

Project Description

UNL SoC Falkinburg Benes – Husker STEM VR 2.0

Project Overview

This project will expand on the current [Husker STEM VR](#) app. The Husker STEM VR project is an outreach/recruitment app that was built for the Oculus Quest. Students built a virtual reality Oculus Quest app for UNL's School of Computing and College of Engineering to encourage STEM outreach. This app helps to make learning fun by creating a virtual reality app designed to create an engaging learning environment. Additionally, we can promote more diversity in STEM by creating an educational environment that promotes inclusiveness.

The first year was able to successfully create the basic app built around Memorial Stadium and implements educational activities for degrees in the School of Computing (CS, SE, and CE). The app needs to be extended to add in information and educational activities/capabilities for prospective students to explore other STEM degrees within the College of Engineering. For instance: Electrical Engineering, Civil Engineering, Architectural Engineering, Mechanical Engineering, Biological Systems Engineering, and Chemical Engineering.

Sponsor Background

Professor Falkinburg is a Lecturer in the School of Computing at the University of Nebraska-Lincoln, a Computer Engineer, and recently retired U.S Air Force Major. My research interests include robotics, embedded systems, 3D modeling, and simulation design. My areas of specialization include VLSI Systems, Computer Architecture, Embedded Systems, Advanced Digital Design. I have been teaching in the School of Computing for four years and have taught courses like Computer Organization, Embedded Systems, Advanced Embedded Systems. During that time I have also been Tribe Lead for many SoC Senior Design projects and wanted to propose a VR project with a little more of a hardware/robotics feel to it. The new app will expand the capabilities of the current app for more STEM degrees withing the College of Engineering.

Stephanie Benes is the Assistant Director of Recruitment for the College of Engineering. I joined the College of Engineering in 2022 and loves recruiting for a college where students can go on to make such a positive impact in the world

Project Stakeholders

This application will be used for engineering outreach throughout UNL.

- Jeffrey Falkinburg, Lecturer, Principle Investigator and Primary Contact
- Stephanie Benes, CoE Assistant Director of Recruitment
- SoC Advising Department
- CoE Student Services Staff
- Other UNL Engineering Students

Current System Overview

The Husker STEM VR project is an outreach/recruitment app that was built for the Oculus Quest. Students built a virtual reality Oculus Quest app for UNL's School of Computing and College of Engineering to encourage STEM outreach. This app helps to make learning fun by creating a virtual reality app designed to create an engaging learning environment. Additionally, we can promote more diversity in STEM by creating an educational environment that promotes inclusiveness. The Husker STEM VR app vision is shown below in Figure 1 and it currently being used for STEM Outreach and Recruitment.



Figure 1: Husker STEM VR App Overview

Find more information on the Husker STEM VR app at <https://www.huskerstemvr.com/>.

Proposed System/Scope

In the following four subsections, we will provide the project vision.

1. Business Justification

This will be an Oculus Quest app that will be used to help with recruitment in the School of Computing and College of Engineering at UNL by providing a fun and engaging way to learn about STEM and about the Huskers in virtual reality environment.

2. Proposed System Overview and Strategy

The final solution we wish to attain is a STEM outreach focused game that implements various fun engineering type activities/research accomplished here at UNL in the CoE. This app will expand on the current app and will create additional challenging escape room type activities for other degrees within the CoE. Ultimately the app will be designed to encourage the user to pursue degrees in STEM at UNL.

3. Scope of Work

The team is tasked to extend the Husker STEM VR app to add in information and educational activities/capabilities for prospective students to explore other STEM degrees within the College of Engineering. For instance: Electrical Engineering, Civil Engineering, Architectural Engineering, Mechanical Engineering, Biological Systems Engineering, and Chemical Engineering. Here is a list of potential escape room type activities/research or capabilities that could be built into the app.

- *Add in upper deck of the east side of the stadium.*
- *Attempt to export the app to be played as a web-based app in addition to VR.*
- *Fly a quad copter around/in Memorial Stadium.*
- *Drive a remote-controlled robot or RC car around/in Memorial Stadium.*
- *Launch Rockets/Fireworks from inside Memorial Stadium.*
- *Building a simple circuit with resistors, buttons, LEDs, speaker, etc. Something like Snap Circuits except virtual. In other words, we could also have them build a robot with motors and sensors to make them work*
- *Mixing different elements to make different compounds.*
- *Some sort of bridge/tower building activity.*

4. High Level Architecture Requirements (Technical Specifications)

This app will be developed to be deployed on the Oculus Quest headset devices using Unity. We may even attempt to export the app to be played as a web-based app in addition to VR.

Expected Deliverables from Project Team (Senior Design Provides)

The expectation is a fully functional Oculus Quest mobile application that will be deployed to the SideQuest Store and the Oculus Quest store by the end of this effort. The team will have to keep performance and optimization in your planning to keep the app frame rate above the 72 frames per second requirement (<https://developer.oculus.com/documentation/unity/unity-perf/>). This will be instrumental to successfully deploying to the Oculus store. Additionally, the team will a deploy a Web-based app to be the Husker STEM VR website. Lastly, we expect that you plan ahead with testing and to have developmental versions being deployed as an APK installation files that can be sideloaded on the Oculus Quest devices via SideQuest for starting no later than Release 3.

Supporting Materials (Sponsor Responsibilities and Provisions)

You can check out more information on the state of the system on the Husker STEM VR website at <https://www.huskerstemvr.com>.

This project was originally motivated by some of the VR capabilities shown in the Oculus First Steps app. Specifically, the blocks, ping pong paddle/ball, paper airplanes, and the remote-controlled zeppelin shown in Figure 2.

- https://www.oculus.com/experiences/quest/1863547050392688/?locale=en_US

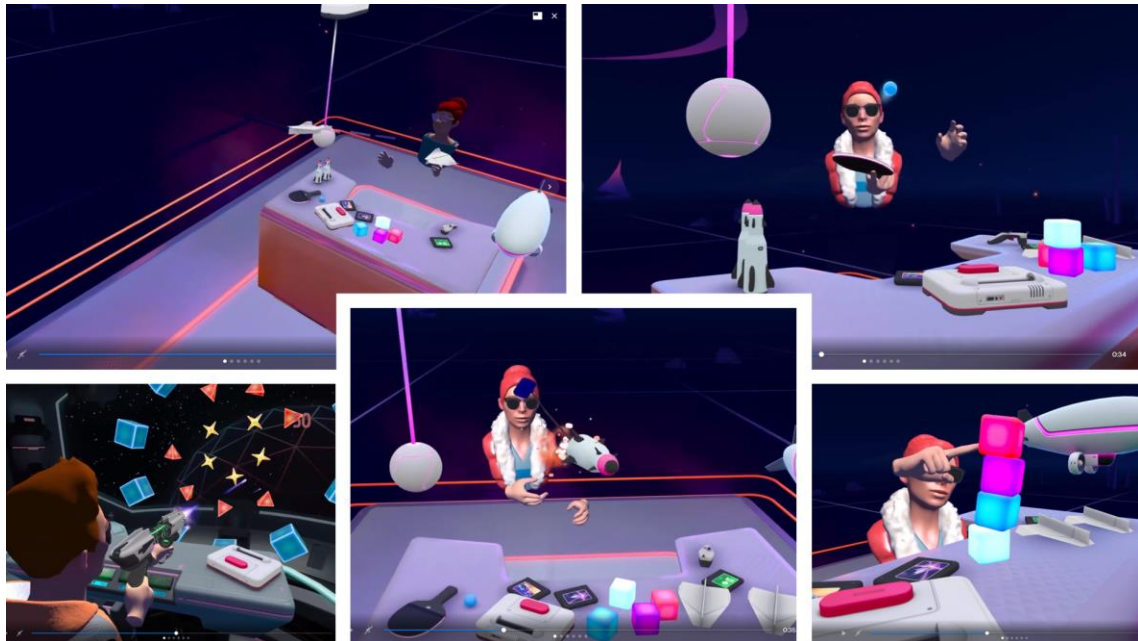


Figure 2: Images from the Oculus First Steps App

You will be using capabilities like these to make this a fun and engaging app that kids will enjoy.

Communication Plan

The communication will be mainly via Teams (text, audio, or Zoom/Teams calls). Meetings will be held via Zoom for weekly meetings and in-person for major milestone meetings if possible. The primary contact is available weekly to answer any questions during his office hours or at scheduled office/Zoom visits. Email for an appointment. Otherwise, send a message via Teams and I will get back to you asap.

Sponsor Contact Information

Below is a list of the stakeholders on this project.

Name	Primary Contact (Y/N)	Email Address	Title	Address	Phone Number
Jeffrey Falkinburg	Y	jfalkinburg2@unl.edu	Lecturer – Computer Engineering	368 Avery Hall	402-312-8078
Stephanie Benes	N	sbenes2@unl.edu	CoE Assistant Director of Recruitment	W204 Nebraska Hall	402-472-7015