

GROOVY ASSIGNMENT: Immersive Dome Projection Media

Nick Jushchyshyn

Digital Media Department, Drexel University, Philadelphia, PA, USA
nickj@drexel.edu

Barbara Mones

Computer Science Department, University of Washington, Seattle, WA, USA
mones@cs.washington.edu



ABSTRACT

In this Groovy Assignment submission, we present an Immersive Dome Projection Assignment that challenges students to create immersive media content designed and formatted for full dome projection experiences. For this assignment, students create immersive media content through video acquisition, computer imagery renderings and or use of an interactive game engine. The finished media must be in polar, fulldome projection format. The assignment is designed to inspire and motivate creative thinking by challenging students to work within the limitations of dome projection formats, including perspective distortion, projection mapping, and light spill to name a few. While the opportunity to display students work in a full scale projection dome can increase student interest and motivation due to the nontraditional nature of the format, the assignment can be easily scaled and utilized without access to a dome projection facility through the use of virtual dome software, or simulations in rendering software or game engines. Assignment complexity is also scalable, as some approaches to completion involved very little in the way of specialized technical skills (i.e. conversion of immersive photos or video into dome projection format), while more complicated, group project scenarios are also possible by increasing scope and or complexity of content requirements (i.e. computer generated animation, procedural effects, etc.)

CCS CONCEPTS

• Applied computing; • Arts and humanities; • Media arts; • Education; • Computing methodologies; • Computer graphics;

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

SIGGRAPH '20 Educator's Forum, August 17, 2020, Virtual Event, USA

© 2020 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-7966-3/20/08.

<https://doi.org/10.1145/3388530.3407242>

KEYWORDS

Immersive Media, education, Augmented Reality (AR), curricular development

ACM Reference Format:

Nick Jushchyshyn and Barbara Mones. 2020. GROOVY ASSIGNMENT: Immersive Dome Projection Media. In *Special Interest Group on Computer Graphics and Interactive Techniques Conference Educator's Forum (SIGGRAPH '20 Educator's Forum)*, August 17, 2020, Virtual Event, USA. ACM, New York, NY, USA, 2 pages. <https://doi.org/10.1145/3388530.3407242>

1 OVERVIEW

In this Groovy Assignment submission, we present an Immersive Dome Projection Assignment that challenges students to create immersive media content designed and formatted for full dome projection experiences. For this assignment, students create immersive media content through video acquisition, computer imagery renderings and or use of an interactive game engine. The finished media must be in polar, fulldome projection format.

2 METADATA

Metadata details of this assignment are presented in Table 1

3 MATERIALS

The most important materials involve a means for creating immersive imagery. This can be an immersive photo or video camera, (there are many options commercially available at a variety of budget levels), or simply a standard render engine that accompanies many computer graphics authoring tools including Maya, Houdini and Blender.

For media originally created in latlong format, a tool for converting to full dome projection format is needed. This conversion can be done through use of the Dome Camera in Blender, or standard features of Adobe After Effects (Polar Coordinates Effect) or the Spherical Transform Node in Nuke from The Foundry.

Additionally, there are dedicated dome projection tools available that allow for dome projections to be viewed easily on traditional

Table 1: Metadata in tabular format.

Summary	Students create immersive media content designed and formatted for fulldome projection.
Learning Outcomes	Students learn and practice creative problem solving, discover non-traditional projection format.
Classification	Digital video, projection, animation, modelling, graphics.
Audience	Undergraduate students at all levels.
Dependencies	Varied based on selected project.
Prerequisites	None. Non-sequential assignment.
Strengths	Scale-able in scope and complexity. Can be assigned individually or to student groups. Students learn a non-traditional projection/presentation format. Opportunity for public exhibition in local dome facilities.
Weaknesses	Requires dome projection mapping tools
Variants	Unlimited design options
Assessment	Rubric can be designed around quality and effectiveness metrics and/or public exhibition of completed pieces.

rectangular displays. One such program, Amateras (<https://www.orihacon.co.jp/amateras/domeplayer/en/>), is available in a free, logo/watermark version that provides functionality to visualize a dome projection on a standard computer monitor.

4 METHODOLOGY

The execution of this assignment can be divided into three stages

4.1 Introduction

During the introduction stage, students are shown examples of dome projection media to conceptualize the opportunities and challenges of the medium. In VR, immersive video, for example, light does not naturally “bounce” within the viewing space where such light contamination does occur within a dome projection space. Similarly, a VR immersive video is precisely centered around the viewer, however a dome project maybe offset based on dome installation height and seating limitations.

4.2 Execution

During execution, students are guided through the production of their media projects. Students may be assigned this production as individuals, or in larger groups depending on the duration and scope of the media production expected by the instructor.

Photo or video based media can be produced easily in similar fashion as a traditional video using commercially available immersive cameras, or captured using photo or video cameras equipped with fisheye lenses, or prepared through stitching. Alternatively, media can be rendered with most readily available rendering engines and 3D animation software, including the free software Blender.

4.3 Exhibition

Upon completion, media can be reviewed in class using dome projection conversion software such as Amateras, or projected in available planetarium domes equipped with digital projection.

5 CONCLUSION

Incorporating a VR Dome into the curriculum as a Groovy Assignment presents the opportunity for students to envision their



Figure 1: Image from student created dome projection experience in its final projected form

creative ideas in a completely new and exciting context - both immersive and in a physical scale that isn't possible without it. The VR Dome expands the educator's toolbox and allows educators to pursue directions for immersive projects that have yet to be completely explored. This enables both students and educators to pursue unique opportunities for collaboration and content development and applications. The possibilities are limitless and can easily fit into any curriculum. The VR Dome offers educators a way to present their work to the public and also educate others within the Dome experience. Dome experiences can be developed in wildly diverse content areas including art, science, music, engineering and many others.