CAP 6121: 3D User Interfaces for Games and Virtual Reality
Spring 2020; MW 4:30pm-5:45pm ENG1 - 0383

Instructor: Dr. Joseph J. LaViola Jr.
Website: www.eecs.ucf.edu/courses/cap6121/spr2020/
Office Hours: M: 6:00pm-7:00pm
T: 4:00pm-6:00pm
Office: ENGRIII – 321, phone: x2285
jjl@cs.ucf.edu

READINGS:
Text: LaViola, J., Kruijff, E., McMahan, R., Bowman, D., and Poupyrev, I. *3D User Interfaces: Theory and Practice, Second Edition*, Addison Wesley, ISBN 0134034325, April 2017.

Smith, M., Queiroz. C. *Unity 5.x Cookbook*, Packt Publishing, October 2015 or latest Unity book.

Papers: student/professor selected research papers

Catalog Description: 3D user interaction, spatial user interfaces, selection and manipulation, 3D navigation, system control, evaluation methodologies, augmented and mixed reality, input and output hardware

Course Objectives: 3D User Interfaces for Games and Virtual Reality is a course designed to give students a rigorous introduction to the design, implementation, and evaluation of the fundamental techniques in spatial 3D interaction.

Student Requirements:
1. Star Wars Game -- Students will create a lightsaber game where they control the saber with and use the force using the HTC Vive.

2. Fruit Ninja -- Students will create a Fruit Ninja game where they will travel through a maze and fend off attacking fruit using the HTC Vive.

3. Survey paper -- Students will write a paper on a 3D UI topic of their choice, focusing on summarizing and aggregating work done in the last decade.

4. Paper Presentations -- Students will have to present at least one paper on a topic in 3DUIs.

5. Final Project -- Students will do a final project of their choice that explores a particular concept in 3D user interfaces, augmented reality, or virtual reality. They must first write a short proposal and get it approved by the professor.

Tentative Grading Scheme:

Assignment 1	15%
Assignment 2	15%
Survey Paper	15%
Paper presentations	5%
Final Project	50%

The instructor reserves the right to use plus/minus grading in this course.

Syllabus

Week	Topic	Readings	Assignments
1	Introduction to 3D User Interfaces -- What are 3DUIs? -- Application areas -- 3DUI history -- Games and 3DUIs	LaViola – Chapters 1,2 LaViola (2008) Bowman et al. (2006,2008)	
2	Intro to Unity 3D HTC Vive, Nintendo Wii Remotes, the Microsoft Kinect, PlayStation Move	Creighton LaViola and Marks (2010)	Assignment 1 – Star Wars out
3	Human Factors and HCI Basics	LaViola – Chapters 3,4	
4	3DUI Output Hardware -- Visual displays -- Auditory displays -- Haptic displays	LaViola – Chapter 5	
5	3DUI Input Hardware -- Desktop input devices -- Gaming devices -- Tracking devices -- Direct human input (e.g., brain, speech, bioelectric) -- Building custom input devices	LaViola – Chapter 6	Assignment 1 due Assignment 2 – Fruit Ninja out
5	Selection and Manipulation -- 3D manipulation tasks -- Interaction techniques for 3D manipulation -- Design guidelines	LaViola – Chapter 7	
6	Travel Techniques -- 3D travel tasks -- Travel techniques -- Design guidelines Wayfinding -- Theoretical foundations -- User-centered wayfinding support -- Environment-centered wayfinding support	LaViola – Chapters 8	
7	System Control -- Graphical menus -- Voice commands -- Gestural commands	LaViola – Chapter 9	Assignment 2 due

	-- Tools -- Multimodal interaction		
8	Designing and Developing 3DUIs -- Designing for humans -- Inventing 3D user interfaces -- Borrowing from the real world -- Magical techniques	LaViola – Chapter 10	
9	Evaluation of 3DUIs -- Tools for Evaluation -- Evaluation metrics -- 3D UI evaluation characteristics -- Testbed evaluation	LaViola – Chapter 11	Survey paper due
10	Future of 3D UIs	LaViola – Chapter 12	Final Project proposal due
11-16	In the last 4-6 weeks of the semester one class will be for updates from students on their final projects. The second class will be for students to present papers. Each student must do at least one 15 to 20 minute presentation of a paper of their choice.		