

Interactive Simulation

Class 1

Prof. Roger Smith

<http://www.simulationfirst.com/ein5255/>

© Copyright 2002-2003, Roger Smith

Introductions

- Majors
 - Industrial Engineering
 - Modeling & Simulation
 - Education
 - Computer Science
 - (others ...)
- FEEDS
 - Videotapes
 - RealMedia on Web (www.feeds.engr.ucf.edu)

Roger D. Smith

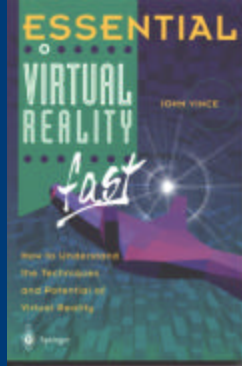


- Vice President & Group CTO, Titan Corp.
- President, Simulation First LLC.
- Adjunct Professor, University of Central Florida
- Adjunct Professor, Florida Institute of Technology
- Industrial Advisory Board, University of Florida, Computer Science Department
- Editorial Board, ACM Transactions on Modeling and Computer Simulation
- Consultant/Instructor, Distributed Simulation Technology
- Lecturer, Georgia Tech, Univ Virginia, Univ Texas, UCF
- Chairman, ACM Special Interest Group for Simulation
- General Chair, Electronic Conferences on Training Simulation
- STRICOM, STAR Award
- SCS, Outstanding Contribution Award
- ACM, Service Award for Simulation
- General Dynamics, General Manager's Commendation

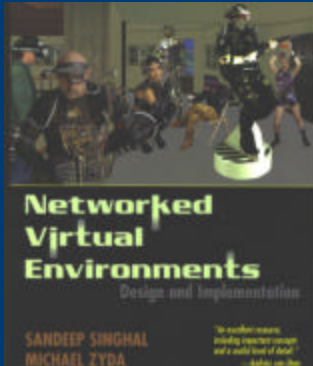
Class Documents

- Watch the web site:
 - <http://www.simulationfirst.com/ein5255/>
- Syllabus
- Research Instructions
- Lecture Schedule & Slides
- Resources & Software
- Assignment Samples
 - Creator, Research Papers

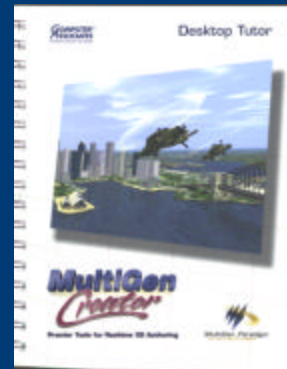
Textbooks



ISBN 1-85233-012-0



ISBN 0-201-32557-8

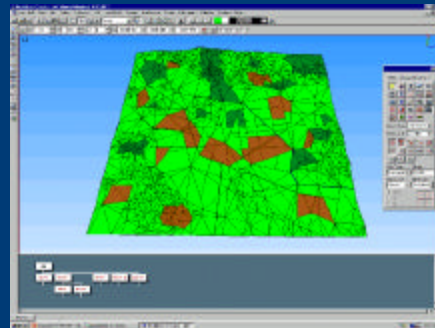
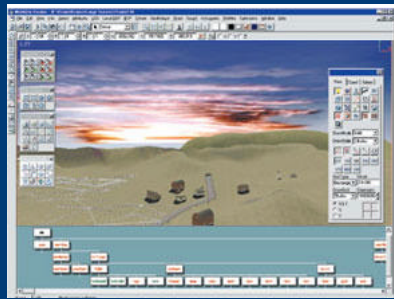


Copies in Labs

Assignments

- Creator Project
- Research Paper
- SimStorm World
- Mid-term Exam
- Final Exam

MultiGen Creator



www.multigen.com

AIS SimStorm



www.ais-sim.com

Definitions

- Interactive Simulation, what is it?
- Simulation is a representation of a real-world or hypothetical events and processes
 - Live: Real entities included in the simulation (QZAR ...)
 - Constructive: All entities are computer generated
 - Virtual: Real and computer generated entities are present and interact with environment (games ...)

Definitions

- Interactivity is the ability of the user to change the outcome of an event or a process
- Interactive Simulation is a representation of an event, which outcome is changeable by the user.

Benefit

- The benefit of Simulation is reproducing events and processes that would have been expensive, time consuming, or simply infeasible otherwise.
- In our case, we are using simulation for training purposes
- The focus of the class is:
 - Interactive Virtual Simulation Technologies for Training Purposes

Benefit for Training

- It is better to make mistakes in the simulator, than in real life. In combat situation, the simulator is more forgiving.
- It cost less and take less resources to set up a training exercise that include multiple entities.

Virtual Reality (VR)

- Like video, VR is another media
- It conveys information to the user in different ways than any other media, by adding interactivity

Virtual Reality (VR)

- VR Systems are characterized by a 3D computer generated environment that a human interact with as a player
- VR is about using computers to create images of 3D scenes with which one can navigate and interact
- VR is the use of computer technology to create the effect of an interactive three-dimensional world in which the objects have a sense of spatial presence

VR and Training

- Evolution of computer based education and training:
 - Text (Books)
 - Pictures (Books with pictures)
 - Video and Sound (limited interactivity)
 - VR and 3D graphics (interactivity similar to real life)
- VR became the future of interactive simulation and training.

VR and Training

- The effectiveness of training is achieved by immersing the trainee in a Virtual Environment.
 - Immersion means isolating the trainee from any event that is not relevant to training session such as background noises.
 - Immersion contributes to positive transfer of skills learned in the virtual world to the real world (combat flight simulators)

Virtual Environment (VE)

- In the same way live simulation involves real people moving in real terrain and building, virtual simulation involves real and computer generated people that interact with virtual terrain, buildings..
- A VE is a set of virtual terrain, buildings, entities, and environmental features and properties (weather, time of day ...)
- Also called synthetic environment

Real Time Simulation

- A simulator is said to be Real Time, when the user's actions are processed and displayed without time delay. Not realistic
- There will always be some processing time to the user's actions. Therefore, the definition of an acceptable Real Time System:
 - A simulator is said to be Real Time, when its processing time is fast enough to make the user believe that consequences of his actions are immediate.

UCF EIN5255: Interactive Simulation



Virtual Environments you have been in ...

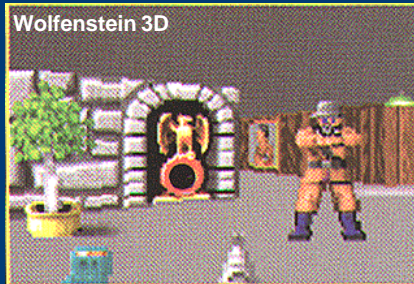


Simulation ~ Games

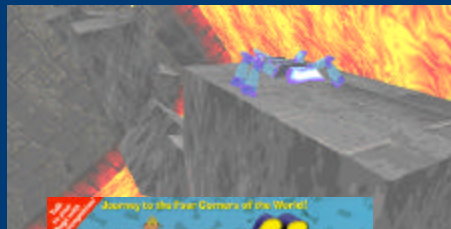




Important Games



Adaptive Learning



- Galapagos
 - Learn the Hard Way
- Dogz, Catz
 - Collect Rules of Behavior
- Creatures



Intelligent Agents



- The Sims
 - Work Environment - Create your coworkers and abuse them
- Traffic Sim
 - Model route to work and experiment with it at different commute times/congestion
 - Specific cities modeled
- Negotiation
 - Roof Jumper
 - Bank Robber
 - Nuclear War
 - Terrorist

Is Real-time Distributed Simulation ^{Just} a Weapon?

Keynote Presentation: 2000 Distributed Simulation for Real-time Applications Conference, San Francisco

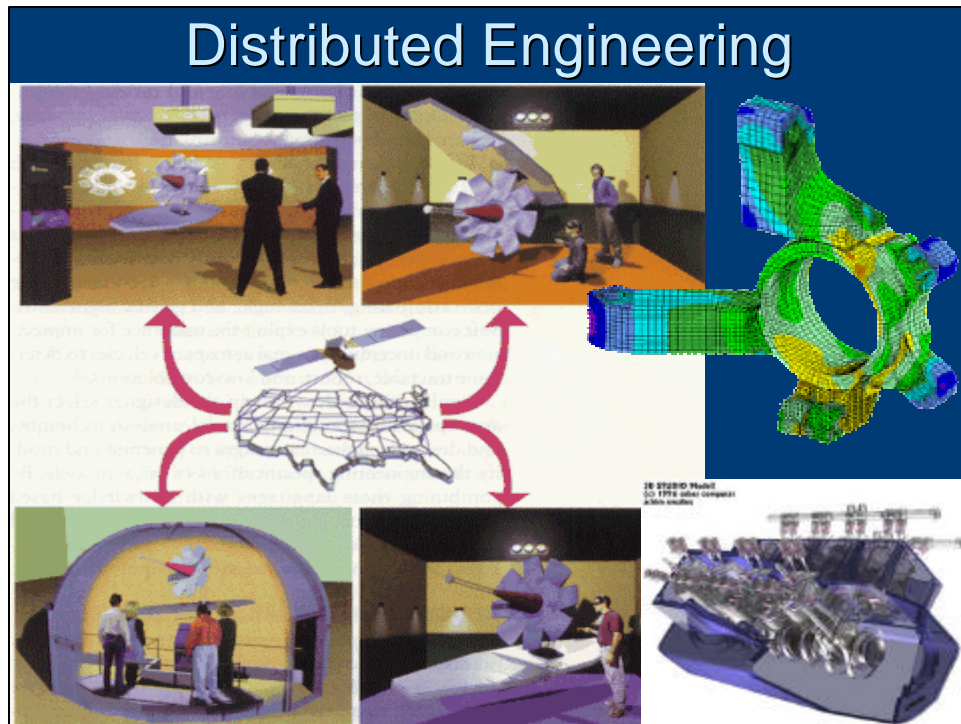
Interactive Simulation can do more . . .

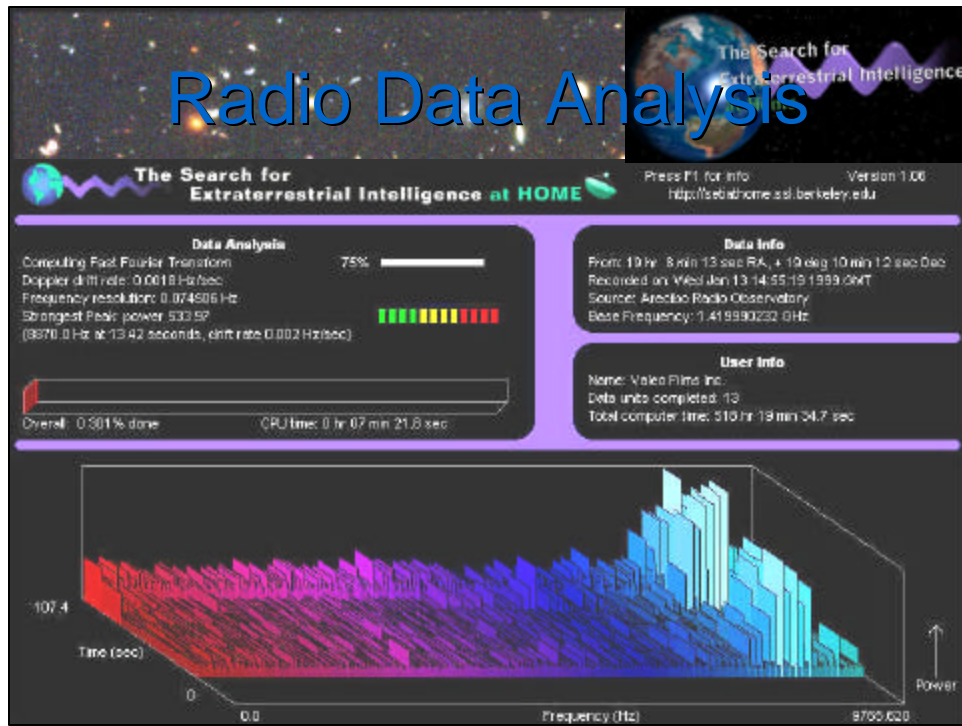
- Wargames - Training in alternatives to killing
- Medicine - Chemical interactions
- Poverty - Distributed Jobs
- Hunger - Transport Food, Reduce Waste, Predict Weather
- Commerce - Accelerate Velocity of Money
- Education - Teach Everyone (Pub/Sub in Chat)
- Economy - Sustain Growth, Avoid Collapse
- Communications - Share Info, Predict Needs (Hurricane)
- Environment - Weather, Earthquakes, Hurricanes
- Public Safety -Traffic, Disease
- Entertainment - Beyond shooting games



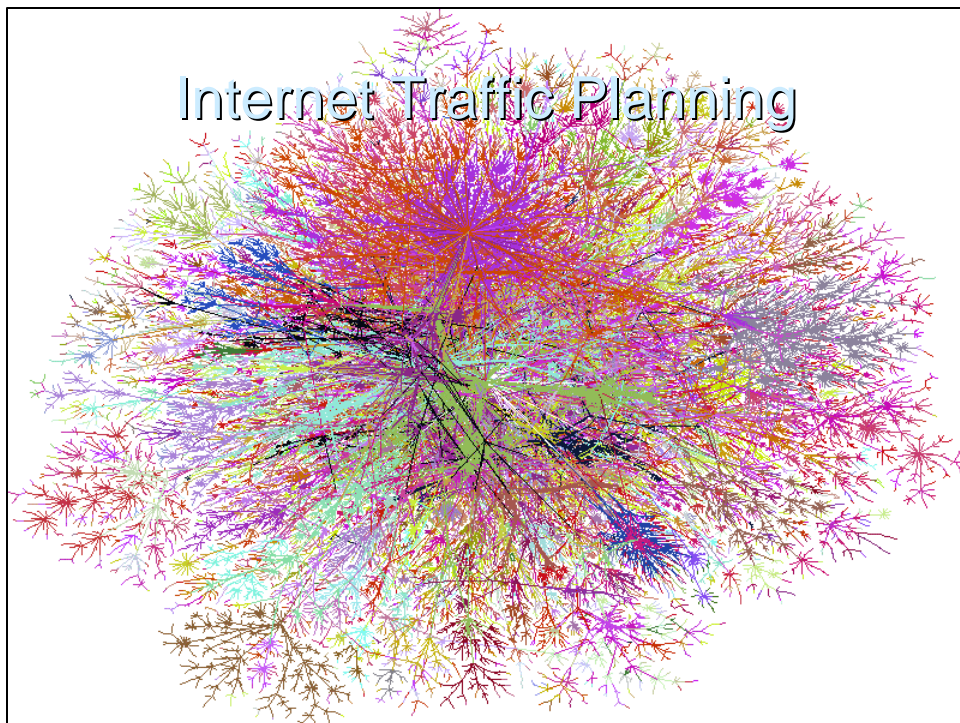
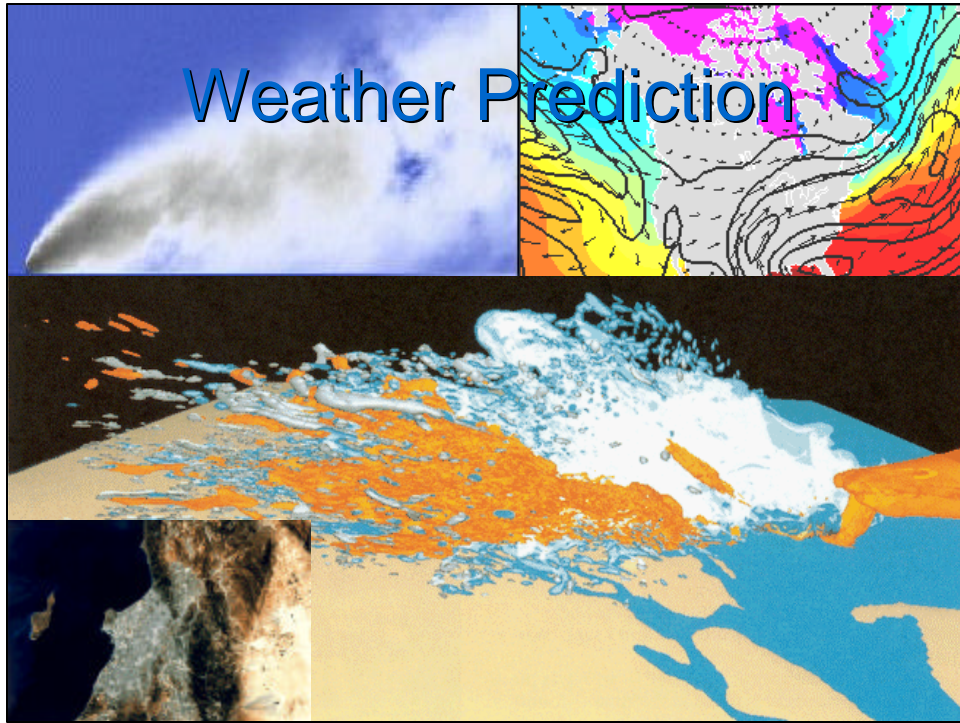
Analysis







Prediction





Interaction

UCF EIN5255: Interactive Simulation

