



# COMPSCI 372 S2 C

## Computer Graphics

Burkhard Wünsche<sup>1</sup>, Christof Lutteroth<sup>2</sup>

<sup>1</sup>*Graphics Group*

<sup>2</sup>*Software Innovation Research Group*



## IMPORTANT ANNOUNCEMENT

### Departmental Policy on Cheating on Assignments

1. *The Computer Science Department uses many ways to check that the work students submit for marking is their own and was not produced by, or copied from, someone else. In particular, for most programming assignments, the department uses a program comparison program to automatically compare all submissions from students. Also Turnitin.com may be used on essays and reports. This detects similarity to online material and submitted works in its own database.*
2. *All assignments where plagiarism is detected are checked for similarity by the course supervisor or another suitable person associated with the course.*
3. *All assignments deemed to be too similar are **automatically allocated a zero mark.***
4. *All students who submitted these assignments are **entered in the duplicate assignment register.***
5. *A standard email (see below) is sent to these students.*
6. *Repeat offenders may be **referred to the University Disciplinary Committee.***

For more details see <http://www.cs.auckland.ac.nz/CheatingPolicy.php>

# COMPSCI 372 Computer Graphics

## Lecturers

Part 1: Burkhard Wünsche  
City Campus, Building 330, Rm 490  
burkhard@cs.auckland.ac.nz  
Office hours: Friday 9-11am

Part 2: Christof Lutteroth  
City Campus, Building 330, Rm 494  
lutteroth@auckland.ac.nz  
Office hours: Open door

# Who is Burkhard?

- Born in München (Germany)

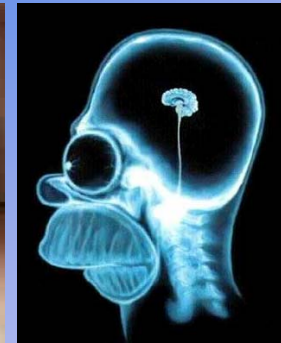


- Studied 3 years in Kaiserslautern (Germany)

- PhD in Biomedical Visualization

- Research Interests:

- Computer Graphics, Biomedical Imaging, Scientific Visualization, Geometric Modelling, Computer-Aided Geometric Design, Game Technology, Simulation Algorithms, Information Visualization.











# Graphics Group

## University of Auckland, NZ

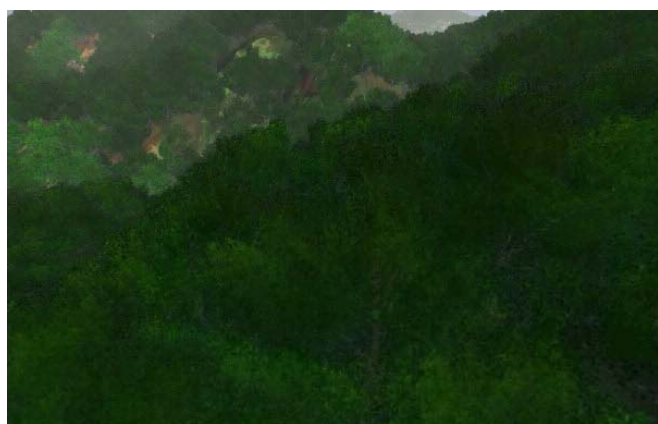
- 1 academic staff
- 3 PhD & 4 MSc Students
  
- > 80 international publications since 1997
- More than 2 million dollar research grants in the past 5 years
  
- > 20 student scholarships in the past six years



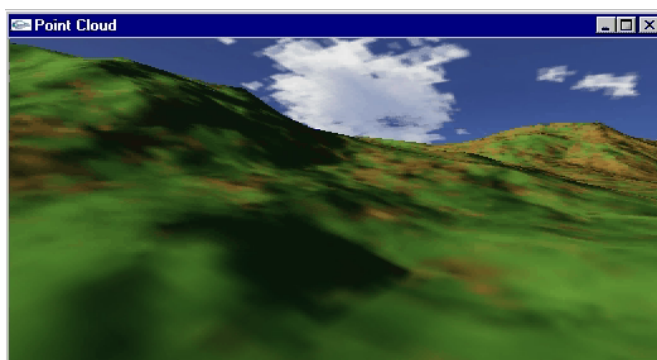
URL: <http://www.cs.auckland.ac.nz/GG>



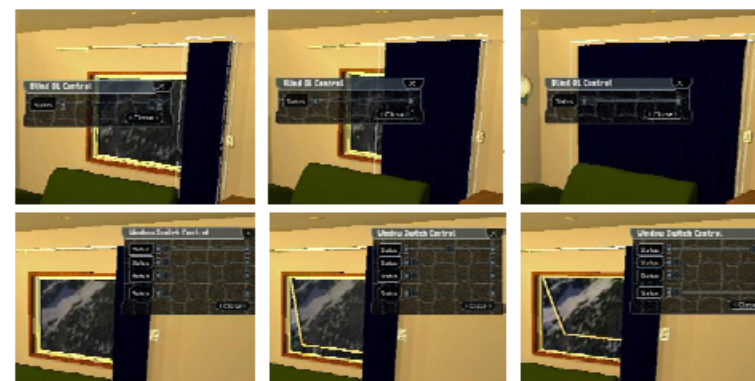
# The Graphics Group - Some Research Interests



Imaged-based  
Rendering



Aug-  
mented  
Reality



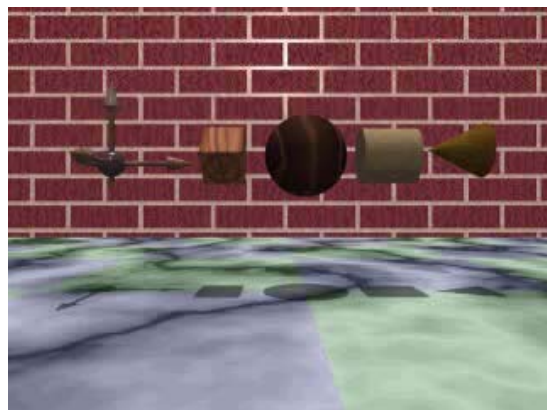


# The Graphics Group - Some Research Interests



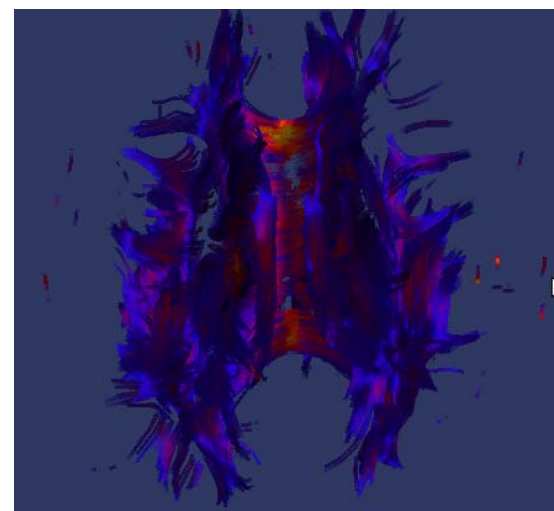
Game  
Tech-  
nology

Realistic  
human  
avatars



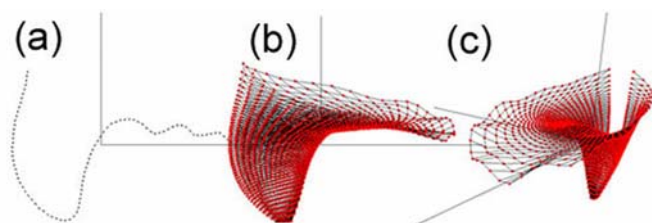
Modelling &  
Animation

Biomedical  
Modelling &  
Visualization

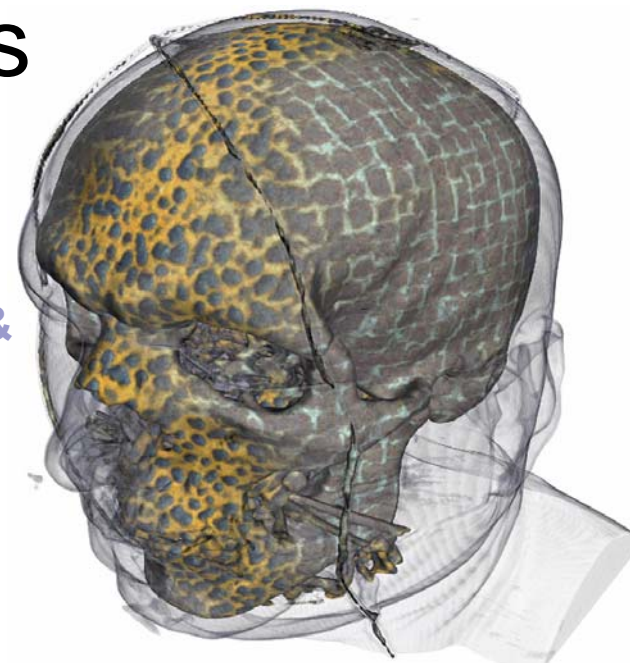


# The Graphics Group - Some Research Interests

## Sketch-based Modelling



## Texture Synthesis & Morphing



## Pen-and- paper Interfaces



# COMPSCI 372

## Computer Graphics - People

### Tutor & Course administrator:

Stefan Marks

City Campus, Building 330, Rm 496

email: [smar189@aucklanduni.ac.nz](mailto:smar189@aucklanduni.ac.nz)

Tutorials: Tuesday and Thursday 3-4pm (Rm 279)

Office hours: Tuesday 9-10am, Friday 1-2pm (Rm 496)

Please read class emails and check the 372 web page:

<http://www.cs.auckland.ac.nz/compsci372s1c/tutorials/>



# COMPSCI 372 Computer Graphics

## Lectures

Lectures:

Day	Time	Room
Wednesday	4-5pm	LgeChem
Thursday	4-5pm	LgeChem
Friday	4-5pm	LgeChem

# COMPSCI 372 Computer Graphics - Lectures

Week 1 (21st July - 27th July): Burkhard

Week 2 (28th July - 3rd August): Burkhard

Week 3 (4th August - 10th August): Burkhard

Week 4 (11th August - 17th August): Burkhard

Week 5 (18th August - 24th August): Burkhard

Week 6 (25th August - 31st August): Burkhard

**1st September - 14th September: MID-SEMESTER BREAK**

Week 7: (15th September - 21st September): Christof

Week 8: (22nd September - 28th September): Christof

Week 9: (29th September - 5th October): Christof

Week 10: (6th October - 12th October): Christof

Week 11: (13th October - 19th October): Christof

Week 12: (20th October - 26th October): Christof

**26th October - 17th November: Study break & Exams**

# COMPSCI 372 Computer Graphics Test and Exam

Test: 10% of final mark

Date: To be announced

Exam: 65% of final mark

Date: To be announced



# COMPSCI 372

## Computer Graphics - Assignments

Assignment 1 - Due date: probably 18<sup>th</sup> August  
(see assignment handout for details)

Assignment 2 - Due date: probably 15<sup>th</sup> September  
(see assignment handout for details)

No assignments accepted after the due date. Both assignments will be worth 6.25% of your final mark.

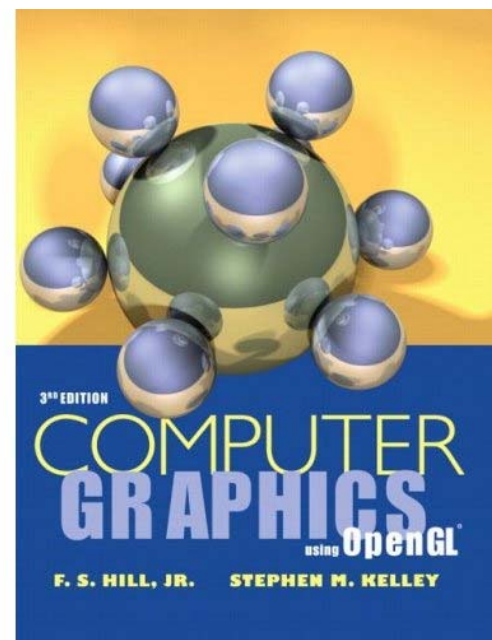


There will probably be one assignment worth 12.5% for Christof's part (due in the last week of lectures)

# Reference Material

## The prescribed text is:

- “Computer Graphics using OpenGL”, F.S. Hill, Jr., 3rd Edition, Prentice Hall, ISBN 0131496700.  
(the 2<sup>nd</sup> edition is also ok)



# Reference Material

## The following texts are recommended reading:

- “Interactive Computer Graphics: A Top-Down Approach with OpenGL”, Edward Angel, 2nd Edition. Addison-Wesley.
  
- “OpenGL Programming Guide: The Official Guide to Learning OpenGL”, Woo, Neider, and Davis, Addison-Wesley (aka “The Red Book”).
  - 1st edition online: <http://www.glprogramming.com/red>
  
- OpenGL/GLUT manuals
  - See *COMPSCI 372 Resources* page





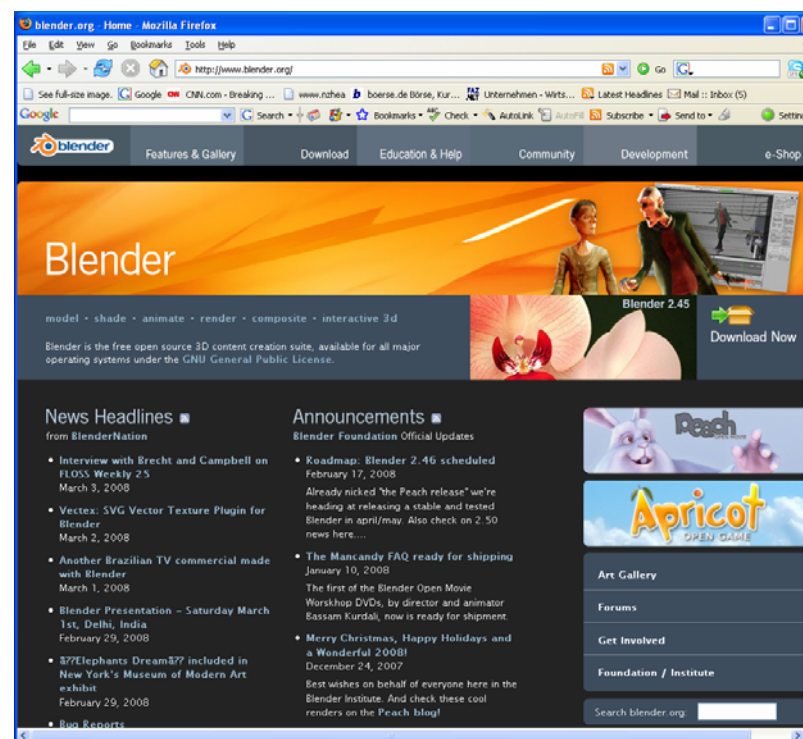
# Reference Material

- **C References:**
- C Language Reference & ANSI-C Standard library
  - See COMPSCI 372 Resources page
  - man-pages of any UNIX implementation (eg. type 'man printf')
  
- **C++ References:**
- Microsoft Visual C++ Help
- Bruce Eckel - Thinking in C++
  - free online:  
<http://mindview.net/Books/TICPP/ThinkingInCPP2e.html>
  - A local copy is on the COMPSCI 372 Resources page

# Reference Material

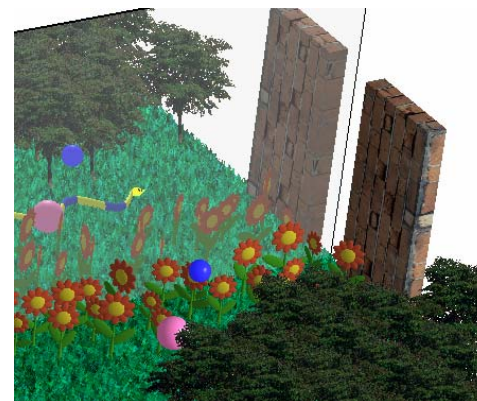
## Other resources:

- Blender tutorial:  
<http://www.cs.auckland.ac.nz/~jli023/opengl/blender3dtutorial.htm>



# About this Course

- Introduction to C/C++
- 3D graphics
- Use OpenGL throughout
- By the end of the course you should:
  - Be able to define the geometry of simple polygon-based 3D scenes using primitive components and geometric transformations
  - Be able to write OpenGL programs to construct and display simple 3D scenes
  - Be able to use lighting and surface materials in simple OpenGL programs
  - Understand such basic algorithms of 3D graphics as projection, clipping, illumination, shading, and visible surface determination, and be able to apply that understanding in the context of OpenGL programming




Screenshot from assignment 2 (2005)

# Pre-requisites

- Linear algebra
- Analysis
- Data structures
- Algorithms
- Programming skills
  - Java ok, but you have to learn C/C++
- Motivation and enthusiasm!!!



# How to do well ...

- If you are not familiar with C/C++ start studying now
- Spruce up your mathematics skills ;-)
- Read the lecture notes BEFORE the lecture
- Read the lecture notes again after the lecture and try to understand everything
- Read the prescribed textbook, use the web, ...
- **Form study groups!!!** (use the online forum for this)
- Go to the tutorials
- Do the assignments yourself (don't copy)
- Be nice to each other 



# How this course is taught ...

- Goal: Learn to learn!!!
- Three 1 hour lectures each week:
  - Lectures explain concepts and give examples
  - I will NOT go through all lecture notes – always read the entire set of notes yourself
- Exercises for each topic (voluntarily, but highly recommended!)
  - Explain basic concepts taught in the lecture
  - Make you familiar with the tools we are using
- Assignments (mandatory)
  - Deepen your understanding of learned concepts and allow you to apply them to practical problems.
- If you don't understand something ask questions (forum, tutorial, tutor, lecturer, your classmates, use the web, ...)



# COMPSCI 372

## Computer Graphics – Burkhard's Part

### TOPICS:

1. Introduction to Graphics
2. Introduction to Modelling and Animation Tools
3. Introduction to of C/C++
4. Introduction to OpenGL
5. 2D Geometry and Transformations
6. 3D Geometry and Transformations
7. Modelling with Polygonal Meshes
8. Texture Mapping