CO2016 Multimedia and Computer Graphics

Credits: *10*   **Convenor:** *Dr. R. Crole*   **Semester:** *2nd*

Prerequisites: *Essential: CO1003, CO1005*

Assessment: *Coursework: 40%*   *Two hour exam in May/June: 60%*

Lectures: *15 hours*
Laboratories: *15 hours*

Private Study: *45 hours*

Subject Knowledge

Aims   This module teaches the principles and technical details of multimedia data and 3D-environments.

Learning Outcomes   Students should be able to: explain, discuss and solve simple problems in the basic representation and handling of multimedia data (images, audio and animation), and the basic components of a 3D-environments.

Methods   Class sessions together with course notes, recommended textbook, worksheets, and some additional hand-outs and web support.

Assessment   Marked coursework, written examination.

Skills

Aims   Produce animation. Create a 3D representation

Learning Outcomes   Students will be able to: write programs involving different multimedia formats; create simple 2D animations; write Java 3D components and reason about their behavior; create dynamic 3D environments.

Methods   Class sessions together with worksheets.

Assessment   Marked coursework, written examination.

Explanation of Prerequisites   It is essential that students have a good working knowledge of Java, up to and including the use of abstract classes and exceptions. No specific knowledge about multimedia data is required. It is beneficial if students taking this module have a very rudimentary understanding of 3 dimensional space and its coordinate geometry.

Course Description   The area of multimedia includes a wide variety of data. In this module we will deal with pictures, animation, audio and 3D landscapes. Images are built out of pixels. Each pixel has a certain color or grey tone. Handling images on this level will allow us to analyse and manipulate images. On the practical side we will program effects in Java. For bringing images to life, e.g. for animation, we will use the established Internet standard SVG. Images in SVG are described using XML documents. This allows scalability and animation. SVG has similar features to FLASH. Completing the introduction to multimedia data we draw our attention to audio data. The understanding of how to digitize sound and how to deal with sound in the digitalized format (e.g. writing sound effects) and its practical implementation will be the focus here. In the last part of this module we will create virtual landscapes using Java 3D. Apart from the basic concepts these landscapes contain different forms of lighting and lighting effects, moving objects and objects with different behaviors (e.g collision behaviors). The main computer language for this module is Java including Java3D.

Detailed Syllabus

1. Image analysis

2. Image resizing and dithering

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3. Basic SVG concepts

4. Audio data handling

5. Scene graphs in Java3D

6. Rotation and movement of 3D objects

7. Textures, lighting in Java3D

8. Behaviors of 3D objects

Reading List

[B]   Frank Klawonn, *Introduction to Computer Graphics; ISBN 978-1-84628-848-7,* Springer Verlag, 2008.

[B]   Ze-Nian Li and Mark S. Drew, *Fundamentals of Multimedia; ISBN: 0130618721,* Pearson Prentice Hall, 2004.

Resources   Course notes, departmental web page, study guide, worksheets, handouts, lecture rooms with projection facilities and OHPs, example examination papers.

Module Evaluation   Course questionnaires, course review.