University of Michigan Lecture Archiving

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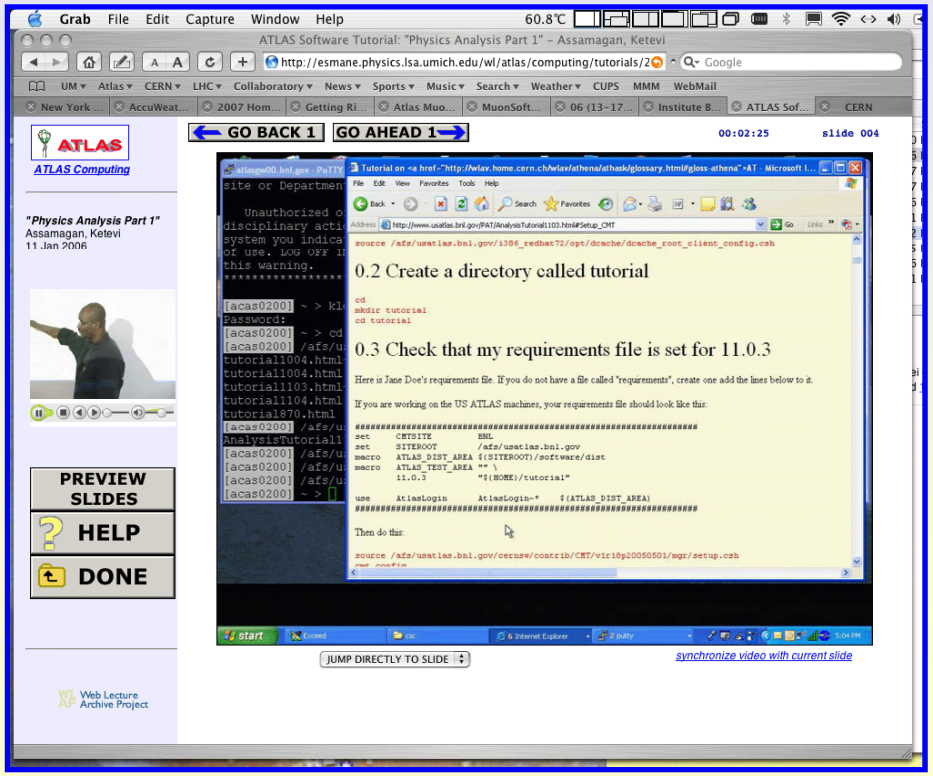
CHEP 2007, Victoria, B.C.

What is a Web Lecture?

- Media-rich presentation viewable by anyone in the world with:
  - any web browser
  - RealPlayer plug-in
- Media streams:
  - lecturer's audio
  - lecturer's video (low bandwidth)
  - high-res slide images
  - high-res chalkboard images
- Features
  - slide index
  - ability to "jump around"
  - platform independence
  - low bandwidth
  - ability to evaluate usage



Quick History

- 1997: Charles Severance wrote initial software for synchronized playback of audio/video/slides
- 1999: Our team started recording/archiving CERN Summer Student Lectures in 1999
- 2001 – 07: funded by ATLAS to record key events (ATLAS Weeks, tutorials, workshops)
- 2003 – 04: funded by NSF to develop tracking camera
- 2006 – 07: MScribe Pilot Project
  - recorded 8 entire U-M courses using automated carts
- Our archive now has 1600+ lectures

Makeup of Lecture Archive

- The ATLAS experiment
  - software tutorials
  - physics workshops
  - large meetings
- Special CERN events and workshops
- Special University of Michigan events
- U-M Saturday Morning Physics (since 2001)
- American Physical Society (APS) meetings
- Int'l Conference on Systems Biology 2005 at Harvard
- MScribe classroom recordings (2006-07)

ATLAS Recordings

- list of recordings this year
- graph of how many recordings

MScribe

- Overview

MScribe – Technical Achievements

- 8 courses recorded
- venues, size of classes
- used with Tablet PC in Statistics review sessions
- chalkboards captured
- got automatic processing software operating more smoothly

MScribe – Pedagogical Results

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Student use patterns

Use MScribe?

Yes – 58%

MScribe access method?

Web	78%
iTunesU/iPod	15%
Both	7%

No – 42%

Why not?

I get what I want from class already	67%
I tried but couldn't	26%
They weren't posted when needed	16%
It's difficult to find needed content	13%

Changes in classroom activities attributed to MScribe usage (%)

	Increased	Decreased
Studying for exams	69.2	3.8
Reviewing lecture content / notes	60.0	7.7
Taking notes	36.2	9.2
Reading/preparing for class	29.2	3.8
Writing papers/projects	21.7	.8
Asking questions outside of class	16.3	8.5
Attending lecture	8.5	33.1*

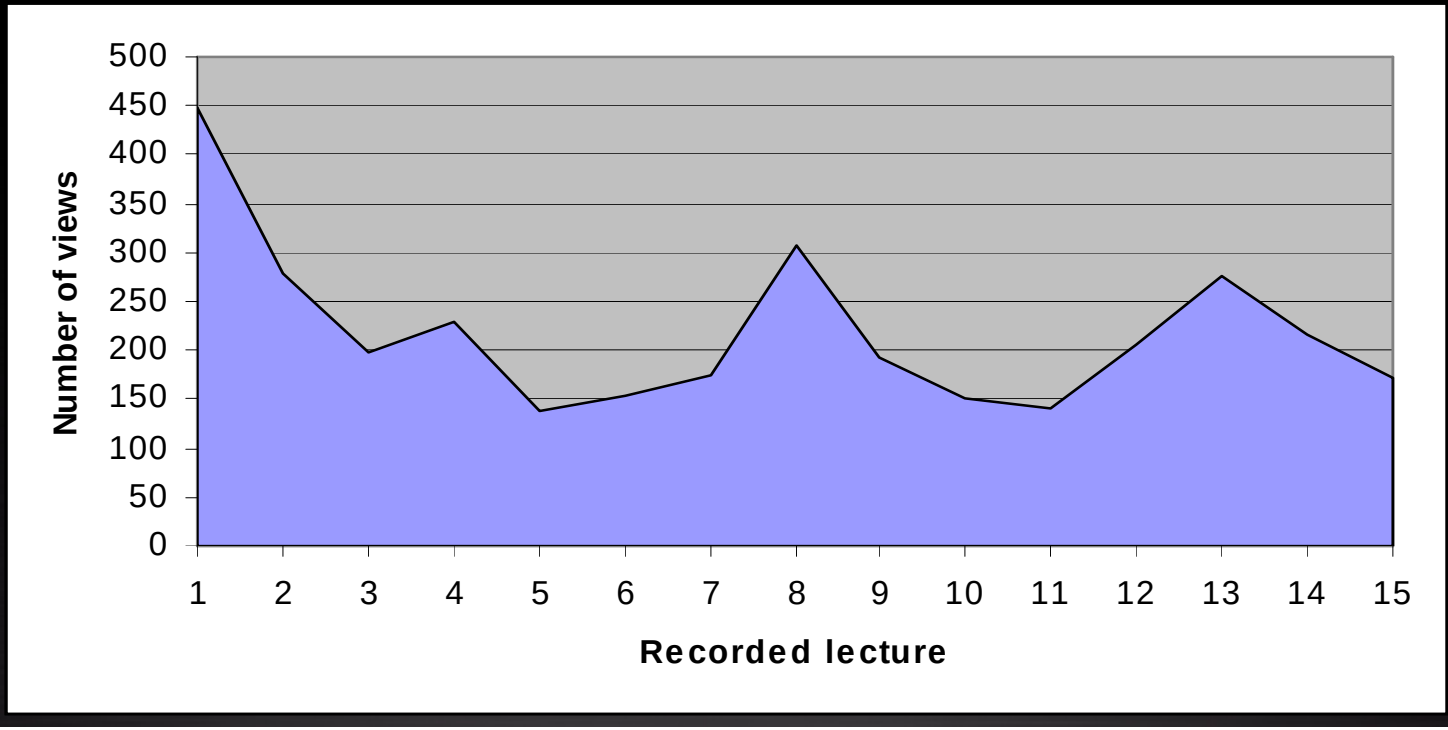
* note: faculty discerned no drop in attendance

Focus group findings

- MScribe technology allows students to pay closer attention to the *ideas* in a lecture.
- Some use the live lecture to outline important points and to “absorb” the information, and detail the notes by listening again later.
- Student use patterns differ.

The dark secrets of the server log

- Of 434 students taking intro psych class:
  - 398 tried the system; 294 had 3 or more viewing sessions
  - 99 used it 12 or more times



Viewing individual lectures

- Preliminary analysis of lecture on brain structure in Psych 111 reveals:
  - Average viewing time 28 minutes
  - Viewing patterns tend to be sequential, with “fast forwarding” through slides, as opposed to “selective access” model
  - Only 14% of viewers use the thumbnail navigation tool
- Re-use of lecture archive for exam and general review efforts

MScribe benefit to ATLAS

- MScribe recording system now installed on a laptop
- Drastically more portable than cart, can be taken all over the world
- Allows us to post ATLAS talks faster
- Laptop system used to record ATLAS meetings:
  - Physics Analysis Tools Workshop (April 2007, Norway)
  - CTEQ Workshop (May 2007, Gull Lake, Michigan)
  - ATLAS Week (July 2007, Glasgow)
  - UM-CERN REU Student Talks (August 2007, CERN)
  - First ATLAS Physics Workshop of the Americas (August 2007, SLAC)
- Have recorded 5 events and 120 talks with the laptop-based system

Tracking Camera - Achievements

- Developed automated tracking system using IR necklace and CCD cameras
- Used IR tracking to record 8 courses in 2006-2007
  - production system, but only worked in ideal conditions
  - confounded by incandescent lights and sunlight
- Made improvements to IR tracking system
  - optimized filter arrangement
  - found extremely bright LEDs
  - fully exploited camera settings
  - can now be used in all rooms on campus
- Tested Position Sensitive Detectors (PSDs)
  - only works effectively at close range
- Tested IR Quad Detectors
  - promising but requires pan-tilt platform

Tracking Camera Current Research

- Necklace Design
  - testing fiber-optic options
  - parallel chain of wide-angle IR LEDs (120°, 8mW/sr)
  - super-bright Malaysian (120°, 45mW/sr) with special high-current circuitry
- Testing Tracking Algorithms
  - Modularizing current code
  - Generating database of position data
  - Trying to mimic human camera operator
- Flashing LED necklace
  - will further improve signal-to-noise ratio
- Ultrasonic Phase-Difference array
  - no competing noise in that medium
  - can use time difference between ultrasonic receivers to calculate angle
  - can hopefully eliminate need for pan-tilt platform

U-M Campus-Wide Recording Service

- Already developed expertise and hardware/software tools over 8 years
- Have trained staff in place
- Requesting start-up funds from University to start a campus-wide recording service
- Because everything is digital and mostly automated, costs/pricing are low

The Future

- Totally automated room installations
  - record lectures at times specified in online agenda
- ultra-portable recording carts
- desktop recording software
- many display formats available
- multiple-person (and audience) tracking
- integration with SMAC

People

- Homer A. Neal – PI, Director
- Steven Goldfarb – Advisor, Research Scientist
- Jeremy Herr – Project Manager
- Tushar Bhatnagar – Engineering Student (IR tracking)
- Robert Vogt – Electrical Engineer (ultrasound tracking)
- Mitch McLachlan – Media Specialist (recording processes)
- Curtis Hiller – Web development, programmer intern
- Alumni
  - Jim Irrer
  - Cang Ye
  - Giosue Vitaglione
  - Eric Myers

Links

- Web Lecture portal:
  - http://www.wlap.org
- ATLAS Collaboratory Project
  - http://vesuvio.physics.lsa.umich.edu/acp