Welcome to Applications in VR

First Things First

- This is 4003-590-09 / 4005-769-09
  - (Applications in Virtual Reality)
- I am Joe Geigel…your host!

Plan for this afternoon

- Logistics
- Answer the questions
  - What is this course about?
  - How will the course will run
  - What exactly is Virtual Theatre…and why should I care?
  - How do I fit in
- More logistics
- But first…
  - attendance

Logistics

- mycourses
  - Announcements
  - Dropboxes
  - Grades
  - GRADS to be ADDED To UGRAD SECTION
- E-mail
  - Be sure that your e-mail is being forwarded correct.

Logistics

- Course Web Site:
  - http://www.cs.rit.edu/~jmg/vtheatre
- Contact:
  - office hours: MW 2-4 or by appt.
  - Office: 70 (GCCIS) Rm 3527
  - e-mail: jmg@cs.rit.edu
  - phone: 475-2051
- Slides:
  - Will be available (in PDF) on Web site.

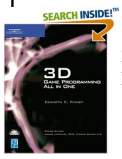
Logistics

- Official Prerequisite – one of the following:
  - Computer Graphics 1(CS 570/761)
  - Foundations of 3D Graphics Programming (IT 502)
  - 3D Graphics Programming (IT 735)
- However…
  - Need expertise in
    - Graphics Progamming
    - Basic programming
    - Audio
    - Networking
    - Logistics
    - …

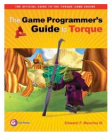
More Logistics

- Computing Environment
  - ICL6
    - Windows Machines
    - TORQUE gaming engine
    - LUSTER
  - Graphics Lab (70-3405)
    - MoCap development
    - Need access
  - Digital Studio Lab
    - Building 7A
    - Organic Motion moCap system

Textbooks

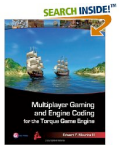


3D Game Programming All in One, 2nd Edition
By Kenneth Finney



The Game Programmer's Guide to Torque
By Edward F. Maurina III

Textbooks



Multiplayer Gaming and Engine Coding for the Torque Game Engine By Edward F. Maurina III

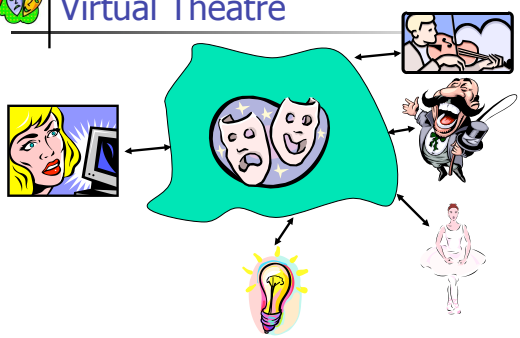
Other references

- TORQUE developer pages
  - http://www.garagegames.com/developer/torque/tge
- MotionBuilder docs
  - http://usa.autodesk.com/adsk/servlet/index?siteID=123112&id=6837710
- LUSTER docs?

Goals of the course

- Introduce students to virtual reality hardware, software, and toolkits
- Apply to a given domain
- Apply to a large scale problem.
- Teamwork, teamwork, teamwork!

Virtual Theatre



VR and Theatre

- Virtual Theatre
  - A distributed computer system whereby performers, stage crew, and audience can be in physically separate places yet share in the same live theatrical performance.

Logistics

- This is a project based course
- Teams will be assembled
  - Each team will work on a specific component / problem
  - Components will integral part of larger system
  - Teams: 1 grad + 1 undergrad
- Collective goal:
  - To build on an existing framework for a virtual theatre system
  - Test the framework out on short virtual performance.
  - Opening night: Midterm and Final

Logistics

- Old vs. New
  - Current system: built on TORQUE
    - Garagegames
  - New system: built on LUSTER
    - DarkwindMedia

Logistics

- Collaboration
  - Within teams
  - Between teams
  - With artists in School of Design
- Questions so far?

How will the course be run?

- **Schedule will be aggressive**
- Weeks 1
  - Intro material
  - Team formation
- Week 2
  - Define team goals
- Weeks 3 – 8
  - Group work
  - **Midterm: Demo at Brick City**
  - Lectures: status meetings / updates / working sessions
  - 3 checkpoints
- Week 10
  - Rehearsal / Tech run
- Finals Week
  - Showtime!

How will the course be run

- Checkpoints
  - Periodic Status checks
    - Weeks 4,6,9
    - At least 1 intermediate deliverable
    - Demo
- Brick City Demo
  - Saturday, Oct 11th
- Checkpoint deliverables vary by team
  - Will be discussed at start of CP cycle.

How will the course be run

- Status meetings
  - Announcements / new developments
  - News from the artistic side
- Updates
- Mini-deliverables
  - TBD
- Guaranteed team working time.

Important dates

- Checkpoint 1 -- Sept 24
- Checkpoint 2 / Midterm (Brick City) – Oct 11th
- Checkpoint 3 -- Oct 29
- Week 10 -- Rehearsal
- Showtime!
  - Finals week

Assessment – Team Grade

- Team grade
  - Meeting checkpoint
  - Deliverable + demos
  - Working with final demo
- Individual Grades
  - Peer review
    - Evaluation of teams from those not in teams
  - Teammate Evaluation
    - Evaluation of students from teammates
  - Leader Evaluation
    - Evaluation of grad leaders from teammates

Grad Students

- In addition, Grad Students will be assessed:
  - Leadership Role -- Leader evals
  - Documentation -- Team documentation is responsibility of leader.
  - Other deliverables -- as agreed upon with instructor.

Assessment

	Graduate	Undergrad
Checkpoints (Team)	25%	35%
Final Demo (Team)	35%	40%
Peer Evals (Individual)	20%	25%
Leadership / Docs (GRAD)	20%	

Plan for today

- Answer the questions
  - What is this course about?
  - How will the course will run
  - What exactly is Virtual Theatre…why should I care?
  - How do I fit in
- Any questions?

Virtual Theatre

Virtual Theatre

- Art and Technology Collaboration

R·I·T School of Design

✓ Visuals
✓ Lighting / Staging

R·I·T Department of Computer Science

✓ Technology

Virtual Theatre

Integration of distributed virtual reality / gaming technologies into the theatrical storytelling process.

- Our experiments in theatrical storytelling
  - Live…action takes place in a distributed virtual space
  - Performers / crew control from a physical space
  - Active Audience Participation

Spring 2004 - present

Motivation

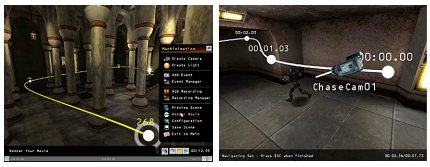
- Machinima

a new form of filmmaking that uses computer games technology to shoot films in the virtual reality of a game engine.

Anna (2003) -- Fountainhead Entertainment

Motivation

- Machinimation (Fountainhead Entertainment)



http://www.fountainheadent.com

Cinema vs. Theatre

- Cinema
  - Recorded
  - Editted
  - Passive Audience
  - POV of filmmaker
- Theatre
  - Live
  - Real time
  - Active Audience
  - POV of audience

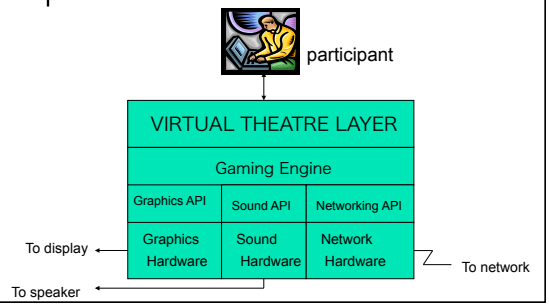
Why Start From Scratch?

- Gaming Engines
  - Provide object oriented graphical abstraction
  - Performs real time rendering
  - Provides networking infrastructure
- Requirements for theatrical use
  - Adapt to use theatrical metaphor / language
  - Physical control of virtual characters and staging
  - Theatrical components designed by artisans.

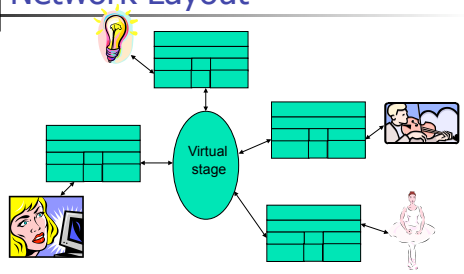
Gaming Engines

- API
  - Set of programming libraries used to create 3D games
  - Implies use of low level language (C, C++, Java)
- Scripting Systems
  - Extending of existing games (Mods)
  - Game specific language
  - Constrained by capabilities of game / script
  - Examples
    - Quake II
    - Unreal Tournament
    - Second Life

System Architecture



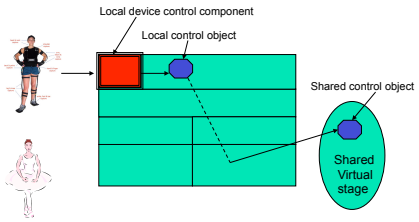
Network Layout



The Virtual Theatre Layer

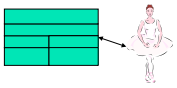
- Components of a theatrical production
  - Action
  - Staging
  - Audience
  - Sound / Music
- Objects to be defined on virtual stage
  - Actors
  - Stage Manager
  - Audience Member
  - Orchestra

Local device control



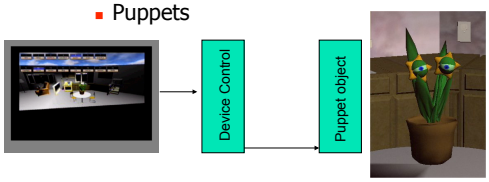
Actor Objects

- Controls characters on stage
- Actors have associated avatar(s) on virtual stage.
- Specific control of avatar behavior defined by subclasses of Actor



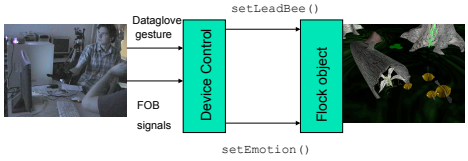
Actor objects

- Example 1
  - Puppets



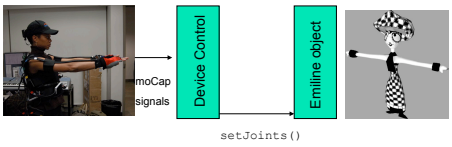
Actor Objects

- Example 2
  - Gesture (*What's the Buzz?* Spring 2004)



Actor Objects

- Example 3
  - Full Body Motion Capture

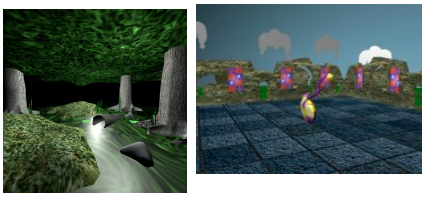


Staging

- Set and Lighting Design
  - Created by artistic team
  - Imported into Virtual Stage
  - Controllable Components
    - Triggering of Cues
    - Continuous Events

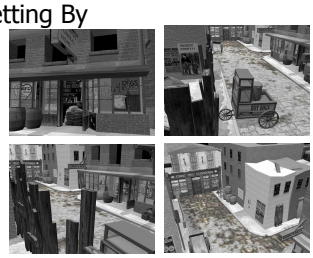
Staging

- What's the Buzz?



Staging

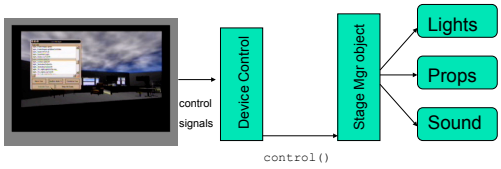
- Getting By



Stage Manager Object

- Controls dynamic staging, lighting, and sound effects
- Triggering of predefined cues.
- Stage manager object manages cues and allows for manual (or automatic) triggering of these cues.
- Object in virtual space

Stage Manager



Audience

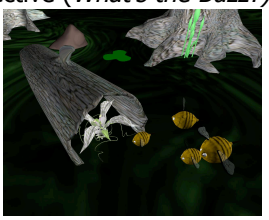
- Each audience member is also an object in the virtual space
  - May (or may not) have a physical avatar
  - Human audience member connected via audience device control
  - Interactivity
- Control of what the audience sees

Playing Games with the audience

- Interactivity (*What's the Buzz?)*

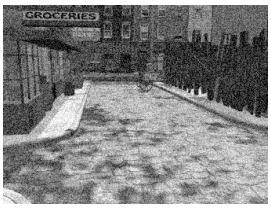
Playing Games with the audience

- Perspective (*What's the Buzz?)*



Playing Games with the audience

- Special Effects



Playing Games with the audience

- Critters (Spring 2006)
  - Rose colored glasses
  - Audience decides to see visions or not.

Questions?

- Let's take a break…
- After break: critters! + tasks for this quarter.

Critters

- Our latest Virtual Theatre show:

  Critters

IMAGINERIT

Critters

- Critter is the story of ESTER…

Critters

- …and her imaginary friends

Virtual Theatre

- Let's go to the video tape.

Tasks for this quarter

- 1st Half of Quarter
  - Fix issues with Critters (TORQUE Version)
- 2nd Half of Quarter
  - Port of system to LUSTER

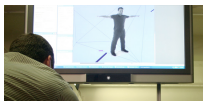
Tasks for this quarter

- Major areas
  - Motion Capture
  - Staging
  - Access Grid
  - Audio
  - Audience Experience
- Several tasks for each area.

Motion Capture

- Two motion capture systems
  - ShapeWrap III (measurand)
  - Stage (OrganicMotion – markerless)

ShapeWrap III



Stage

MotionCapture

- Autodesk MotionBuilder
  - Interface between moCap system and game engine.
  - Determines character motion from moCap data.

Motion Capture

- Sub-teams:
  - 1. Team ShapeWrap
    - Logistics of SWIII system
    - Interface ShapeWrap II to MotionBuilder
  - 2. Team OrganicMotion
    - Logistics of Stage System
    - Interface Stage to MotionBuilder
  - 3. Team MotionBuilder
    - Interface MotionBuilder to game engine

Staging

- Sub-team:
  - 4. Team Event
    - Chaining of events…more general event model
  - 5. Team Grab
    - Design strategy for "grabbing" things.
  - 6. Team Lighting
    - Creation of stage lighting tool (LUSTER)
  - 7. Team GUI
    - GUIs for stage mgr/puppet (LUSTER)

8. Team AccessGrid

- Use of Access Grid for
  - During production communication
  - Production recording
  - Work with ICE LAB

9. Team Audio

- Play audio clips
- Streaming audio
- Multiple sounds (clapping / booing)

10. Team Audience

- Define audience experience
  - Interface / GUI for audience (LUSTER)

Teams

- Choosing teams
  - First Quiz!
    - Student survey on mycourses
    - Please fill out ASAP (by EOD Sept 3rd)
    - Will try my best to accommodate
  - Grad Leaders
    - 10 teams / 10 tasks / 10 grad students / 10 undergrad students
    - We'll see.
- Questions?

For Next time…

- Fill out student questionaire / team request on mycourses.
- To prepare for next class:
  - Chapters 4,5,6 of Torque book on e-reserve. Get from mycourses and read for next time.