

CMSC 388G: Virtual Reality Game Development

Credits: 1

Time and Location

Friday, 1:00-1:50 PM

CSI 2120

Course Description

This course will explore virtual reality game development best practices and use of commercial game engines to build VR experiences that are engaging, immersive, comfortable, and avoid the many pitfalls of developing an experience for VR. The course will focus on development with Unreal Engine using C++, and will also explore best practices for lighting, modelling, and graphics to optimize the experience for VR. We will also explore collaborative approaches to design and development. The course will focus on development for the tethered HMDs, such as the Oculus Rift and HTC Vive. With the relatively high hardware requirements of running Unreal Engine, students are not expected to have a personal machine capable of running it. However, they will have virtually unlimited access to a laboratory with PCs that have the engine pre-installed.

Topics

- Introduction to Unreal Engine and setting up development environment for C++
- VR potential for experiences in gaming and outside of the gaming industry
- VR game best practices for avoiding simulation sickness
- Interaction using the HMD
- Interaction using controllers
- Movement systems with teleportation
- Movement systems with vehicular mechanics
- Optimizing the environment for HMD graphics
- Techniques using 3D audio to enhance immersion
- Graphics that don't work in VR

Grading

Grades will be maintained on the CS Department grades server.

<<https://grades.cs.umd.edu/classWeb/viewGrades.cgi>>

You are responsible for all material discussed in lecture and posted on the class repository, including announcements, deadlines, policies, etc.

Your final course grade will be determined according to the following percentages:

Percentage	Title	Description
10%	Quizzes	Quizzes
20%	Class Projects	Projects will use techniques covered individually in class lectures.
20%	Midterm	The midterm will be in exam format on topics discussed during the first half of the semester. Questions will be mostly high-level and conceptual, rather than low-level.
50%	Final Project	The final project will combine elements covered in most of the projects throughout the semester. Presentations to the class are optional for extra credit, but should only need to be submitted by the end of the semester for grading.

Any request for reconsideration of any grading on coursework must be submitted within one week of when it is returned. No requests will be considered afterwards.

Timeline

Week	Topic	Assignment
1 (2/1)	SNOW DAY	
2 (2/8)	Syllabus week + Intro to Unreal + VR C++ implementation of character, camera setup and Actor VR experience best practices	

4 (2/15)	Graphics that work well on screen but do not work with HMDs	Project 1 OUT
5 (2/22)	Techniques in avoiding simulation sickness	Project 1 DUE Quiz 1 Project 2 OUT
6 (3/1)	HMD Engineering	
7 (3/8)	Interaction using HMD and gamepad or hand controllers	Quiz 2
8 (3/15)	Movement systems with teleportation	Project 2 DUE
9 (3/22)	SPRING BREAK	
10 (3/29)	Vehicular movement systems	MIDTERM, Final Project OUT
11 (4/5)	3D modeling best practices for VR experiences	
12 (4/12)	Lighting, reflections, and visual effects	Quiz 3
13 (4/19)	Using 3D audio for VR experiences	
14 (4/26)	Final Presentations (extra credit)	Quiz 4
15 (5/3)	Final Presentations (extra credit) + Next steps to making compelling VR experiences	Final Project Due

Projects

The projects are designed to get you familiar with specific development techniques with Unreal Engine to make engaging experiences that avoid common pitfalls of existing VR games and

experiences. We will explore what causes these issues and how to avoid them without being too intrusive on an original idea for an experience. The courses will require using C++ but will not require an in-depth knowledge of the language, but we will be using pointers and code complexity similar to CMSC132.

Communication with course staff outside of class

Office hours will be held in the laboratory and students are strongly encouraged to make use of them when working on projects.

Instructor:

Galen Stetsyuk - stetsyuk@umd.edu

Sponsor:

Dr. Ashok Agrawala - agrawala@cs.umd.edu

Office Hours: TBD

Excused Absence and Academic Accommodations

See the section titled "Attendance, Absences, or Missed Assignments" available at Course Related Policies.

Disability Support Accommodations

See the section titled "Accessibility" available at Course Related Policies.

<<http://www.ugst.umd.edu/courserelatedpolicies.html>>

Academic Integrity

Note that academic dishonesty includes not only cheating, fabrication, and plagiarism, but also includes helping other students commit acts of academic dishonesty by allowing them to obtain copies of your work. In short, all submitted work must be your own. Cases of academic dishonesty will be pursued to the fullest extent possible as stipulated by the Office of Student Conduct.

It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

Course Evaluations

If you have a suggestion for improving this class, don't hesitate to tell the instructor or TAs during the semester. At the end of the semester, please don't forget to provide your feedback using the campus-wide CourseEvalUM system. Your comments will help make this class better.

Thanks to the writers of this <<https://www.cs.umd.edu/class/fall2016/cmsc330/syllabus.shtml>> syllabus for the wording of much of this document.