

GCIEL Viking Longship Virtual Reality Project: Design Document

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1. Project Overview

The Viking Longship Virtual Reality Project is a project funded by the National Endowment for the Humanities through the Digital Humanities Advancement Grant program. Grinnell College and Carleton College have partnered up to create a virtual reality experience that will not only allow for learning through experiencing the environment of a person in the Viking age but also through the creation of a Viking longship. The goal of the project is not only rooted in creating a learning environment but also in creating the virtual reality experience within itself as a long-term Digital Humanities research project.

The purpose of having a design document is to serve as a blueprint for the project, as it holds all necessary baseline information that all developers must be aware of [3]. It documents design decisions, which allows all involved in the project to see any changes that have been made to the VR experience and how it connects to the rest of the project. The design document also provides guidance for development as all decisions can be further built upon, as the foundation has already been laid. Among the developers and stakeholders, the document promotes clear communication, common understanding, and collaboration as all trains of thought are documented and detailed so they can be built upon without unnecessary instances of miscommunication. As an additional note, the technology used for this Design Document includes Google Docs and diagrams.net web applications, allowing for an immense degree of collaboration.

Requirements also considered for the project include various design decisions to meet user experience guidelines with some design ideas adopted from VR games [1], [2]. Considering the experience controls, the project sought to choose the most optimal method of using controllers to navigate the VR experience. Furthermore, to increase the capabilities of the experience, design questions centered around implementing various functionalities and features. Namely, the project implemented requirements that determined which objects can be efficiently located in a VR environment and decided how the right area for the object is identified when transporting an object to the Viking Longship. For accessibility purposes, the project additionally implemented a requirement for determining the correct way to introduce the controller features to the user.

2. Stakeholder Map

Below is a stakeholder map for our design document. (Figure 1)



Figure 1. The stakeholder map for our project

3. Functionality

Our project is mainly on presenting the VR experience of a blueprint with the development team. The figures (Figure 1-7) below show details of either the design of a specific scene or the functionality of the VR experience. If it is for a scene, it shows the general flow of it. If for functionality, it shows how the user's action reflects on the actions and movements inside the VR experience. How UML diagrams should be made is learned from Sundaramoorthy [4].

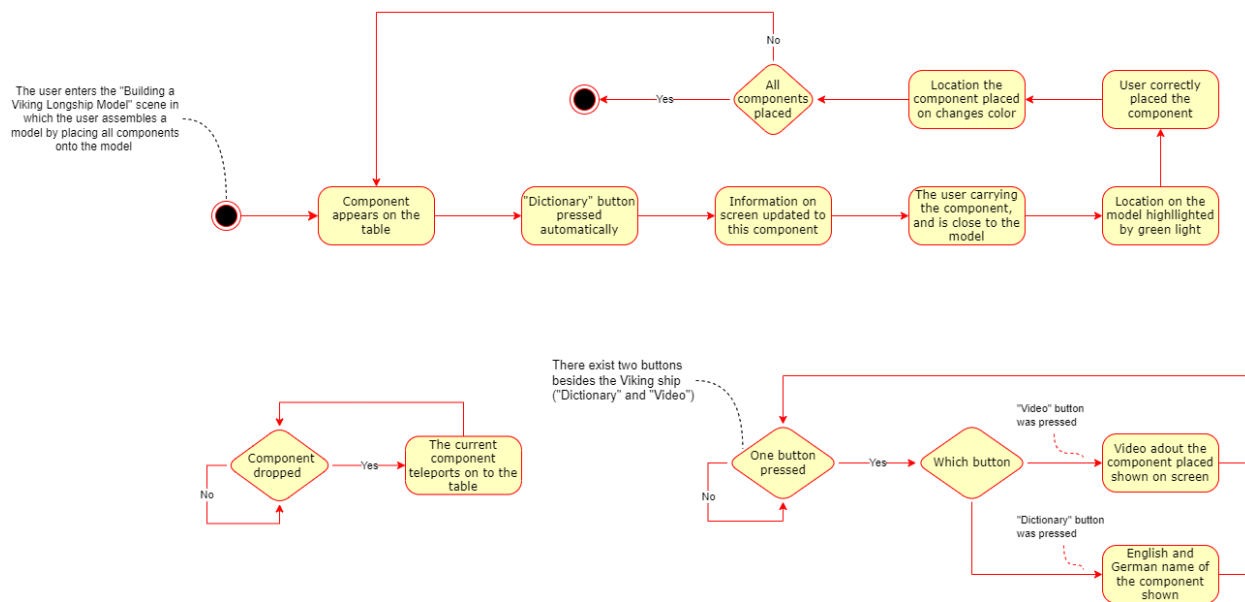


Figure 2. Build the Viking Longship (Model) Scene

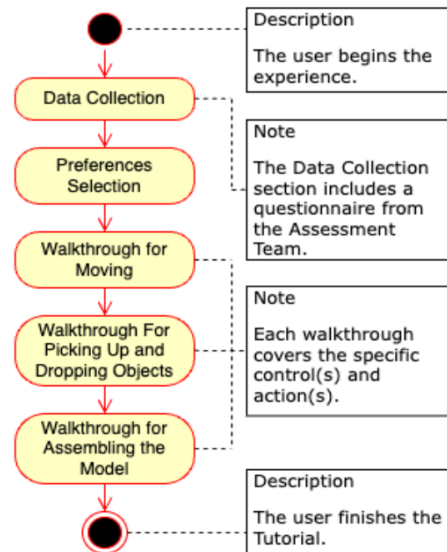


Figure 3. The General Flow of the Tutorial Scene

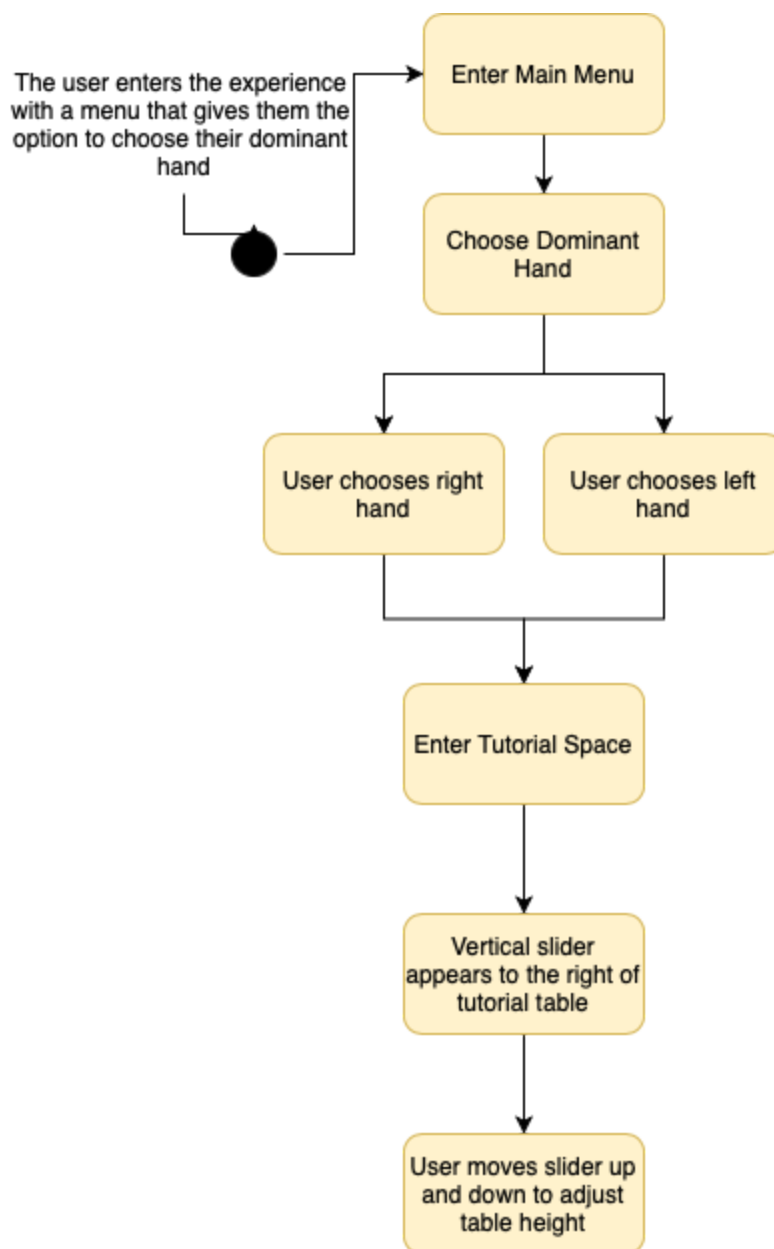


Figure 4. Accessibility - Choosing the Dominant and Non-Dominant Hand Controllers and Adjusting Table Heights

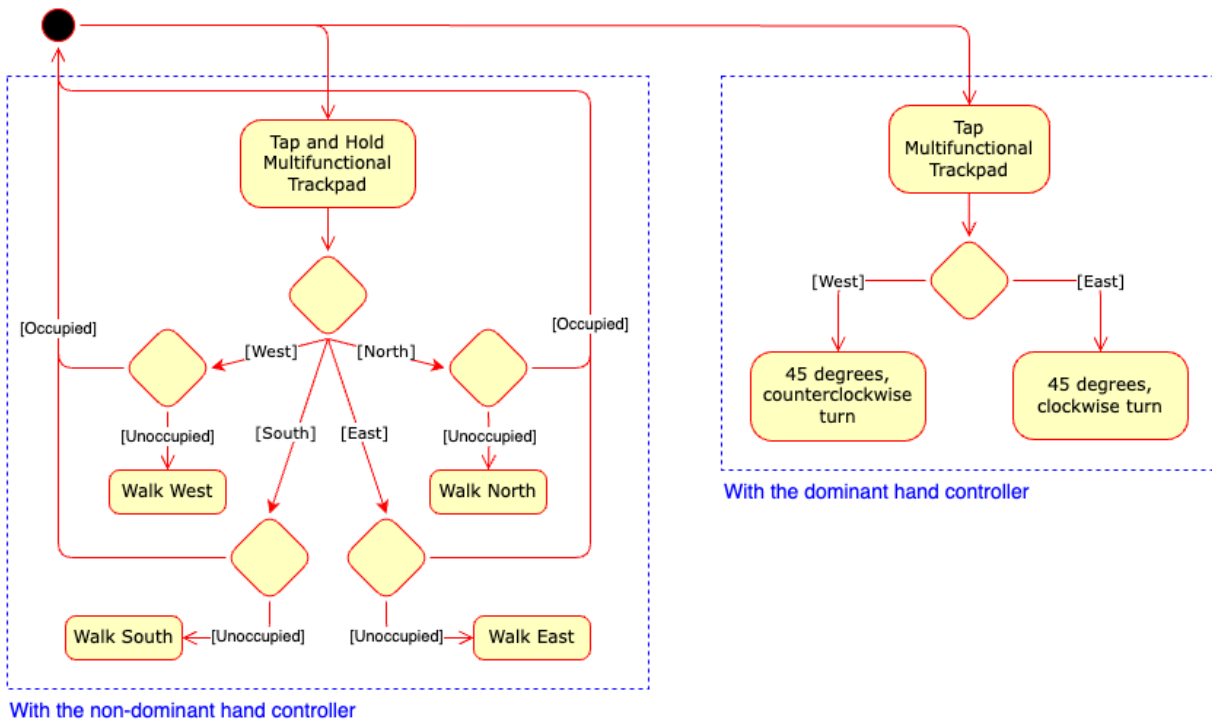


Figure 5. Moving — Walking and Turning

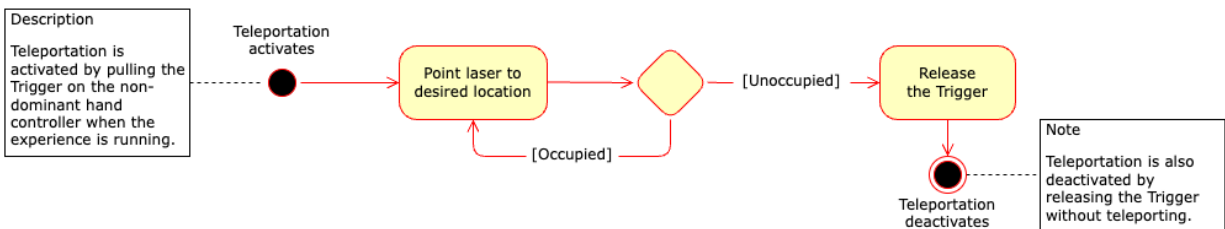


Figure 6. Moving — Teleporting

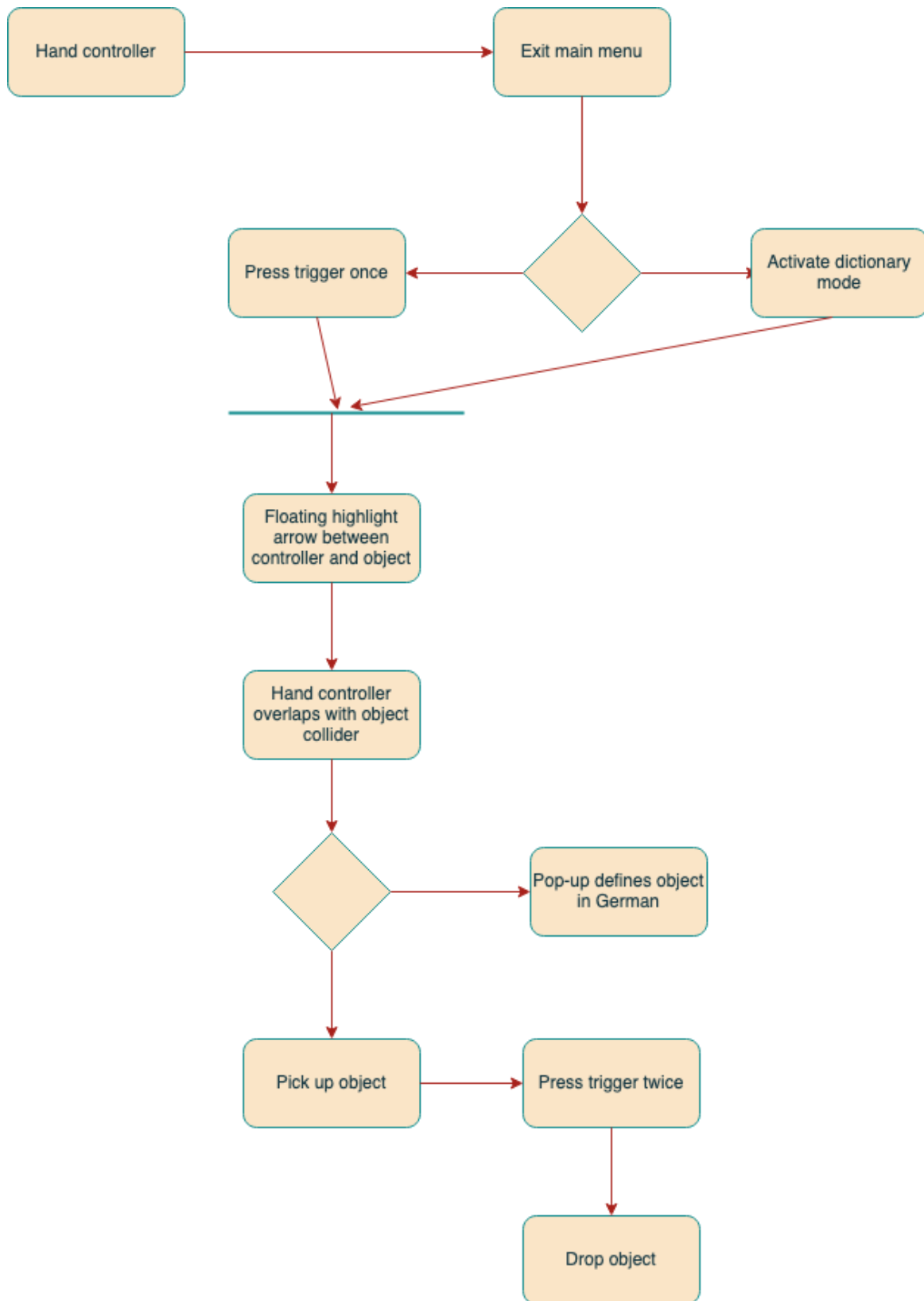


Figure 7. Picking Up and Dropping Objects

4. Wish List

We would like to consider the following design decisions in future design and development iterations:

- 1) additional accessibility features/controls including font styles and colors, subtitles and captions, audio cues, voice commands, colorblind-friendly color palettes, and high-contrast settings;
- 2) additional pop-up features (e.g., on the hand controllers and the screen) displaying information (e.g., on the ship component that the user picks up);
- 3) additional hand controller commands for easier transportation of objects from the objects table to the model table;
- 4) collaborating more closely with the Experience Development team and the Experience Assessment team; and
- 5) brainstorming for the Building the Viking Longship (Full-Scale) Scene and the Mead Hall Scene.

5. References

- [1] Smithsonian American Art Museum, "Beyond The Walls," [Virtual Reality Experience], Steam, 2019.
- [2] Valve, "The Lab," [Virtual Reality Experience], Steam, 2016.
- [3] E. Nersesian, "VR Design Doc," artncoding.com, 2023. [Online]. Available: <https://artncoding.com/vresapp-vr-design-doc>. [Accessed: 11-12-2023].
- [4] S. Sundaramoorthy, "UML Diagramming: A Case Study Approach," [New York: Auerbach Publications], 2022.

6. Appendix: Memo of Understanding

MEMORANDUM OF UNDERSTANDING & CONFIDENTIALITY AGREEMENT **DESIGN DOCUMENT FOR VR EXPERIENCE**

This Agreement is entered into between (1) The Grinnell College Immersive Experiences Lab, hereinafter known as the "GCIEL," (2) Megan Bernacchi, Brian Sung, Zitan Wang, and Pyait Myat from CSC-324-01 Software Design & Dev w/Lab, hereinafter known as the "Students," in the purpose of providing *design document for the VR experience* to GCIEL.

PART I: MEMORANDUM OF UNDERSTANDING

Recitals:

1. This project requires collaboration between GCIEL and students. The GCIEL provides support and feedback to students; the students provide services in designing the document.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, the Parties hereto agree as follows:

Responsibilities:

The Parties' responsibilities with regard to Design Document for VR Experience and assigned Students are as set forth below:

A. THE COMMUNITY PARTNER:

The Community Partner Organization AGREES TO:

- a. Utilize the services of student(s) of the Institution who are eligible to engage with the community, who are qualified for curricular community-engagement opportunities, and who are acceptable both to the Community Partner and Institution;
- b. Any changes must be reported to the Faculty Supervisor and must be agreed upon by the Institution before they become effective;
- c. Comply with all appropriate federal, state and local laws;
- d. Determine requirement of Student background check(s) before commencing service and await clearance administered by either the Institution or the Community Partner.
- e. The Community Partner agrees that no Student will be denied opportunity to engage with Partner or be subjected to different treatment on the grounds of race, color, creed, religion, national origin, sex, sexual orientation, age, marital status, disability, or status as a disabled veteran or Vietnam era veteran. It further agrees that it will comply with the provisions of the Civil Rights Act of 1964 (Pub. L. 88-352; 78 Stat. 252) and Title IX of the Educational Amendments of 1972 (Pub. L. 92-318) and the regulations of the US Department of Education which implement these acts;
- f. Regulate the amount of service contributed in accordance with the hours delegated to the Student by the Faculty Supervisor and Institution; Notify the Faculty Supervisor of any change affecting the student's role;

- g. Permit representatives of the Institution to perform on-site visits when needed;
- h. Comply with the Grinnell College Policy, Procedures, and Guide to Preventing, Reporting, and Responding to Sexual Misconduct and Other Forms of Interpersonal Violence. This policy applies to all forms of sexual and gender-based harassment, sexual assault, sexual exploitation, intimate partner violence (including dating violence and domestic violence), stalking, and retaliation;
- i. Comply with Family Educational Rights & Access ([FERPA](#)); the Community Partner must have written permission from the parent or eligible Student in order to release any information from the Student's educational record;
- j. Provide Student(s) with an explanation of responsibilities, performance requirements in terms of quality, quantity, methods, and priorities of their service.
- k. Complete institution's survey designed to assess the student's service and their impact on the community partner's work;
- l. Any and all intellectual property, materials and other service product (including any patents, copyrights, or other intellectual property rights therein) created by Grinnell College Students under this Memorandum will be owned by the Students. The Community Partner must have written consent from the Student(s) before sharing or promoting such property;
- m. Any intellectual property, materials or other work product jointly created by Students and one or more employees of Community Partner Organization (such that they would be joint inventors or joint copyright holders under relevant intellectual property law) will be jointly owned by the Students and Community Partner, with each party able to use the jointly-created work without accounting to the other and without the consent of the other.

B. THE INSTITUTION

(Grinnell College) AGREES TO:

- a. Determine student eligibility for community-engaged coursework;
- b. Determine requirement of Student background check(s) before commencing service and await clearance administered by either the Institution or the Community Partner; cover fees of background check;
- c. Only refer students for placement who are eligible (i.e. International student who completed CPT);
- d. Comply with Family Educational Rights & Access ([FERPA](#)); the Institution must have written permission from the parent of / or eligible Student in order to release any information from the Student's educational record;
- e. Any and all intellectual property, materials and other work product (including any patents, copyrights, or other intellectual property rights therein) created by Grinnell College Students under this Memorandum (collectively, "Student Service") will be owned by the Students; The Institution must have written consent from the Student(s) before sharing or promoting such property;
- f. Any pre-existing materials provided by the Community Partner for use in a project will remain the property of the Partner, though both the Institution and its Students are hereby granted a license to use such materials for the project.

C. THE STUDENTS

(Grinnell College Students) AGREE TO:

- a. Follow instructions for background check(s) before commencing service and await clearance administered by either the Institution or the Community Partner.
- b. Respect commitments made with Community Partner and make significant effort to meet appointments, deadlines, and related expectations of project-based service; acknowledge community engaged service is mutually beneficial and reciprocal.
- c. Communicate any needs, obstacles, and/or challenges during partnership to address or determine adjustments necessary regarding service;
- d. Not exceed the requirements outlined with the Community Partner & Faculty supervisor without consultation with related faculty and/or staff connected to their project-based work;
- e. Participate in (guided) reflection of the community-engaged experience throughout and at end the course/project; evaluate what one has learned and identify further civic and professional development goals;
- f. If Students encounter bias, harassment, or other forms of implicit or explicit mistreatment during their experience, they will file a report and seek legal assistance from the Institution ([Bias Incident Report](#) and [Title IX Information](#));
- g. Students will not share confidential data or personal information (See Part II: Confidentiality Agreement) related to their community-engaged service outside of individuals directly related to the project/course;
- h. Students will not use unauthorized third party intellectual property for their service projects; this includes property that is not open-sourced or does not hold creative commons license;
- i. Students grant to the Community Partner a worldwide, non-exclusive, perpetual, royalty-free right and license to copy, modify, publish, distribute and otherwise use any and all Student work submitted under this Memorandum for purposes consistent with the Community Partner Organization's status as a [government ministry, non-governmental or non-profit organization];
- j. Each Student grants to the Institution a perpetual, non-exclusive, worldwide, royalty-free license to publicly perform, publicly display, modify, create derivatives of and otherwise use for academic, educational, administrative or research purposes any and all Student service;
- k. Any pre-existing materials provided by the Community Partner for use in a project will remain the property of the Partner, though both the Institution and its Students are hereby granted a license to use such materials for the project;
- l. Any intellectual property, materials or other service product jointly created by Students and one or more employees of Community Partner Organization (such that they would be joint inventors or joint copyright holders under relevant intellectual property law) will be jointly owned by the Students and Community Partner, with each party able to use the jointly-created service without accounting to the other and without the consent of the other.

D. THE FACULTY SUPERVISOR

AGREES TO:

- a. Determine requirements for background check(s) before commencing service and await clearance administered by either the Institution or the Community Partner;

- b. Respect commitments made with Community Partner; approach community engaged learning relationships as mutually beneficial and reciprocal;
- c. Maintain and communicate general learning objectives relevant to any Student placements;
- d. Report any mid-term or academic year changes to the agreement or course to the Community Partner;
- e. Offer Students the opportunity to assess and reflect upon their community-engaged learning;
- f. Provide Community Partner with surveys designed to assess the student's service, assess the student's impact on the community partner's mission, and offer the Community Partner an opportunity to continue or discontinue participation with a community-engaged class.
- g. Comply with Family Educational Rights & Access (FERPA); the Faculty Supervisor must have written permission from the parent or eligible Student in order to release any information from the Student's educational record;
- h. Any and all intellectual property, materials and other work product (including any patents, copyrights, or other intellectual property rights therein) created by Grinnell College Students under this Memorandum (collectively, "Student Service") will be owned by the Students; The Faculty Supervisor must have written consent from the Student(s) before sharing or promoting such property;

Scope of Work

Scope of work includes a complete design document for the Viking Longship VR Project which includes the Executive Summary, Experience Learning Objectives, Experience Narrative, Experience Structure, Experience Controls, Experience Interactivity, Target Platform Minimum Requirements, User Interface, Experience Layout and Design, Experience Storyboard, Object Art, Audio, Video, MVP (Minimum Viable Product), Wishlist, Works Cited, and UMLs sections.

Tentative dates for weekly sprints

Date	Time
10/27	1 hour
11/3	1 hour
11/10	1 hour
11/17	1 hour
11/22	1 hour
11/29	1 hour

Costs & funding

No financial support is required of either party.

Warranty

Nothing in this Memorandum shall be construed as consent by either party to enter into a contract, subcontract or other business relationship. Activities (if any) in which the parties wish to engage pursuant to this Memorandum will not be binding unless agreed to in a separate written document

executed by an authorized representative of each party. Neither the Institution, nor the Students make any warranty, express or implied, concerning the work to be performed under this Memorandum. Grinnell College specifically disclaims any and all implied warranties, including without limitation the warranties of fitness for a particular purpose and merchantability. Neither party will be liable for any incidental, consequential or special damages under this Memorandum.

Release of Liability of Institution

The Community Partner waives, releases, holds harmless and forever discharges the Institution and its employees, agents, officers, trustees and representatives (in their official and individual capacities) from any and all liability whatsoever for any and all damages, losses, injuries, and expenses (including attorney fees) arising in whole or in part out of a student's actions or inactions.

Termination

THIS AGREEMENT MAY BE TERMINATED AT ANY TIME BY THE INSTITUTION OR BY MUTUAL CONSENT; IF NOT TERMINATED, THIS AGREEMENT WILL REMAIN IN EFFECT UNTIL SUPERSEDED BY ANOTHER AGREEMENT, OR UNTIL CHANGES IN LEGISLATION OR REGULATIONS RENDER THIS AGREEMENT INVALID. THE COLLEGE MAY, AT ANY TIME AND IN ITS SOLE DISCRETION, DISCONTINUE THE PROGRAM AND WITHDRAW ITS SUPPORT FROM THE AGENCY FOR ANY REASON AND SHALL NOT BE LIABLE FOR ANY LOSS (INCLUDING FINANCIAL LOSS) TO THE AGENCY BY REASON OF SUCH DISCONTINUATION OR WITHDRAWAL.

This MOU shall remain in effect until December 2, 2023.

Student not Agent of College

Under no circumstances shall a Fellow be treated as an agent or employee of the College.

Miscellaneous

The rights and obligations of the Parties to this MOU may not be assigned or subcontracted unless such assignment or subcontract is in writing and consented to by the Parties hereto. This MOU shall be binding upon and shall inure to the benefit of the Parties hereto and their respective legal representatives, heirs, successors and permitted assigns. Nothing in this MOU, express or implied, is intended to confer upon any party (including, without limitation, Fellows), other than the Parties hereto (and their respective heirs, legal representatives, successors and permitted assigns), any rights, remedies, obligations or liabilities under or by reason of this MOU. This MOU constitutes the entire agreement between the Parties hereto pertaining to the subject matter hereof and supersedes all negotiations, preliminary agreements and all prior and contemporaneous discussions and understandings of the Parties in connection with the subject matter hereof. No amendment, change or modification of any of the terms, provisions or conditions of this MOU shall be effective unless made in writing and signed or initialed by all Parties. Waiver of any provision of this MOU shall not be deemed a waiver of future compliance therewith and such provision shall remain in full force and effect. In the event any provision of this MOU is held invalid, illegal or unenforceable, in whole or in part, the remaining provisions of this MOU shall not be affected thereby and shall continue to be valid and

enforceable. This MOU shall be governed by and construed in accordance with the laws of the State of Iowa, United States of America, without regard to conflicts of laws principles.

In addition to any other remedies available at law or in equity to the Parties hereto with respect to a breach hereof, the Parties hereto each reserve the right to enforce this MOU by specific performance. The titles or captions of paragraphs in this MOU are provided for convenience of reference only, and shall not be considered a part hereof for purposes of interpreting or applying this MOU and such titles or captions do not define, limit, extend, explain or describe the scope or extent of this MOU or any of the terms or conditions. Words and phrases herein shall be construed as in the singular or plural number, and as masculine, feminine or neuter gender, according to the context. This MOU shall not be construed more strongly against any Party regardless of who was more responsible for its preparation.

THE PARTIES HEREBY IRREVOCABLY WAIVE ALL RIGHT TO TRIAL BY JURY IN ANY ACTION, PROCEEDING OR COUNTERCLAIM ARISING OUT OF OR RELATING TO THIS MOU.

PART II: CONFIDENTIALITY AGREEMENT

Student Confidentiality Agreement

Students of Grinnell College ("Institution") may have access to confidential student, employee, and community partner information about financial, educational, personnel, medical, academic and other matters from various media (paper and electronic) and sources including, but not limited to, interoffice communications, internal publications, verbal interactions, correspondence, and data bases. By virtue of the student's role with a community-engaged course, they are accountable for the responsible use and disclosure of the institution's and community partner's information and for ensuring the confidentiality, integrity, and accuracy of such information.

- a. Students agree to the responsibility and accountability for maintaining the confidentiality of all student, employee, alumni and College related information, and community partner information. This information will only be disclosed, distributed, or discussed as part of the normal performance of my role in a community-engaged course, and only with individuals authorized to view and discuss such information.
- b. Students will not attempt to alter, change, modify, add, or delete student, employee, community partner or other College information or documents, except as part of the normal performance of their role. Students will follow proper College procedures for the disposal of confidential information.
- c. Students will access only information required for the normal performance of their role. Access to information, which includes written documents, electronic files, student educational or financial records, and personnel data, records or files, will occur only through normal business procedures for obtaining information.
- d. All procedures, written documents, records, and computer programming that Students generate, access, input, modify, report, record, etc. shall be done in accordance with College policies, regulations established by applicable governing bodies, or applicable laws. Confidential information

is considered property of the Institution & Community Partner and will not be disclosed to third parties without permission of the College.

- e. Students will take all reasonable precautions to protect the confidentiality of information by the practice of good work habits. These include: protecting the confidentiality of passwords, closing or minimizing programs when not at the terminal, and promptly informing appropriate parties of any breach of confidentiality or security on my part (e.g., the loss of a document, the loss of a key).

Student Signature below additionally agrees to the following:

Failure to abide fully with this Confidentiality Agreement is grounds for disciplinary action following the regulations specified within the appropriate Handbook (staff, faculty, or student). Disclosing confidential information without proper authorization may violate the Family Educational Rights and Privacy Act of 1974 (["FERPA"](#)) and other federal and State laws and regulations that protect the confidentiality of information, and may subject the College and/or the student to civil and/or criminal liability.

Signature below indicates that the student has read and understands the above and agrees to the terms of this Confidentiality Agreement. Without limiting the foregoing, a signature below agrees not to disclose Institution, Community Partner, or Student confidential information to any unauthorized person or organization while fulfilling civic components of a community engaged course. This Confidentiality Agreement shall be governed and construed in accordance with the laws of the State of Iowa.

Part III: Signatures**"Institution"**

GRINNELL COLLEGE

By: _____

Printed Name: _____

Title: _____

Address: _____

Email for Notices: _____

Date: _____

"Community Partner"

By: David Neville

Printed Name: _____

Title: Digital Liberal Arts SpecialistAddress: HSSC C0426

Email for Notices: nevilled@grinnell.eduDate: 13 October 23**"Students"**

STUDENTS OF GRINNELL COLLEGE

By: _____

Printed Name(s): Brian Sung, Pyait Myat, Megan (Mae) Bernacchi
Zitan WangGrinnell Email: sungbria@grinnell.edu, myatpyait@grinnell.edu , bernacch@grinnell.edu
wangzita@grinnell.edu

Date: Oct 13, 2023

"Faculty Supervisor"

FACULTY SUPERVISORS OF GRINNELL COLLEGE

By: _____

Printed Name: _____

Grinnell Email: _____

Date: _____

**Any questions regarding this memorandum should be referred to the
Grinnell College Center for Careers, Life, and Service;
1127 Park Street, Grinnell, IA 50112; (641) 269-4940.**