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Application Summary

Competition Details

Competition Title:	Spring 2024 CURO Research Award
Category:	
Cycle:	

Application Information

Submitted By:	Ridwan Haque
Application ID:	2671
Application Title:	Exploring Virtual Reality in STEM Education: Enhancing Student Understanding through Immersive Learning Environments

Personal Details

First Name:	Ridwan
Last Name:	Haque
Application title:	Exploring Virtual Reality in STEM Education: Enhancing Student Understanding through Immersive Learning Environments
UGA Student ID (81x):	811770444
Preferred Name:	Ridwan
UGA MyID email address:	rsh28496@uga.edu
Year in school as of Fall 2023:	1st year
Expected graduation date:	May 2027
Major(s):	Computer Engineering
Major(s) College(s):	College of Engineering
Current cumulative GPA:	N/A
Are you currently a member of the Morehead Honors College?:	No
Have you presented research at the CURO Symposium? :	No

If yes, please list each year you presented

Have you previously received a CURO Research Award or CURO Research Award?:	No

If yes, please list each semester and year you received an award

Are you currently enrolled in or have you previously completed a CURO Research or Thesis course?:	No

If yes, please list courses. Include prefix, course number, and semester taken

To help us determine financial need, please explain how you are paying for tuition, and please list any financial aid or scholarships you are currently receiving, including student loans::	I am currently receiving the Federal Pell Grant which is $6,745.00 split evenly between the Fall and Spring Semester I am currently receiving the Zell Miller Scholarship which is $9,790.00 split evenly between the Fall and Spring Semester. I am also cu
Faculty Mentor Last Name:	Weliweriya
Faculty Mentor First Name:	Nandana
Faculty Mentor's UGA email address:	nandanaw@uga.edu
Faculty Mentor's Department:	Physics & Astronomy
Faculty Mentor's College:	Franklin College of Arts and Sciences

Research Title

Exploring Virtual Reality in STEM Education: Enhancing Student Understanding through Immersive Learning Environments

When and how frequently will you meet with your mentor?

1-2 hours per week (Monday, Wednesday, or Friday)

Does your research involve human subjects:	No
Type your full name below to indicate you are aware of the CITI and IRB requirements:	Ridwan Haque
Does your research involve domestic or international travel?:	No travel

The initiative of our project aims to enhance the quality of instruction in astronomy courses at UGA, making complex astronomical physics more accessible and comprehensible for students. As an undergraduate freshman majoring in computer engineering working as a 3D design and simulation specialist for this project, my responsibility involves the creation of astronomical simulations by replicating intricate astronomical concepts that can be integrated into the astronomy curriculum. The overarching goal is to provide students, particularly those facing challenges in grasping astronomical concepts, with a visually immersive learning experience.

My specific focus within this project is the creation of an immersive 3D solar system simulation that can be viewed with VR tools in real time.The intended user interface will allow astronomy students to select any location on Earth and view an accurate simulation of the virtual night sky. In addition, our simulation will include a solar eclipse prediction algorithm, so students will be able to observe solar eclipses in real-time from any location on earth. This would provide students with an unparalleled educational experience.

We are currently exploring various 3D software options such as Blender and Unreal Engine to assess their capability in accurately rendering solar simulations and compatibility with VR software. At this point in the project I have utilized NASA's 3D resources such as an official model of the Earth, and Moon and have scripted an orbital simulation of the Earth, Moon, and Sun system in Blender's 3D space. I have also created an hdri skybox using NASA's official deep star maps. I am tasked with replication of accurate orbital velocities, planetary sizes, gravitational pull, and barycenter motion. In addition, I have written detailed documentation of our progress which include sequential instructions so students and researchers can replicate our work.

Under the guidance of Dr. Weliweriya and Dr. Song, we aim to contribute to the project's core mission of enhancing students' conceptual understanding of physics and astronomy. Our intention is to provide VR headsets so students can explore the cosmos and visualize key astronomical concepts. The immersive nature of VR, coupled with the authenticity of real-world scenarios, will empower students to apply problem-solving and decision-making skills in a context that mirrors the challenges they will face in their future STEM endeavors.

Engaging in this project aligns with my academic and career goals as an undergraduate freshman majoring in computer engineering. Serving as a 3D design and simulation specialist in this initiative represents a significant step towards both short and long-term goals.

In the short term, my academic focus on computer engineering requires practical application beyond theoretical foundations. Developing an accurate solar system simulation sharpens my mathematical and problem-solving skills, offering a practical application of engineering design principles. This project becomes a unique opportunity for growth, transforming challenges into milestones for advancing my analytical capacities.

Looking ahead, my long-term career goals involve delving into advanced computer engineering and emerging technologies. Learning to use 3D software to create physics simulations propels me into the realm of robotics where prototyping and 3D design is vital. The python scripting I employ in this project would be useful for programming which is essential in the space of cybersecurity, another field I aspire to contribute meaningfully in. These skills are foundational for successful research and highly transferable to any career path.

The mentorship provided by experienced researchers such as Dr. Weliweriya in this project is instrumental in shaping my understanding of computer engineering beyond a conventional academic setting. The collaborative nature of the project introduces me to a network of knowledgeable peers and experts, potentially opening opportunities for collaborations and diverse career pathways.

In conclusion, my participation in this project is a transformative experience that propels me towards my academic and career goals. Through this immersive initiative, I am confident that I am not only contributing to the advancement of STEM education but also laying the foundation for a future where technology and education intersect seamlessly, inspiring generations of STEM enthusiasts.

Review Form

Spring 2024 CURO Research Award

Routing Step:	Faculty mentor UGA email address
Application Title:	Exploring Virtual Reality in STEM Education: Enhancing Student Understanding through Immersive Learning Environments
Application ID:	2671
Review Deadline:	11/10/2023 11:59 PM

***Your Comments:**

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***Please indicate whether you approve or do not approve this application moving forward in the competition.:**

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