EG UK Computer Graphics & Visual Computing (2025)
Y. Sheng and A. Slingsby (Editors)

StaffsVerse: Exploring Unreal Editor for Fortnite in Virtual Campus Design

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Abstract

Virtual campuses have seen expanded development in the past few years, appearing in various technical forms ranging from WebVR to Minecraft. This paper presents the considerations behind development of the StaffsVerse, a virtual recreation of the University of Staffordshire's campuses, designed within Unreal Editor for Fortnite. In this work, we have discussed the optimization strategies behind designing the StaffsVerse and the social and marketing impacts during its initial release. The StaffsVerse is the first virtual campus to be released within Fortnite and serves as a new form of engagement and outreach. Future works can utilize the findings within this paper to inform design decisions when developing large-scale virtual campuses within UEFN.

1. Introduction

Metaverse technologies have seen an impressive level of development, most notably during and following the COVID-19 pandemic. This collection of technologies presents an opportunity for interaction, collaboration, and spatial engagement in both educational and professional contexts.

We present the development and implementation of the StaffsVerse project, an immersive virtual campus. The StaffsVerse has been developed in the Unreal Editor for Fortnite (UEFN) Engine to recreate the University of Staffordshire. Utilizing UEFN confers a number of key advantages, most notably the ability to host the virtual campus in the Fortnite ecosystem. This allows us to capitalize on the available infrastructure (player management for example) and make the virtual campus available for free, and accessible to Fortnite's 650 million registered players.

The virtual campus has been initially developed to support applicant transition to university, by allowing them to familiarize themselves with the campus. However, it has also seen success as a marketing tool for the university during virtual open days. This has resulted in the virtual campus being a transformative tool in guiding new and prospective students through The University of Staffordshire from the comfort of their own home, a concept previously only possible through the use of 360-degree panorama viewers. StaffsVerse showcases how the inclusion of a fully 3D explorable recreation of the university can revolutionize the way students interact with their campus and course in a more immersive and engaging way.

The StaffsVerse has undergone a substantial amount of iteration in its two years of development. Additionally, it is the first virtual recreation of a university campus to have been made within UEFN, making it a valuable source of information to learn from for the creation and marketing of future virtual campuses. This paper is presented to highlight some of the key technical insights identified during this iterative development process.

This paper will present a brief synopsis of the history of virtual campuses to place our new implementation in context. In addition, we will present the reasoning behind the various design, technical, and social factors considered during the implementation.

2. Background

2.1. Early Development of Virtual Campuses

3D Virtual campuses have first shown development in the mid 2000's with Vrije Universiteit Amsterdam being among one of the earliest examples available in Second Life (SL). This virtual campus was developed to explore the possibilities and research potential that SL provided. [FEvdL*09] More broadly, SL saw regular use for hosting recreations of university campuses due to its ease of access and ability to connect with users across the world, a feature rarely seen utilized for educational purposes prior.

In total over 90 virtual campuses have been developed in SL by 2009, showing a peak of academic interest as the technology grew in popularity [GD09].

DOI: 10.2312/cgvc.20251208

2.2. Virtual Campuses During and Post COVID-19

Virtual campuses have seen an advancement in development from several universities during and immediately post COVID-19 pandemic. These digital recreations originally existed to provide a sustainable alternative for key university events.

One such example is a WebVR based virtual campus designed by Tecnologico de Monterrey (a private, non-profit higher education institution in Mexico). This virtual campus was designed as an alternative to traditional online meetings such as Zoom and Microsoft Teams, to provide a more engaging and interactive experience for students and teachers during the pandemic. The application found success in reproducing face-to-face interactions, although there were some issues regarding ease of access for some users due to technical problems caused by the now deprecated WebVR. [RERRGRGM22]

Another example of a virtual campus was the University of Lincoln's 'Lincoln Island'. The Lincoln Island (or TULI) project was designed to reconnect students with the campus during lockdown. It was subsequently used for the onboarding of new students, and provide virtual tours to international students. However, it was developed as a single player experience and didn't have multiplayer functionality. Lincoln Island was developed in Unity, and hosted on Microsoft's app platform, it showed success in reducing anxiety of new students. [THHM22, HDTW21]

Figure 1: *University of Lincoln INB Building in both the real world, and in the Lincoln Island virtual campus.*

2.3. What is Unreal Editor for Fortnite (UEFN)?

Unreal Editor for Fortnite (UEFN) is a modified version of the Unreal Engine 5 game engine which allows users to build games and experiences to play within the Fortnite ecosystem. UEFN experiences are built around 'Islands' which act as the main environment to build and develop within, an Island can also be published making it available for others to play. This is done through generating an Island Code, that is a unique identifier assigned to a published island in Fortnite. Players can use the unique Island Code to directly access their published project via the Discover menu. [Epi25]

2.4. Development of StaffsVerse

The prior development of StaffsVerse was accomplished within two key phases. The first major development consisted of a creating a pilot Island, where the goal was to create a faithfully scaled digital recreation of the university campus. User experience was also paramount to the initial stages of development as this would be the foundation to which the Island would be improved and iterated upon.

Initially StaffsVerse was developed to be a creative interpretation of the campus rather than a true-to-life representation. This decision was made to avoid adding in unnecessary detail while efficiently recreating the key areas of the campus. [HWH*24]

The second phase of StaffVerse's development consisted of refining the Island further in pursuit of creating an immersive and engaging experience for new and prospective students. [Uni25] The initial goals of the project was expanded to include a focus on providing students with an interactive space where they can get to know the facilities of the University of Staffordshire's Stoke, Stafford, and London campuses from anywhere in the world.

3. Design and Technical Considerations

During the development of StaffsVerse, various design and workflow decisions were made early on to ensure a consistent, stable, and optimized experience.

Firstly, the textures and material shaders utilized were mostly leveraged from the built-in assets found within UEFN. This was done to ensure that the art style remained consistent with the Fortnite aesthetic and that the textures all followed the same parameters. Keeping the resolution, compression settings and level of detail consistent, allowed for a standardized workflow and visual quality throughout the island map. Additionally, utilizing textures and material shaders from UEFN directly, has been discovered to significantly reduce the memory usage on the Island, due to the assets being optimized by Epic Games beforehand. This resulted in more resources being allocated towards increasing the draw distance which requires a much greater level of memory resources allocated towards it.

One key benefit of utilizing UEFN was the ability to leverage built-in landscaping tools and materials to carve out large sections of the campuses layout efficiently. This would typically include landscape materials such as grass, asphalt, sand and gravel, which provided a great benefit to blocking out the core layout for many large areas at once.

Memory usage was a core priority to regulate and manage. UEFN has an upper limit of 100,000 'memory units', set to ensure that the Islands created ran effectively on all platforms. This creates some challenges due to the scale of the Island (encompassing the Stoke, Stafford and London campuses), as such, efficient optimization was needed to ensure that the Island stayed below the memory limit.

3.1. Memory Calculation

UEFN includes a bespoke Memory Calculation tool which allows you to identify where memory was most heavily being used. Through its detailing on what assets were taking up the most space, optimization could be applied to reduce the cost. This approach allowed StaffsVerse to be created completely within one island level. [Epi25]

3.2. Memory Cost

Within the UEFN ecosystem we discovered that vehicles, spawn devices and Niagara VFX are among the heaviest in memory costs ranging from between 1000 to 9000 memory units. This expensive cost is partially caused by the complexity in physics, animation and multiplayer replication produced across all clients in session.

3.3. Memory Reduction Strategies

There are several strategies available to minimize memory costs which were identified following vigorous testing.

- Careful implementation of device spawners, particularly vehicles.
- Utilizing tillable textures/decals over unique texture maps for reusability and limiting draw calls.
- Reducing poly-count through utilizing Nanite which is built into UEFN.
- Implementing Fortnite assets rather than imported assets where possible.
- Removing excess landscape sections under water or otherwise invisible to the player.
- Limiting the use of foliage and landscape painted grass, to reduce wind physics calculation.

Through the careful reduction of memory costs, StaffsVerse was able to exist within one consistent virtual space, without the need for multiple levels/Islands to be created. This provided both prospective and current students with a seamless experience of the virtual campus.

4. Social Considerations

StaffsVerse provides a new way for prospective students to connect and engage prior to starting university. A substantial advantage to creating StaffsVerse within UEFN is the benefit of using Fortnite as a vehicle for showcasing the virtual world. The official estimate from Epic Games suggests that over 75 million individuals aged 18-24 play Fortnite monthly, estimating 60 percent of all users.

Additionally, a UCAS survey found that 39 percent of prospective applicants have cut down on the number of open days they have attended. This is due to factors such as costs and distance which has guided the development of StaffsVerse to meet the needs of prospective students. [UCA23]

4.1. Counter Terrorism

All virtual representations of campuses (including camera tours, 3D models, and panoramas) in the UK must comply with relevant government legislation, including the Terrorism (Protection of Premises) Bill. Commonly referred to as Martyn's law, this legislation aims to improve security and preparedness in publicly accessible locations, including universities. Notably, most publicly available virtual campus tours are not compliant with this legislation according to our interpretation of this law and associated guidance.

As such, digital twins and immersive environments must be carefully designed to avoid disclosing sensitive architectural details that could be exploited for malicious purposes by hostile actors. This includes omitting or abstracting specific layouts, access points, and security features. The development of the StaffsVerse has adhered to these principles strictly by employing selective detailing, abstraction of sensitive structures, and close collaboration with campus security teams to ensure adherence. As an additional layer of protection, we included no information that wasn't already a matter of public record via tools such as Google Street View. Additionally, visual terrorism countermeasures have been employed throughout the environment. This approach allowed us to create an engaging and informative virtual spaces while upholding institutional responsibilities related to national security and public safety.

5. Current Application of the StaffsVerse

The StaffsVerse was formally released to the public in January 2025. Following this release some small changes were made. Most notably the chat function built into UEFN was disabled, as this feature was quickly misused. As Fortnite allows players to engage via pseudo-anonymous profiles, the chat function was abused by a small number of hostile players.

5.1. Marketing Impact

The success of StaffsVerse has led to it becoming a highly successful marketing tool for the University. It has been used extensively in promoting its various facilities offered. Furthermore, research shows that StaffsVerse garnered a total of 36.6 million impressions on various media platforms, and was the most viewed video on Esports News UK's TikTok.

StaffsVerse also appeared in BBC News online, BBC Midlands Today, BBC Radio Stoke, BBC Radio Hereford & Worcester, BBC Radio Shropshire, Chamberlink Magazine, and Research Professional News. Overall, StaffsVerse has succeeded in enhancing the university's outreach and engagement, showcasing students, practical skills and creativity. Since the deployment of the environment, the university has seen Social Media followers grow by 21%. [BBC25]

5.2. Virtual Tours

Open days have become increasingly inaccessible for prospective students to attend due to travel distances, financial costs and accessibility challenges, creating the need for an effective digital alternative. StaffsVerse has provided an engaging and sustainable method of hosting virtual tours, due to the virtual campus being a faithful recreation of it's real-world counterpart. Hosted on the popular game Fortnite, StaffsVerse is easily accessible to a large audience and provides an interactive way for students to connect before transitioning to university.

Figure 2: *University of Staffordshire Mellor Building in both the real world and the StaffsVerse virtual campus.*

5.3. Testing New Buildings (Student Village Project)

The University is currently constructing a Student Village, and to ensure that the campus reflects the real-world, we have begun developing its virtual equivalent in StaffsVerse. This led to the ambitious challenge of recreating the Student Village using only promotional images and construction plans/sketch mock-ups.

Implementing the Student Village into StaffsVerse provided an opportunity to present buildings which are currently under construction within a digital equivalent, showcasing their finished state virtually. This would allow prospective students to tour the facilities ahead of their real-world completion.

Collaboration with the architects and construction company allowed us to create a faithful recreation of what the buildings will look like at the end of their construction. It also assisted in visualizing a sense of scale and size of both the buildings and the surrounding environment.

Figure 3: *The StaffsVerse Student Village*

6. Conclusion

StaffsVerse represents a significant step forward in Metaverse technology and has succeeded in becoming the first university to be created within Fortnite. This accomplishment has resulted in an impressive media coverage from several outlets highlighting its innovative design and novel approach to traditional methods of university engagement and outreach.

Various techniques have also been discussed relating to UEFN memory limitations and the tools available to counteract them. Through utilizing these technical workflows, StaffsVerse has implemented the Stoke-on-Trent, Stafford and London campuses within one island level. Moreover, this has uncovered the potential for future virtual campuses to be created on a greater scale and with more detail, underscored by diligent optimization for a seamless user experience.

References

[BBC25] BBC NEWS: University recreated in world of fortnite, January 2025. Video. Accessed on August 14, 2025. URL: https://www.bbc.co.uk/news/videos/c07ke82x4xdo. 3

[Epi25] EPIC GAMES: Fortnite documentation. https://dev.epicgames.com/documentation/en-us/fortnite/fortnite-documentation, 2025. Accessed: 2025-06-08. 2, 3

[FEvdL*09] FELDBERG F., ELIËNS A., VAN DER LAND S., HUYSMAN M., KONIJN E.: Vu@ second life: a report on experiences with the development of a (virtual) community of learners. In *Virtual Social Networks: Mediated, Massive and Multiplayer Sites*. Springer, 2009, pp. 36–51. 1

[GD09] GOUGH R., DEARNLEY J.: Educational campuses in second life, 2007–2009: the development of a framework for campus builders. *Innovation in Teaching and Learning in Information and Computer Sciences 8*, 3 (2009), 19–39. 1

[HDTW21] HEADLEAND C. J., DAVIES B., THRELFALL D., WILLIAMS B.: The University on Lincoln Island: Reimagining a University Campus as a Role-Playing Video Game. In *Computer Graphics and Visual Computing (CGVC)* (2021), Xu K., Turner M., (Eds.), The Eurographics Association. 2

[HWH*24] HEADLEAND C. J., WARD D., HICKS K., BUTLER S., THRELFALL D., WILLIAMS B.: Staffsverse: Building a metaverse campus utilising the unreal editor for fortnite. In *European Conference on Games Based Learning* (2024), vol. 18, Academic Conferences International Limited, pp. 357–368. 2

[RERRGRGM22] ROCHA ESTRADA F. J., RUIZ-RAMÍREZ J. A., GEORGE-REYES C. E., GLASSERMAN-MORALES L. D.: Evaluation of a virtual campus adapted to web-based virtual reality spaces: Assessments of teachers and students. In *Frontiers in Education* (2022), vol. 7, Frontiers Media SA, p. 918125. 2

[THHM22] THRELFALL D., HEADLEAND C. J., HICKS K., MILLER K.: Developing transitional activities to support student transition to university: Findings from a qualitative co-design study with university stakeholders. In *Computer Graphics and Visual Computing (CGVC)* (2022), Vangorp P., Turner M. J., (Eds.), The Eurographics Association. 2

[UCA23] UCAS: The influence of cost of living on student decision making, April 2023. Accessed: 2025-06-25. URL: https://www.ucas.com/providers/services/news/influence-cost-living-student-decision-making. 3

[Uni25] UNIVERSITY OF STAFFORDSHIRE: Staffsverse. https://www.staffs.ac.uk/visit/staffsverse, Jan. 2025. Accessed: 2025-06-09. 2