

Experiential Signal Processing (ESP) and Experiential Telecommunications (ET)

Jerry D. Gibson

ViVoNets Lab

Department of Electrical and Computer
Engineering

and

Media Arts & Technology Graduate Program

ESP and ET

- Sense Everything
 - Plenoptic Video
 - Plenacoustic Audio
 - Plenus—full or complete
- Transmit Everything You Sense
- Present Everything You Receive

What is Experiential Telecommunications?

- Communicating an *Environment* at a distance to allow experiential participation by a user
- Communicating an *Event* at a distance to allow experiential participation by a user
- Communicating an *Experience* at a distance to allow experiential participation by a user

Ultimate Goal of Experiential Telcommunications

- Provide access to an Event, Environment, or Experience that is not otherwise available or reproducible
- No modeling, rendering, or characterization
- Without interfering with the experience presented to the audience attending the Event

Related Concepts

- **Experiential Communications** is a term commonly used for the designers of business meetings or for the designers of retail store, entertainment, or vacation environments
- **Experiential Telepresence** or **Immersive Telepresence** is concerned with experiencing remote environments and events but perhaps with some modeling

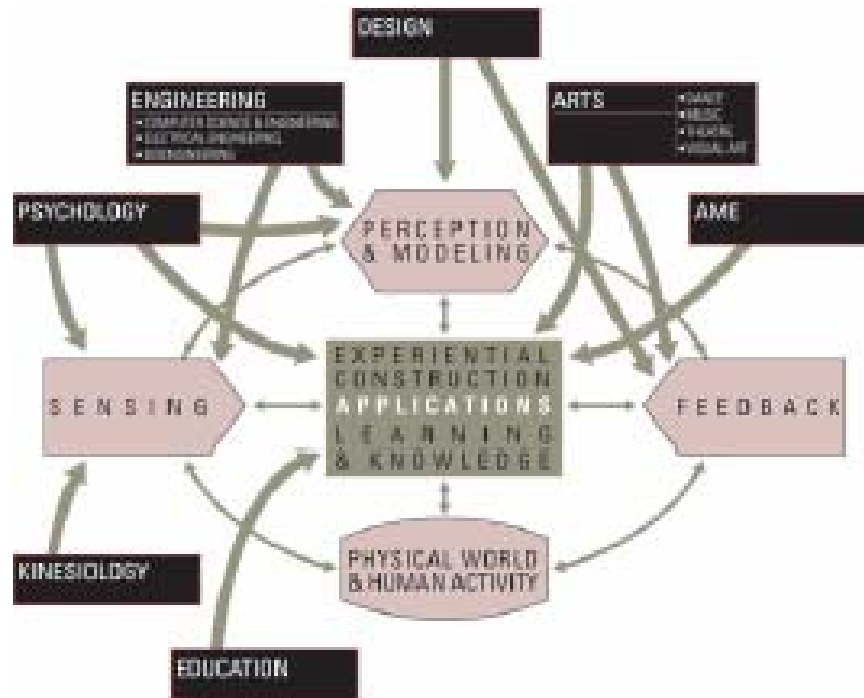
Related Concepts (Continued)

- **Experiential Learning** is used in two contrasting ways;
 - Education as direct participation in life events
 - Education as an encounter with phenomena in an immediate and relevant setting
- **Experiential Computing** allows a user to apply all of their senses to observe data and information related to an event

Related Concepts (Continued)

- **Experiential interactive environments** and **tele-immersive environments** allow participation by users, perhaps at a distance
- **Experiential Media Systems** has been used for “systems that integrate computation and digital media in the physical human experience for the production of enhanced physical-digital experiences” (ASU)

Experiential Media at ASU



Envisioned Applications of Experiential Telecommunications

- **Content delivery** for training and education
- **Mass communications** of difficult ideas and concepts with the public
- **Enhanced collaboration** for management, design, marketing, development, research, and information sharing
- Negotiations

Envisioned Applications (Continued)

- **Expanded opportunities for information gathering** for decision makers
- **Delivery and archival** of key performances by artists and entertainers
- **Delivery and documentation** of key events
- **Not the usual Internet desktop play at present!!**

Why the Time is Now for ESP and ET

- Related Research and Products
- Remote Content Delivery of Events
- New Digital Delivery Venues

Related Research and Products

- 3DTV Research in Europe—6.3 million Euros (<http://www.3dtv-research.org/>)
- Multiview Compression for H.264/AVC
- GENI
- Computing Grid
- Cisco Telepresence Videoconferencing System
(<http://www.cisco.com/web/thehumannetwork/index.html>)

European 3D TV



March 5, 2007



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Cisco's Telepresence Videoconferencing System



Remote Content Delivery of Events

- Movie Theaters will show more than just movies
- The Metropolitan Opera broadcast 6 performances to 184 theaters in the last year
- The NBA has announced they will be recording their games in 3D HD for delivery to theaters

The Metropolitan Opera HD Broadcast to Theaters



**The Metropolitan Opera
Goes to the Movies**

Experience the excitement of the Metropolitan Opera Saturday Matinees—LIVE in HD on the Big Screen! Six performances will be broadcast straight from the stage of one of the world's greatest opera houses into select movie theaters equipped with high definition screens and surround sound. These are one-day-only events, and seating is limited, so purchase your tickets now. Don't miss the chance to enjoy thrilling world-class opera from the comfort of your neighborhood theater.

NBA Goes 3D HD

NBA Goes 3D HD for 2007 NBA All-Star



March 5, 2007



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New Delivery Venues

- Movie Theaters
 - Currently there are only a few hundred (?) digital theaters
 - With the standardization of JPEG2000 by the Movie industry, this will soon jump to the thousands—See Mike Marcellin’s talk on Digital Cinema on May 25th
- Outdoor Stadium
- An Allosphere near you?

Key Components of an Experiential Telecommunications System

- Sensing and Acquisition Systems
- Signal Processing and Encoding Systems
- Transmission Networks
- Decoding and Information Preparation Systems
- Presentation/Delivery Systems

Key Attributes of an Experiential Telecommunications System

- All information required to reconstruct the environment is sensed
- The volume of data to be transmitted is minimized without degrading the delivered Event, Environment, or Experience
- The information is delivered to the destination with minimum delay

Key Attributes (Continued)

- The Event, Environment, or Experience is **recreated** at the destination
- **Experiential participation** by the user at the level appropriate for the Event, Environment, or Experience **is facilitated**
- The **user interface** at the destination is **easy-to-use and reliable**
- The entire experience is **seamless to the user**

Key Attributes—Future Work*

(*Secondary considerations)

- The information transmission is scalable to user network capabilities*
- The delivered Event, Environment, or Experience is scalable to the user presentation capabilities*
- The sensed Event, Environment, or Experience is minimally impacted by user scalability

Research Areas and Technologies

- Plenoptic and Plenacoustic Sampling and Processing
- High Dynamic Range Video Sensing, Compression, and Display
- Acquisition of Dense, Dynamic Light Fields
- Multiview Autostereoscopic Displays
- Multiprojector Displays
- Multicamera Systems and Arrays

High Dynamic Range Display



<http://www.brightsidetech.com/products/dr37p.php>

Autostereoscopic Displays

(from Dan Lelescu, “The Brave New Media: A Plenoptic Journey”)



Research Areas and Technologies (Continued)

- Camera and Display Mappings
- Overall System Architectures
- Compression and Rate Distortion Theory of M Correlated Sources
- Networks of cameras and microphones
(dare I say it? Sensor networks)

What am I Proposing?

- A large scale effort in constructing and testing ESP and ET systems (not off-the-shelf)
- Identifying key limiting technologies
- Determining fundamental limits on plenoptic video processing and plenacoustic audio processing
- Research on key theoretical issues involved in plenoptic video and plenacoustic audio signal processing