

Thesis Paper Outline

- 1 Introduction
 - 1.1 Abstract
 - 1.2 Thesis Statement
- 2 Literature Review
- 3 Background/History
 - 3.1 Linear Film Production Pipeline
 - 3.2 Rise of Virtual Production/Non-Linear workflow
 - 3.2.1 Film and Television Success using Virtual Production
 - 3.2.2 Demand for Realtime in the year of Covid-19
- 4 Key Discussion
 - 4.1 Intent
 - 4.2 Learning
 - 4.3 Skill
- 5 Case Studies
 - 5.1 Introduction to Project Expected Outcome
 - 5.2 Assets Used
 - 5.3 Designing FX
 - 5.4 FX Simulation
 - 5.5 Optimization
 - 5.6 Cache/Exporting
 - 5.7 Importing to Unreal
 - 5.8 Shading/Lighting/Rendering
 - 5.9 Found advantages and disadvantages of pipelines
 - 5.10 FX Timeline with Problem/Chosen Solution
- 6 Conclusion
 - 6.1 Technical Challenges and Solutions
 - 6.2 Summation and Final Thoughts
- 7 Appendix
- 8 Bibliography

Bibliography

Epic Games. "Unreal Engine 4 Documentation." 2021. Accessed February 12, 2021.

<https://docs.unrealengine.com/en-US/index.html>.

Epic Games. "Unreal Online Learning." 2021. Accessed February 12, 2021.

<https://www.unrealengine.com/en-US/onlinelearning-courses>.

Epic Games. "In-Camera VFX." 2021. Accessed February 12, 2021.

<https://docs.unrealengine.com/en-US/WorkingWithMedia/InCameraVFX/index.html>

Epic Games. "Virtual Production Hub." 2021. Accessed February 12, 2021.

<https://www.unrealengine.com/en-US/virtual-production>

Farris, Jeff. "Forging new paths for filmmakers on 'The Mandalorian'." Epic Games, February

20, 2020. Accessed February 12, 2021. [https://www.unrealengine.com/en-](https://www.unrealengine.com/en-US/blog/forging-new-paths-for-filmmakers-on-the-mandalorian)

[US/blog/forging-new-paths-for-filmmakers-on-the-mandalorian](https://www.unrealengine.com/en-US/blog/forging-new-paths-for-filmmakers-on-the-mandalorian).

Glad, Andreas, host. "Visual Effects Bootcamp: Like a Mace to the Face: Leaving the

Battlefield to Go It Alone." GDC (Game Developers Conference). 2017. Accessed

February 12, 2021. [https://www.gdcvault.com/play/1024295/Visual-Effects-](https://www.gdcvault.com/play/1024295/Visual-Effects-Bootcamp-Like-a)

[Bootcamp-Like-a](https://www.gdcvault.com/play/1024295/Visual-Effects-Bootcamp-Like-a)

Glad, Andreas, host. "Volume to Mesh Workflow Realtime VFX Techniques Forged in the

Trenches of Battlefield 1." GDC (Game Developers Conference). 2017. Accessed

February 12, 2021. <https://vimeo.com/207921165>

Guerrette, Keith and Drew Skillman, speakers. "Visual Effects Bootcamp: The Rise of

Realtime." GDC (Game Developers Conference). 2017. Accessed February 12, 2021.

<https://www.gdcvault.com/play/1024630/Visual-Effects-Bootcamp-The-Rise>.

Harvey, Ian. "The Mill SDGM Real-Time FX R&D Burnout." February 2, 2020. Accessed

February 12, 2021. [https://www.ianharveyvfx.com/post-pme0g/the-mill-sdgm-real-](https://www.ianharveyvfx.com/post-pme0g/the-mill-sdgm-real-time-fx-r-d-burnout)

[time-fx-r-d-burnout](https://www.ianharveyvfx.com/post-pme0g/the-mill-sdgm-real-time-fx-r-d-burnout)

- Harvey, Ian. "The Mill SDGM Real-Time FX R&D Testing Volumes." January 22, 2020. Accessed February 12, 2021. <https://www.ianharveyvfx.com/post-pme0g/the-mill-sdgm-real-time-fx-r-d-testing-volumes>
- Harvey, Ian. "The Mill SDGM Real-Time FX Switching Gears to Niagara." March 9, 2020. Accessed February 12, 2021. <https://www.ianharveyvfx.com/post-pme0g/the-mill-sdgm-real-time-fx-switching-gears-to-niagara>
- Kadner, Noah, *The Virtual Production Field Guide*, Epic Games, 2019. <https://cdn2.unrealengine.com/Unreal+Engine%2Fvpfieldguide%2FVP-Field-Guide-V1.2.02-5d28ccec9909ff626e42c619bcbe8ed2bf83138d.pdf>
- Kovalovs, Artem. *Volumetric Effects of The Last of Us: Part Two*. In *ACM SIGGRAPH 2020 Talks (SIGGRAPH '20)*. Association for Computing Machinery, New York, NY, USA. Article 62, 1–2. doi:<https://doi.org/10.1145/3388767.3407393>
- Lozar, Klemen. "Frame Blending with Motion Vectors." March 16, 2015. Accessed February 12, 2021. <http://www.klemenlozar.com/frame-blending-with-motion-vectors/>.
- Lyndon, Mike. "Houdini to UE4's Niagara." SideFX, April 29, 2020. Accessed February 12, 2021. <https://www.sidefx.com/tutorials/houdini-to-ue4s-niagara/>
- Lyndon, Mike. "The Lazy Artist's Guide to Real-time VFX. | Mike Lyndon (SideFX) | Siggraph 2018." August 22, 2018. Accessed February 12, 2021. <https://vimeo.com/286182503>.
- Mayeda, Ryan. "HBO's Westworld turns to Unreal Engine for in-camera visual effects." Epic Games, July 30, 2020. Accessed February 12, 2021. <https://www.unrealengine.com/en-US/spotlights/hbo-s-westworld-turns-to-unreal-engine-for-in-camera-visual-effects>.
- Nadro, Jason, Matt Battaglia, and Aren Voorhees. *Mortal Kombat 11: high fidelity cached simulations in real-time*. In *ACM SIGGRAPH 2019 Talks (SIGGRAPH '19)*. Association for Computing Machinery, New York, NY, USA. doi:<https://doi.org/10.1145/3306307.3328187>.

Nadro, Jason, Matt Battaglia, and Aren Voorhees. "Mortal Kombat 11: High Fidelity Cached Simulations in Real-Time. In ACM SIGGRAPH 2019 Talks (SIGGRAPH '19)." 2019. Accessed February 12, 2021. <https://dl.acm.org/doi/10.1145/3306307.3328187>

Okun A., Jeffrey ed., Susan Zwerman ed., Christopher McKittrick ed., and Lisa Sepp-Wilson ed. *The VES Handbook of Visual Effects Industry Standard VFX Practices and Procedures*. New York: Routledge, 2021.

Seymour, Mike. "Art of LED Wall Virtual Production, Part One: 'Lessons from the Mandalorian.'" FX Guide, March 4, 2020. Accessed February 12, 2021. <https://www.fxguide.com/xfeatured/art-of-led-wall-virtual-production-part-one-lessons-from-the-mandalorian/?highlight=Mandalorian>.

Seymour, Mike, host. "Using real-time VFX for live TV with The Future Group." Visual Disruptors (Podcast), Epic Games, April 2019. Accessed February 12, 2021. <https://open.spotify.com/episode/2LAIKwLmBkKjBIP8yJ5LTJ>.

Seymour, Mike, host. "What is virtual production?." Visual Disruptors (Podcast), Epic Games, Oct 2018. Accessed February 12, 2021. <https://open.spotify.com/episode/6lQDU1Bz1PMss2gVEUBUm2>.

Seymour, Mike. "Virtual Production for DOPs." FX Guide, December 17, 2020. Accessed February 12, 2021. <https://www.fxguide.com/xfeatured/virtual-production-for-dops/>.

Seymour, Mike. "Virtual Production Guide: Kaya Jabar, Third Floor." FX Guide, July 25, 2019. Accessed February 12, 2021. <https://www.fxguide.com/quicktakes/virtual-production-guide-kaya-jabar-third-floor/>.