Winter 2014

CSE 165: 3D User Interaction

Lecture #1: Introduction

Jürgen P. Schulze, Ph.D.

Instructor

Jürgen Schulze
Email: jschulze (at) ucsd.edu
Office Hour: Tue 3:30-4:30pm (today 4-5pm)
At Atkinson Hall, Room 2125

Course web site:
http://ivl.calit2.net/wiki/index.php/CSE165W2014

On Ted: Grades and Discussion Board

Course Staff

- TA:
  - Matteo Mannino
    - mtmannin (at) eng.ucsd.edu
- Tutor:
  - Thinh Nguyen
    - thn024 (at) ucsd.edu
- Office hours TBD

Class Goals

- Provide in-depth introduction to spatial 3D user interfaces
- Strengthen graphics programming skills
- Speaking and presentation skills

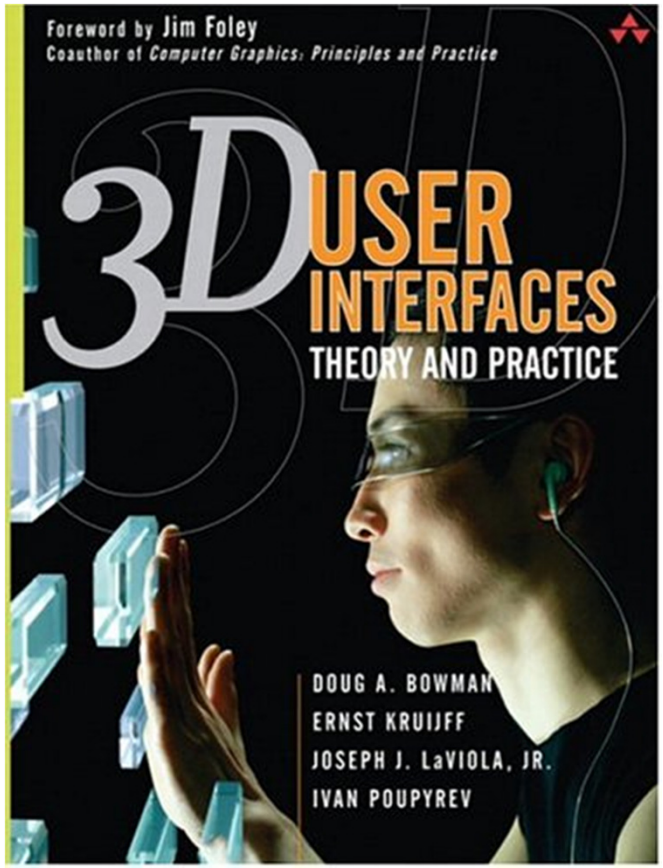
Textbook (Required)

Bowman, Kruijff, LaViola, Poupyrev

3D User Interfaces: Theory and Practice

Addison Wesley Longman Publishing Co., Inc. Redwood City, CA, USA 2004

ISBN: 0201758679



Prerequisites

- CSE167 (Introduction to Computer Graphics) or equivalent
- Experience programming in C++
- Experience with OpenGL graphics programming

Class Structure

- Lectures
  - Fundamentals of 3D user interfaces
- 3 homework assignments
- Student paper presentations
  - 10 minute presentation, plus Q&A
- Final Project

Grading

Assignment 1 (team)	20%
Assignment 2 (team)	20%
Assignment 3 (team)	20%
Paper Presentation (individual)	15%
Final Project (team)	25%

Programming Assignments (1)

- To be done in teams of two
- Two weeks per project
- All projects involve 3D interaction devices:
- Razer Hydra, Kinect, Leap
- Recommended to purchase own units, but loaners are available

Programming Assignments (2)

- Operating system: Windows
- Programming language: C++
- Graphics API: OpenSceneGraph
- Computer Lab: CSE basement room 260
- Even numbered PCs only
- Programming assignments need to be demonstrated to instructor or tutor on the due date after 1:30pm

Paper Presentation

- Each student needs to present one paper from qualifying conferences from past 3 years:
  - IEEE Virtual Reality (VR)
  - IEEE Symposium on 3D User Interfaces (3DUI)
  - ACM SIGCHI Conference on Human Factors in Computing Systems
  - ACM Symposium on Virtual Reality Software and Technology (VRST)
  - ACM SIGGRAPH
  - SIGGRAPH Asia
- Send your preferred date and paper title to instructor by January 17th

Course Topics

- Introduction to 3D interaction
- Application domains
- Output hardware
- Input hardware
- Selection and Manipulation
- Navigation (Travel and Wayfinding)
- System Control
- Symbolic Input
- 3D user interface design
- Evaluation of 3D User Interfaces
- Augmented Reality Interfaces

Late Policy

- All assignments must be handed in on time!

Software Tools

- Visual Studio C++
- OpenSceneGraph
  - Open source scene graph engine
  - Supports 3D stereo, but lab computers do not
- Microsoft Research Kinect SDK
- Razer Hydra API
- Leap SDK
- Trimble SketchUp
  - Nice model database (Google Warehouse)

Note on Slides

- Many slides are courtesy of Professor Joe LaViola
  - From CAP6121 -- 3D User Interfaces for Games and Virtual Reality
  - University of Central Florida

What are 3D UIs?

- 3D interaction: Human-computer interaction in which the user's tasks are carried out in a 3D spatial context
  - 3D input devices
  - 2D input devices with direct mappings to 3D
- 3D user interface (3D UI): A UI that involves 3D interaction
- 3D interaction technique: A method (hardware and software) allowing a user to accomplish a task in a 3D UI

Why 3D Interfaces?

- 3D applications should be useful
  - immersion
  - natural skills
  - immediacy of visualization
- But, applications in common use have low complexity of interaction
- More complex applications have serious usability problems
- Technology alone is not the solution!