Course Announcement:
Using Virtual Reality to Study Human Behavior
Spring Semester 2021

**CS 4980:0003 Topics in Computer Science II (Virtual Reality) and
PSY 7150:0001 Current Topics in Psychology (Virtual Reality)**

Instructors: Joe Kearney and Jodie Plumert
Time: 3:30-4:45 MW
Classroom/Lab: Online/Synchronous
Requirements: (by instructor permission)
- **Senior or graduate student in computer science or engineering**
- **Graduate student in psychology**

Virtual reality technology is advancing at a furious pace. Driven by progress in smartphone display technology, the cost and quality of head-mounted display systems (e.g., the Oculus Rift and HTC Vive) has dramatically improved in the last five years. Coupled with advances in the technology for motion tracking, real-time graphics rendering, and powerful, freely available game engines, the door to virtual experiences is open wide.

One area that is being transformed by VR is the study of human behavior. Psychological experiments can be conducted in VR that are impossible to do in the real world, either because the required conditions are too difficult to create or because it would be too dangerous to conduct the experiment in a real environment. For example, consider a study examining the influence of texting on how people cross streams of traffic. Such a study could not be conducted on real roads because it would expose participants to possible harm from collisions with vehicles. Moreover, it would be very difficult to create replicable traffic patterns from trial to trial. However, there is no risk of injury in VR and the traffic can be precisely controlled.

This course will focus on the use of VR for studies of human behavior. The course will be project-based with hands-on experience developing VR applications using the Oculus Quest VR system and the Unity3D game engine. The course will be interdisciplinary, combining students from computer science and engineering with students from psychological science. Students will learn about both disciplines and how to successfully work in an interdisciplinary team. Students will also gain a foundation in methods for

interactive, network-based simulation, real-time rendering, motion tracking, and 3D modeling.

The first third of the semester will focus on learning Unity3D, reading papers describing experiments that use VR to study behavior, and considering how to design experiments in VR. The second third of the semester will involve designing 2-3 simple experiments in VR, developing software to run these experiments, and collecting and analyzing data from the experiments. Experiments could come from any area of psychological science providing that behavioral measures are used to study motoric, perceptual, cognitive, social, and emotional functioning. The last third of the semester will be used to design, build, and run a novel experiment as a group project.

This is a new course and will offered for the first time in the 2021 Spring Semester. Because of limitations in space and equipment, the course will be open to 24 students (12 from computer science/engineering; 12 from psychology). Students will work in groups of 4 containing students with a mix of backgrounds, skills, and experience (e.g., two from technical disciplines and two from psychology). Each student will receive their own Oculus Quest to work with during the semester, which will allow students to work remotely with each other and the instructors.

Grades will be based on participation and productivity. Participation will be assessed on attendance, contribution to in-class discussions and project critiques, contribution to on-line discussions, assistance provided to both members of your own team and members of other teams in solving problems, and contribution to the group project. Productivity will be based on the success of the projects. Projects will be judged on novelty, technical achievement, theoretical impact, and potential practical value.

The course is intended to bring together students who have advanced skills in either computing or experimental psychology so that they are ready start on a project from the beginning of the semester. As such, students with experience in computer science will provide expertise related to the more technical aspects of the projects and students with experience in psychological science will provide expertise related to the design and analysis of behavioral experiments. Knowledge of Unity3D is a plus, but not necessary. Computer science and engineering students should be experienced programmers. Background in HCI, game development, computer graphics or animation, image processing, motion capture, or computer networking is a plus. Psychology students should be knowledgeable in experimental design and methods to analyze the results of experiments.

Students must receive special permission from the instructor to register for the course. Interested students should contact either Professor Joe Kearney (joe-kearney@uiowa.edu) or Professor Jodie Plumert (jodie-plumert@uiowa.edu). Students interested in taking the course will be asked to complete a questionnaire about their background and interests. The goal is to make sure enrollees are ready to start on a significant project and to make sure the class includes students with a range of knowledge and experience.