

CSE 4/60373: Multimedia Systems

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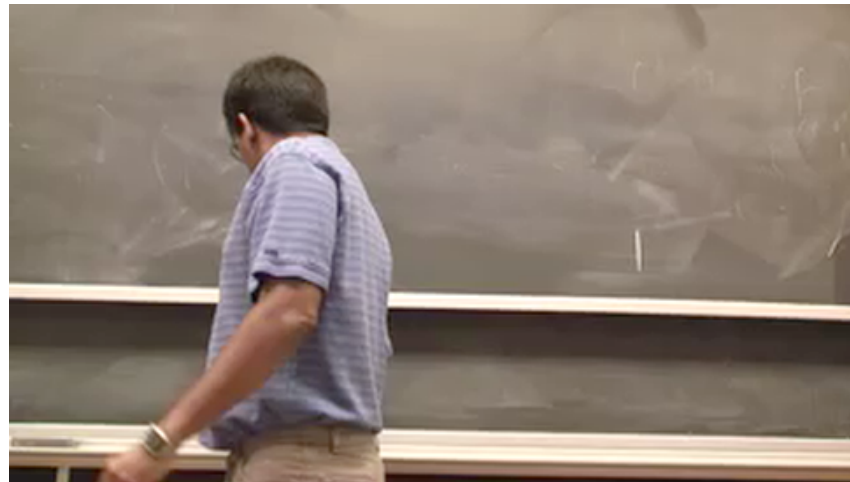
Outline for today

- ▶ High level introduction to Multimedia Systems
- ▶ Course policies:
 - Course goals, organization and expectation
 - Grading policy, late policy, reevaluation policy
 - Academic honesty



Definition: Multimedia

- ▶ Systems operating on multiple modalities: text, audio, images, drawings, animation, video etc.
 - Some would like to restrict it to systems that simultaneously operate on more than one modalities. Others are more forgiving.
 - Audio/video vs video
 - Synchronizing multiple modalities is important and hard



Example Multimedia Applications

- ▶ Video teleconferencing, distributed lectures, telemedicine, tele symphony
- ▶ White board, collaborative document editing
- ▶ Augmented reality
- ▶ DVDs, digital movies, VOIP telephony (Vonage, Skype) ...
- ▶ Networked games
- ▶ Video on demand (from cable TV, satellite etc.), IPTV (AT&T U-verse)
- ▶ Can you think of more applications?

- ▶ YouTube.com, founded in Feb 2005
 - Every minute, 10 hours of video is uploaded



Hypermedia and Multimedia

- ▶ A **hypertext** system: meant to be read nonlinearly, by following links that point to other parts of the document, or to other documents
- ▶ • **HyperMedia**: not constrained to be text-based, can include other media, e.g., graphics, images, and especially the continuous media – sound and video.
 - The World Wide Web (WWW) — the best example of a popular hypermedia application.



SMIL (Synchronized Multimedia Integration Language)

- ▶ **Purpose of SMIL:** it is also desirable to be able to publish multimedia presentations using a markup language.
- ▶ A multimedia markup language needs to enable scheduling and synchronization of different multimedia elements, and define their interactivity with the user.



Characteristics of Multimedia

- ▶ Depends on the usage model. Streaming movies different than downloading movies
 - Watching videos in Bluray different than IPTV
- ▶ Objects are large
- ▶ High timing constraints – inter and intra media
 - TV frames refreshed every 30 frames. Audio synched with video with tight tolerances
 - MMORG games – if you shoot your opponent first, the opponent should die
- ▶ Media for human consumption can exploit aspects of human cognition to achieve good performance (vs media for processing – face recognition)
 - We can see changes in brightness better than changes in color



Tools

- ▶ Adobe suite, Apple suite etc.



Multimedia Authoring Metaphors

- 1. Scripting Language Metaphor:** use a special language to enable interactivity (buttons, mouse, etc.), and to allow conditionals, jumps, loops, functions/macros etc. E.g., a small Toolbook program is as below:

```
-- load an MPEG file
extFileName of MediaPlayer "theMpegPath" =
    "c:\windows\media\home33.mpg";
-- play
extPlayCount of MediaPlayer "theMpegPath" = 1;
-- put the MediaPlayer in frames mode (not time mode)
extDisplayMode of MediaPlayer "theMpegPath" = 1;
-- if want to start and end at specific frames:
extSelectionStart of MediaPlayer "theMpegPath" = 103;
extSelectionEnd of MediaPlayer "theMpegPath" = 1997;
-- start playback
get extPlay() of MediaPlayer "theMpegPath";
```





- ▶ Slide Show Metaphor: A linear presentation by default, although tools exist to perform jumps in slide shows.
- ▶ Hierarchical Metaphor: User-controllable elements are organized into a tree structure — often used in menu-driven applications.
- ▶ Iconic/Flow-control Metaphor: Graphical icons are available in a toolbox, and authoring proceeds by creating a flow chart with icons attached
- ▶ **Frames Metaphor:** Like Iconic/Flow-control Metaphor; however links between icons are more conceptual, rather than representing the actual flow of the program



- ▶ **Card/Scripting Metaphor:** Uses a simple index-card structure — easy route to producing applications that use hypertext or hypermedia; used in schools.
- ▶ **Cast/Score/Scripting Metaphor:**
 - Time is shown horizontally; like a spreadsheet: rows, or tracks, represent instantiations of characters in a multimedia production.
 - Multimedia elements are drawn from a cast of characters, and scripts are basically event-procedures or procedures that are triggered by timer events.
 - Director, by Macromedia, is the chief example of this metaphor. Director uses the Lingo scripting language, an object-oriented event-driven language.

What areas does Multimedia touch

- ▶ Multimedia application touches on most of the fun components: games, movies etc. Multimedia require technologies from across CS, arts etc.
- ▶ **Networks and Operating Systems:** Media objects have real time constraints, objects are large
 - OS scheduling, storage system design, data block placement, network management, routing, security etc.
- ▶ Multimedia coding: Content analysis, retrieval, compression, processing and security
- ▶ Multimedia tools, end systems and applications: Hypermedia systems, user interfaces, authoring systems ...



Topics to be covered

- ▶ Most of the topics from the book, get people up to speed and then discuss recent work from papers.
- ▶ Focus on breadth rather than depth. There is way too much to cover as it is.



Grade distribution

- ▶ **Home work assignments: 7 x 8 pts**
 - We will have seven written take home assignments (even two weeks)
- ▶ **Home work projects: 2 x 9 pts**
 - We will have two projects to experiment with the technologies that we discuss. Projects are groups of two.
- ▶ **Mid term exams: 10 pts, Final Exams: 16 pts**
 - in class, open book/notes affair
- ▶ Minimal programming – many of the low level components are quite hard to code.



Homework projects

- ▶ **Projects are group (ideally two) efforts.**
- ▶ Each project should be electronically turned in with a succinct report on what you learned
- ▶ Maximal freedom in trying out ideas



Reevaluation policy

- ▶ Arithmetic errors, missed grading will be reevaluated promptly
- ▶ I encourage you to discuss concerns with your solution with me
- ▶ I discourage re-evaluation of partial credits (partial credits are based on the complexity of your solution and the overall class performance):

- Football penalty policy:

If you think you deserve a better partial grade, write down the reason why you think that you deserve a better grade and how many extra points you think you deserve. If I agree, you could get up to this many extra points. If I disagree, you will lose this much points. You can increase your odds by performing experiments to prove your answer



Late policy

- ▶ None – Projects/homework/critiques are due at 1:55 pm (right before the beginning of class). **I do not accept late submissions** (not even a second)
- ▶ Please contact me regarding unforeseen emergencies



Academic Honesty

- ▶ Freedom of information rule:
 - Collaboration is acceptable (even for individual efforts such as take home assignments as long as you follow the rules of this course)
 - To assure that all collaboration is on the level, **you must always write the name(s) of your collaborators on your assignment.** Failure to adequately acknowledge your contributors is at best a lapse of professional etiquette, and at worst it is plagiarism. Plagiarism is a form of cheating.



Academic Honesty – Gilligans Island Rule

- ▶ This rule says that you are free to meet with fellow students(s) and discuss assignments with them. Writing on a board or shared piece of paper is acceptable during the meeting; however, you may **not take any written (electronic or otherwise) record away from the meeting.** This applies when the assignment is supposed to be an individual effort. After the meeting, engage in half hour of mind-numbing activity (like watching an episode of Gilligan's Island), before starting to work on the assignment. This will assure that **you are able to reconstruct what you learned from the meeting, by yourself, using your own brain.**

