



# *Sample of Research Projects*

Walt Scacchi

[ivecg.uci.edu](http://ivecg.uci.edu)

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# Motivation

## What are we doing?

- *Empirical research and technology prototyping* of computer games/virtual worlds (CGVWs) that support challenge problems in science, health care, art, technology, software engineering, and defense.
- Collaborate with external R&D partners/sponsors
- Engage high risk, adventuresome research projects

# Motivation

## Why are we doing this?

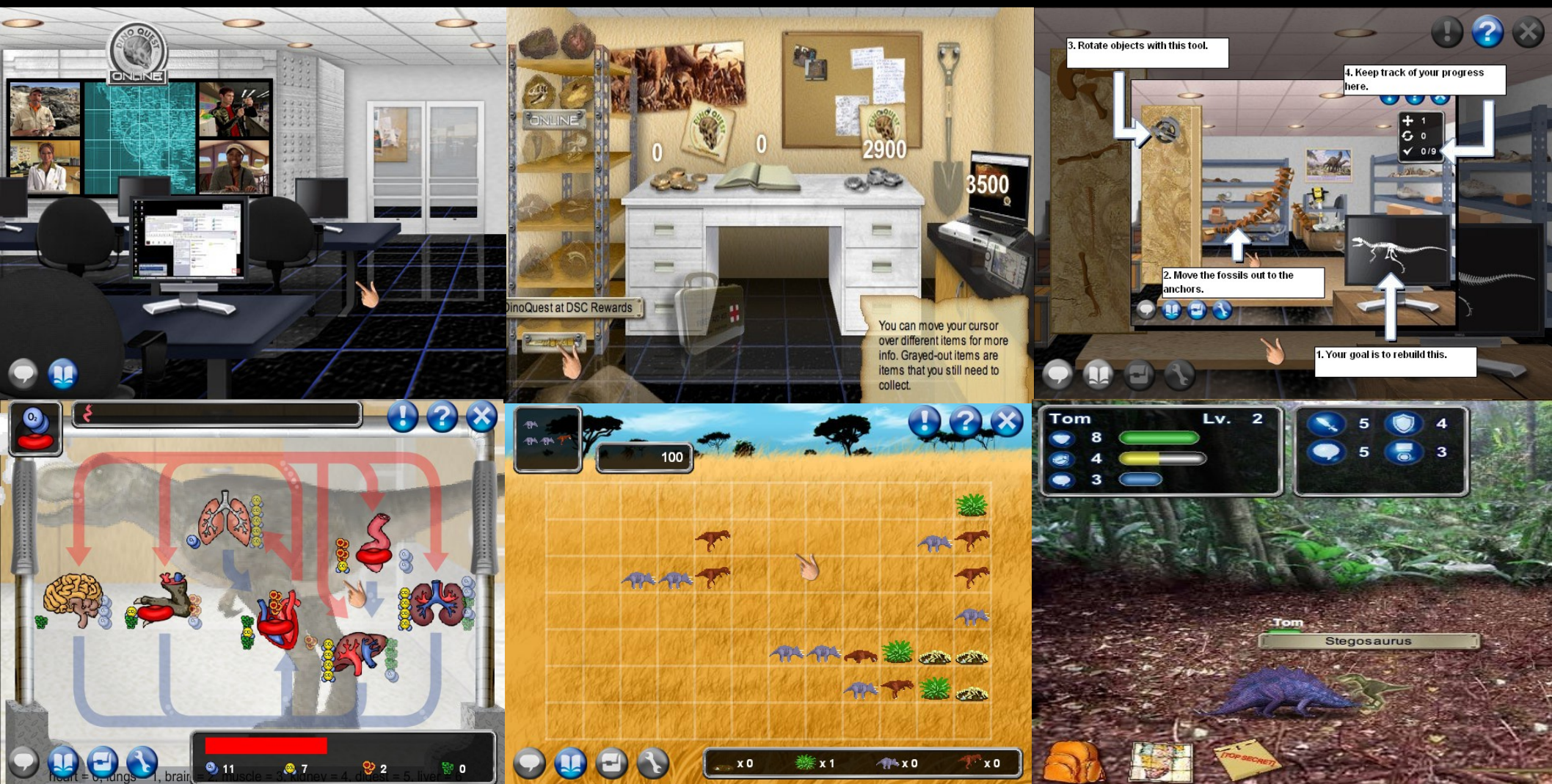
- Computer games are both *technology* and *new media*
- *Play* and *work* are not fundamentally different activities
- Enable immersive and transformative learning experiences
- Engage new students and emerging scholars
- Realize the interests of more than 50 UCI faculty at IVECG

# Some R&D projects of interest

- ◉ Science learning games for informal science education at *Discovery Science Center*
- ◉ Game-based semiconductor fabrication operations training simulator at *Intel*
- ◉ Virtual worlds for space science on a sphere at *DSC*
- ◉ Game-based decentralized command and control training simulator for *Naval Postgraduate School* and *Northrop-Grumman*
- ◉ Informal classical music learning game environment for *San Francisco Symphony*
- ◉ Experimental games for business, cultural critique, art and technology
- ◉ Facilitating local game development community
- ◉ New projects in progress:
  - ◉ Games for NeuroScience Education



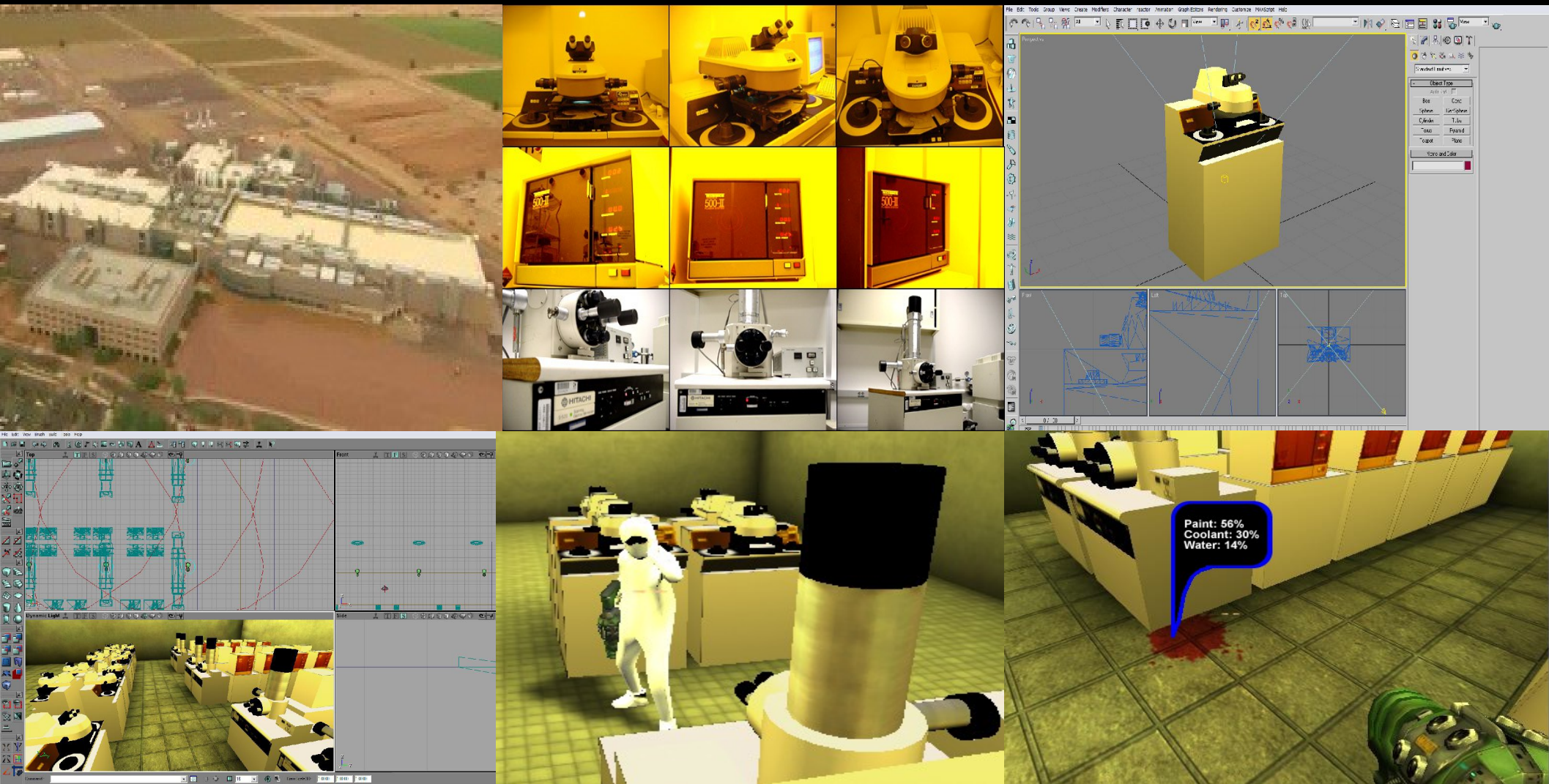
# Web-based science learning games for informal science education for K-6<sup>th</sup> grade students and families



Scacchi, W., Nideffer, R. and Adams, J. (2008), [A Collaborative Science Learning Game Environment for Informal Science Education: DinoQuest Online](#), in *New Frontiers for Entertainment Computing*; P. Ciancarini, R. Nakatsu, M. Rauterberg, M. Rocetti (Eds.); Boston: Springer, 71–82.



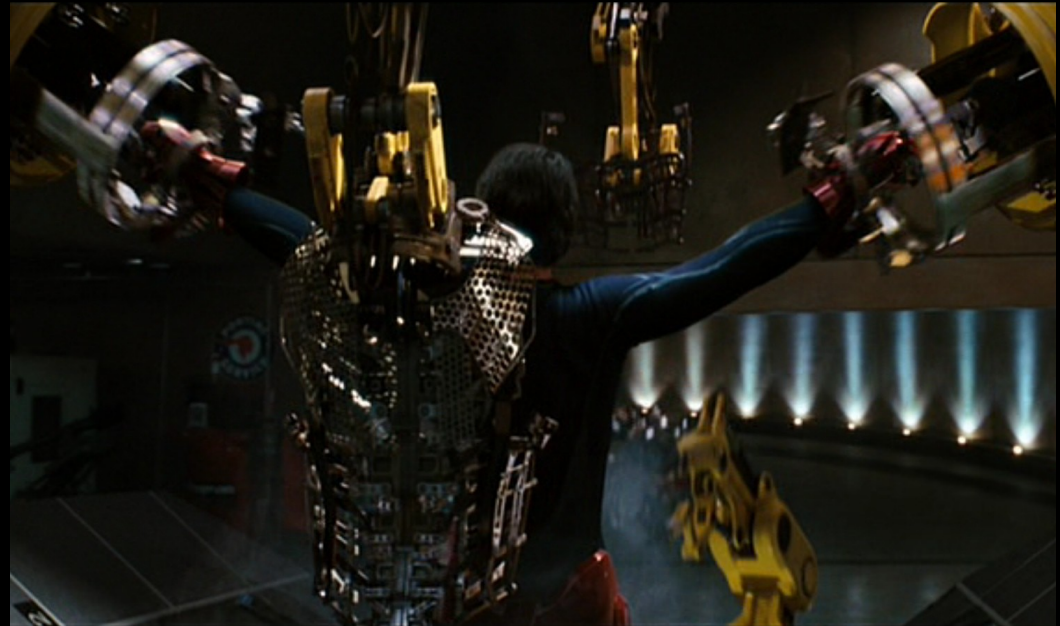
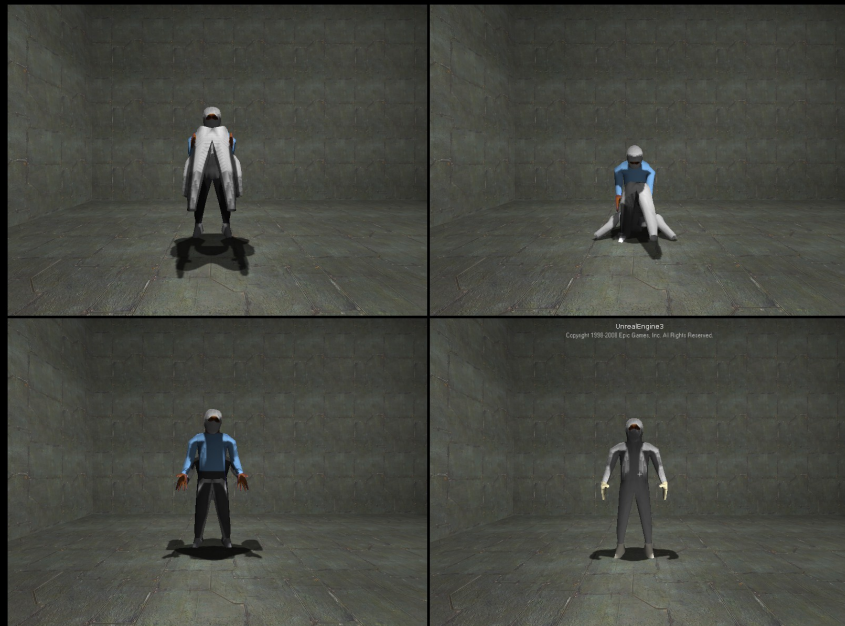
# Semiconductor/nanotechnology fabrication operations and diagnostics training game



FabLab Demo Reel

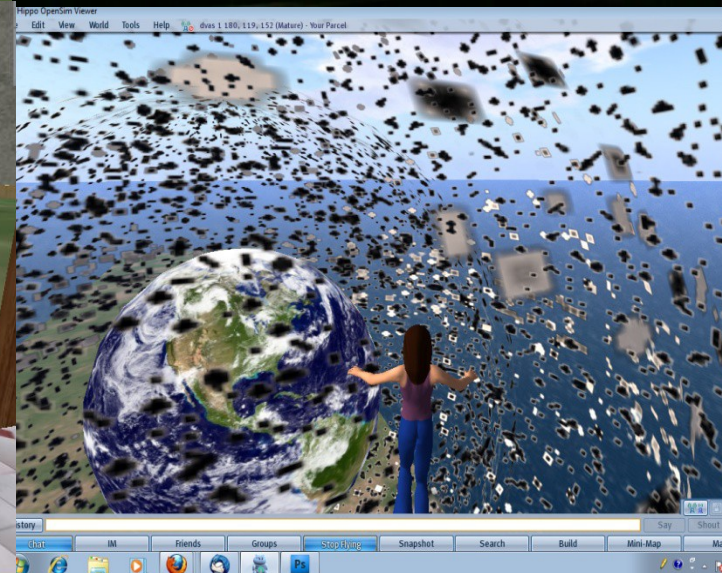
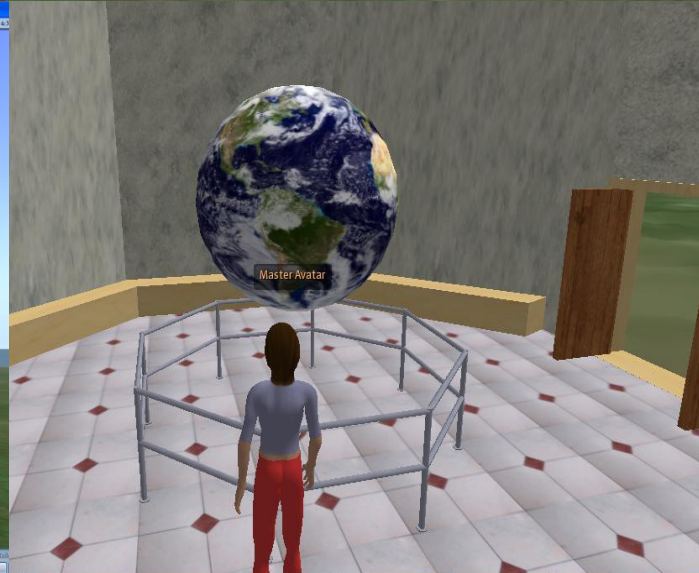
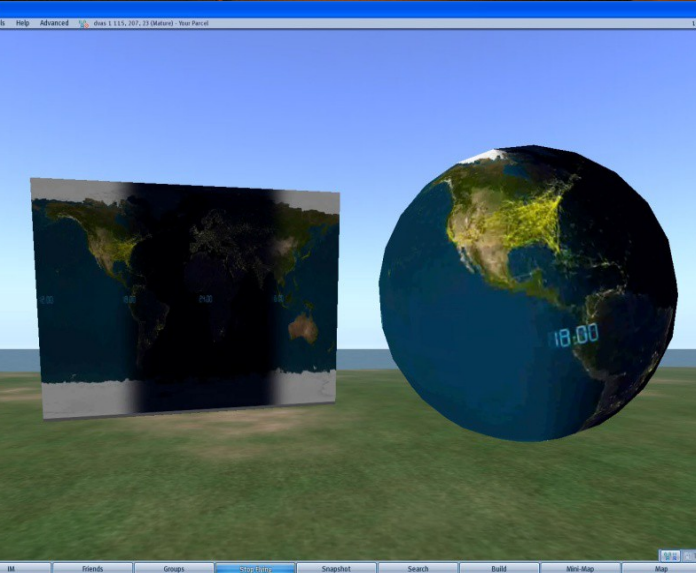
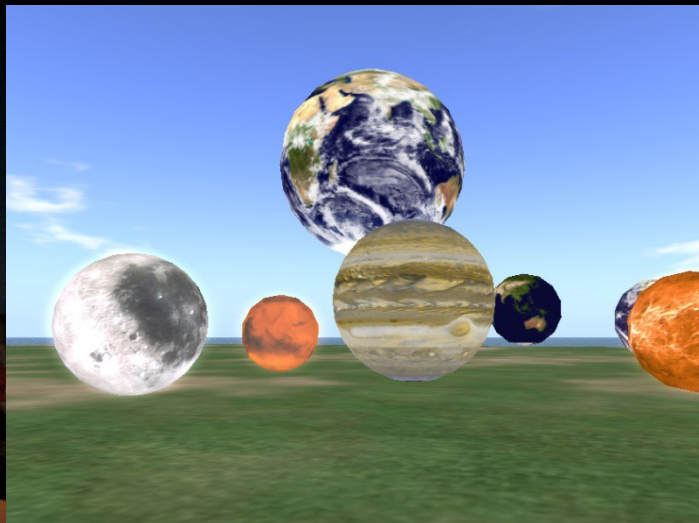
Scacchi, W. (2010). *Game-Based Virtual Worlds as Decentralized Virtual Activity Systems*, in W.S. Bainbridge (Ed.), *Online Worlds: Convergence of the Real and the Virtual*, Springer, New York, 225-236.

# Semiconductor/nanotechnology fabrication training game: “Gowning processes”





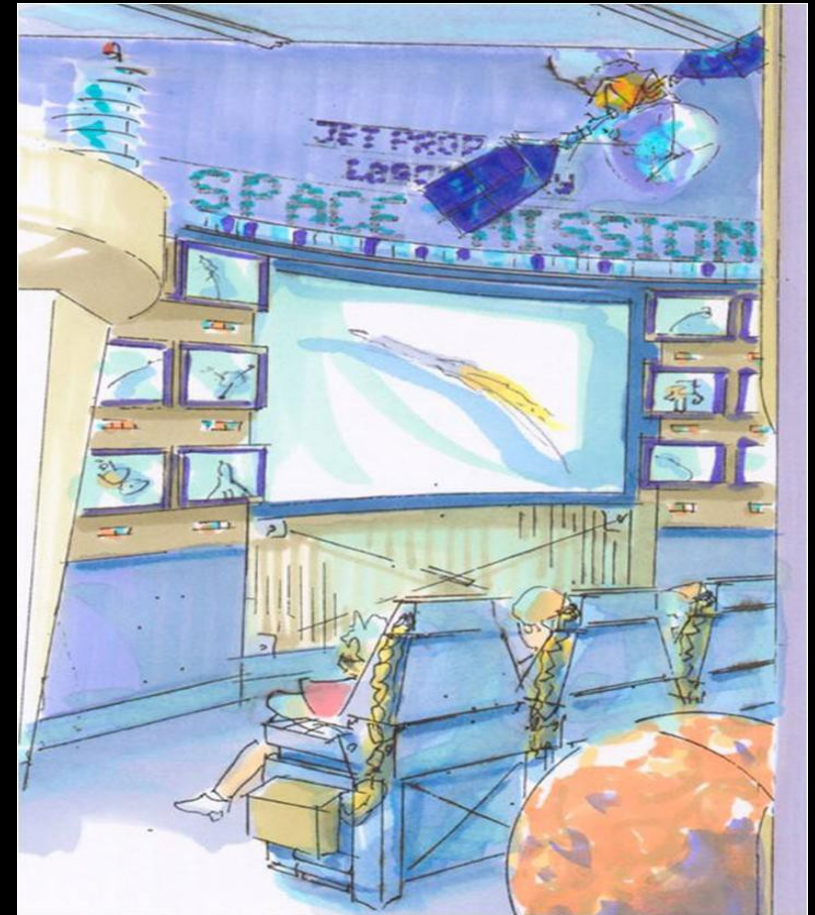
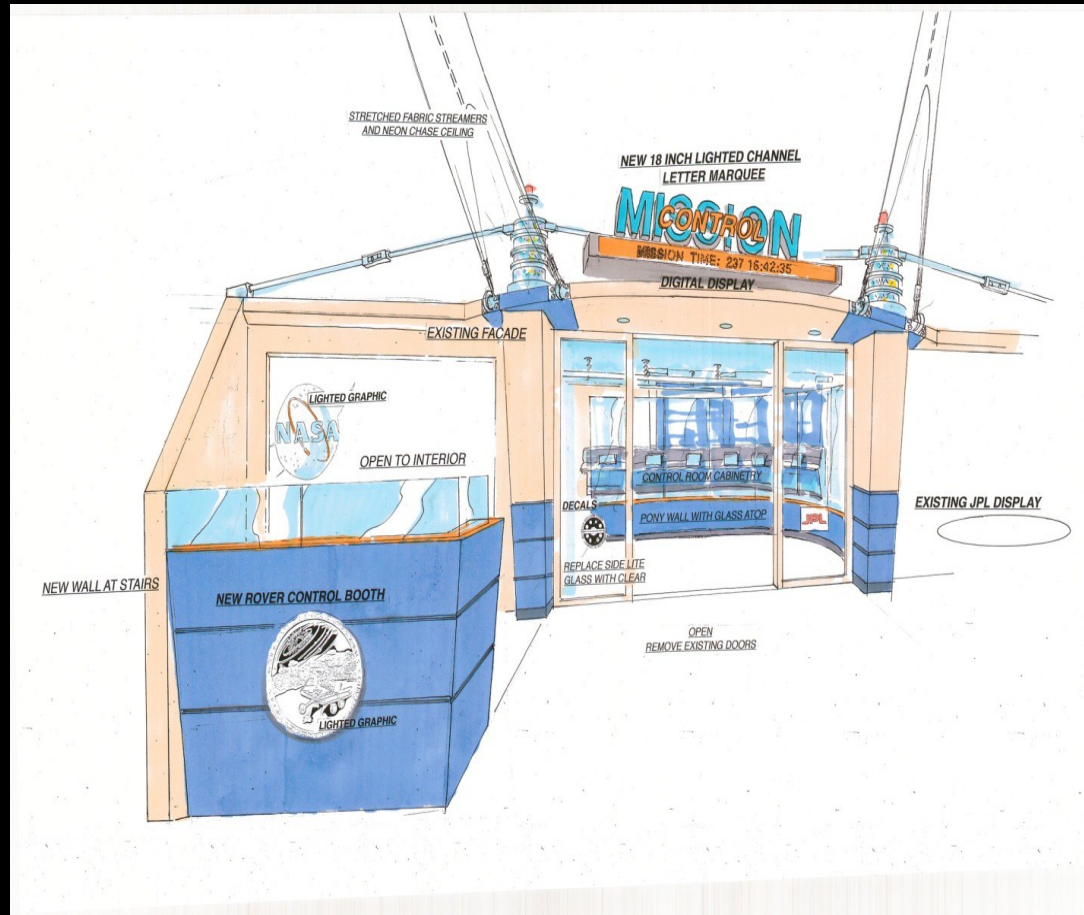
# Planetary science data visualization and “spherescasting” support: *NOAA Science on a Sphere* installation in *Opensim* VW platform



Supporting virtual exploration of planetary and near-earth objects (space debris, small satellites, near-earth asteroids)



# Mission Control Room: Vision for *Discovery Science Center*





# VW for experimental studies in decentralized command and control centers using *OpenSim*





# Informal Classical Music Learning Game Environment for San Francisco Symphony: *SFSKids.org*

**SFSKIDS**  
FUN & GAMES WITH MUSIC

## Discover Music

Under the Sea of Knowledge.



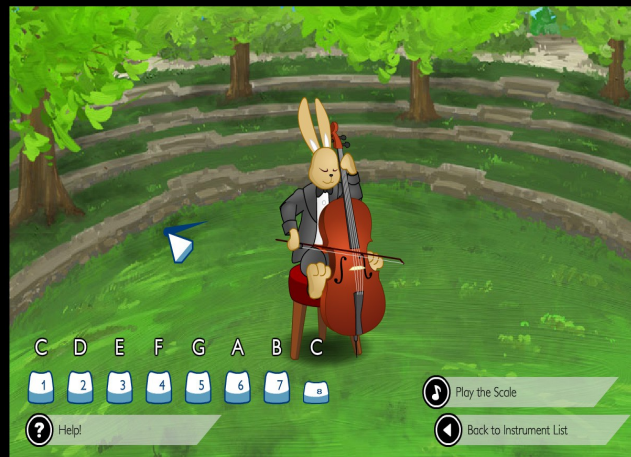
## Play with Music

Above the Musical Skies



## Perform Music

In the Instrument Garden



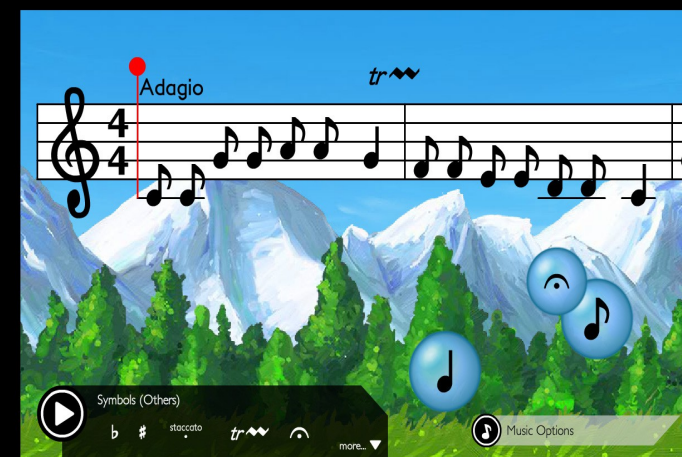
## Conduct Music

At the Symphony Hall



## Compose Music

Atop the Mountain of Muses



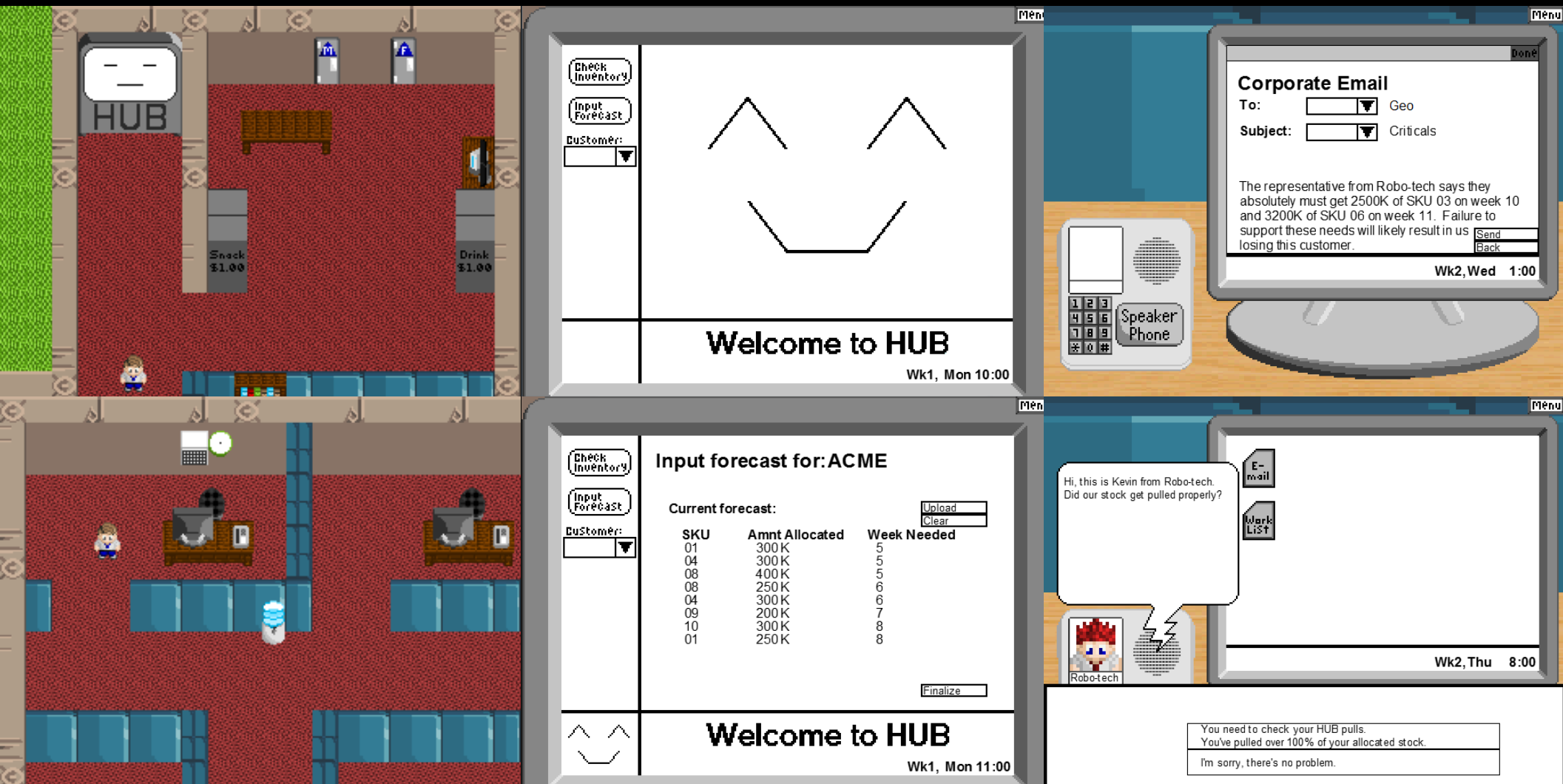
# Potential extensions to SFSKids.org

SFSKids.org, an instance of the *World of Music* platform, is designed for extension, modding, or customization of:

- Recorded music catalog
- Music history
- Music genres (Opera, Jazz, World,...)
- Musical instruments
- User-created music+imagery (“music videos”)
- Localization (internationalization)
- Integration with Science, Technology, Engineering, Arts, and Mathematics (STEAM) learning initiatives



# CBA: Customer relations work practices simulator implemented using low-cost, rapid micro-development cycle



# 2D, side-scrolling, *World of Warcraft* inspired, role-playing game and CGVW development/modding kit

Aoedipus.net



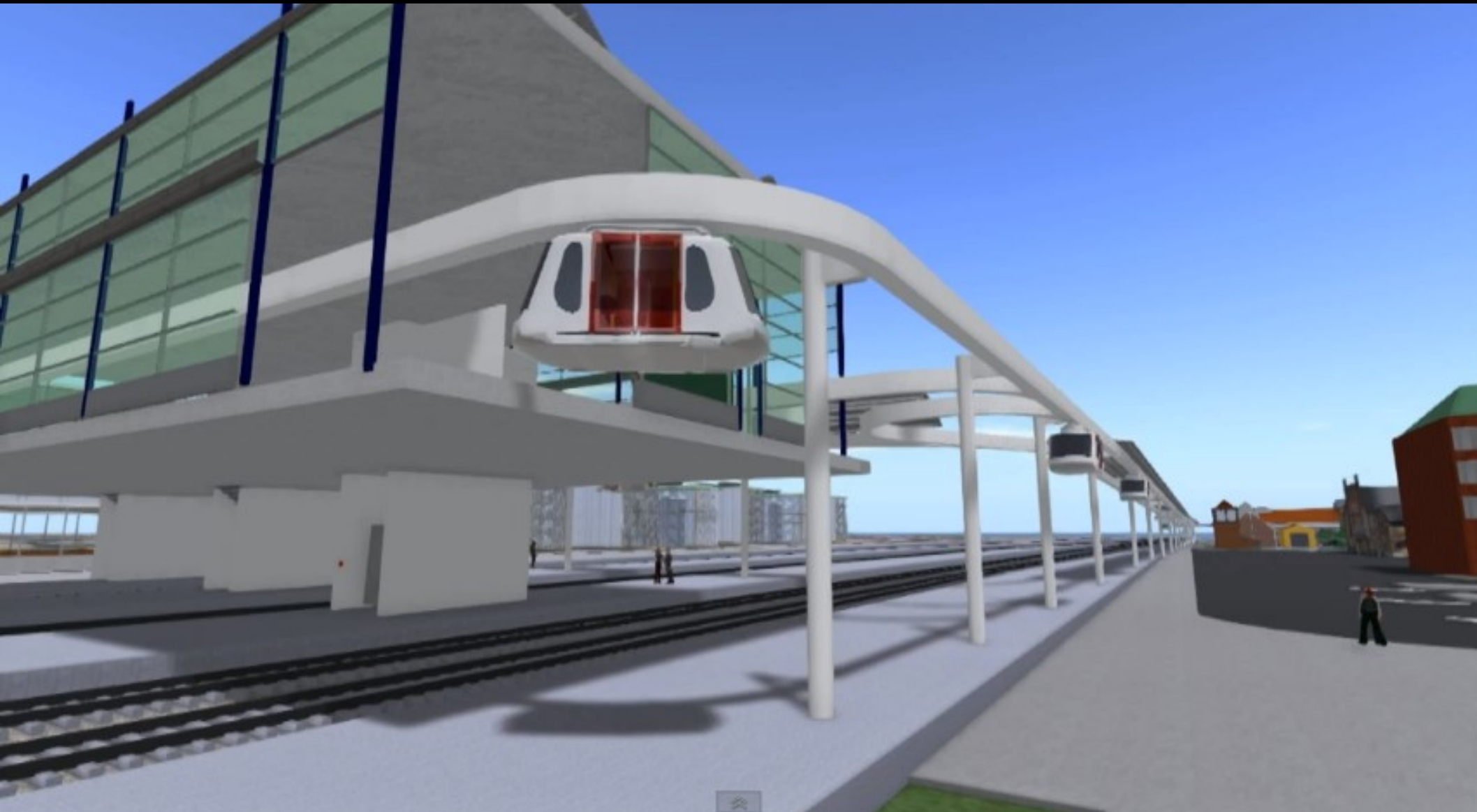


# Envisioning a virtual social computing world



Virtual Life Demo Reel

# Modeling and Simulating the design of a Personal Rapid Transit system for Uppsala, Sweden





# Game-based VW simulator interfaces for immersive motorsports racing experiences: *cost* vs *realism*?



\$500 vs. \$5000 vs. \$50,000 vs. \$500,000 vs. \$5,000,000

# High fidelity motorsports game?





# Game-based VW simulator you can actually drive in physical world! -- *OutRun* @ UCI



<http://www.conceptlab.com/outrun>



# Community development concept: Supporting UCI video game developers club projects (sample)





# Community development concept: Supporting UCI video game developers club via Computer Game Science Laboratory





# Community development concept: *IEEE Intercollegiate Computer Game Development Showcase* (2012-2015)

The screenshot shows the homepage of the IEEE GameSIG 2013 Intercollegiate Game Showcase. The header features the IEEE logo and the GameSIG 2013 logo. Navigation links include HOME, EVENT, GUIDELINES, JUDGES, SPONSORS, and CONTACT US. Below the header, the event title "Intercollegiate Game Showcase 2013" is displayed. A central banner features a blue robot character with a speech bubble saying "Do You Have What It Takes?". Below the banner, there is a section for the game contest with the text "COMPETE in our Game Contest, Win PRIZES, EARN ACHIEVEMENTS & FINE TUNE YOUR SKILLS". The bottom of the page has three columns: "Game Event" with details about the venue and time, "Our Esteemed Sponsors" with a link to a complete list, and "Submission Guidelines" with details about the submission process and a link to read more.

**IEEE GameSIG**  
Intercollegiate Game Showcase **2013**

HOME EVENT GUIDELINES JUDGES SPONSORS CONTACT US  
ORGANIZING COMMITTEE SPECIAL TEDX EVENT

**game**  
Programming skills on Fire

University of California at Irvine (UCI)  
Saturday April 27, 2013 at 2:00PM

COMPETE in our Game Contest, Win PRIZES,  
EARN ACHIEVEMENTS & FINE TUNE YOUR SKILLS

Do You Have What It Takes?

**Game Event**  
details about game event

Venue: University of California at Irvine in Bren Hall, Saturday, April 27. Setup starts at 11:00 AM. Main event starts at 2:00PM and ends at 4:00PM, followed by a reception with game demos from 4:00PM to 6:00PM.... [READ MORE](#)

**Our Esteemed Sponsors**  
making this event possible

We have attracted even more sponsors this year, helping us make this event more exciting than ever. Please support these fine schools and companies... [SEE COMPLETE LIST](#)

**Submission Guidelines**  
our submission rules etc.

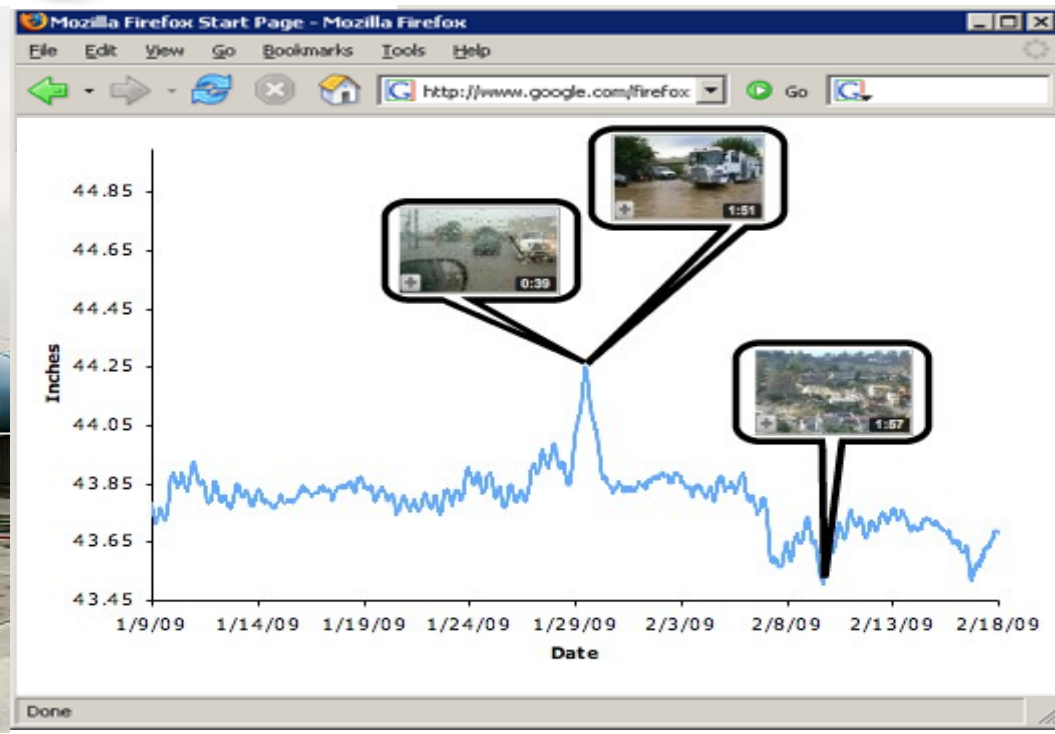
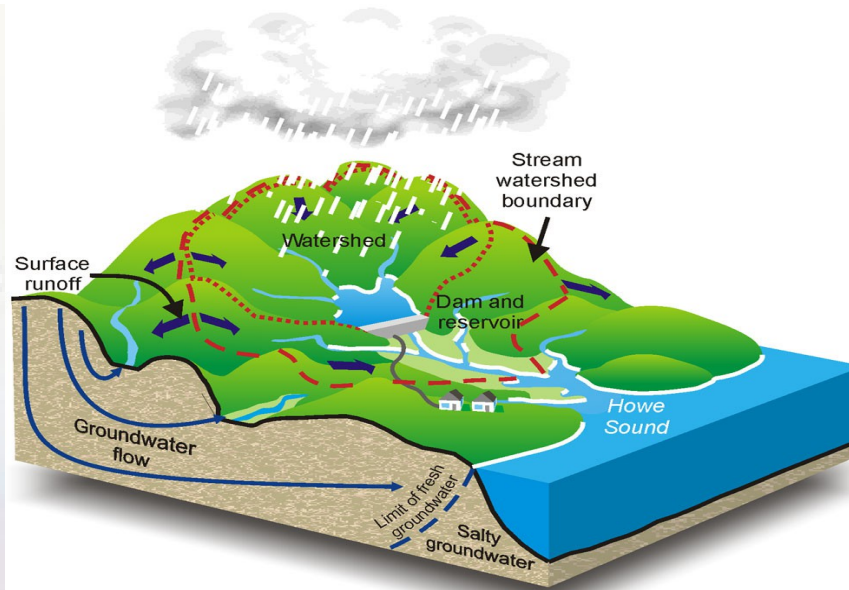
Submissions begin on April 1, 2013 at 12:01AM Pacific Time (PST), and end on April 7, 2013 at 8:00AM Pacific Time (PST). Finalists will be selected based on their one page Executive Summary and 3-5 minute YouTube video submissions.... [READ MORE](#)

# Large group conferences in virtual world: *OpenSim Community Conference (2013-2014)*





# Participatory Drought Management and Water Quality Game (Vision with *UCI Urban Water Research Center*)



# CGVW Research Agenda produced for *National Science Foundation*





# Game-Based Worlds for Neuroscience

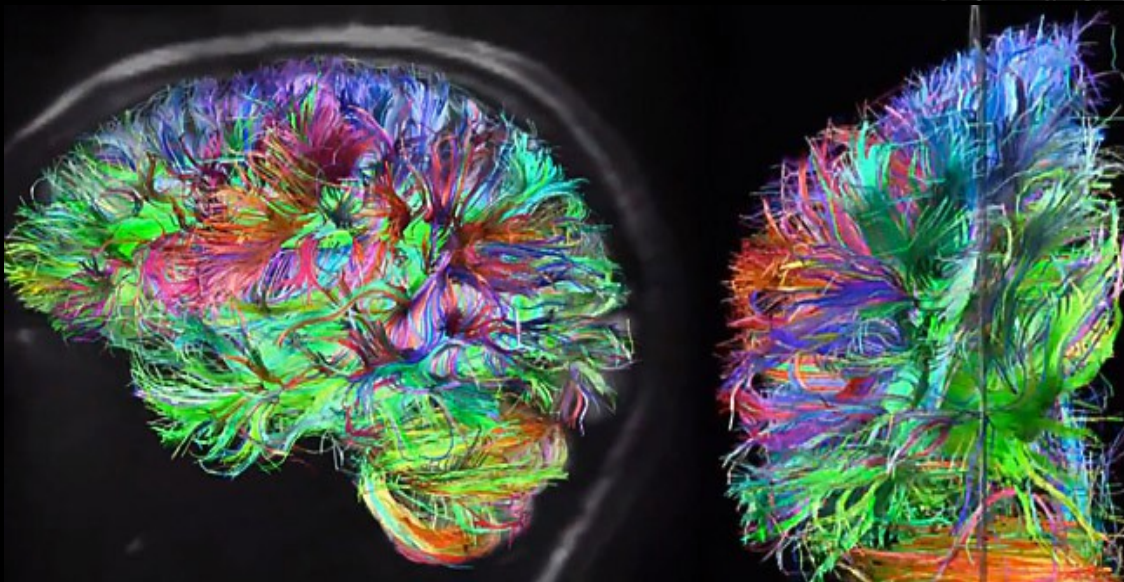
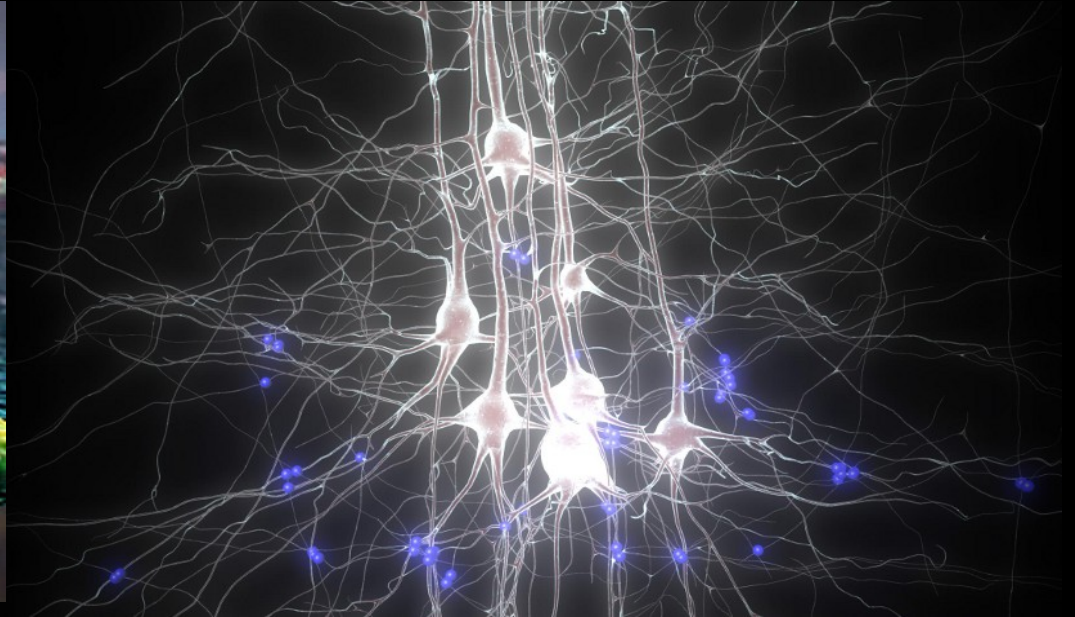
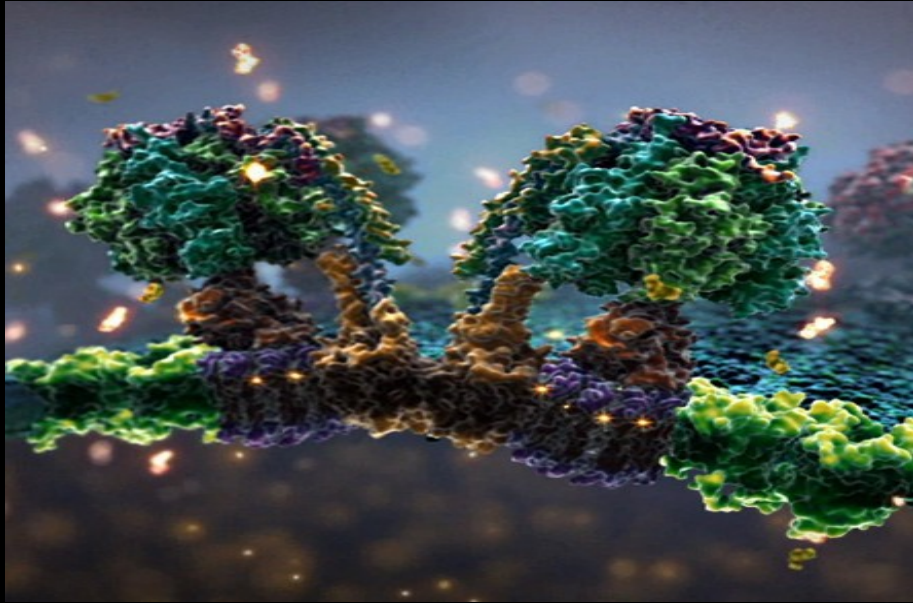
Adventure/Quest games for learning neuroscience via experiments in simulated brain/anatomical testbeds to study:

- Neurobiological processes
- Disease and drug pathologies
- Brain repair and rehabilitation
- Brain-computer interaction (HMD, EMM, EEG, 5.1 headphones)





# Games for (Ca)BRAIN) NeuroScience?



# Research Collaborators

## *Faculty*

— Robert Nideffer (RPI), Thomas Alspaugh, Yunan Chen, Steve Cramer, Magda El-Zarki, Garnet Hertz (Emily Carr U), Alfred Kobsa, Crista Lopes, Gloria Mark, Bonnie Nardi, David Redmiles, Richard Taylor, and many others

## *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



# Acknowledgements

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- Discovery Science Center, Naval Postgraduate School (Center for Edge Power), Intel, Northrop-Grumman, San Francisco Symphony, UCI (School of Medicine) Anatomy & Neurobiology, (School of Biological Sciences) Neurobiology and Behavior.
- Digital Industry Promotion (DIP) Agency, Daegu, South Korea
- UCI Video Game Developers Club
- ◉ *No review, approval, or endorsement implied.*