Game-Based Virtual Worlds for the Internet of VR/AR Things

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The Virtual/Augmented Reality Legacy

- Imagined physical, everyday socio-cultural worlds
- Symbolic worlds: literary, cosmological, musical, gustatory, etc.
- Dreams and lucid dreaming
- Hallucinations via brain injury or psychoactive drugs
- Cinema, theater, concert venues
- Panorama, cyclorama, dome venues (“circlevision”)
- CAVE room, wall, or table-top interactive visualization
- Head-Mounted Displays (audio, haptics?) for PCs, mobile devices
- Physical fantasy worlds (Disneyland, *Burning Man*)
The Virtual/Augmented Reality Legacy

• What is a virtual (augmented) reality?
  – Computer-mediated immersive presentation that encapsulates one or more senses that renders (overlays) a virtual world (objects) for play, work, or learning activities
  – VR/AR is:
    • Embodied as technological mechanisms
    • Engaged and rendered as interactive content
    • Recognized as immersive and present experience (“it's like being there”)
  – VR is not one technology, content, or experience
Games, Virtual Worlds, Virtual Reality/Augmented Reality Projects

- Game-based virtual worlds (GBVW) for research, education, and training applications [Sca12].

- Networked AR and body-worn sensors for Smart Workers (Advanced Manufacturing).

- Massively multi-user virtual worlds for STEM research/education using *hypergrids* (multi-VR world interoperation platform) [DVL15, Lop11].
Embedded sensor network-based science learning game environment for K-6th students and families

Online science learning game research labs for informal life science education for K-6th grade students and families [Sca10]
FabLab: Semiconductor/nanotechnology fabrication operations and diagnostics training game world [Sca10]
Planetary science data visualization and “spherecasting” support for *NOAA Science on a Sphere* interoperation in a networked GBVW platform (OpenSim).
DECENT: GBVW for experimentation in secure decentralized command and control
Informal Classical Music Learning Game Environment: SFSKids.org (STEM+Arts=STEAM)
UCI Game-Based *Stroke TeleRehabilitation* workstation and AR Telerehabilitation Testbed

UI devices: Game console buttons (large, small), continuous dial, Myo armband, touchpad, joystick, WiiMote, PS Eye, finger pressure force sensor.

All devices integrated to act like PC mouse/keyboard inputs.

Workstations currently deployed in nationwide clinical trial.

Images: Cramer Group, UCI Med.
Future: IoT-based AR for Smart Workers in Advanced Manufacturing (Calit2)
Large Group Virtual Research Conferences

Image credit: C. Lopes/Diva Canto
Future: GBVWs transforming undergraduate science/STEM education (e.g., personal virtual labs)
Conclusions: Into the Future

- Game-based virtual worlds, virtual reality and augmented reality concepts, techniques, and technologies will *transform* STEM research and education.
  - More personal, more participatory, more open.
- IoT-based industrial internet will further extend the reach of GBVW and VR/AR applications to *transform* manufacturing and health care.
Research Collaborators

**Faculty**


**Research Staff**

– Craig Brown (NomNom Games), Yuzo Kanomata (IGB), Kari Nies (ISR), Alex Szeto (American Honda, ISR), and others.

**Students**

– UCI Video Game Developers Club
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References


