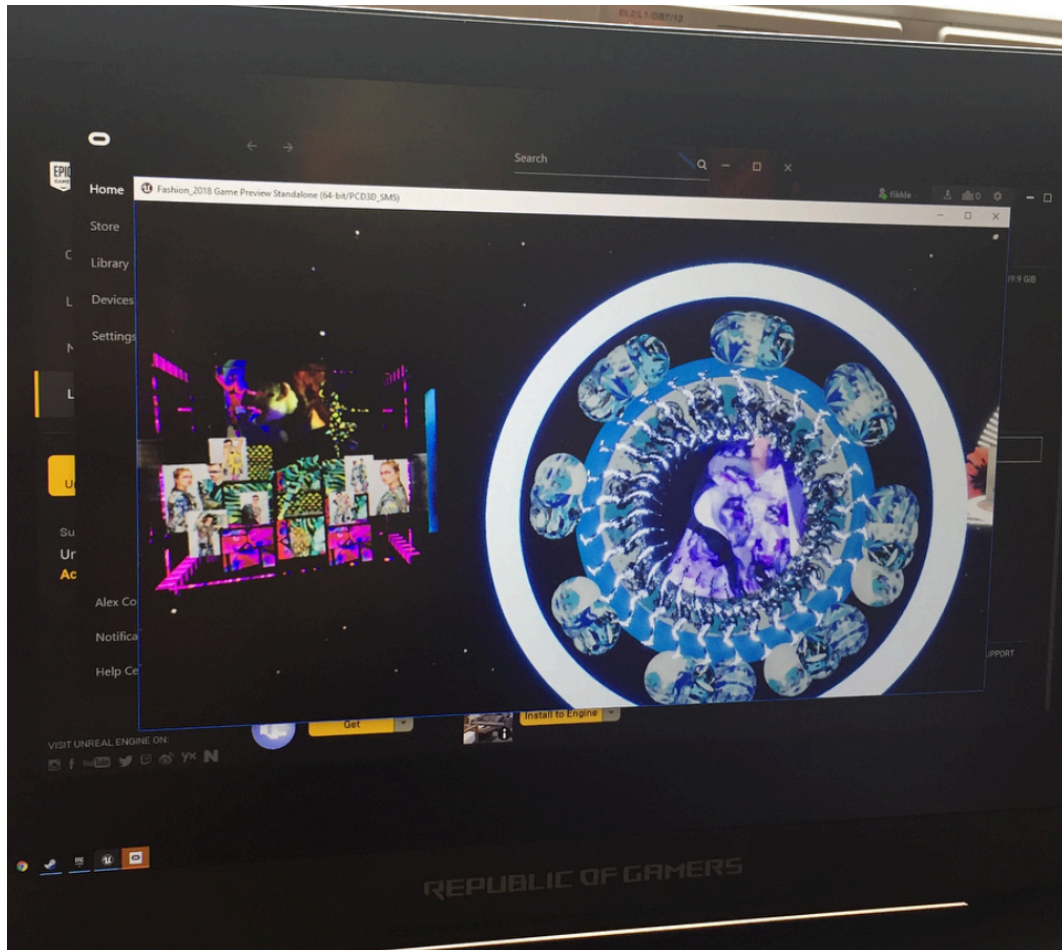*Figure 7: Generating stages in Unreal Engine, May 2018.*

Figure 8: Generating stages in Unreal Engine, May 2018.

The Unreal Engine programme can rapidly alter colour and light emissions to each of the selected objects, which could be easily modified at any stage of the development process. In total, we had nine stages to design. During development of the stages, it was necessary to consider how they would be viewed in VR, while also giving consideration to user reaction of immersive experiences, which can, in some cases, lead to motion sickness. Therefore, we decided not to create anything that involved too much movement while wearing the VR headset.

The end result is an immersive experience with the nine stages suspended in space. The viewer is surrounded by the orbiting stages slowly moving towards them. Virtual crystalline hands enable the selection of the video cubes that represent each graduate's collection, allowing the viewer to examine the work in closer detail.

Conclusion

The authors worked collaboratively on the production of the film. Collectively approving successful elements of the film and its production, in addition to areas that required further development. We both naturally seemed to have the same ideas while designing and developing each stage, this made the process easier and efficient. The final production, once all the assets were in place, took 8 days to put together. Although generating the imagery, motion capture and VR tools took two months to construct and a lot of planning to achieve the deadline, ready for GFW and the University of Portsmouth graduate show.

On reflection, the authors found the project to be a creative and enjoyable process. Homewood, June 2018 noted, 'I personally learned a great deal, especially regarding the range of assets required using

the VR software and how smooth the creative process can be, providing you have the expertise in this particular area.'

Understanding the VR software in greater detail allowed reflection on how this tool could be further utilised in showcasing students' work, and how it can be applied in the developmental process, for example, through virtual garment development methods.

Without time constraints, the natural progression for this film would be to expand the experience to become more interactive, using teleportation within the film to move between each of the nine stages and allow greater interaction with the components on each stage. This would have required complex programming and more time than was available for this project.

The film was showcased at GFW in London, June 2018 (figure 9), and at the University of Portsmouth graduate show also in June 2018. It was well received by the public of all ages at both events. The children that experienced the film really enjoyed the interaction and it seemed completely intuitive for them to be in that type of virtual environment. The transition between real and unreal environments seemed very natural to them. One drawback with using this software is that you can't interact with other people at the same time, this would be an area for further development.

Figure 9: Final film presented at GFW, London, June 2018.

Now that the fundamental tools have been developed in Unreal Engine, we can utilise these tools further and will be applying them on future collaborations.

Deciding the name of the film was the very last stage of the project. Having created nine stages we discussed various names relating to the nine-sided polygon a nonahedron, another mathematical term was 'Nonahedra' which worked well as a film title.

This type of project and final outcome has never before been showcased at GFW. It is a pioneering virtual fashion film which requires greater exploration into the possibilities and opportunities using virtual gaming software, and how it can be applied within the fashion industry and in wider context for design, production and showcasing collections.

References

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