

**ARTS-4966, 6965. Experimental Telepresence Spring '08 (beta)**

Curtis Bahn PhD, Jonas Braasch PhD, Co-Instructors

Sarah Weaver Visiting Artist in Residence

Michael Bullock PhD Research Assistant

West Hall 118, 4:00-7:50 Thursdays

Office hours and meetings by appointment.

This semester we will investigate the possibility of extending computer communication with touch. Building on research in telepresence developed by Jonas Braasch, Pauline Oliveros, at RPI and our partners in the "Telematic Circle" (<http://www.deeplisting.org/site/telematic>), we will build and use simple haptic interfaces - similar to vibration feedback in popular video games - to provide a sense of physicality and touch for live internet transmissions of music, dance, visual art, performance art or any variety of media in co-located performances. The seminar is held in cooperation with The multimedia ensemble Tintinnabulate, the NYSTAR Acoustics and Telepresence lab in the Gurley Building, EMPAC seed research support, and CCRMA at Stanford University.

Our work has two main branches: developmental research in telepresence and haptics software/hardware, and experiential research in distance performance and co-located music. While both these branches stem from the same fundamental exploration, members of the class will form teams specializing in certain areas and developments. The teams will come together to produce connections and experiments between the WH118 telepresence lab and the NYSTAR lab in the Gurley building, as well as to participate in concerts and meetings with our partners in the "Telematic Circle."

Prerequisite: computer music 2020 or Permission of Instructor. Meets w/Arts 6965. Cr: 4 Instr: Bahn - Arts, Braasch - Arch.

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<http://www.soundpainting.com>, <http://www.isimprov.org/>

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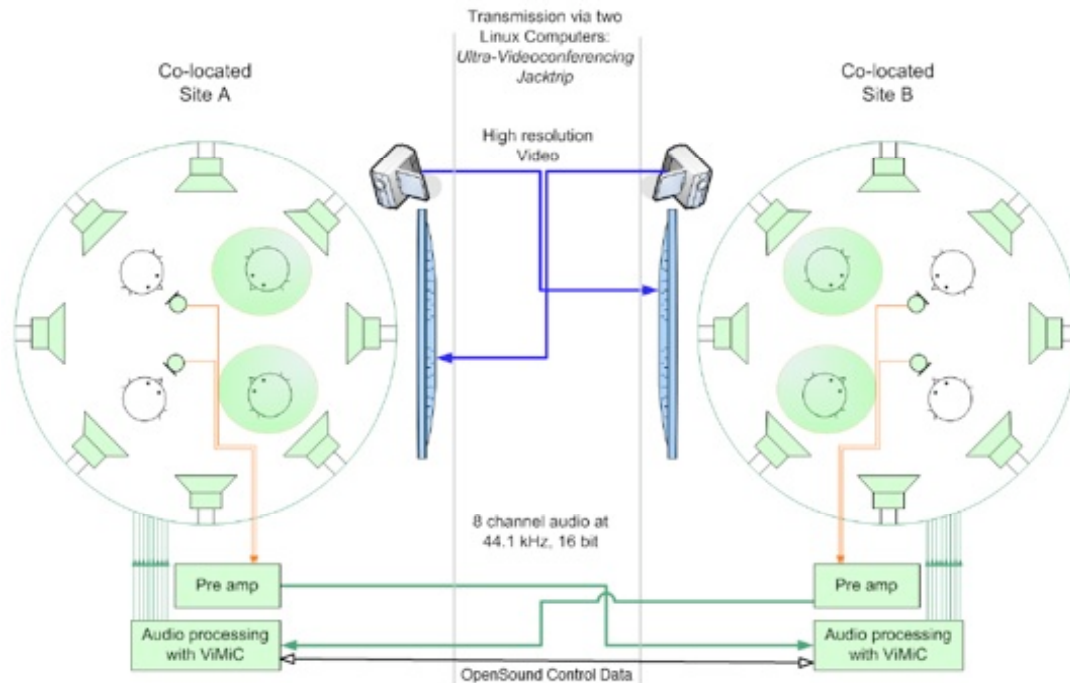
Dr. Chris Chafe, CCRMA Stanford <http://ccrma.stanford.edu/~cc/>

<http://ccrma.stanford.edu/groups/soundwire/>

Mark Dresser, CIRCA UCSD <http://music.ucsd.edu/people/people.php>

## Projects:

### Telepresence



We will be using a system developed by Jonas Braasch and Partners which is used to project musicians in two or more co-located venues into a shared virtual acoustic space. The sound of the musicians is captured using spot mics. Afterwards, it is projected at the remote end using spatialization software based on virtual microphone control (ViMiC) and an array of loudspeakers. In order to simulate the same virtual room at all co-located sites, the ViMiC systems communicate using the OpenSound Control protocol to exchange room parameters and the room coordinates of the musicians.

### Haptics Research

Generally speaking, the word "haptics", derived from the Greek *haptesthai*, implies anything related to the sense of touch. More specifically, it means information acquisition and object manipulation through touch by humans and machines in real, virtual or teleoperated environments.

We will be developing a set of experimental Haptic interfaces to be used in conjunction with existing telepresence software and hardware to explore the extension of touch into distance performance and communication. This is based on an EMPAC seed development grant:

#### **Abstract**

How can experimental computer-mediated performance attain the very high levels of interpersonal intimacy and temporal intensity attained over millennia of artistic evolution involving traditional analogue instruments and affordances? Current practice is lamentably missing key components of a hypothetical possibility space combining enhanced sensory perception with embodied skills inherited from traditional art forms. This proposal focuses on the least investigated human sense, that of touch, and proposes to develop a body of theoretical and

applied knowledge as a basis for the use of haptics in live electroacoustic performance. The proposal conjoins three schools at Rensselaer, Engineering, Architecture, and Humanities and Social Sciences. The project's relevance to EMPAC is to develop a platform for use of haptics combining musical instruments, movement, real-time computer-processing and, immersive audio displays for on-site and telepresence performances. This platform would be available for use in experimental performance by faculty, artists-in-residence, and students. A theoretical model will guide the research, differentiating between haptics as a distinct textural channel in multi-modal expression, with dimensions analogous to pitch, tempo or timbre in music, and haptics as an explicit signaling language between performers. We anticipate that in addition to enlarging the expressive range of mediated performance in general, the results will provide practical means to "work around" conditions of high latency or excessive complexity, such as exist in telepresence transmissions. The work builds on active research at Rensselaer in haptics, interactive music and dance performance, and auditory virtual environments. The techniques for haptics mediated communication as developed here are potentially pertinent to the design of next generation human computer interfaces at large, and to specific industries, such as interactive entertainment and wireless communication devices.

Haptics wiki:

<http://haptics.bluwiki.com/go/Category:Haptics>

<http://haptics.bluwiki.com/go/Category:Actuators>

### **Tinnabulate**

*Tinnabulate* (verb) - to ring or sound loudly and sonorously; "the bells rang"

Tinnabulate is a multimedia ensemble of graduate students and faculty of Rensselaer Polytechnic Institute and created by Pauline Oliveros. Sarah Weaver is Visiting Artist in Residence at the iEAR studios Spring 2008 leading and directing the ensemble with technical support by Jonas Braasch. Tinnabulate performs in interesting acoustic spaces as well as virtual spaces with acoustic and electronic instruments and has participated in many co-located telepresence performances via the INTERNET.

As an ensemble of improvisational artists and musicians, Tinnabulate's voices and senses are tuned through the practice of Deep Listening. Harmony is achieved through intuition, play, and sympathetic resonance.

"Telepresence requires that the senses of the user, or users, are provided with such stimuli as to give the feeling of being in that other location. The user's position, movements, actions, voice, etc. may be sensed, transmitted and duplicated in the remote location to bring about this effect. Therefore information may be travelling in both directions between the user and the remote location." (Wikipedia)

### **Telemergence**

Sarah Weaver, visiting artist and soundpainter from the Deep Listening Institute, Ltd. will guide Tinnabulate in an exciting performance project this semester. Composers Michelle Nagai, Kristin Norderval, Monique Buzzarte, and Will Swofford have been commissioned by the Deep Listening Institute supported by the New York State Council on the Arts to write new works for telematic music at Rensselaer Polytechnic Institute. Performance ensembles for these new works include Tinnabulate, SoundWire at Stanford University, and additional performers from the Telematic Circle. Works will take place using hi-tech and low-tech telematic technology, with

emphasis on electro-acoustic instrumentation and listening properties of the medium. Other possible partners and approaches will be discussed and developed in the Seminar. A Concert will be held on April 27<sup>th</sup> incorporating these composers and supported by our seminar as performers and technicians.

<http://www.myspace.com/tinnabulate>  
<http://www.deeplistening.org/site/telematic>

Kristin Norderval <http://www.norderval.org/>  
Monique Buzzarte <http://www.buzzarte.org/>  
Will Swofford <http://www.saturnalianyc.org>  
Michelle Nagai <http://www.treetheater.org>

### **Course Objectives:**

Each student is expected to: participate actively as a member of a multi-disciplinary team; familiarize themselves with literature and developments related to the research topics above; assist in developing new and unique approaches to multi-media co-located performance. Every student will engage these challenges in their own way and to the best of their skills.

### **Grading and Evaluation**

Evaluation and grading for the course is based on participation as an initiator and collaborator in seminar activities. At the beginning of the course, each student will identify their skills and form teams to address various issues. The teams will be expected to give progress reports and demonstrations of new developments, and to deliver tangible participation and results in terms of musical performances, hardware and software developments. Of crucial importance is the maintenance of strong communication between seminar leaders, group leaders and group members.

You will receive “service points” for attendance, completion of agreed upon tasks such as seminar presentations, participation in performances, development of new hardware/software, editing of documentation etc. Periodically, service points will be evaluated and discussed and you will be told if your performance is in question. At Midterm, all students will receive an evaluation of their performance.

### **Attendance Policy**

There is no official attendance policy, but participation and attendance will be factored into the final grade as noted above. Experience has shown that since nearly all of the course material is taught, discussed, and practiced in class, students who miss even two or three classes have difficulty keeping up.

### **Academic Integrity**

Collaboration between students in this course is strongly encouraged, in fact it is imperative. Likewise, students are encouraged—indeed, to some extent *required*—to exchange ideas, opinions, and information constantly. You are encouraged to help each other with performance, production, and presentation of research and performance projects. Plagiarism of any kind is in direct violation of University policy on Academic Dishonesty as defined in the *Rensselaer Handbook*, and penalties for plagiarism can be severe. In this class you

will be expected to attribute due credit to the originator of any ideas, words, sounds, circuits, or work which you incorporate substantially into your own work.

**Related Reading:**

Pauline Oliveros

<http://www.deeplisting.org/pauline>

Deep Listening: A Composer's Sound Practice, iUNIVERSE, 2005'Improvising with Spaces, For the 151st meeting of the Acoustical Society of America – Providence, Rhode Island June 7, 2006

Acoustic and Virtual Space as a Dynamic Element of Music, Leonardo Music Journal #5 1995 and Music in Women in Music Technology, edited by Judy Malloy. MIT Press 2003

Tape Delay Techniques for Electronic Music Composers, In Software for People: Collected Essays from 1962-1981, Smith Publications/Printed Editions 1984.

EIS Manual, Jesse Stiles, Deep Listening Publications 2005

Jonas Braasch [http://symphony.arch.rpi.edu/acoustics/Acoust\\_Biographies.htm](http://symphony.arch.rpi.edu/acoustics/Acoust_Biographies.htm)

A "Tonmeister" Approach to the Positioning of Sound Sources in a Multichannel Audio System, 2005 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics

A Loudspeaker-based 3D Sound Projection using Virtual Microphone Control (ViMic), Audio Engineering Society Convention Paper presented at the 118th convention 2005 May 28-31, Barcelona Spain.

Chris Chafe - <http://ccrma.stanford.edu/~cc/>

Chris Chafe (Music) is director of the Stanford Center for Computer Research in Music and Acoustics (CCRMA). His research is in the area of Real-time Controllers for Physical Models, including haptic interfaces for musical performance and in modeling human aspects of musical performance. He also initiated an interuniversity course on HCI device design that has been taught at Stanford, jointly with San Jose State and Princeton.

SoundWIRE

<http://ccrma.stanford.edu/groups/soundwire/>