

Proposal for New Course: Multimedia Information Systems, Fall 2004

Course Number: CSc664

Course Title: Multimedia Information Systems

Credits: 3

Prerequisite: C or better in Software Development (CS-413) or consent of the instructor

Textbook: Fundamentals of Multimedia 1st Edition, by Ze-Nian Li and Mark S. Drew

Instructor: Dr. Rahul Singh, Assistant Professor, Computer Science

Introduction

Multimedia and heterogeneous modalities are increasingly becoming common in acquisition, communication, and presentation of information. Furthermore, expression of information through multiple media has significant implications for algorithmic information processing and decision making. Today, the influence of multimedia can be envisaged in areas as diverse as media arts, sensor networks, robotics, life-sciences, communication systems design, and information systems like multimedia databases and the WWW.

Our curriculum currently does not have any course dealing with Multimedia, Computer Vision, and Image and Signal Processing. These topics provide significant opportunities for technology development and form the basis for some of our envisioned growth areas as well as for areas of focus like *Computing for Life Science*, *Digital Media and Art*, and *Software Engineering*. In addition, modern curricula have to include these topics since heterogeneous and multimedia information is becoming part of everyday computing applications.

We are therefore proposing a comprehensive course at graduate level, which will give students broad and holistic background in Multimedia that will encompass basic technologies and algorithms, system-level issues, editing tools, and SW issues. The course will focus on fundamentals of multimedia systems as well as emerging issues that are being addressed or need to be addressed. It is expected that students who complete the course will have understanding of all basic methods and concepts in Multimedia at high to medium level.

Course Objective

- Comprehensive overview of all basic topics in multimedia systems
- Through final project, expose students to teamwork and all phases of development of multimedia systems and applications

Summary of Syllabus

1. Fundamentals of Multimedia

- Introduction to Multimedia systems. Elements of Multimedia: Audio, Video, Images, Graphics, Text, Tactile, and other sensors.
- Sensors and multimedia capture
- Fundamentals of signal processing
- Details of main data types and characteristics: Text, Audio, Image, and Video. Basics of processing and analysis.

2. Multimedia creation and presentation

- Authoring and production environments.
- Languages and systems for authoring and presentation.
- Dynamic creation of multimedia content

3. Transmission

- Compression
- Multimedia networking
- Multicasting, Streaming

4. Storage, Organization, and Access

- Storage systems
- Media data modeling, Unified multimedia data modeling, and semantics of multimedia
- Multimedia indexing
- Information retrieval
- Multimedia storage, query, and retrieval: Multimedia databases, information retrieval, semantics of multimedia, multimedia indexing.

5. Issues in Multimedia system design

- Synchronization
- Quality of Service (QOS) and Quality of Experience (QOE)
- Architecture for multimedia systems

6. Applications

- Multimedia in life-sciences and medicine
- Multimedia information on WWW
- Sensor Networks
- Ubiquitous computing
- Multi-sensor autonomous robotics
- Personal information management
- Other applications

Instructional methods:

Instructions will consist of classroom coverage of MM topics with home assignments, in-class mid-term examination, and a class project with a final project presentation. The midterm examination will test theoretical and problem solving skills. The class project will involve two phases. The first phase will require researching a specific application involving multimedia. The students will identify salient problems and design an approach to solve them. The second phase of the project will involve implementation of the proposed design and experimental verification of its efficacy. Projects involving up to three students are encouraged. A final presentation of the project and a project report will be required. Both the presentation and report will need to highlight the individual contributions of the participants.

Course material:

Course material will consist of course notes from the instructor, as well as some selected research papers. Certain textbooks can be used to augment sections of the syllabus. For the midterm and/or final project, certain commercial or publicly available tools and SW packages may be required. Students will be expected to learn to use these.

Grading:

Homework: 30 %

Midterm: 20 %

Final project: 50 %