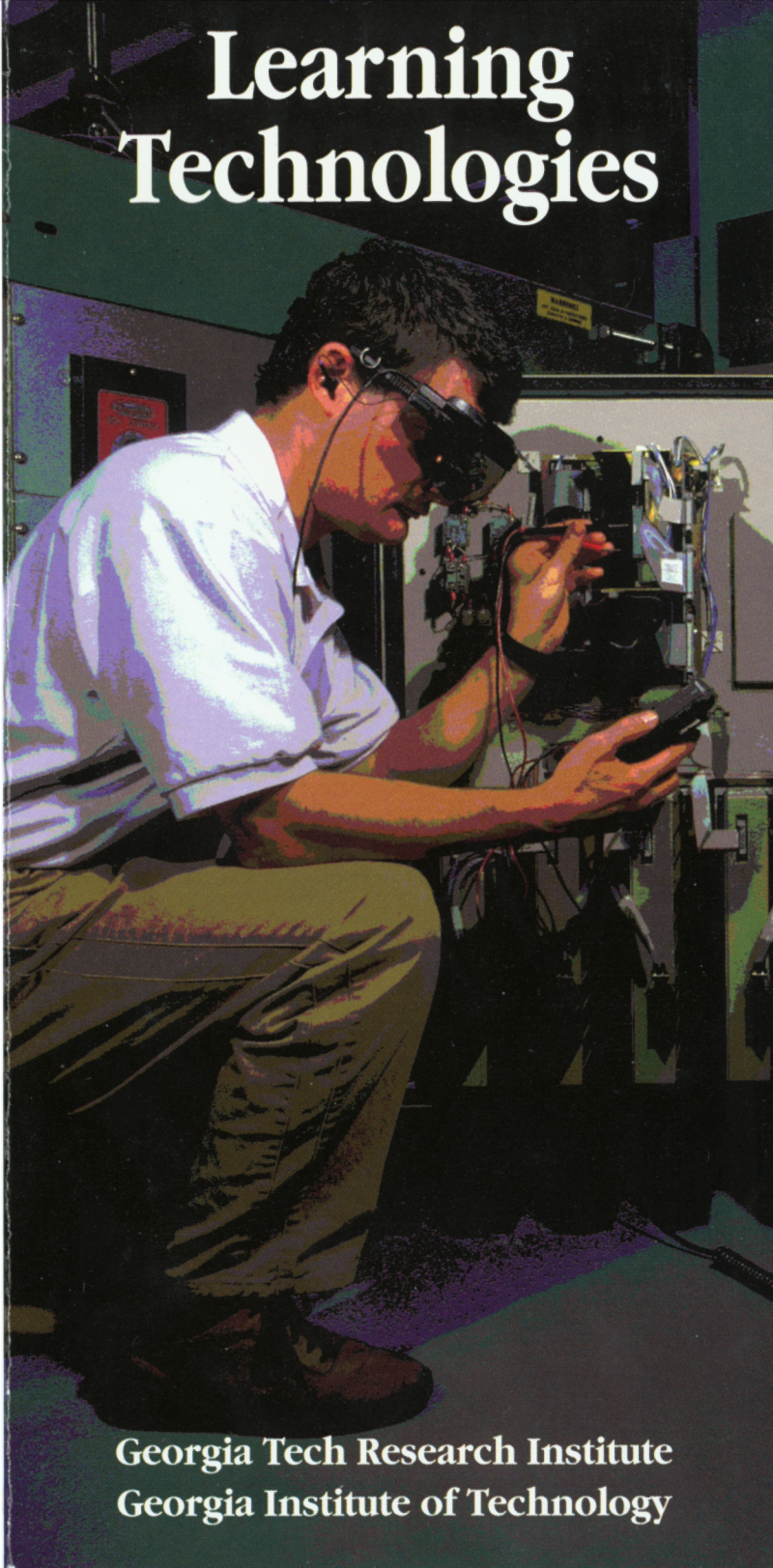
Learning Technologies



Georgia Tech Research Institute
Georgia Institute of Technology

Introduction

The Learning Technologies Initiative of the Georgia Tech Research Institute (GTRI) is a multidisciplinary research and development program applying advances in information and communication technologies to traditional and emerging learning needs. Organized in 1992, the Learning Technologies Initiative is focusing GTRI and Georgia Tech capabilities in areas such as: instructional technology, software engineering, computer graphics/visualization, interface design, and electronic communications systems.

The goals of the Initiative are to

- create learner-centered applications for measurable success;
- apply educational technology research to the needs of the Georgia Tech campus, teachers and students in public school science and mathematics classes, industry, and government agencies;
- develop multiple stakeholders including educators, students, families, industry, and communities to improve the use of technology in education.

The initiative has established relationships with other similarly focused Georgia Tech programs, including the EduTech Institute and the Center for Education Integrating Science, Mathematics, and Computing (CEISMC), along with complementary efforts outside Georgia Tech.

Key research capabilities include

- learning-technology development;
- learning-technology evaluation;
- design and implementation of learning environments;
- design and implementation of user interfaces;
- evaluations of implications of learning technology for learning theory.

On the cover: **The Factory Automation Support Technology project is improving workers' capabilities for hands-free learning while working.**

Focus Areas

Electronic Performance Support Systems

When industrial maintenance or operational staff need to learn more about how to do their jobs, they usually have to leave the factory floor to take classes or to consult books, manuals, or computer databases. GTRI's Factory Automation Support Technology (FAST) project aims to give industrial personnel the capability of learning while working. GTRI engineers are developing an integrated system that allows workers to see the image of a computer screen projected on special-purpose safety glasses while maintaining an unimpeded view of their immediate workplaces. The computer screen carries the output of a voice-activated portable computer attached to the worker's belt. The worker also wears an audio headset for accessing more information and a wireless data link that connects the portable computer with information on other computers. *For further information, contact Chris Thompson at 404/894-6143 (E-mail: chris.thompson @gtri.gatech.edu).*

Multimedia Courseware Development

GTRI's Multimedia in Manufacturing Education (MIME) project is creating the infrastructure and resources necessary to enhance manufacturing education in the classroom and on the job. Current activities include

- development of a manufacturing-focused multimedia development resource;
- rapid infusion of educational technology into the manufacturing curriculum, at both university and professional levels;
- production, evaluation, and dissemination of interactive manufacturing-related courseware;
- development of courseware to support instruction in design and systems dynamics;
- research to understand the utility of, and improve the effectiveness of, interactive learning technologies;

- study of mobile computing in manufacturing;
- development of just-in-time human-performance support systems.

One major accomplishment of the MIME project is construction of the dedicated multimedia design-and-production facility for manufacturing education located at Georgia Tech's Manufacturing Research Center. Staff members also have begun the first joint development effort with the Society of Manufacturing Engineers to create and disseminate multimedia education products.

Current activities include development of a nondestructive-testing intelligent tutor for Boeing under National Science Foundation sponsorship; ergonomics task analysis trainer and interactive video for production managers; the Factory Automation Support Technology project (see preceding section); and the PoultryPlus project (see next section). *For further information, contact Wayne Daley at 404/894-3412 (E-mail: wayne.daley@gtri. gatech.edu).*

Cable TV Distance-Learning Applications

With their high-bandwidth data-transmission lines, cable-television companies have strong potential as computer-network information providers. In a research project sponsored by Cox Enterprises, GTRI research engineers recently adapted a commercialized cable set-top box so that students can tune into a broadcast video of a class and exchange information with the teacher at low data-transmission rates. Scientific-Atlanta donated their 8600 advanced analog set-top and other equipment for the cable testbed. Because the set-top box is microcontroller-based, it provides a much less expensive solution than computer-based systems that offer similar programming services. GTRI researchers have designed a multimedia presentation in which students view a live video broadcast of a class in the upper part

Researchers have developed multimedia courseware that is creating opportunities for collaborative work by college students beyond the traditional classroom.

of their television screen, while using the set's remote controller to answer test questions in a panel on the lower part of the screen. *For further information, contact Daniel Howard at 404/894-3541 (E-mail: daniel.howard @gtri. gatech.edu).*

K–12 Science and Mathematics Applications

GTRI is equipped to assist K–12 school systems in using the emerging National Information Infrastructure,

through technology implementation plans; network planning and management; installation; and training and support. GTRI seeks to form partnerships with educators and regional technology-support centers to co-develop curriculum supplements. These materials will promote the use of computing and networking capabilities by classes as well as by individual families and community organizations. One current research project sponsored by the Georgia Poultry Federation is PoultryPlus, an interactive multimedia learning tool that presents information on the poultry industry. Presentations such as PoultryPlus provide "real-world" applications of technology that teachers can use to enrich math and science classes in a visually engaging way. *For further information, contact Margaret Horst at 404/894-3578 (E-mail: margaret.horst@gtri.gatech.edu).*

World Wide Web Applications

An emerging body of research suggests that interactive-multimedia presentation technologies offer unique advantages for various types of information-dissemination efforts, including technology transfer and training programs. With sponsorship from the U.S. Environmental Protection Agency, a GTRI research group is evaluating this claim by developing and testing an interactive multimedia tutorial to disseminate knowledge on a complex environmental-research topic. In phase one, researchers have created a World Wide Web site; phase–two plans call for them to evaluate the effectiveness of the site for targeted audiences and expand the information content beyond that contained in the introductory tutorial. They are exploring the utility of a Web site as an example of interactive multimedia because of the relatively low bandwidth needs of the tutorial's illustrations and its low cost of production, distribution, and revision as compared with multimedia presentations in video-based or CD-ROM formats. *For further information, contact Mark Hodges at 404/894-6987 (E-mail: mark.hodges@gtri. gatech.edu).*

Research Sponsors and Partners

- Boeing
- Cox Enterprises
- Georgia Center for Advanced Telecommunications Technology
- Georgia Poultry Federation
- National Science Foundation
- Scientific-Atlanta
- State of Georgia
- U.S. Environmental Protection Agency

Contact Information

Claudia Huff
Senior Research Associate
Georgia Tech Research Institute
Georgia Institute of Technology
Atlanta, Georgia 30332-0837
Voice: 404/894-3941 FAX: 404/894-2184
E-mail: claudia.huff@gtri.gatech.edu

Georgia Tech researchers are helping K–12 teachers make better use of educational resources on the Internet.

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