Course Syllabus

CS 5754 - Virtual Environments

Spring 2023
In-person course at LITRV 1860
TR 11:00AM - 12:15 PM

Course Description

This class will introduce students to the technology and techniques used in virtual environments (VEs; also known as virtual reality, or VR). Students will gain knowledge about the latest innovations in this field, will understand the important research issues and methodologies for VEs, and will have the opportunity to gain practical experience with the hardware and software used to create VE applications.

Prerequisites

There are no official prerequisites for this class. It is assumed, however, that students will have a background in general human-computer interaction and user interface design, and that students will be familiar with basic principles of 3D computer graphics. Students without this background may still be able to succeed in the course by partnering on the course project with students who have complementary skills and background.

Learning Objectives

Students will:

- Be able to describe the components of a VR system and how they work together, and be able to develop VR applications using off-the-shelf hardware and software resources.
- Understand technical issues that must be addressed to make VR systems work effectively, and be able to explain the various approaches to these issues.
- Understand human factors (perceptual, cognitive, ergonomic) that come into play with the use of VR systems, and be able to apply this knowledge in the design of VR applications.
- Apply human-computer interaction principles and processes to the design of VR systems, and understand the unique issues in 3D interaction.
- Develop a broad understanding of current research issues in VR, and be able to design, run, and analyze the results of human-subjects experiments in VR.
- Be prepared to undertake graduate-level research in VR or an R&D position in the VR industry.

Instructor

an David-John (http://brendandavidjohn.app)
@vt.edu (mailto:bmdj@vt.edu)
Office Hours**:**

Tuesdays (Moss Arts Center Room #251): 9:30AM – 10:30AM

Wednesdays (on **Zoom** (https://virginiatech.zoom.us/j/81449482319)): 1PM – 2PM

Teaching Assistant

Daniel Enriquez (**denriquez@vt.edu** (mailto:denriquez@vt.edu))
Office Hours: (**Starting Jan. 27**)

Mondays (on **Zoom** (https://virginiatech.zoom.us/j/82159681636)): 10AM – 11AM

Fridays (Moss Arts Center Room #251): Noon – 1PM (**except Feb. 3rd**)

Please email the TA ahead of time if you would like them to bring a VR headset for testing or code debugging.

Textbook
Required: LaViola, Kruijff, McMahan, Bowman, and Poupyrev. ***3D User Interfaces: Theory and Practice*** (http://www.informit.com/store/3d-user-interfaces-theory-and-practice-9780134034324) . 2nd edition. Pearson, 2017. ISBN 978-0134034324. **The textbook is available online through the VT library**. **Access the book via O'Reilly** (https://www.oreilly.com/library/view/3d-user-interfaces/9780134034478/?ar) . On the popup, choose "Not listed" for your institution, then enter your vt.edu email address.

Readings/Course Notes
Lecture notes and additional readings will be available on Canvas. Be sure to check the **schedule** (https://canvas.vt.edu/courses/165676/pages/schedule-and-reading-list) regularly. Readings should be prepared *in advance* of the class for which they are listed.

Website
All class announcements, policies, schedule changes, lecture notes, etc. will be posted on the class Canvas site. Check it regularly!

Grading
Grading will be based on:

1. ***Research Project*** *(https://canvas.vt.edu/courses/165676/pages/projects) (50%)*
   The main assessment component of this class will be a semester-long research project. For more information on choosing and managing a project, and how projects will be graded, see the **project page** (https://canvas.vt.edu/courses/165676/pages/projects) .
2. ***Paper Discussions*** *(https://canvas.vt.edu/courses/165676/pages/paper-discussions) (10%)*
   Each student in the class will serve as a discussant at least once during the semester; they will be responsible for leading the discussion of one of the papers assigned to the class. For more information on how to sign up for a paper, how to prepare to lead a discussion, and how discussants will be graded, see the **discussant page** (https://canvas.vt.edu/courses/165676/pages/paper-discussions) .

3. ***Class Participation (https://canvas.vt.edu/courses/165676/pages/participation)*** *(30%)*
   The participation grade will be based on two components: 1) preparation of a short written summary of each assigned reading (20%); and 2) attendance at the group discussions of the various topics (10%). For more information on how the participation grade will be calculated, see the **participation page (https://canvas.vt.edu/courses/165676/pages/participation)** .
4. *Final Exam (10%)*
   The final exam in this class will be a take-home exam (available Apr. 28, due May 8). The final exam will cover the cumulative information of the entire semester, and will primarily assess understanding/insight into the concepts discussed in class. Format and review information for the final exam will be provided later in the semester.

Additional Information

Schedule of Class Activities

Each course topic will typically be covered during a one-week period and has several components.

- A reading from the textbook. Students should complete this reading before viewing the lecture.
- A synchronous in-person lecture during the scheduled class time. Students should attend the lecture to understand the material prior to the paper discussion session. Students should post questions about the lecture in the **Canvas Discussion forum (https://canvas.vt.edu/courses/165676/discussion_topics)** .
- Research paper readings. Students need to read and summarize these papers before the paper discussion session.
- A synchronous paper discussion session, where a student leads discussion of each research paper. All students are expected to attend and participate.

However, be alert for changes to the **schedule (https://canvas.vt.edu/courses/165676/pages/schedule-and-reading-list)** .

Attendance

Attendance at all classes and scheduled project meetings will be necessary for students to succeed in this course. Please show respect for the instructor and the other students by arriving on time and prepared.

Lecture recordings are available on a case-by-case basis for excused absences or accommodations only.

Honor Code

All work in this course is to be your own, and the university honor code is in effect. Groups will collaborate on projects, but the other three graded aspects of the course are based on individual work. You will be required to sign an honor code statement on the final exam. In particular, written work (paper summaries, project reports, final exam) must be written in the student's own words. Wording that is taken from another source must be clearly formatted as a quotation and properly attributed.