

# The Future of Computer Games\* in Research, Education and Workforce Development

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*\*(including virtual worlds and virtual reality)*

# Overview

The Future of Computer Games and Virtual Worlds—*beyond entertainment.*

Informal STEM and Arts education

Adult training in advanced manufacturing

Advanced medical care

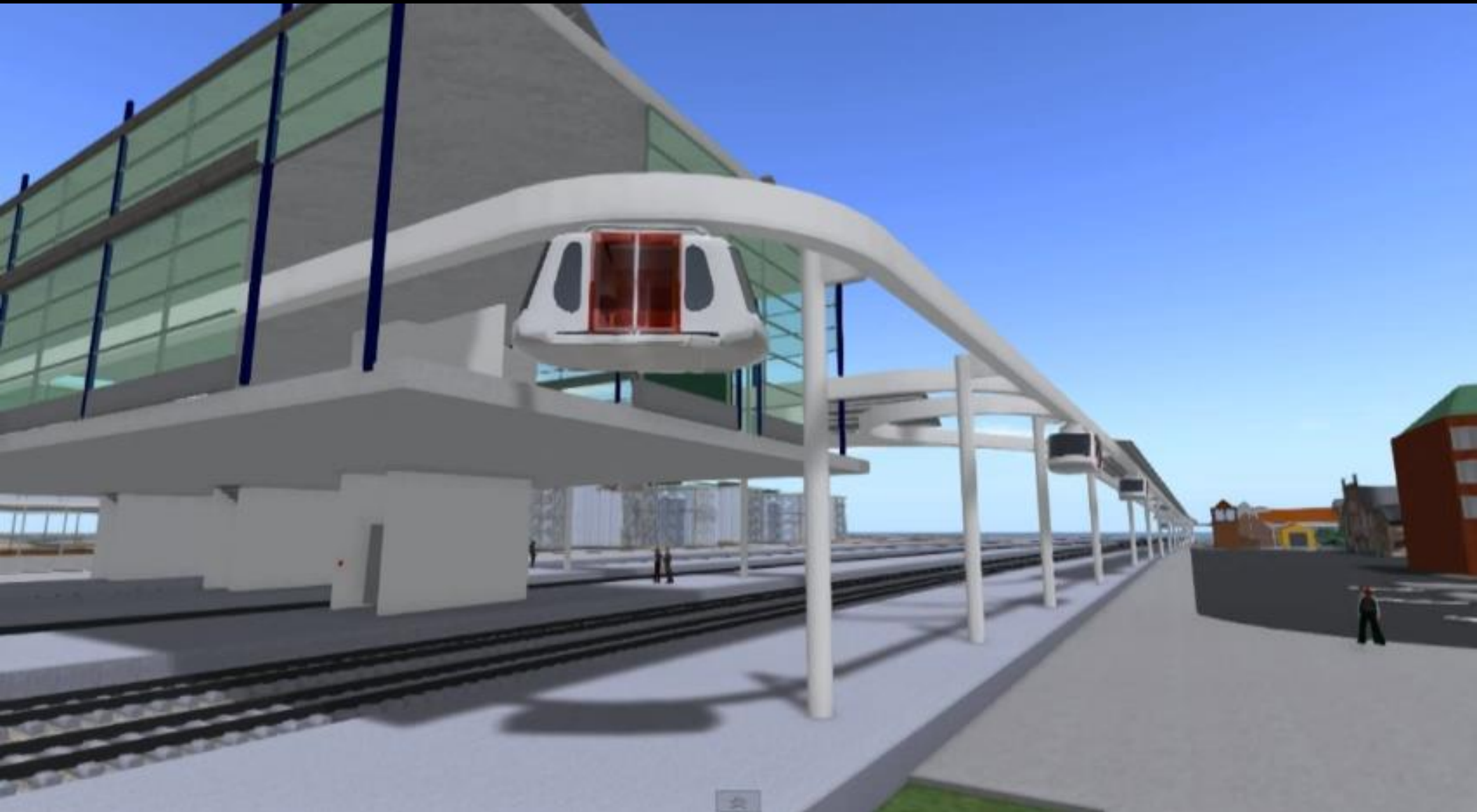
Commercialization of Space

Opportunities for action

# *Future of Research in Computer Games and Virtual Worlds: NSF Workshop Report*



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





# Large Group Virtual Research Conference





# *DinoQuest Online*: Game-Based Virtual World for Informal Life Science Education





# Informal Classical Music Learning Game Environment: *SFSKids.org*

**SFSKIDS**  
FUN & GAMES WITH MUSIC

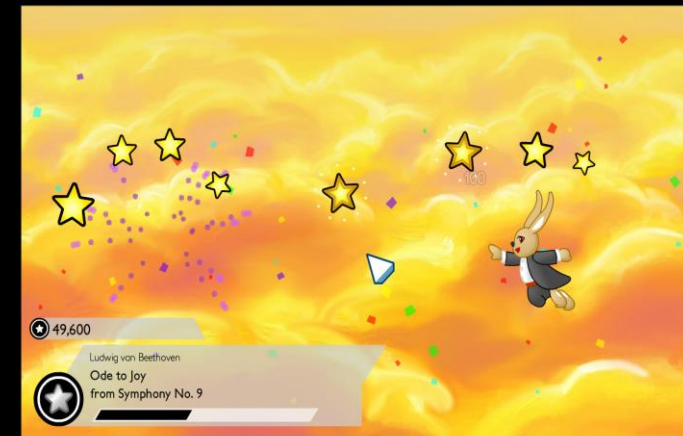
## Discover Music

Under the Sea of Knowledge.



## Play with Music

Above the Musical Skies



## Perform Music

In the Instrument Garden



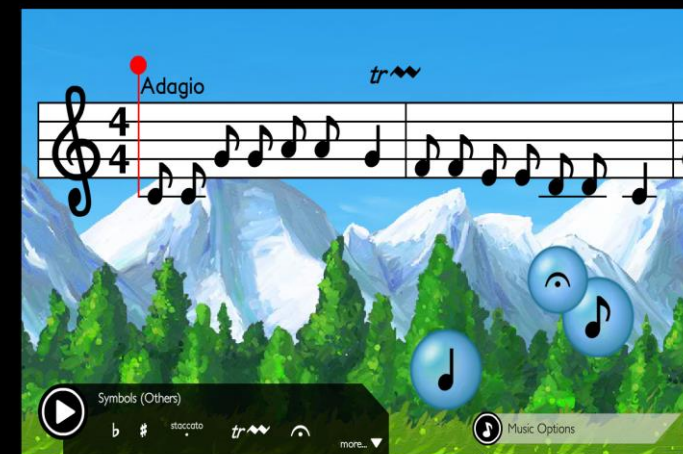
## Conduct Music

At the Symphony Hall



## Compose Music

Atop the Mountain of Muses



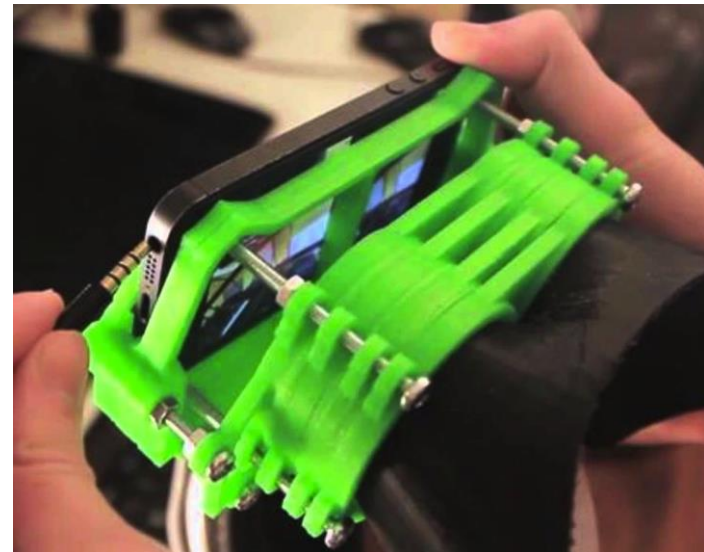




# Game-based production system for material transfer processes



# Opportunity: create a game for decentralized virtual manufacturing system





# Opportunity: Smart Workers and Augmented Work (with UCI Calit2)



# Game-based simulator interfaces for immersive *medical education: low-cost* vs *realism*?



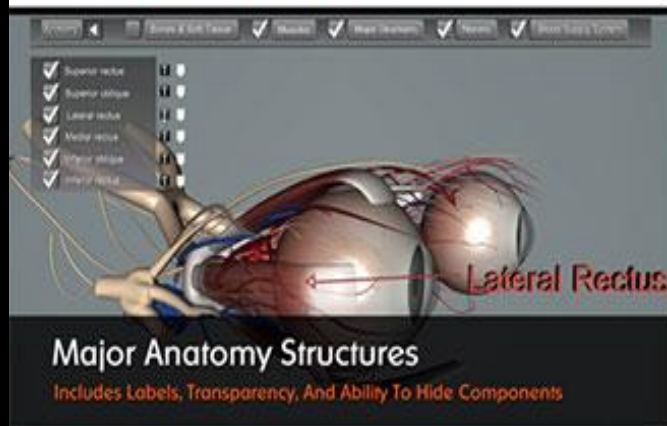
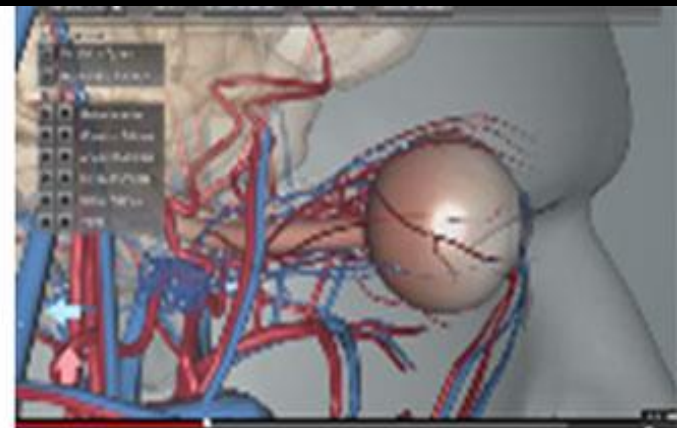
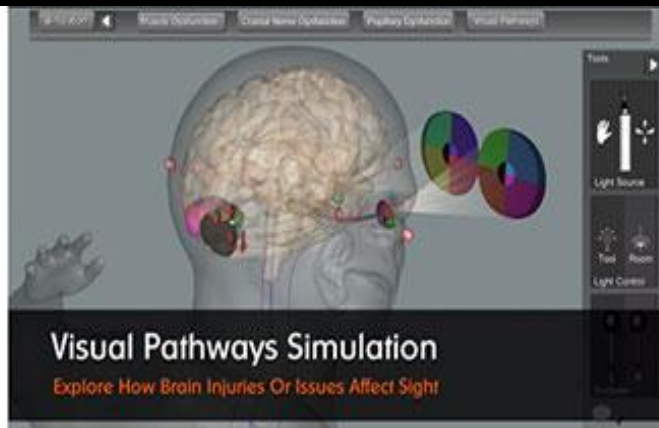
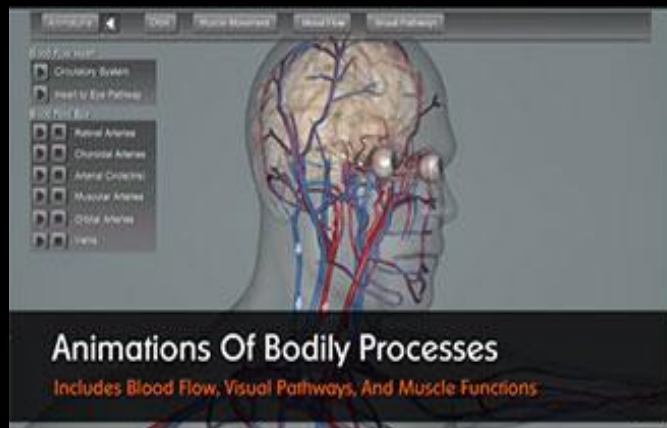
Virtual human in *Surgeon Simulator 2014*  
(iPad/PC game)



# Commercial, virtual medical clinic simulator

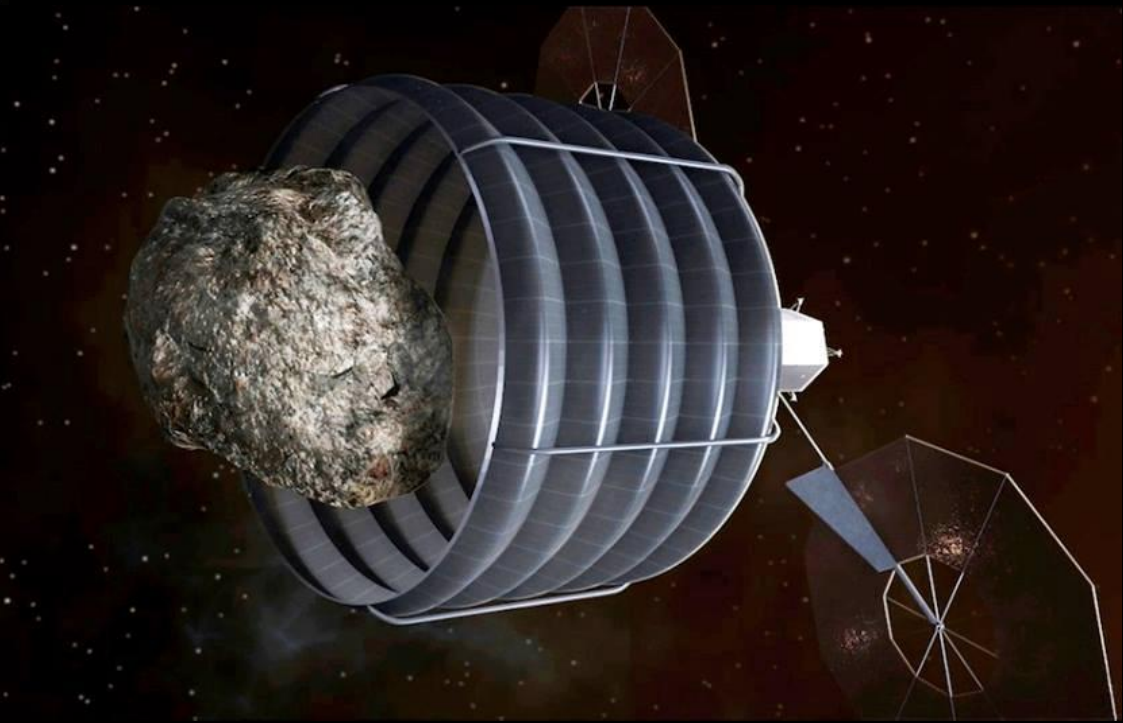
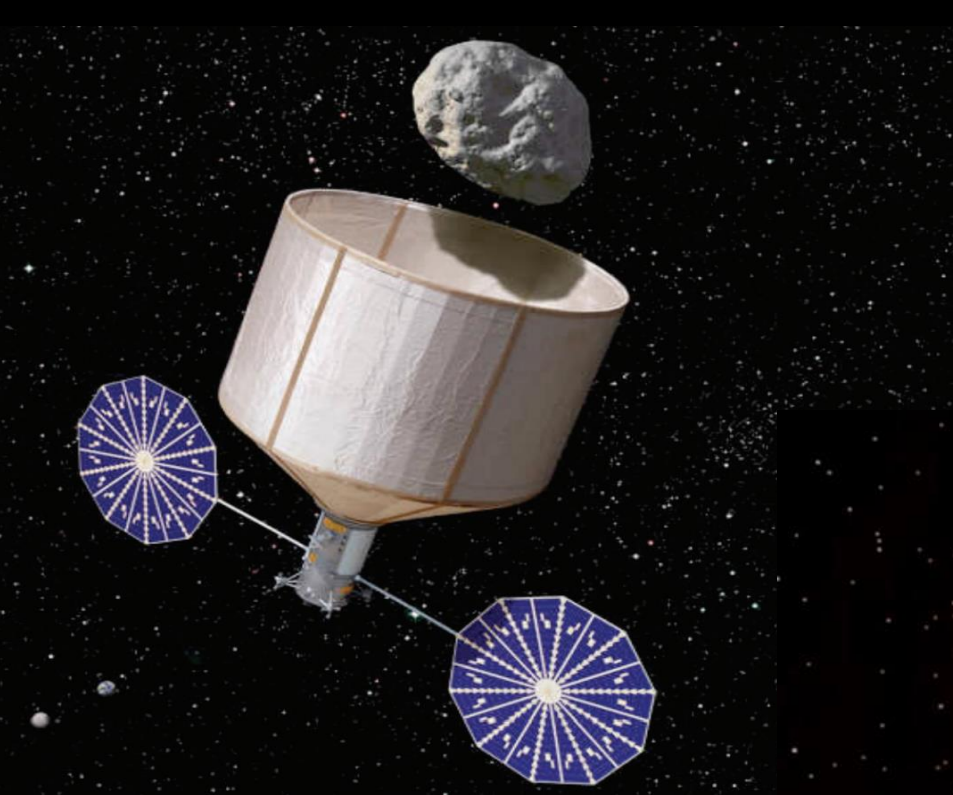


# Commercial, high fidelity virtual anatomical training systems



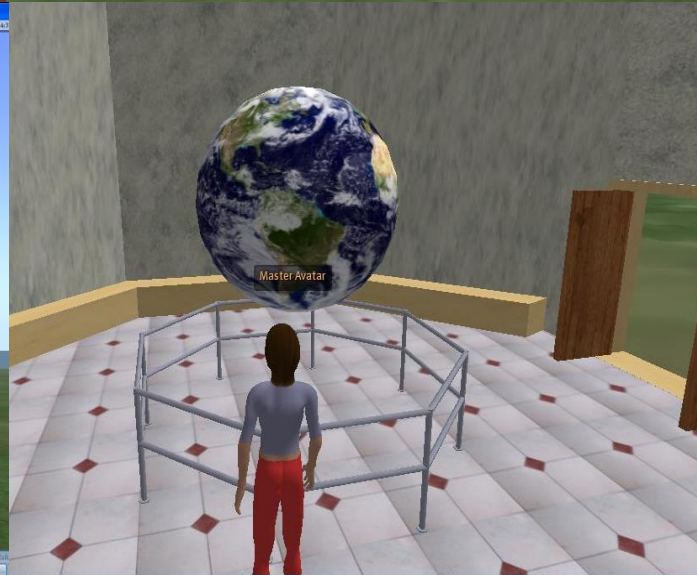
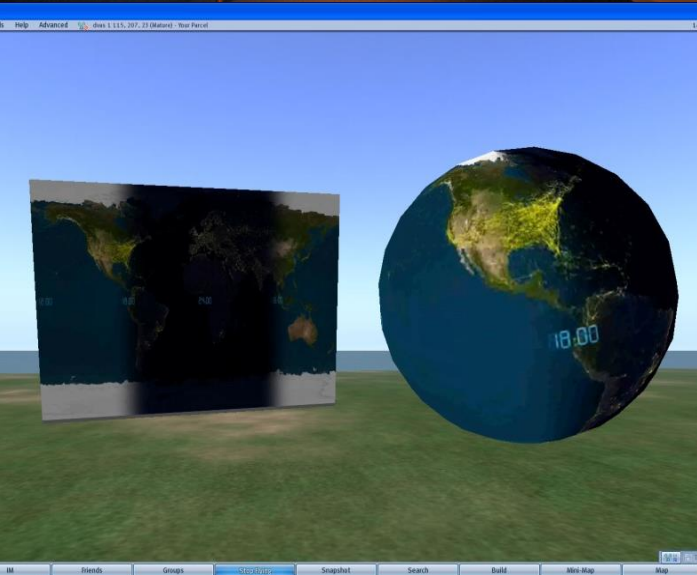
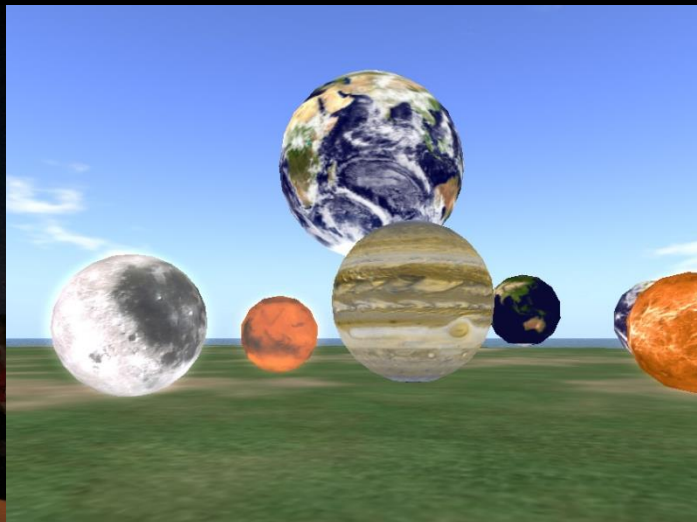


*Opportunity:* develop reusable framework for developing interactive “science missions” for government, industry and public.



Sample project: *Asteroid Redirection Mission* (NASA and *Kerbal Space Program*) for resource harvesting.

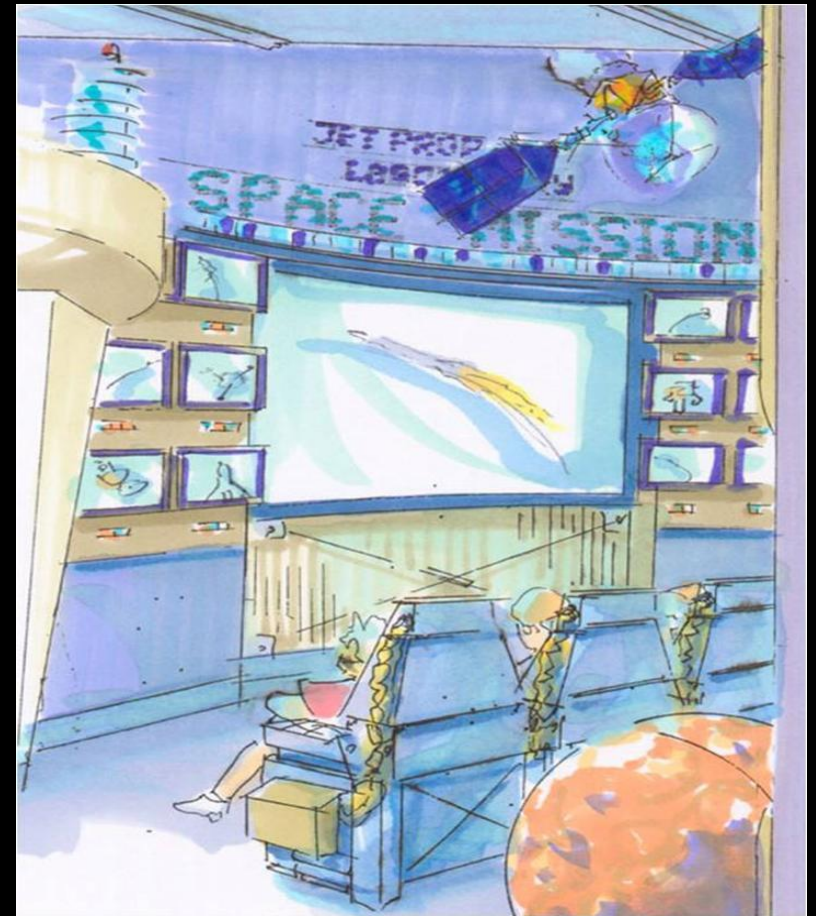
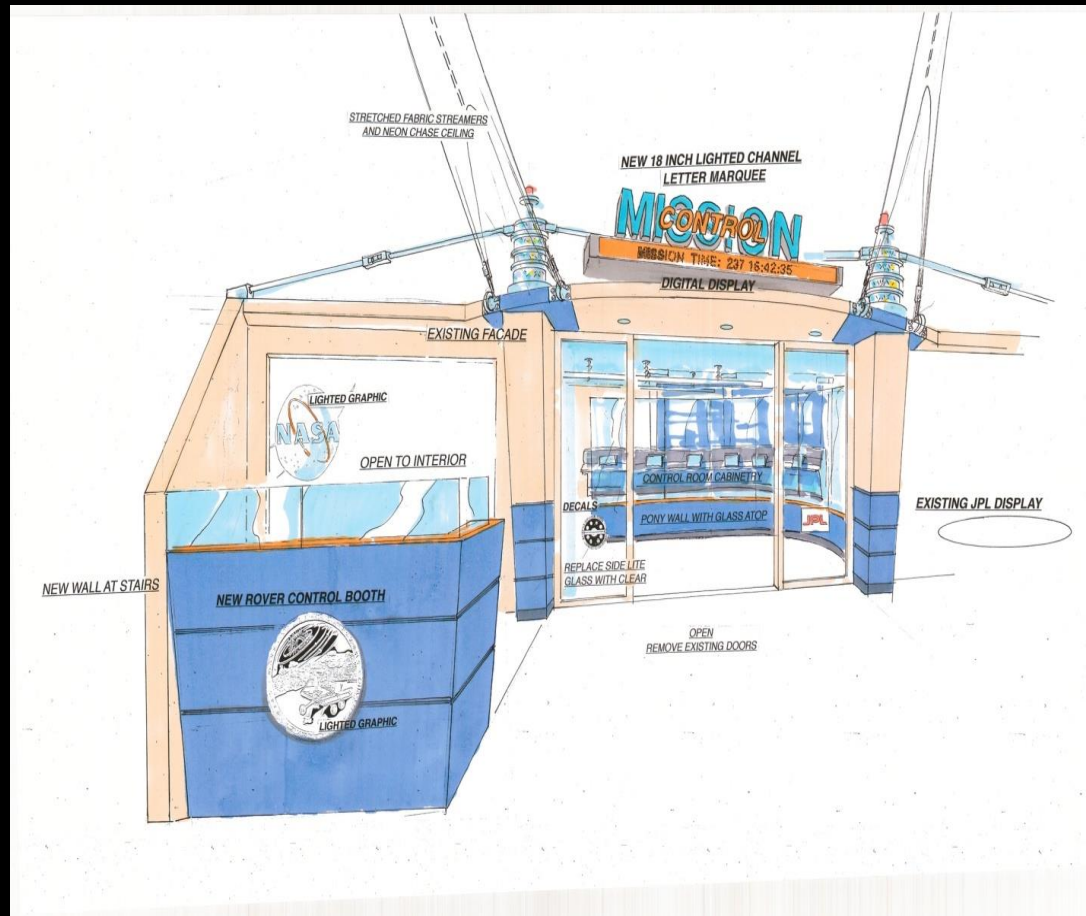
# Planetary science data visualization and “spherescasting” support: *NOAA Science on a Sphere* installation in *Opensim* VW platform



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



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





# Advanced training center concept using low-cost game-based virtual world technology





# Opportunities for Action

Provide seed funds for meetings and stimulate partnerships between academia, emerging industries, large enterprises, and government agencies.

Provide challenge grants and open competition events that seek to demonstrate new socio-technical and educational capabilities through computer games and virtual reality.

California's economy and workforce have *global* competitors, yet we can further our lead through computer game technology and culture!

# Research Collaborators

## *Faculty*

— Robert Nideffer (RPI), Thomas Alspaugh, Jill Berg, Yunan Chen, Steve Cramer, Garnet Hertz (Emily Carr U), Alfred Kobsa, Jung-Ah Lee, 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



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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.*

# Additional Information and Resources

*The Future of Research in Computer Games and Virtual Worlds: NSF Workshop Report*

Collaborative Game Environments for Informal Science Education: DinoQuest and DinoQuest Online,

Game-Based Virtual Worlds as Decentralized Virtual Activity Systems

Exploring the Potential of Virtual Worlds for Decentralized Command and Control

[VirtualWorldSociety.org](http://VirtualWorldSociety.org)