

# **The NPS MOVES Academic Group & the UCB Design Visualization Center**

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## **Talk Outline**

*Biography*

*MOVES Curriculum*

*MOVES Research Center*

*Directions for the MOVES Research  
Center*

*What can UCB provide*

## **Zyda Biography**

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***Professor in Department of Computer Science at the Naval Postgraduate School.***

***Chair & Academic Associate Chair for the NPS MOVES Academic Group.***

***Research focus - computer graphics, specifically the development of large-scale, networked 3D virtual environments.***

## **Zyda Biography**

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***Member, National Research Council Committee on Virtual Reality Research and Development (92-95).***

***Chair, National Research Council Committee on Modeling and Simulation: Linking Entertainment & Defense (95-97).***

***Member, National Research Council Committee on Advanced Engineering Environments (98-00).***

## **Zyda Biography**

***Member of the Technical Advisory Board of the Fraunhofer Center for Research in Computer Graphics.***

***Senior Editor for Virtual Environments for the MIT Press quarterly PRESENCE.***

***Member, Editorial Advisory Board of the journal Computers & Graphics.***

## **Zyda Biography**

### ***Consulting -***

- White House Office of Science and Technology Policy, Ministry of Industrial Development Sabah Province, Malaysia, Japan Tech Services Corporation, Tokyo, Hitachi Plant Construction & Engineering, Ohtsuka,
- SimGraphics Engineering, Pasadena, Silicon Graphics International, Geneva, Nihon Silicon Graphics KK, Advanced Telecommunications Inc., TecMagik and Paramount Digital Entertainment, among others.

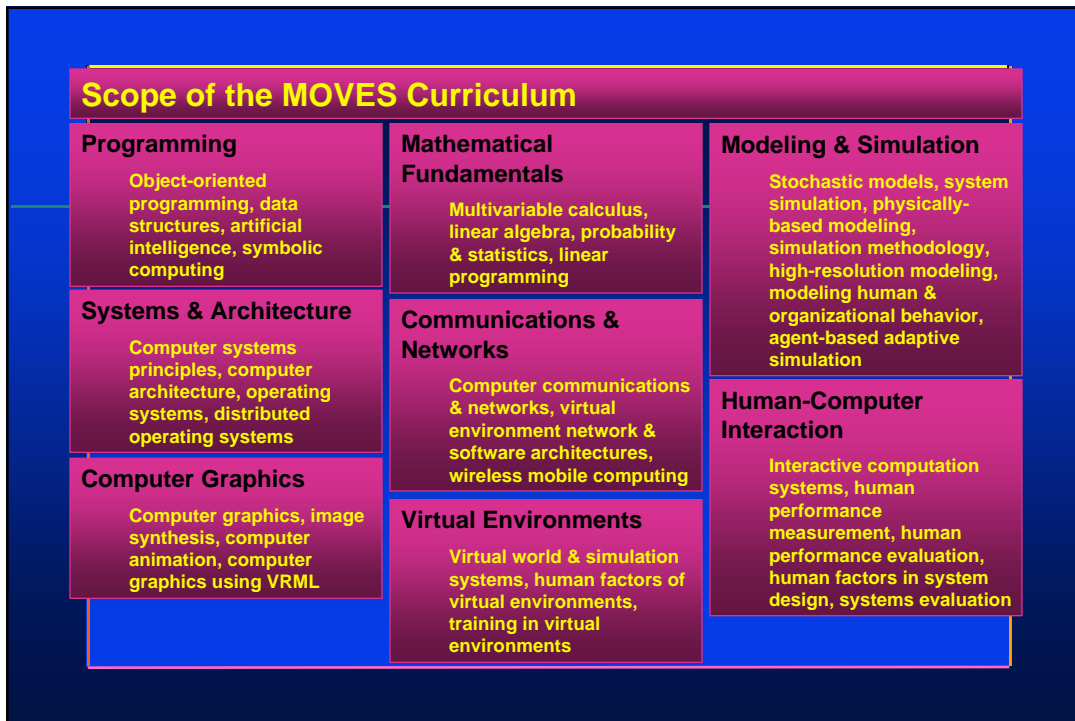
## NPS Modeling, Virtual Environments & Simulation (MOVES) Program

- The Naval Postgraduate School Modeling, Virtual Environments & Simulation (MOVES) program offers MS degrees in MOVES, with a Ph.D. program under development for consideration by the NPS Academic Council.
  - Initially, we did not create a department but rather a degree program comprised of existing courses from several departments.
  - The MOVES Faculty is interdisciplinary.

## MOVES Tracks

### *Two tracks in MOVES -*

- **Visual Simulation** - technology development for virtual environments.
- **Human Computer Interaction** - technology utilization and evaluation for virtual environments.
- We have plans to create additional tracks
  - **Physically-Based Modeling**



## MOVES Research Center

***There is a MOVES Research Center for interdisciplinary research efforts.***

- We have core (annual) funding and reimbursable funding.

## Directions for the MOVES Research Center

### Networked Virtual Environments

All aspects of large-scale, networked 3D virtual environments, from their design & construction to their evaluation & fidelity requirements. High-Level Architectures (HLA) for virtual environment interoperability, RTI & next-generation RTI. Cross-platform interoperability. Web-based virtual environments.

### Visualization

Immersive ship & building walkthroughs (damage control, hostage extraction, urban warfare), ocean environment visualization, information visualization.

### Computer-Generated Autonomy

Computer-generated virtual environment characters & semi-automated forces. Human & organizational behavior modeling. Agent-based adaptive simulation. Software architectures for computer-generated autonomy.

### Modeling & Simulation

Dynamic & state space modeling. High-resolution models. High-level aggregate models. Intelligent agents. Physically-based modeling.

### Human-Computer Interaction

Human factors, psychophysics, evaluative research. Spatial sound for the improvement of performance in the virtual environment. Training in the virtual environment. Fidelity requirements for wayfinding in the virtual environment. Human body tracking technology development (inertial motion tracking, locomotion devices, human modeling - articulated body kinematics & dynamics).

## UCB Design Visualization Center

***What can Berkeley provide with respect to the planned foci of the center?***

- Design
- Modeling
- Virtual Environments
- Entertainment

## **UCB Design Visualization Center**

***Customers for the students - people for whom content development & technology utilization is important.***

- Building industries
- Internet & Entertainment Corporations
- Government (NASA, DoD, ...)
- Museums & Historical Preservation

## **Building industries want ...**

***Building industries want graduates who can -***

- Construct 3D virtual environments that are beautiful, 3D VEs that are functional in the design process. They want to go directly from VE to construction, they want to go from the built world to the VE. They want to add physics into the models they are constructing, physics that works in real-time.

## **Internet & Entertainment Corporations**

### ***Internet & Entertainment Corporations want graduates who can -***

- Build compelling 3D VEs, environments that hold our attention and provide us an entertaining experience. These 3D worlds need to be interactive with live and autonomous players. The worlds need to be networked. High-end and low-end machines and web-based systems are all in the mix. Spatial, high-quality sound & novel VR cubicles/input devices ...

## **Government (NASA, DoD, ...)**

### ***The government wants graduates who can***

- Build 3D VEs that can be used for pre-planning missions & advanced engineering, VEs that can network with others across the web, VEs of very high quality, VEs in which the metrics match precisely the real world. The government wants autonomy in its VEs, autonomy for training. Physics, spatial sound, novel interface devices for locomotion are all in the government purview.

## Museums & Historical Preservation

### *Museums & historical preservation efforts want graduates who can -*

- Construct 3D VEs of historical sites, sites that we may be losing due to environmental destruction. These VEs need to be annotatable, with audio and video clips collected from the original. We want to provide interactivity & open doors & view spaces normally off-limits ... We want to place these worlds on the web for global participation ...

## Educational program

### *Educational Program*

- Degrees with new names
  - **Virtual Environment Design**  
(Building industry, Government)
  - **Entertainment Technology & Design**
  - **Design, Modeling & Virtual Environments**  
Museums & Historical preservation

## Research Program

*There is plenty of work still to be done to make building VEs routine. There is applied work in getting experience constructing VEs of interest and not yet done fundamental technology. See the NRC reports:*

- Virtual Reality - Scientific & Technological Challenges
- Modeling & Simulation - Linking Entertainment & Defense

## NPSNET Web Sites

**Mike Zyda:**

<http://www.npsnet.nps.navy.mil/zyda>

**MOVES Page:**

<http://www.moves.nps.navy.mil>