

COSC416: Mobile 3D Graphics

(Special Topic, Semester 2, 2010)

Course Outline

Mobile 3D Graphics is the most rapidly advancing area of Computer Graphics, with many new software and hardware related technologies introduced every year. It is also an area of active research with several algorithms for real-time rendering and tracking being developed for applications in view synthesis, augmented reality and games. Recently, there has been a huge growth in the application domain for mobile graphics with the availability of dedicated graphics hardware and APIs supporting vertex and pixel shaders.

The course aims to provide students with an opportunity to learn software development concepts, and programming interfaces needed for deploying native graphics applications on mobile phones. The course introduces advanced methods in computer graphics such as scene graphs, object loading, key-frame animation, graphics interaction and mesh processing. It also aims to provide an in depth, practical coverage of two standard application programming interfaces used for mobile 3D graphics, viz., OpenGL-ES-2.0, and J2ME-M3G.

The course will enable students develop, test and deploy graphics applications on mobile devices. After completing the course, students will have learned the theoretical and implementation aspects behind several advanced concepts in computer graphics, that will help them create new methods and algorithms for different types of graphics applications, including games for mobile platforms.

Prerequisites

§ COSC363 or equivalent.

Tentative Lecture Plan

- Week 1: **Introduction to Java ME, MIDlets**
- Week 2: **Image based animation, Game API**
- Week 3: **M3G: Immediate Mode Rendering**
- Week 4: **Scene graphs and animation**
- Week 5: **Advanced concepts**
- Week 6: **Introduction to OpenGL ES 2.0**
- Week 7: **The OpenGL ES Shading Language**
- Week 8: **Textures and fragment operations**
- Week 9: **Interactive techniques**
- Week 10: **Advanced programming**

Lecturers:

§ Dr. R. Mukundan (Course supervisor) [10 lectures]
mukundan@canterbury.ac.nz
Phone 7770
Room 311, Erskine Building

§ Prof. Mark Billingham / Dr. Raphael Grasset [8 lectures]
mark.billinghurst@hitlabnz.org
HIT Lab, Old Maths Building

Course Assessment

- Assignment 1: 30% **(Due: 20 Aug 2010)**
- Assignment 2: 30% **(Due: 30 Sep 2010)**
- Test : 40%

Reference Books:

1. Kari Pulli, **Mobile 3D Graphics with OpenGL ES and M3G**, Morgan Kaufmann Publishers, 2008.
2. Claus Höfele, **Mobile 3D Graphics: Learning 3D Graphics with the Java Micro Edition**, Course Technology PTR, 2007.
3. A. Munshi, **OpenGL ES 2.0 Programming Guide**, Addison Wesley, 2008.

Course Webpage:

<http://learn.canterbury.ac.nz/>

The course webpage contains lecture materials, supplementary reading materials and links to useful resources for each topic covered in the course.

Other Important Documents:

A summary of some important Computer Science documents that apply to students in **all** Computer Science courses can be found at

http://www.cosc.canterbury.ac.nz/students/current/impt_docs.html

It is important that you read the summary and all of the documents that it refers to, and become familiar with the rights and responsibilities as described in the documents. In particular, you must know the standard academic regulations and assessment requirements as outlined in the COSC Standard Academic Rules Regulations and Guidelines (CSARRG) document which can be found at

<http://www.cosc.canterbury.ac.nz/organisation/committees/academic/sarg/sarg.pdf>