

Visual Computing: Graphics

COMP 3003
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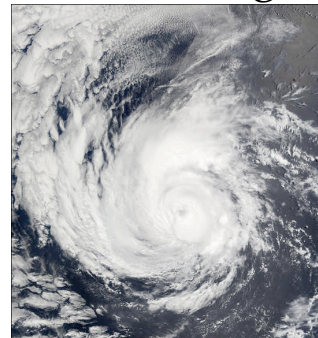
Games



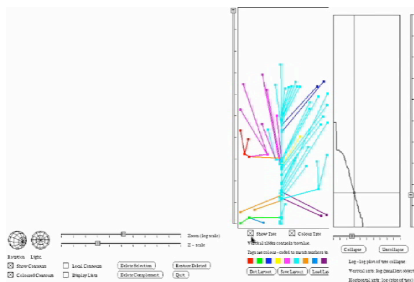
Movies



Satellite Imagery



Visualization



And the list goes on

- Human-Computer Interaction
- Virtual & Augmented Reality
- Robotics
- GUI programming
- &c., &c.

Major Fields

- Computer Graphics: rendering images
- Image Analysis: interpreting images
- Computer Vision: copying the eye
- Human-Computer Interaction
- Common factor: human visual system

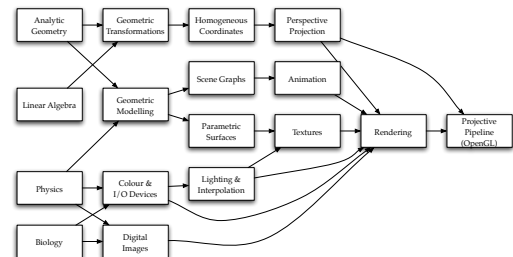
Computer Graphics

- Teaching computers to draw
 - computers are mathematical
 - so we use mathematics for drawing
 - but so did Leonardo da Vinci!

Course Description

- Physics and biology of vision; mathematical foundations of computer graphics; geometric modelling of the world; geometric transformations; perspective & orthographic projections; models of computer rendering; animation; surface modelling; lighting, colour and textures; clipping, culling and compositing; performance optimization; modelling natural phenomena.

Partial Diagram



Schedule

- Week 1: Physics, Biology & Images
- Week 2: 2D Geometry & Rasterization
- Week 3: 3D Geometry & Modelling
- Week 4: Transformations & Perspective
- Week 5: Scene Graphs & Animation
- Week 6: Colour, Lighting & Interpolation

Schedule

- Week 7: Parametric Surfaces & Textures
- Week 8: Clipping, Culling & Shadows
- Week 9: Blending & Compositing
- Week 10: Smooth Curves & Surfaces
- Week 11: Raytracing; Radiosity
- Week 12: Review; Project Demos

Course Evaluation

- 60% final exam
- 40% practical
 - based on a software project
 - animated scene
 - (small) game
 - more details later . . .

Final Exam

- 6 mandatory questions
- 4 out of 6 optional questions
- Sample Exams will be provided

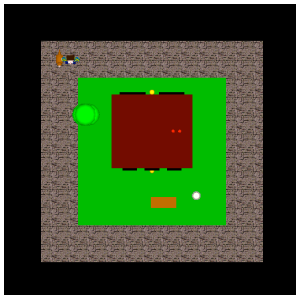
Practicals

- Attendance required at tutorials & labs
- Material is examinable
- BUT in the last month of term
 - no tutorials
 - labs will be for working on project

Course Project

- Worth 40% of final mark
- Render & animate a scene
- Must include a specified object
- Due Friday, November 25
- We'll show them all on November 29

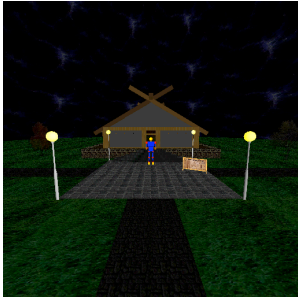
Sample Projects



Sample Projects



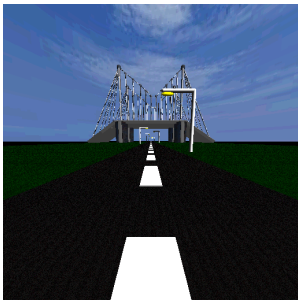
Sample Projects



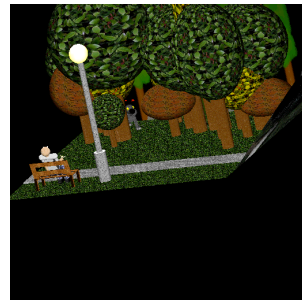
Sample Projects



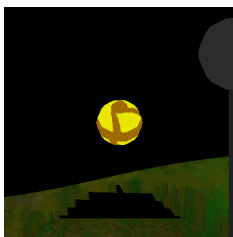
Sample Projects



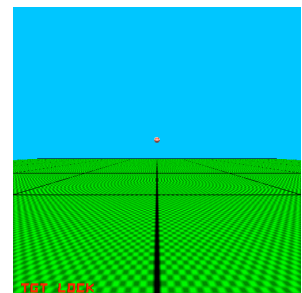
Sample Projects



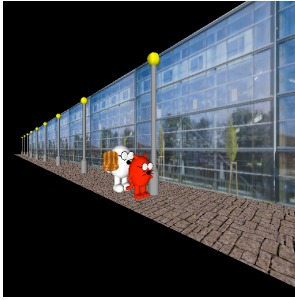
Sample Projects



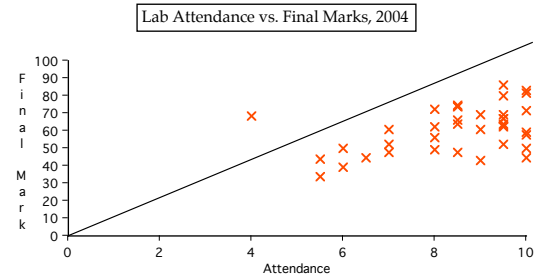
Sample Projects



BUT



Lab Attendance, 2004



Unfortunately, . . .

- Graphics depends on mathematics:
 - Geometry
 - Linear Algebra
 - Calculus
- You have been warned!

Software & Hardware

- The practical in this course will use:
 - OpenGL
 - GLUT
 - C / C++
- And a recent video card

Why OpenGL & C?

- OpenGL is:
 - Industry standard
 - Fast, efficient
 - Hardware-accelerated
 - Platform-independent
 - Dependent on C

Reference Material

- No text required, but these are useful:
 - Foley & van Dam
 - Official OpenGL Documentation:
 - http://www.opengl.org/documentation/red_book_1.0
 - http://www.opengl.org/documentation/blue_book_1.0

Slides & Notes

- Slides will be on the webpage:
 - <http://www.cs.ucd.ie/staff/hcarr/home/teaching/comp3003.html>
- usually the previous Friday
- BUT material may be added in class
 - so please attend lectures

Next Lecture

- The Physics & Biology of Human Vision
 - Physics of Light
 - The Human Eye
 - Rendering with Computers