



CpSc 863: Multimedia Systems and Applications

Introduction

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Attribution

- Materials and lecture notes in this course are adapted from various sources, including the authors of the textbook and references, Internet, instructor's personal notes, instructor's friends, etc.
- The instructor has tried to attribute all authors of the course materials.
- If you think that the instructor may overlook something, please tell the instructor.



What is Multimedia?

- Apps that involve more than conventional data types (e.g., text, drawing and images)
- Best examples are continuous media (e.g., animations, audio, and video)
 - Called continuous media because of its temporal nature



Multimedia Applications

- hypermedia courseware
- video-on-demand
- interactive television
- audio/video conferencing (GroupWare)
- virtual worlds (<http://www.activeworlds.com>)
- games
- multimedia authoring
- digital libraries
- web
- audio/video postproduction
- smart phones
- More ...



Why are we here?

- We are here to learn something that has been hot for years.
- Why Multimedia is so hot?
 - It is fun!!!
 - Interesting technique issues.
 - Huge application potential.
 - Digital audio and video is revolutionizing music, film, and video industries.
 - Smart phones have changed people's life.
- How hard is Multimedia?
 - It is easy and fun when you look outside in.
 - It is hard and boring when you look inside out.



Course Objectives

- This course will provide the students with an overview of multimedia technologies and the latest developments in multimedia systems.
- Students will be able to gain valuable hands on experience in multimedia systems and applications.
- Issues in effectively representing, processing, and retrieving multimedia data will be addressed
- Recent multimedia papers or technique reports will be presented or assigned as homework
- Upon completion of the class, the students will be able to:
 - Comprehend multimedia system fundamentals
 - Design and implement a multimedia application or identify a problem in certain multimedia area and provide a reasonable solution.





Reality

- ✿ This course will cover a lot of topics such that I will not get into details for every topics. It is your responsibility to dig into the references for details.
- ✿ Some topics in this course are so young that it might not have a best solution yet.
- ✿ Hard work is essential to succeed in this course.



Class Topics

- ✿ **Audio/Video Fundamentals**
 - ✿ Human visual/auditory system and perception
 - ✿ Video representations (analog and digital)
 - ✿ Audio representations (analog and digital)
 - ✿ Media processing algorithms
- ✿ **Signal Processing and Compression**
 - ✿ Image Compression (JPEG)
 - ✿ Standard video CODEC's (MPEG, H.26x)
 - ✿ HDTV (ATSC standard)
 - ✿ Layered source/channel coding
 - ✿ Standard audio CODEC's (MP3, G.72x, AC3)



Class Topics (Continue)

- ✿ **Operating System Support**
 - ✿ Real-time scheduling
 - ✿ Buffer management
 - ✿ File systems
 - ✿ Cache and storage systems
- ✿ **Network Support**
 - ✿ Network hardware (Sonet, ATM, Ethernet, and 1394/iLink)
 - ✿ Network protocols (link-level resource management, IP-multicast, RTP, SIP, etc.)
 - ✿ Systems services (e.g., continuous media toolkits, announce/listen protocols, receiver-oriented layered multicast, resource discovery, etc.)



Class Topics (Continue)

- ✿ **Web Technologies**
 - ✿ Web Server and Web Caching
 - ✿ Multimedia streaming
 - ✿ X3D/VRML, XML
 - ✿ Multimedia content delivery
- ✿ **Multimedia Databases**
 - ✿ Large-scale multimedia servers
 - ✿ Content based multimedia retrieval
 - ✿ Multimedia data mining
- ✿ **Synchronization**
 - ✿ Synchronization models
 - ✿ Static -vs- dynamic schedules
 - ✿ Distributed collaboration



Attendance

- ✿ It is very important to attend the class since the lecture contents are drawn from various sources.
- ✿ Failure to attend the course most likely leads to missing some information that won't show in lecture notes or textbook.



Grading Policy

- ✿ **Test #1 (25%):** Cover the contents studied in first half of the semester.
- ✿ **Test #2 (25%):** Cover the contents studied in second half of the semester.
- ✿ **Project (50%):** The instructor will provide a list of multimedia projects for students to choose from. The students should form teams of 2 persons by their own choice. Each team can choose one project from those provided by the instructor to work on. A team can also work on a project they propose upon the approval of the instructor.
- ✿ **Penalty Points (-10%):** Students are required to attend the class. The instructor may penalize those who fail to attend the class without instructor's approval.
- ✿ **Grading:** A (90 - 100), B (80 - 89), C (70 - 79), D (60 - 69), F (0 - 59). (The scale may be curved down at the end of the semester)





Website and Blackboard

<http://www.cs.clemson.edu/~jzwang/1501863/cpsc863.htm>
<http://bb.clemson.edu>

- ✿ Check website or blackboard regularly for latest announcements, updates, and assignments.
- ✿ All lecture notes and assignments will be posted on website or blackboard before or after the class.
- ✿ Useful links will be posted there too.
- ✿ Projects will be assigned in the second or third week.



Important Issues

- ✿ A successful project is the essential part of the success in this class.
- ✿ Start project as early as possible.
- ✿ Ask questions if you have any doubts on anything.
- ✿ Tests will be limited to those content in lecture notes.



References

- ✿ ACM Multimedia Conference Proceedings
- ✿ Fundamentals of Multimedia, Ze-Nian Li, and Mark S. Drew, Pearson Prentice Hall, October 2003.

