

Claudio Pinhanez

"In most video games and interactive installations, the action happens on what I believe is the wrong side of the screen: inside the computer graphics world. In my view, this is an unnecessary impoverishment of the experience, depriving users, and especially children, of opportunities for physical and social interaction with the real world and with real people. My work has been focused on how to create physical spaces where people can meet and play with computer graphics characters, objects, and landscapes in a real, physical space. Instead of virtual reality, I am trying to make fantasy more real.

"Through examples, I will show that some interaction technologies based on perceptual computing and tangible media are already providing the tools to build such interactive, immersive physical spaces. For instance, in 'The KidsRoom,' built in 1996, we used computer vision to track children and recognize dance steps in a complex narrative happening inside a real children's room. In 'i/i,' a computer theater play, I employed a stereo camera system to track an actor on stage and control his interaction with a computer graphics character.

"My research has convinced me that interactive stories, especially in physical spaces, should not be based on choice mechanisms but instead on exploration of local 'pockets' of interaction that do not disrupt the suspension of disbelief. Also, I contend that to achieve immersion in physical interactive spaces it is not necessary to resort to cumbersome devices like 3D goggles or highly artificial spaces like the CAVE. Instead, people can be entranced by carefully designed and produced stories and characters that, coupled with the right amount of unencumbered interactivity, respond to the user in the appropriate context."

Claudio Pinhanez is a media artist and computer scientist. Born in Brazil, he received his PhD in 1999 from the MIT Media Laboratory, where he conducted research on computer vision and artificial intelligence, and created and produced computerized performances. His work aims to create interactive spaces where users and performers can experience complex narratives while interacting with computerized actors. He coined the term "computer theater" in 1996 to describe the new and emerging experiences involving computers in theater, and since then he has been actively creating live performances inhabited by computer-controlled actors. He is also a member of the team that created the original prototype of "The KidsRoom," an interactive, immersive environment for children currently running in the Millennium Dome in England. He has also been a visiting researcher at ATR Laboratories (Kyoto, Japan) and the Sony Computer Science Laboratory (Tokyo, Japan), where he developed the "HyperMask" project presented in SIGGRAPH 99's Emerging Technologies. He is currently a research scientist at IBM T.J. Watson Research Center in New York.

Naoko Tosa

Naoko Tosa is a media artist and researcher in the ATR MIC Laboratories. She received PhD in art and technology research from the University of Tokyo, where she focused communication and used computers and electronics to create artwork that relates to the intelligence of emotions, consciousness, and unconsciousness. She specializes in creation of interactive art. Her best-known is was the Neuro-Baby project. Her work has been exhibited at the Museum of Modern Art, New York; the New York Metropolitan Art Museum; the annual SIGGRAPH conference; ARS Electronica; the Long Beach Museum; and other locations worldwide. Her works are also included in the collections of the American Film Association and 10 Japanese Art Museums.



From "Interactive Theater," ATR MIC Laboratories, 1998.
Photo by Naoko Tosa and Ryohel Nakatsu

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Virtual reality (VR) technology has undergone a transition in the past few years that has taken it out of the realm of "expensive toy" and into that of functional technology. It integrates real-time computer graphics, body-tracking devices, visual displays, and sensory input devices to immerse a participant in computer-generated virtual environments (VE) that change in a natural way with head and body motion. Much as an aircraft simulator tests and trains piloting ability under a variety of controlled conditions, VEs can be developed to present simulations and augmentative stimulus inputs that are useful for cognitive and behavioral mental health applications.

In this panel, some leading VR and mental health scientists discuss their use of VR to assess and treat persons with phobias, post-traumatic stress disorder, burn- and cancer-related pain, traumatic brain injury, attention deficit and hyperactivity disorder, learning disabilities, and assessment of cognitive and functional abilities in aging populations.

Skip Rizzo

"My interest in virtual reality as a tool for mental health assessment and treatment stems from my previous work as a psychologist developing and implementing cognitive rehabilitation programs for clients with traumatic brain injuries. I saw first hand the limitations that exist in this area when using the traditional state-of-the-art tools. In fact, it is my view that much of the current assessment and treatment forms in psychology are still rooted in circa-1950s approaches. This is not so much an indictment of the mental health field as it is an observation of the limitations of the available technology in this area. Specifically, my work is guided by the view that well-suited matches exist for certain VR applications in the cognitive assessment and rehabilitation domain, as well as in the general mental health arena!

"Never before have we had the practical capacity to create mental health applications with the power to systematically deliver and control complex and graphically rich stimulus environments that also allow for precise measurement of behavior. These VR-mental health tools are a psychologist's "dream" and, potentially, a patient's deliverance! However, I believe that the key to success is in scientific determination of relative value of VR-based techniques compared to existing methods. To become enamored with these tools to the point of technological overkill could serve to drain resources from well-thought-out approaches based on good science. It is these views that drive my passion for developing and honestly evaluating new information technology tools that could make the best use of available resources for addressing mental health concerns."

Albert "Skip" Rizzo has joint faculty appointments with the University of Southern California Integrated Media Systems Center and the USC School of Gerontology. He is the former program coordinator for the USC Alzheimer's Disease Research Center and is the director of the Memory Enhancement Seminars for Seniors program. He is also director of the IMSC Virtual Environments Lab, which designs, develops, and evaluates the usefulness, feasibility, and efficacy of virtual reality systems that target assessment and rehabilitation of spatial abilities, attention, and other cognitive functions. He is also conducting research on computerized facial recognition, facial avatar animation, and better human-computer interaction systems for the elderly and persons with disabilities. His other IMSC activities involve provision of human-factors input on teleimmersion projects and research on integrating immersive audio in virtual environments.

He is the associate editor of the journal "CyberPsychology and Behavior" and is on the editorial boards of "The International Journal of Virtual Reality," "Cognitive Technology," and "Presence: Teleoperators and Virtual Environments." He is the creator/manager of the Virtual Reality Mental Health Email Listserv. Prior to his USC affiliation, he was a cognitive rehabilitation specialist for eight years at the Coastline Traumatic Brain Injury Program in Costa Mesa, California, where he developed and implemented cognitive rehabilitation programs for clients with traumatic brain injuries. He received his PhD in clinical psychology from the State University of New York at Binghamton.

Larry Hodges

"Virtual reality is a field that has always been much better known for its potential than for its successful applications. One of the few areas where virtual reality has moved from laboratory prototypes to commercially available systems is psychological therapy. Most prominent among these applications has been the use of virtual environments in treatment of anxiety disorders. Hospitals and medical clinics in approximately a dozen locations in the US routinely use virtual reality exposure therapy to treat anxiety disorders such as fear of heights, fear of flying, and post-traumatic stress disorder. Other areas, such as the use of VR for pain management and rehabilitation, are developing rapidly and will soon be commonly available for general use. Current VR technology, with all its limitations, is still 'good enough' to support useful applications whose primary purpose is to give users the impression of being in a certain kind of space (such as is needed for exposure) or to direct the attention of users to their virtual circumstances (such as is needed for pain distraction or rehabilitation). In my opinion, the use of virtual reality in the general field of clinical psychology and rehabilitation will become the 'killer app' of VR."



Virtual Classroom for Attention Deficit Assessment Developed at the USC Integrated Media Systems Center.

Exploring New Roles for Interactive Virtual Characters

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Movies, the theater, and various types of performances have contributed to our lives as both entertainment and art for a long time. Recently, there has been a trend to introduce interactivity into these media. One of the main forces leading this trend is the introduction of digital and computer graphics technologies that make it possible to create autonomous characters with either realistic or exquisite qualities. Another force is that interaction technologies such as speech recognition and image recognition have advanced so much that they can be applied to real-time human-computer interaction. Integration of these technologies has provided computer characters with interactive capabilities, and these are the key factors in the new interactive media.

On the other hand, this trend raises several questions. Why is it necessary to introduce interactivity into these media? Is "being" on the Titanic more interesting than "watching" the movie "Titanic"? Does interactivity really create something new and impressive in virtual environments? If so, what are the new experiences that can be utilized or have been developed to realize this? Although these are crucial questions, there have been few discussions on these essential issues.

The goal of this panel is to examine these questions through the work of researchers who have been deeply involved in the actual making of new interactive environments and characters. Given the recent progress in technologies such as gesture recognition and speech recognition, we believe that now is a good time to discuss these essential topics with researchers, engineers working in these fields, and artists. We hope that several key issues for further research will be clarified through this panel.

Rodney Berry

"In my opinion, the purpose of interactivity is to increase the level of engagement in a virtual environment or multimedia work. After all, a microwave oven is 'interactive,' but it is not particularly engaging. A good painting, however, can be deeply engaging. In the latter case, interaction happens within the minds of viewers as they respond to the visual information.

Perhaps our idea of interactivity should extend beyond the sphere of the human-machine interface to include all forms of interaction: between humans and their own thoughts, between different humans, between parts of programs. Interactivity could be redefined as 'capacity for interaction.' The important thing to remember is that interactivity on its own does not guarantee engagement. Engagement comes from a feeling of personal involvement in the interaction. If I am asked to make choices, I need to feel that my choices will actually make a difference. Ultimately though, it comes down to how much our mind gets involved."

Rodney Berry is currently a visiting artist/researcher at ATR's Media Integration and Communications Laboratories in Kyoto, Japan. He holds a masters degree in media art from the University of New South Wales College of Fine Arts in Sydney, Australia. He has created many sculptural musical instruments and sound installations. He typically combines high and low-end technologies to integrate sound, visual, and spatial elements into a cohesive whole. The works often attempt to convey some sense of being in the presence of a living thing. More recently, he has focused on the use of computer-based artificial life to produce musical environments.

His work has been seen and heard in a number of Australian and international art events including the Third International Symposium on Electronic Art in Sydney, SoundCulture in Sydney and Tokyo, the Australian Perspecta exhibition in Sydney, the Third Australian Sculpture Triennial in Melbourne, Sculpture '85 in Melbourne, and Geographies of The Ear, a solo exhibition at The Performance Space in Sydney. His musical environment, Feeling Creatures, has been shown at Allief in Los Angeles, Virtual Worlds '98 in Paris, and the European Conference on Artificial Life in Lausanne, Switzerland.

Larry Friedlander

"All art is interactive in some sense. Digital media introduce new and transformative possibilities not anticipated by earlier media, yet it is foolhardy for exploration of interactive media to proceed without the informing presence of past examples, and an adequate theory of medium-user relationship and some typology of art forms. Once the novelty of interactive experiences wears off, users will demand from digital media a density and subtlety of meaning that we expect from all art. By a careful analysis of the connections and disjunction between old and new, we can devise strategies that add new dimensions to our experiments. These considerations can open up neglected avenues in design of interactive experiences and help move the field toward a sophisticated narrative and psychological level that it demands if it is to compete successfully with older forms."

Larry Friedlander is a professor of English literature and theater at Stanford University, where he specializes in Shakespeare and performance. He is also co-director of the newly formed Stanford Learning Lab, a center for research and dissemination of learning technology and innovative curricula. He has been heavily involved in museum design and planning, and is now advising the Museum of Scotland, a new national museum in Edinburgh. He was an Osher Fellow at the San Francisco Exploratorium, where he helped design their new Learning Center. He has worked in major research laboratories such as the Apple Multimedia Lab and the Interactive Cinema Group at the MIT Media Lab, where he collaborated on a computer-enhanced theater space and narrative piece called the "Wheel of Life."

Panelists
 Rodney Berry
 ATR Media Integration and
 Communications Research
 Laboratories

Larry Friedlander
 Stanford University

Donald Marinelli
 Carnegie Mellon University

Claudio Pinhanez
 IBM T.J. Watson
 Research Center

Donald Marinelli

"Audience empowerment means the ability of a user to become a genuine protagonist within a story. Truly interactive environments must transcend the current state of forced-choice and decision-tree paradigms that are at the heart of most interactive environments today. The computer-user interface must permit a lifelike interaction, wherein a user and computer graphics persona can converse in a non-linear manner, discuss the given circumstance, and establish and pursue objectives, while heightening the dramatic impact of the story.

"Carnegie Mellon's Entertainment Technology Center, aware of the lifelike, invisible interface that interactive entertainment must achieve, has developed Synthetic Interviews based on the above considerations. Synthetic Interviews allow users to interact via spoken language with a computer graphics persona. The goal is an open-ended, non-linear dialogue, with the computer graphics persona deciding the parameters of what can be discussed. Since conversation is the basis of how most human interaction is conducted, Synthetic Interviews explore a primary way in which users become protagonists in an interactive environment."

Donald Marinelli is co-director of the new Entertainment Technology Center, a joint endeavor between Carnegie Mellon University's School of Computer Science and the College of Fine Arts. He is also a tenured professor of drama and arts management in the College of Fine Arts. Prior to accepting the position in the Entertainment Technology Center, for 14 years he was the associate head of CMU's Drama Department, where he teaches theater history, critical writing, and arts management. He is also editor of the Dramaturgical Sourcebook Series developed by U Press and Smith & Kraus Publishers. He co-founded CMU's master of arts management program, as well as the joint MFA graduate acting program between Carnegie Mellon University and the Moscow Art Theater School-Studio of Russia.

Ryohji Nakatsu

"I have been engaged in researching interaction technologies such as speech recognition, gesture recognition, and facial expression recognition. Also, I have studied the development of interactive virtual environments by integrating these interaction technologies with computer graphics technologies. This research confronts a big question: What will this integration create? Although many researchers and artists are working in this area, there is still no clear answer to this question.

"My answer is: 'deep immersion.' I believe that in the well-designed interactive virtual world, we would feel deeper immersion or involvement than we feel when we read novels or watch movies. Our basic attitude when reading novels or watching movies is passive. In the interactive environment, on the other hand, we can actively experience the virtual world by interacting with the entities of the world. This is the source for creating deep immersion or in other words active immersion.

"Of course, it is difficult to create this sensitivity by simply introducing interaction capabilities into the virtual environment. Therefore, the next question is: What is the key to realization of deep immersion? There are several key factors. In this panel, I clarify these key factors."

Ryohji Nakatsu received his BS, MS, and PhD degrees in electronic engineering from Kyoto University in 1969, 1971, and 1982, respectively. After joining NTT in 1971, he mainly worked on speech recognition technology. Since 1994, he has been with ATR (Advanced Telecommunications Research Institute) and currently is the president of the ATR Media Integration & Communications Research Laboratories. His research interests include emotion extraction from speech and facial images, emotion recognition, nonverbal communications, and integration of multi-modalities in communications. He is a member of the IEEE, the Institute of Electronics, Information and Communication Engineers Japan (EICE-J), as well as the Acoustical Society of Japan.

He organized courses for SIGGRAPH 96 and SIGGRAPH 97, and he organized and moderated panels for the 1998 ACM Workshop on Technologies for Interactive Movies and the 1998 IEEE Workshop on Computer Vision for Virtual Reality Based Human Communications.



From "It/I," MIT Media Laboratory, 1997.
 Photo by Claudio Pinhanez