Instantaneous Beaming to Distance Places – A Possible and Desirable Future?

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AIMS

We imagine a possible future where everywhere that people live there will be humanoid robots for rent. Instead of physically visiting a remote place people will have the option of going on line, selecting a place, hiring such a robot, and then embodying it in order to carry out tasks and interact with local people there. If we think of the center of consciousness as the location at which we are aware of perceiving multisensory information that locates us in space, then effectively we transfer our consciousness into the body of the robot: a kind of 'beaming' of the self from one place to another.

Beaming means instantaneous transportation of our body to a physically remote place. Today we can clearly beam digital representations of ourselves through video conferencing or collaborative virtual environments. However, it is also possible to be represented in physical form in a remote location through combining virtual reality and robotic telepresence/telexistence techniques. The beamer, for example, wears a head-mounted display (HMD), including real-time motion capture, and devices for physiological capture including electrical brain signals. Instead of beaming the physical body to the remote environment (the destination), his or her actions and dynamic state - movements, voice, physiology, and electrical brain activity - are transmitted across the internet in order to control a remote humanoid robot in the destination. The beamer sees the remote destination in wide field-of-view stereo through cameras mounted as the eyes of the robot that transmit augmented video back to the HMD, and similarly sounds, touch and force or even odors from the remote environment are transmitted to the beamer. Thus the beamer is physically present in the remote environment and can interact with the local people there.

This panel will explore how this technological setup can be achieved, examples of its use, and also look to future developments. Anthony Steed will concentrate on collaboration using such beaming technologies and the implications of asymmetric access to the common space that is supported. Susumu Tachi will introduce a telexistence avatar called TELESAR V, which enables a beamer to have a physical avatar body in a remote environment where he or she is beamed down and to interact with the environment using the avatar body as his or her own body. Doron Friedman shows how actions of the robot can be accomplished through a brain-computer interface rather than rely on motion capture. Greg Welch will look at some factors affecting local (self) and remote (with others) presence of the beamer. Mel Slater will moderate the panel introducing how the beaming concept has already been used in news reporting.

Each speaker will present an opening statement and pose a number of challenges to the participants and audience, in the first 30 minutes, followed by debate. The session will revolve around the motion: *Beaming is technologically possible in the medium future and will positively benefit society*. Speakers for and against this motion will be solicited.

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1 MODERATOR: melslater@ub.edu

Mel Slater is an ICREA Research Professor at the University of Barcelona and part-time Professor of Virtual Environments at UCL. He has been involved in research in VR since the early 1990s. He was awarded the IEEE VR Career Award in 2005, and recently completed a European Research Council Advanced Grant on VR. He is Field Editor of Frontiers in Robotics and AI. He has contributed to the scientific study and technical developments of VR and to the use of VR in other fields, notably psychology and the cognitive neuroscience of how the brain represents the body.

2 PANELIST: ANTHONY STEED a.steed@ucl.ac.uk

Anthony Steed is Head of the Virtual Environments and Computer Graphics (VECG) group at University College London. Prof. Steed's research interests extend from virtual reality systems, through to mobile mixed-reality systems, and from system development through to measures of user response to virtual content. He has worked extensively on systems for collaborative mixed reality. He is lead author of a review textbook "Networked Graphics: Building Networked Graphics and Networked Games". He was the recipient of the IEEE VGTC's 2016 Virtual Reality Technical Achievement Award.

3 PANELIST: DORON FRIEDMAN doronf@idc.ac.il

Doron Friedman is the head of the Advanced Reality Lab (http://avl.idc.ac.il) in the Interdisciplinary Center (Israel). Dr. Friedman has been a Postdoctoral Research Fellow in the Computer Science Department in University College London, where he carried out some of the earliest work on controlling virtual reality and avatars by 'thought' using brain computer interfaces. Doron has a few dozen publications in peer reviewed journals and conferences in the areas of brain computer interfaces, human-computer interaction, and virtual reality. Doron is the co-author of several patent applications and has been involved in setting up several startup companies.

4 PANELIST: GREG WELCH welch@ucf.edu

Greg Welch is the Florida Hospital Endowed Chair in Healthcare Simulation at the University of Central Florida in the College of Nursing, the Department of Computer Science, and the Institute for Simulation & Training. He is also an Adjunct Professor at the University of North Carolina at Chapel Hill. His research interests include human-computer interaction, virtual and augmented reality, human motion tracking, and telepresence. He has been in academia since 1992, having previously worked for NASA's Jet Propulsion Laboratory (Caltech) and the Northrop Corporation. He currently serves on several editorial boards and has co-chaired multiple associated conferences.

5 PANELIST: SUSUMU TACHI tachi@tachilab.org

Susumu Tachi is Professor Emeritus of The University of Tokyo, where he currently leads several research projects on telexistence, virtual reality and haptics, including ACCEL Embodied Media Project at Tachi Laboratory, Institute of Gerontology. In 1980, Dr. Tachi invented the concept of Telexistence, which enables a highly realistic sensation of existence in a remote place without any actual travel, and has been working on the realization of telexistence since then. Other achievements include Haptic Primary Colors, Optical Camouflage, and autostereoscopic VR displays such as TWISTER, Repro3D and HaptoMIRAGE. He was the recipient of the 2007 IEEE Virtual Reality Career Award.