



**Department Project Information**

<b>Department Name</b>	<i>Industrial and Systems Engineering</i>	<b>Date Submitted</b>	<i>04/20/2023</i>
<b>Project Title</b>	<i>Adaptive Extended Reality Systems for Improving Mental Health (UNCC_SE_VRHealth)</i>	<b>Planned Starting Semester</b>	<i>Fall 2023</i>

**Senior Design Project Description**

**Personnel**

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical		Electrical	
Computer		Systems	5
Other (                    )			

**Project Overview:**

The eXtended Reality and Artificial Intelligence (XRAI) lab focuses on designing and developing adaptive Virtual and Augmented Reality (AR and VR) systems to improve end users' experience. Most of our current projects are health care related, where we utilize these technologies to reduce pain and anxiety and improve mental health among various populations. For this project, the students will work on a project which involves developing a naturalistic environment and integrating a biofeedback mechanism to help mitigate anxiety or relax the participants. Additionally, the students will conduct lab studies to validate the efficacy of the system they are developing. The lab has already developed some environments and has integration, so students in the project will not have to develop everything from scratch. Additionally, the lab includes graduate students that can support and provide feedback to students.

**Project Requirements:**

For this project, students will start by conducting a brief literature review to identify how a naturalistic environment can improve mental health among end users. Based on the findings from the literature review, the group will start developing virtual environments using tools such as Unity or Unreal Engine. As mentioned earlier, our lab has built a lot of environments in the past, and students will have the opportunity to use this as a reference point and use these assets for developing the environment. In parallel, the students will also work on integrating a few biosensors with the virtual environment. This integration will help in manipulating the environment based on how a user performs. Finally, when ready, the students will conduct small in-lab studies with participants (students) to evaluate the efficacy of their system.



**Expected Deliverables/Results:**

- Brief literature review on the efficacy of biofeedback-enhanced systems to improve mental health
- Develop nature based virtual environment using Unity/Unreal Engine
- Integrate the virtual environment with biosensors
- Conduct small in-lab studies and report the findings.

**Disposition of Deliverables at the End of the Project:**

Hardware developed is the property of the mentor and department. Typically, the work product is displayed at the last Expo then immediately handed over to the mentor.

**List here any specific skills, requirements, specific courses, club affiliation, knowledge needed or suggested (If none please state none):**

- Experience with coding in C# and Python.
- Since human testing is involved, an IRB may be required.