Video: The next generation of 3-D holograms

October 30 2015, by Miles O'brien

New research led by scientists at Michigan Technological University, along with the National Center for Atmospheric Research (NCAR) and Mainz University, analyzes the mixing of drier air with water-saturated air in clouds using holographic imaging and an airborne laboratory. Raymond Shaw, a Michigan Tech physicist, looks at the smallest part of clouds: droplets. To understand groups of droplets, Shaw and NCAR researchers flew airplanes through fluffy cumulus clouds in Wyoming and Colorado. Aboard the plane, the team took detailed 3-D images with an instrument called the Holographic Detector for Clouds (HOLODEC--after the "Star Trek" holodeck). These particular clouds were made up only of liquid water. The size of the drops is a key part of cloud formation and mixing. The HOLODEC instrument, which is a tube about six

inches in diameter and several feet long, samples a cloud volume about the size of a marker and provides unique insight into cloud mixing. Using HOLODEC, the scientists observed clear boundaries--distinct lines between wet and dry air. Credit: NCAR

Imagine watching the World Cup or the Super Bowl in 3-D in the comfort of your own home. That option may be available sooner than you think. With support from the National Science Foundation (NSF), optical scientist Nasser Peyghambarian and his team at the University of Arizona are working to make next-generation holograms possible. The researchers foresee the day, possibly within the next decade, when laser-generated holograms will be transmitted anywhere in the world, in real time.

Transmitting a video rate hologram takes an enormous amount of bandwidth and power—think 10,000 times the rates for high-definition television. At the Center for Integrated Access Networks (CIAN), the vision is to create transformative technologies for optical access networks that can do just that—transmit huge amounts of data to a broad population anywhere, at any time. The broader impacts of CIAN's research could be felt in almost every home. Ultra-high data bandwidth and cost effective services could contribute to business innovation, improve educational opportunities, enhance distribution of medical services, minimize the environmental impact from infrastructure and pollution, enable new and varied entertainment opportunities, and increase overall national security, just to name a few possibilities.

At the Beyond Today's Internet Summit, researchers from the University of Texas at Dallas demonstrated a working prototype of a next generation communication system that uses 3-D video and force feedback devices to virtually recreate a physical therapy session between a patient and a therapist. Three-dimensional models of the two participants are captured using off-the-shelf Microsoft Kinect 3-D Cameras and the models are placed in a shared virtual environment of one's choosing. To simulate the physical touch aspect of a physical therapy session, the researchers used a Haptic force-feedback device, the data from which is also transmitted to and fro, to recreate the experience of resistance in the virtual environment. In the example, the team created a simulation where two individuals practice sawing a log--a task that mimics the rehabilitation movements used by recovering stroke patients. Credit: National Science Foundation

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