Communication Technology Laboratory

Michigan State University in East Lansing and San Francisco
I N T R O D U C T I O N

The Communication Technology Laboratory explores affordances of evolving technology to design experiences. We develop award winning real world projects and research prototypes, cognizant of our role as inventors of new media genres. Often our design projects are meaningful and emotional, touching human needs and social issues. Sometimes our explorations delve into existential philosophies of what it means to be human, how we learn, how we interact with the world and each other.

Four faculty principal investigators lead Comm Tech Lab areas of inquiry. Telecommunication Professor and Lab Director Carrie Heeter lives in San Francisco and works full time for Michigan State University. Her work includes "being virtual," ways of integrating virtual participants with physically present groups, mixed realities (technology-enhanced physical experiences and reality-enhanced virtual experiences), and virtual learning. Heeter leads three overlapping Comm Tech Lab areas: *Technology-Enhanced Learning, Social Presence,* and *Mixed Realities.*

Journalism Professor Darcy Drew Greene is leader of the *Storytelling and Evocative Interfaces* group. She uses her photojournalism and design background to approach the opportunities of new media, most recently producing a series of engaging, deeply personal patient information products (each requiring 2 years of production) such as "Easing Cancer Pain" and the nearly finished "Completing a Life" CD-ROM and web site.

Telecommunication Assistant Professor Brian Winn joins the Comm Tech Lab in August 2001 as leader of the *Immersive Media Experiences* group. Brian's background in computer science and years of experience programming and managing past Comm Tech Lab projects combine with his interest in webcasting, interactive video, and game technologies to open this new realm of Comm Tech Lab innovation.

Horticulture Professor and Michigan 4H Children's Garden curator Norm Lownds officially joins the Comm Tech Lab as principal investigator this summer. Lownds, Heeter, and Winn have collaborated for four years on innovative technological enhancements and extensions to the children's garden. We are currently funded to develop a "Connected Gardens" model linking children's gardens in substantive ways for science learning and fun, and to create a webcam observatory for scientific observation. Lownds leads the *Technology Enhanced Gardens* group.

Across the diversity of areas, Comm Tech Lab Principal Investigators share a focus on the nuances of design and unique potentials of technology to apply to particular participants and subject matter.

The Comm Tech Lab partners with faculty and other experts in a variety of content realms. Our projects are funded through project grants and research grants. Graduate and undergraduate student interns and employees are essential members of each group.

LAB DIRECTOR/GROUP LEADER/PI Carrie Heeter

All four Comm Tech Lab Principal Investigators innovate through being immersed in the real world projects we develop, integrating insights and perspectives across projects and over time. Perhaps none is more extreme in this than Carrie. A recent Philadelphia Inquirer article about the Fourth International Workshop on Presence wrote: "Keynote speaker Carrie Heeter, a professor at Michigan State University, might be considered Exhibit A for the use of virtual reality in the classroom." She has participated in the university community for four years as a virtual being. Inverting assumptions is an interesting technique for examining theoretical and philosophical paradigms. Most scholars' thinking and writing about presence starts with an implicit assumption that fleeting moments presence are the exceptional, occasional experience, while unmediated reality and less-than-present media are the dominant human experience. Heeter's experiences of living, teaching, collaborating, maintaining collegial, family and friendship relationships, and working remotely provide deep insights into virtual existence as she works on projects related to technology-enhanced learning, social presence, and mixed realities.

Here's a diagram of these overlapping areas and proposed, current, and recent projects.
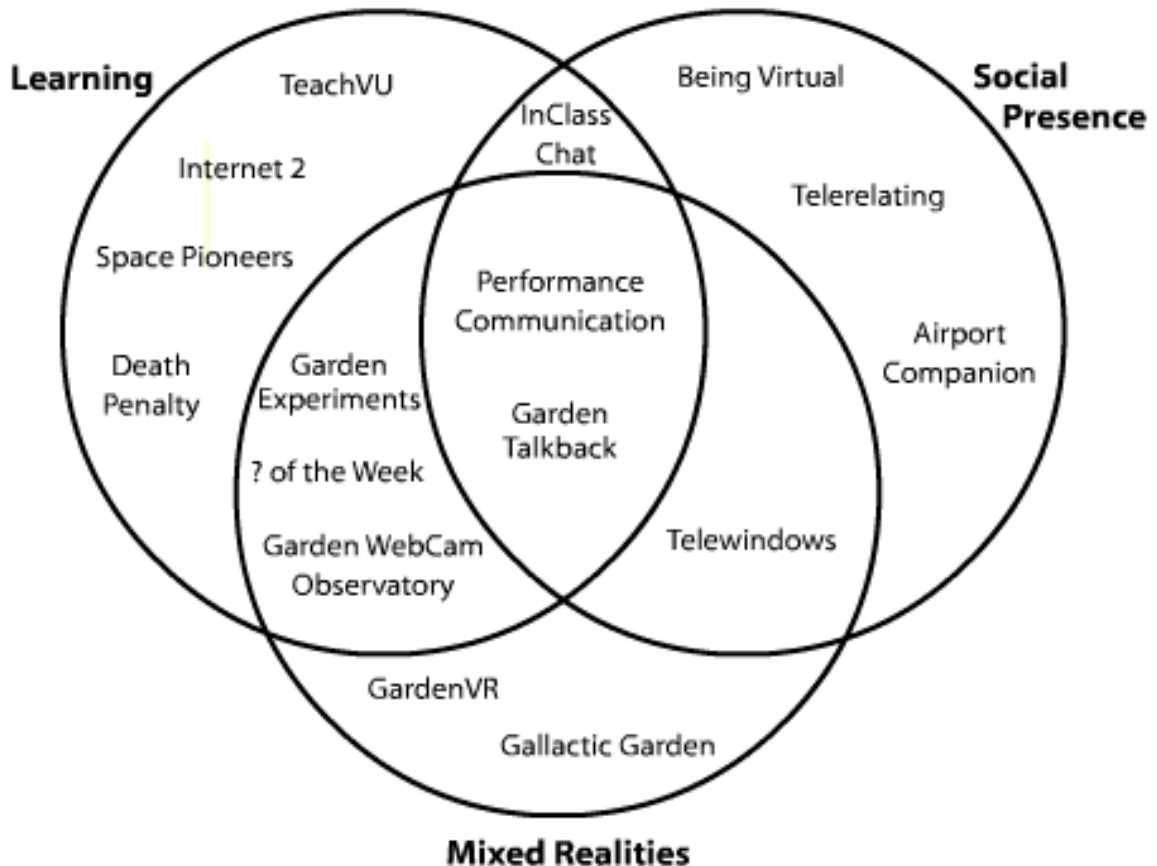

Heeter's involvement with online learning, both through teaching and refining her own courses and through her work with MSU Virtual University producers and programmers, yield insights and understanding of how to connect with students and how to facilitate learning. This spring she was a guest on the Todd Mundt show on NPR talking about online

learning. She is developing a website, "TeachVU" presenting advice and examples from the best of MSU Virtual University courses to help faculty new to online teaching plan their virtual courses. She chaired an MA thesis project to implement and test "InClass," a live chat system with selectable avatars which lets students know how many other students are visiting class pages at the same time.

Heeter wrote the white paper on Technology-Enhanced Learning for the Internet 2 conference in Ann Arbor, and updated the content for an International Communication Association conference panel a year later.

With grant funding and in collaboration with the Death Penalty Information Center, she created death penalty information web sites tailored to use in high school history, social studies, and English classes. The sites have won more than 15 awards for content, design, and educational value. The student site contains only death penalty information content. A parallel teacher's site includes that content plus teacher introductions to each section and a choice of two two-week lesson plan suggestions on how to use the site in class. Each section of the sites is printable, to accommodate differences in computer access and to give teachers flexibility in how the content is used. Teachers and students also have email access to the most-quoted death penalty authority in the U.S., Richard Dieter, director of the Death Penalty Information Center.

Heeter, Winn, and Lownds are working with Education Professor Rhonda Egidio, the MIND Lab, and other faculty in Education on a Virtual Space Camp proposal ("Space Pioneer Learning Adventures").   This project would fit to some degree with each of Heeter's scholarship areas.
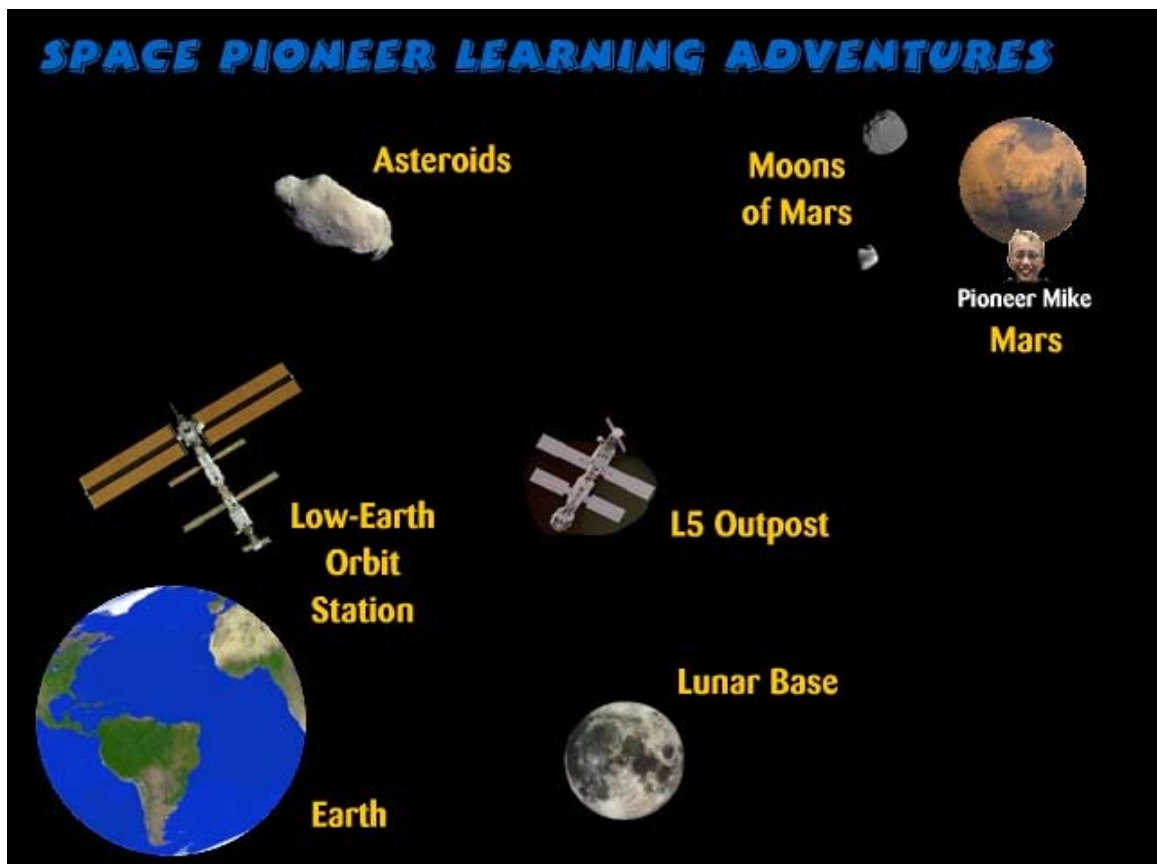
A central application area for Comm Tech Lab research and design has been our close collaboration with the MSU Children's Garden. We have submitted proposals to NSF, two to Ameritech, one to Michigan 4H, one to the Food and Agriculture Association, one to the American Horticulture Society. Our track record is rather terrible, but our determination is strong. We have finally been funded for $420,000 for the "Connected Gardens" project by the Dow Foundation. Along with writing proposals, we have worked together for years to develop applications and to integrate technology into the garden.

Researchers are beginning to use the term "mixed realities" to describe overlaps of the real world into virtual experiences, and of virtual experiences into the real world. Metaphor has often been used in multimedia design to give users a frame of reference and to help ground designers toward a coherent design. Mixed realities in virtual worlds bring in not the metaphor of a garden, but the actual children's garden. In our Plant Problems CD-ROM, the Pizza Garden learning game, and the Garden Symphony Composer, cartoon images are based on physical children's garden images. Our garden electronic greeting cards include the ability to send post card pictures of the garden, virtual reality panoramas, and Flash interactive games to a friend. These examples are one form of *literal* mixed reality. Simply having a web site tied to the real children's garden also enhances the realism of the site. We use the same connection to the Space Program, adding impact and realism to virtual experiences by linking them to real world places, objects, events, and missions.

We have also created virtual tours of the garden: one for grownups, and one (underway currently) for kids. One MA thesis project looked at how seeing the virtual garden and then visiting the real garden impacted what visitors looked for, and vice versa. The Connected Gardens" project will include use of internet-ready picture frames between children's gardens and in experimental classrooms. We will also develop a "webcam observatory" to allow students and teachers to schedule time-lapse photography of particular locations in the garden. Visits and observations will no longer be limited by the ability to be physically present in the garden.

At the garden, kiosks let visitors explore the virtual tours from within the real garden. Visitors can enjoy a variety of custom designed garden science learning games. They can use the "magic typewriter" to type their name in flowers and print out a name tag. They will be

able to use a webcam to take a picture of themselves in the garden and print it out. The real garden is enhanced by integrating technology. Heeter will be delivering the keynote address, "Growing a Web Garden," to the National Youth Garden Symposium.

Garden TalkBack is a custom-designed chat tool (programmed by Brian Winn) for elementary school children to connect to Dr. Norm for ongoing science experiments. We have been working with a fifth grade class to engage students in scientific method, prompting them to ask questions, pose hypotheses, and collect data. Dr. Norm is represented as a cartoon character. The ability of Dr. Norm to turn student avatars into a bee, rabbit, or turtle sends the classroom into gales of laughter and serves as a motivating factor. Heeter sometimes joins the discussion from California.

Social presence, the sense of being with and feeling connected to other people via technology, is drawing increasing academic and industry attention. In the physical world, we are "embodied." The body separates, integrates, and represents us in the world. Communication technologies further separate, integrate and represent the body in a mediated world. Communication technologies alter the human experience of time and space. They limit, eliminate, and sometimes amplify or alter our normal body input/output perceptions and interactions. Context is less visible (but more flexible) and must be inferred to a greater extent.

Unlike physical sciences like Physics where research and undergraduate teaching are quite separate activities, Heeter, Greene, Winn, and Lownds' courses also serve as living laboratories to explore and learn for both professor and students.   Heeter's relationship with her students is symmetrical. Both she and the students meet in cyberspace. Everyone is virtual. Here are a few of her students. Each post they make to the asynchronous discussion board is accompanied by their photo. Their personal portfolio page has a larger image of the same photo. As they get to know each other, they associate their mental model of the individual with this chosen image. The relationships are strong and personal. Students often remark, "it's so nice to take a class where you actually get to know the professor and other students." That's a funny thing to hear from both MSU students and from students in jungle villages in Sumatra, Indonesia who take my virtual courses. It is very strange to meet someone you know very well in person, for the first time, after 15 weeks or more of getting to know them. Bodies/appearances almost seem to get in the way of the pure essence of knowing each other that has been established. It is odd to have a cartoon character as a student. But fascinating.

Heeter's own telerelating with research teams at MSU, with the Telecommunication faculty, and with Virtual University are examples of asymmetrical social presence. She is the only virtual participant, with a group of physically present individuals. This asymmetrical form of being virtual is much harder to sustain than the symmetry of online learning, conference calls, or even normal phone calls. The remote being needs to recognize that their virtual presence is both a privilege and a handicap. Heeter is working out new forms of symbolic presence and means of connecting. Below is a photo of a recent TC faculty meeting. She felt the need for a stronger visual representation at meetings. The coat rack at the table has her picture taped on. At future meetings she will be represented by an "inflatable bop bag" toy with her photo tape on, sitting in one of the chairs.


faculty meetings

For research team meetings and for general Comm Tech Lab socializing, Heeter uses an Internet-ready picture frame which she fills with anywhere from 1 to 20 images appropriate to the particular meeting or day to represent a "Carrie presence" at the conference room table.


Her circumstance is unique, but the need for asymmetrical virtual presence in physical social environments is not unique. Corporate research laboratories frequently want to incorporate international participants separated by long distances. Handicapped or physically distant students may wish to virtually participate in classroom-based classes.

The Comm Tech Lab recently completed a grant-funded TeleWindows project where we used picture phones to connect homebound elderly to the Senior Centers they used to attend. Picture phone technology is not widely used, but has been available for many years. What is unusual about the project is how the picture phones were used. Unlike a typical telephone call, we asked the senior center and participant to leave the picturephone connected for long periods of time (5 to 7 hours) to provide a casual presence rather than just connecting for a conversation. The homebound participants greatly appreciated the connection. Caregivers and center staff claimed to observe improvements in attitude and demeanor. Half of the participants and staff at the centers said they wanted to use a TeleWindow if they became homebound. The connection was highly asymmetrical. The homebound person was easy to see and hear in a close up shot. The center participants were in a wide shot and could only be heard near the microphone. The homebound person had a strong need to connect, lacking other social contacts, while the center participants had many other social options. TeleWindows were not as good as being there, but much better than not being there at all. The sense of social presence was enhanced because the homebound participant already having a mental model of the social context of what it's like to be at the center.
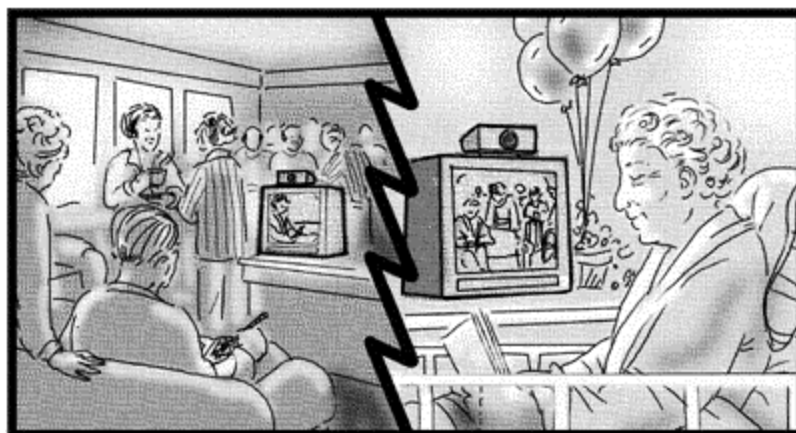
At the convergence of Heeter's three circles of interest is a project she calls Performance Communication. It emerges from a heightened awareness from her virtual existence of the body as a communication interface. Performance Communication is an interface tool Heeter is developing for presentation and communication that will place the presenter inside of their content, giving them control over their appearance and their content. She is working with San Francisco State University to bring high bandwidth networking to her basement office and to place the content on Internet 2. The tool will be useful for creating Virtual University content, for conference presentations to large audiences, and for communication between remote and local participants.
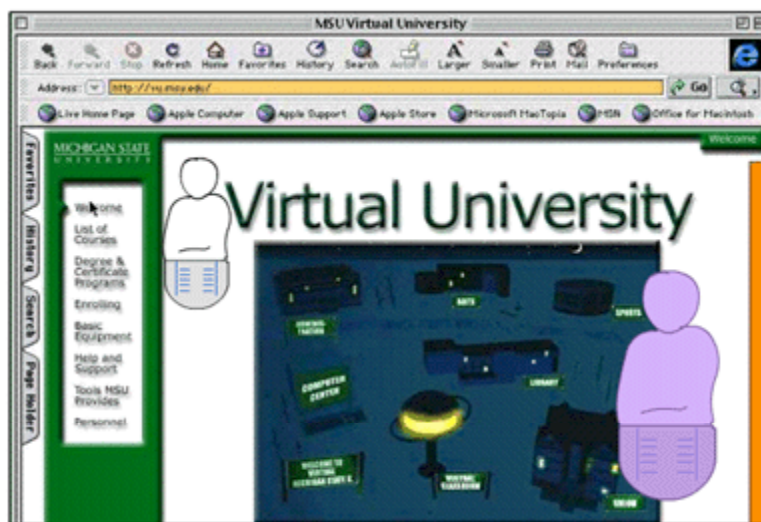
Dual Performer mode w/Robot Body Supplement -- variable sizes

The performer/participants can sit at a computer. Their torsos are chromakeyed in to the scene of their choice – an image, motion video, or computer software. They can control their size and location on the screen, and they can move their arms and head. They can also substitute an avatar, or freeze their body in place (to go do something else) while still talking. More than one participant can be keyed into a scene, so that meetings can be held in a context to set the appropriate tone, mood, or motivation.