MScribe is a system for recording and playing back classroom lectures on the web. It produces a video of the presenter; high-quality audio; snapshots of board work; documentation of media materials; and an index to the material. This technology was developed at the University of Michigan (UM) by the ATLAS Collaboratory Project (ACP), led by Physics Professor Homer A. Neal, with support from the National Science Foundation. This project has been generating novel technologies and social interfaces for scholarly exchange and collaboration since 1997. The ACP Team has recorded over 1300 web lectures for use applications. MScribe is a version of their system that is especially adapted for classroom lectures that emphasize visual media, requires almost no adjustment by the presenter, and functions without the aid of a camera operator.

The success of web lecture recording systems was immediately evident in 1999 when the ACP Team recorded hundreds of lectures in the prestigious CERN Summer School in Geneva, a program attended by approximately 150 of the top science undergraduates in Europe. The powerful positive responses sent by viewers, and requests for more recordings for the ATLAS experiments (an international collaboration of physicists located at CERN in Switzerland), encouraged the further development of the ACP recording techniques in collaboration with Charles Severance in the UM Digital Media Commons. In the next seven years, the technology research and development team gained experience in working with numerous recording settings for audiences who wanted easy access and high-quality documentation. The technology reflects that extensive experience, with exceptional quality in methods for documenting and publishing lectures mainly in the sciences. The ACP Team’s basic system has been deployed in the recording of workshop presentations from CERN, the home of the world wide web, to biology workshops at Harvard, to meetings of the American Physical Society, and the Saturday Morning Physics lectures at the University of Michigan. In 2006, this system was piloted for classroom teaching across a spectrum of disciplines, including the humanities, for the first time.
What makes MScribe Different?

Several factors distinguish MScribe from other lecture capture systems.

- Visual content is available not only to be viewed, but also – because it is indexed – to be viewed selectively.
- The lecturer is videotaped (not only audio taped).
- Through the use of a novel infrared tracking system, a robotic tracking camera follows the lecturer as he/she walks about the lecture space wearing an infrared-emitting necklace—freeing the lecturer from being anchored to a podium and eliminating the operational costs of a camera operator.
- Spontaneous board work and slides are captured as still images.
- All these media feeds are synchronized during the replay mode, so viewers can review such elements of lecturers as the logical argument, comparisons, explanations, questions posed for review, questions the students have during the lecture, and so on.

The MScribe Project

Along with the ACP Team, the MScribe project includes a team to study the pedagogical effects of this transformative technology. Researchers from the Center for Research on Learning and Teaching (CRLT) and the Center for the Study of Higher and Postsecondary Education (CSHPE) are collaborating with the ATLAS Collaboratory Project Team on both the implementation and evaluation of the project. The study will examine use by students, GSIs, and faculty; impacts on teaching and studying; and impacts on student learning. (The specific foci will be developed in partnership between the MScribe project team and individual faculty who choose to participate.)

In 2005-2006, the MScribe project received funding from University of Michigan schools and colleges (see last page). The technology was piloted in a classroom for the first time, documenting all the lectures in the large Physics P140 course, for the second half of Winter Term.

During the 2006-2007 academic year, MScribe technology will record courses, focusing on a small number of classrooms. The research team will document how the technology is used and its pedagogical value.

Technological Achievements

The project team has sought to automate nearly every step of classroom lecture recording. The team has developed new recording and publishing techniques, which include:

- hardware and software solutions to automate the encoding, compression and synchronization of audio, video and slides;
- a proposed XML software programming standard, called Lecture Object by the ACP Team, to facilitate the archiving and sharing of multimedia presentations in an open fashion;
- a robotic camera tracking system to remove the need for a camera operator and be sufficiently robust to operate in a variety of room lighting environments;
- software to harvest text from captured slides, leading to association of the resulting metadata with relevant sections within a lecture and radically improved search capabilities.
Advantages of MScribe

Promotes Improved Student Learning

- Access to web lectures may allow students to grasp higher volumes of classroom material
- Access to web lectures may allow students to gain a deeper understanding of classroom material
- Access to web lectures may result in more efficient study habits
- Since students have ready access to classroom lectures, in class interactions may evolve from being mainly content-based questions to more thought-provoking discussions

Provides Resources for Instructors

- Resulting archive is available for revising the next iteration of a lecture
- Archived lectures can be used as resources for class discussion, either in the immediate term or in a future term
- Recorded lecture material can provide better cohesion between lectures and discussion sections
- Lectures can include questions for further study, for students to come back to
- Recording requires no extra effort by instructors
- Develops new knowledge on student learning for the university community
- Study of student and faculty use can help shape future technology developments to enhance learning and pedagogy
- Study can guide faculty choices of emergent technologies and strategies for use

Our deep interest in this project is due to its potential for eventually transforming the instructional process in higher education.

See MScribe for yourself at the following links to example lectures.

At the URL below, click "View Lecture." The captured lecture will then play. If you want to experiment with navigating the materials, click "Preview Slides" and a slate of the presentation slides will appear. Click on the slide you want to start from, then click "Synchronize...." at the bottom, and the lecture will jump to that point.

A talk by Randy Bass, an American Studies professor from Georgetown, who gave the keynote address at the CRLT Provost's Seminar on IT at the University of Michigan in May 2005:

<http://mscriebass.notlong.com>

A lecture given by David Winn in his Physics 140 class at the University of Michigan during the Winter Term 2006:

<http://mscribesample.notlong.com>
Want to Learn More about MScribe?

Feel free to contact us with any questions!

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**Homer Neal**, Professor of Physics: haneal@umich.edu

### MScribe Project Members

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<td>Homer Neal</td>
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### Organizations Involved with MScribe

The goal of the ATLAS Collaboratory Project (ACP) is to study and advance the technologies and practices required for the organization and execution of modern, large-scale collaborative research experiments and for facilitating the delivery of web-based educational material. Accomplishments of the Project to date include the development and testing of protocols for transatlantic videoconferencing using QoS, the creation of innovative video capture and compression techniques, work on the development of a Lecture Object standard, an early assessment of the value of web lectures in training applications, and the development of speaker tracking technologies.

The Center for Research on Learning and Teaching (CRLT) is dedicated to promoting excellence and innovation in teaching and learning at the University of Michigan. CRLT includes twelve instructional consultants who have doctoral degrees, university teaching experience, and expertise in faculty development. CRLT works collaboratively with instructors at all levels, and with the academic administration, to develop a University culture that values and rewards teaching, supports innovation, and encourages the creation of learning environments in which diverse students can learn and excel. CRLT programs focus on faculty development, evaluation research, instructional technology, interdisciplinary teaching, and multicultural teaching and learning.

The Center for the Study of Higher and Postsecondary Education (CSHPE) was one of three such centers established in 1957 with a grant from the Carnegie Foundation of New York. The only one remaining, for five decades CSHPE has been the nation’s premier preparation program for higher education leadership and has been consistently ranked as top in its field by polls within and outside of education. CSHPE prepares professionals and academics who understand, lead, and change institutions of higher education so they can markedly influence and improve postsecondary education in the 21st century. The scholars who comprise the CSHPE faculty have expertise that spans a wide range of fields of study, including issues affecting higher education from the perspectives of organizational behavior and management, public policy, academic affairs, student development, assessment, and evaluation.

### University of Michigan Contributors to the MScribe Project

| College of Literature, Science and the Arts | M-GRID |
| College of Engineering                     | Bluestream |
| School of Medicine                          | Center for Research on Learning and Teaching |
| Bioinformatics Program                       | Center for the Study of Higher and Postsecondary Education |
| School of Education                          | Department of Physics |