The Future

Lecture 20

The Future

- Key areas of research:
  - Hardware graphics systems
  - Data Input Technology
  - Man-machine Interfacing (MMI)
  - Data Management and Mining
  - Visualisation Techniques
- Broader User Base

Graphics Hardware

- Increases in pixel fill rate and triangles/sec
- Developments in Texturing hardware technology.
- Real-time ray-casting/ray-tracing performance is not available

Graphics Hardware

Bottlenecks include:

- graphics bus speed
- memory capacity
- graphics pipeline speed
  - hardware matrix calculations
  - hardware lighting calculations

Data Input Technology

- Data Input and conversion should be easier than it currently is.
- Creating models whether physical based or numerical still takes significant effort.
- Computer operating systems and application software still has a long way to go before these issues become transparent to the user.

Man-Machine Interfacing

Key research areas:

- Speech recognition
  - Language parsing
- Gesture recognition
- Haptic (force feedback) devices
- Eye tracking

Man-Machine Interfacing

- Virtual reality
  - Stereo image
  - Stereo sound
  - Position sensing
- Stereo/3D projection devices
  - Stereo imaging
  - 3D imaging

Man-Machine Interfacing

- Personal data viewers
  - discrete head/glasses mounted display systems
  - wireless links to central data servers
- Data stream *integration* products combining data, audio and video into a single interface.

Data Management and Mining

- Databases are expanding at a high rate
- Data can no longer be searched manually
- Requires advanced organization and indexing
- Improved data selection and “drilling” techniques

Visualisation Techniques

- New visualisation techniques:
  - Use of glyphs and symbols to increase information density.
  - Texels (Texturing elements)
  - Vector streamline visualisations
  - Volume visualisation
- Existing techniques in new areas
  - requires user education and acceptance.

Broader User Base

- Visualisation is an unknown subject to most people.
- It is only now starting to come into the main-stream.
- Within 10 years there will probably be whole new category of jobs as "Visualisation Engineers" in a wide range of markets.

This Course

- This course has necessarily covered a broad area at a shallow depth.
- This is one of the few courses around the world trying to disseminate the acquired wisdom of little more than a handful of researchers in a range of disciplines.
- I encourage you to take the opportunity to "catch the visualisation wave" in your own research and future careers, using some of the things you have learnt here.

Finally…

- Perhaps computer hardware and software developers should take a leaf out of Hollywood's book of cliches.
- Here are a few relevant movie cliches:
  - High-tech computers, (used by NASA, CIA etc) have simple graphical interfaces or incredibly powerful text-based command shells that can correctly understand and execute any commands typed in plain English.

Cliches…

- Gain access to any information by typing "ACCESS ALL FILES" on any keyboard.
- All computers are connected. Information can be accessed from anyone’s desktop computer, even if it's turned off.
- People typing away on a computer will turn it off without saving the data.
- Any PERMISSION DENIED has an OVERRIDE function.

Cliches…

- Blurry 2D images can be incredibly enhanced and then rotated in 3D to give a different camera viewpoint.
- No matter what kind of computer disk it is, it'll be readable by any system you put it into.
- Complex calculations and loading of huge data sets is accomplished in under three seconds.
- Movie modems usually appear to transmit data at the speed of two gigabytes per second.

Cliches…

- All application software is usable by all computer platforms.
- Hollywood computers never have a problem connecting to connect to enemy/alien systems.
- Trivial to create a virus to crash the enemy/alien computer system.

THE END