



Publishing Reality

Developing a Publishing Model For Augmented Reality, Virtual Reality, and Their Related Pedagogical Materials

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*author order alphabetical

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Today's Speakers



Hannah Gunderman



Matt Lincoln



Rikk Mulligan



Dave Scherer



Emma Slayton



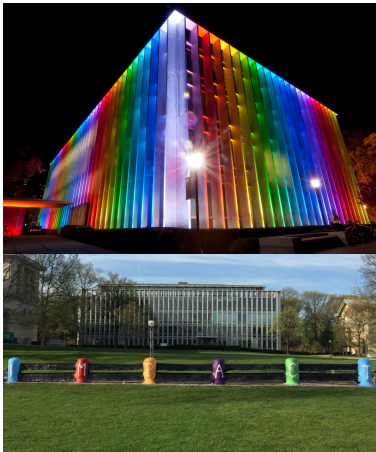
Scott B. Weingart

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Agenda

1. About the CMU Library Publishing Service
2. Augmented Reality & Virtual Reality
3. Shakespeare-VR
4. the KiltHub Repository
5. Depositing Shakespeare-VR in KiltHub
6. Emerging Needs

About the CMU Library Publishing Service



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Augmented Reality & Virtual Reality

- Definitions
 - **AR** (Augmented Reality): An interactive experience in a real-world environment augmented with computer-generated overlaid information (Audio + Visual)
 - **VR** (Virtual Reality): A Simulated experience used to mimic real world environment accessed through headsets or multi-projected environment.
- Issues with AR/VR Preservation for Education
 - Preservation vs. Use
 - Systems may or may not allow for access inside a interface
 - Updates required to VR material to maintain usability

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Emma
Notes:

<https://www.insidehighered.com/digital-learning/article/2018/07/25/drexel-university-introduces-repository-virtual-reality-assets>

<https://virtuallyinspired.org/portfolio/online-avr-repository/>



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Shx-VR.com

Shakespeare-VR

Shakespeare-VR.library.cmu.edu uses virtual reality technologies to bring students face-to-face with professional actors performing Shakespearean soliloquies in a replica of Shakespeare's Blackfriars Playhouse.

Viscerally teaches students how the audience is part of any Shakespeare play.

Team

Stephen Wittek, Stitchbridge, American Shakespeare Company, CMU Libraries Lab, CMU LPS, and many others.



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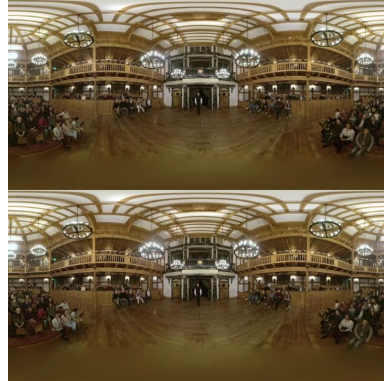
Curating 360° VR Data

Raw footage



- Raw footage before any editing or stitching
- 17 different camera views per scene
- Can be re-used and re-mixed by experts
- Preserves the full data from the recording sessions
- Requires complex directory structure (difficult with our IR provider)

Stitched and edited film



- Final high-quality edits of the scene
- Can be played and understood by humans on desktop, phone, or VR headset
- Preserves the final intended experience

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The data curation challenge for this project was in managing the various kinds of files produced during the recording sessions. These were 360-degree video recordings, so for each take the team actually had 17 separate video files and metadata files from each of the 17 cameras on their capture rig. And yes, the video on some cameras truly does come out sideways in the raw, unedited form! The final videos that you see when you go to the Shakespeare VR site are the end of a long workflow that includes both stitching together the 17 video cams, and then doing standard video editing tasks like cutting, adding effects, and mixing audio. All together, this resulted in about half a terabyte of data.

We wanted to preserve both forms of video. The raw footage preserved the full AV data from the recording sessions, but which is only usable by experts, relied on a complex directory structure that connected the video data with file- and scene-level metadata about camera placement, focal distance, and more.

On the other hand, the final 6K-quality edits of each scene preserved the final intended experience and are easily played by anyone on their own computer or VR headset. Each could get its own deposit within our institutional repository. I also worked with the team to identify other files that needed to be preserved, from raw

audio to 2D assets to candid photos taken by Dr. Wittek during the filming days.

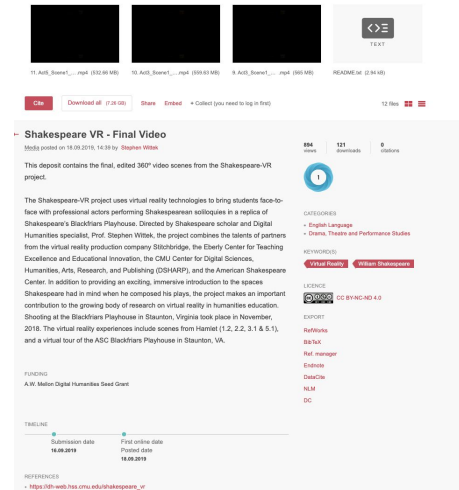
If you don't have access to a VR headset, visiting the shakespeare VR website linked in at the end presentation, where there is computer-friendly interface presented via YouTube that lets you pan around the 360 video as it plays.

And now I'll pass off to Hannah to talk about the repository itself.

The KiltHub Repository

The KiltHub Repository uses Figshare.

- Figshare is an online open access repository to share research outputs including datasets, images, figures, videos, and audio files. [<https://figshare.com/>]
- Each deposit has its own metadata record, citation, copyright notice, and DOI
- Multiple files can be included within the same deposit
- Data Deposits accompanied by a README.txt file (required for KiltHub Data Deposits)
- Views, downloads, citations, and altmetric data being tracked

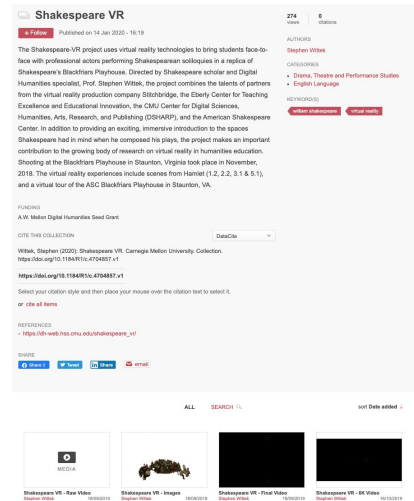


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Shakespeare-VR Collection

Shakespeare-VR Collection on the KiltHub Repository

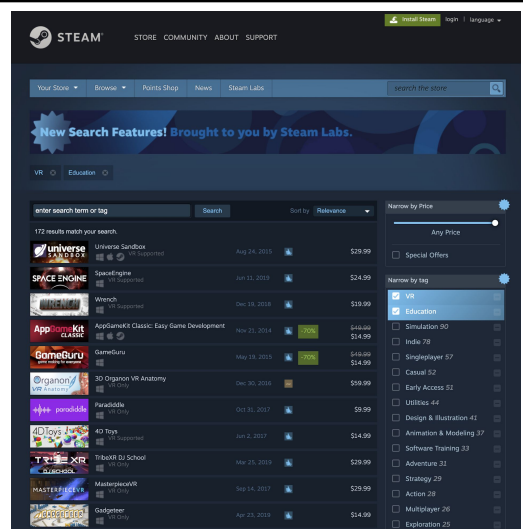
- Arrangement tool within Figshare
- Same benefits of individually published content
 - Citations, Discoverability, DOI
- Items are grouped together within the Collection under one description, citation, DOI
- Collection lists views, citations, and Altmetric data associated at Collection-level



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Emerging Needs

- KiltHub (IRs) are good for access to static content
- KiltHub is not appropriate for streaming content or to interact with VR
- Use Case: CMU ETC student VR projects
- **Valve** created **Steam** in 2003 to digitally distribute games and apps. Steamworks is the set of tools and services to distribute games on Steam.
- LPS as game publisher can provide the administration and institutional continuity.



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Rikk Mulligan

Institutional Repositories

KiltHub and other institutional repositories arose from an organizational commitment to the stewardship of research and scholarship including curation, access, and long-term preservation. Many journals now require the deposit of a dataset and assignment of a persistent identifier to allow open access as part of the publication. Journals do not provide such a service or hosting.

Shakespeare-VR

1. Our KiltHub repository provides DOIs to materials in the Shakespeare-VR collection for citation and access, the platform does not stream content or support direct interaction with VR experiences or games. These

1. requirements, as well as the size of the project's raw video files, required the creation of a dedicated website. This is not scalable as a Library Publishing service for most, particularly the cost to maintain and secure such sites.

Other challenges

2. Once published or deposited, the cost of scholarly publications, whether printed journals and books or digital objects such as datasets and media files, is primarily the cost to maintain the infrastructure--the database, content management system, and discovery layer.
3. However, AR applications and VR software require ongoing updates, from small software patches up to entirely new versions, as security exploits are discovered or the hardware changes. VR remains an immature technology with frequent changes in the hardware of users and the software used to create games and experiences. In addition, to provide access to a greater audience, rather than replacing the latest version, multiple versions are needed for the variety of possible combinations of hardware and operating systems.

Our Use Case

4. Tom Corbett, one of our faculty in the Entertainment Technology Center at CMU, presented us with both a need and an approach to publishing VR content.
5. Student needs:
ETC Students pursue a two-year graduate degree in interactive entertainment. AS their final project students work in teams to create interactive storytelling or immersive games often using VR. The result is typically a prototype which ends up languishing on a server afterward. Yet many of

these projects provide unique opportunities for students to analyze actual products and gain industry-relevant experience through working to improve them.

Enter Steam

1. The game developer Valve, publisher of the game Half-life, created the online Steam platform in 2003 to digitally distribute games and applications.
2. Steamworks is their set of tools and services that help game developers and publishers distribute games on Steam.
3. Steam only supports games and VR experiences, but one of their growing categories is Education.

The CMU LPS can be a game publisher.

4. The Steamworks Developer Program would allow us to manage the administration, bank and tax information, and institutional continuity to be responsible for student-created products after students have left CMU.
5. LPS would pay the \$100 fee to submit a game or experience for review by SDP. This includes an analysis to identify malware, exploits, security issues, and the types of information the software collects from the computers of users.
6. LPS would maintain the content of the webpages on Steam and respond to requests to patch or update objects. We would then work with the ETC to either update these VR experiences or formally sunset them and remove them from the Steam store.
7. The store pages would also allow LPS to distribute modification packages, MODS, to these products, host technical documents, and information, and provide a forum

1. for users and creators to interact.

If our pilot with the ETC proves a success, there are other groups on campus who could work through the LPS to similarly publish their games and VR experiences.

For Questions or Comments:

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Pictures of the The Fence, in the middle of the Cut, on the CMU Pittsburgh campus. The top image includes the Hunt Library in the upper left corner. Photo Credit: Emma Slayton CC-BY-NC (2020).

Access to the Slides and Recording: <https://doi.org/10.1184/R1/12668783.v1>

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Links

CMU Library Publishing Service: <https://lps.library.cmu.edu/>

CMU Entertainment Technology Center: <https://www.etc.cmu.edu/learn/about-the-etc/>

KiltHub: <https://kilthub.cmu.edu/>

Shakespeare-VR: <https://shakespeare-vr.library.cmu.edu/>

Shakespeare VR KiltHub Collection: <https://doi.org/10.1184/R1/c.4704857.v1>

Steamworks: <https://partner.steamgames.com/>

Valve Software: <https://www.valvesoftware.com/>



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