

Computer-generated 3D Graphics

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1 Aim

At the end of the course the students will:

- Understand how 3D computer graphics is used in various industries
- Understand the benefits of using computer generated graphics (e.g. saving money) instead of more traditional forms of graphics (e.g. photos, movies)
- Be able to create simple 3D objects
- Be able to create a simple animation
- Be able to use lightning techniques to create more realistic images
- Know about the three main stages for creating a 3D object: modelling, texturing and rendering.
- Know how to apply these skills in their school projects, homeworks, etc ...

2 Motivation

This course is important for students because it introduces them to 3D computer-generated graphics, which is widely used in many industries such as:



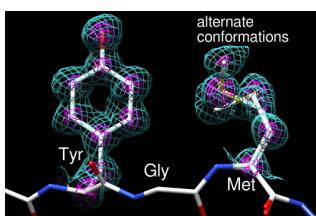
(a) Computer games



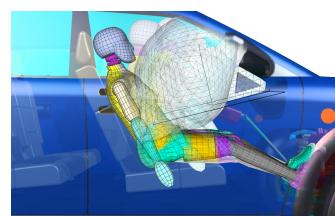
(b) Animation films



(c) Special effects in movies



(d) Educational videos



(e) Simulations (e.g. car tests)



(f) Architecture design



(g) Interior design



(h) Advertisements



(i) Virtual Reality

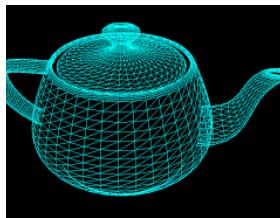
Figure 1: The industries where 3D computer-generated graphics is used

The students will be able to assess whether they like this kind of work and perhaps consider one of these industries as their career options. Furthermore, the skills learned in this course can also aid students in their school projects or homeworks, as it enables them to make realistic 3D models of any object they like. These drawings will add a lot of value to reports and presentations they will make in school, university and later on at their workplace.

3 Lesson Plan

3.1 Presentation: Overview of 3D Computer Graphics - 20 min

I will explain what computer-generated graphics is and how it is used currently in many industries (Fig. 1). We will then discuss the motivations for using computer generated graphics in each industry (i.e. save money, generate images not otherwise available in the real world). I will then explain the three key stages for creating a 3D computer-generated object: Modelling, Texturing and Rendering.



(a) Modelling



(b) Texturing



(c) Rendering

I will conclude the introductory presentation by showing the students some designs I've made in the past (see Fig 4). This will give the students an idea of what one can do with the skills we learn.

3.2 Practical Session - 2h

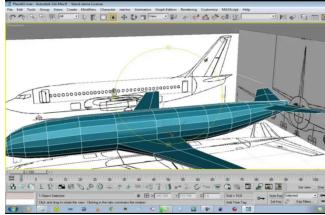
This will be a hands-on session, where I will show the students how to create some basic 3D objects and put them together in a 3D scene. The students will try to replicate my steps on their computer, and I will pause if any student is left behind. The session will be highly interactive, and students will be able to suggest alternative ways of creating the objects.

The tasks that we will aim to do are:

- Build a house (Fig 3a) - 40 min
- Animate the movement of a plane (Fig 3b) - 40 min
- Build realistic wine glasses (Fig 3c)- 40 min



(a) House



(b) Plane



(c) Realistic wine glasses

Figure 3: Objects we will model in the practical session.

3.3 Student-led Session - 1h

The students will be grouped into teams and each team will be free to draw anything they like. At the end of the session, the teams will display their 3D images/animations in front of everyone else. Everyone will vote for the best 3D object/animation (self voting not permitted) and the winner team will be awarded a prize.

4 Teaching Experience

I have organised a 3-week course on this topic in 2013 at Imperial College (IC) London. I have also been a tutor for several programming and modelling courses:

- Programming in Java/C++: Taught this for 1.5 years to first-year undergraduate students at IC. I was also responsible for marking their courseworks and going through the problems in the class.
- Computational Modelling in Medical Imaging: Lab helper for 1 term (3-4h/week). I was helping the students with any questions regarding the coursework and with marking their courseworks.

5 Personal Portfolio of 3D Computer Generated Graphics

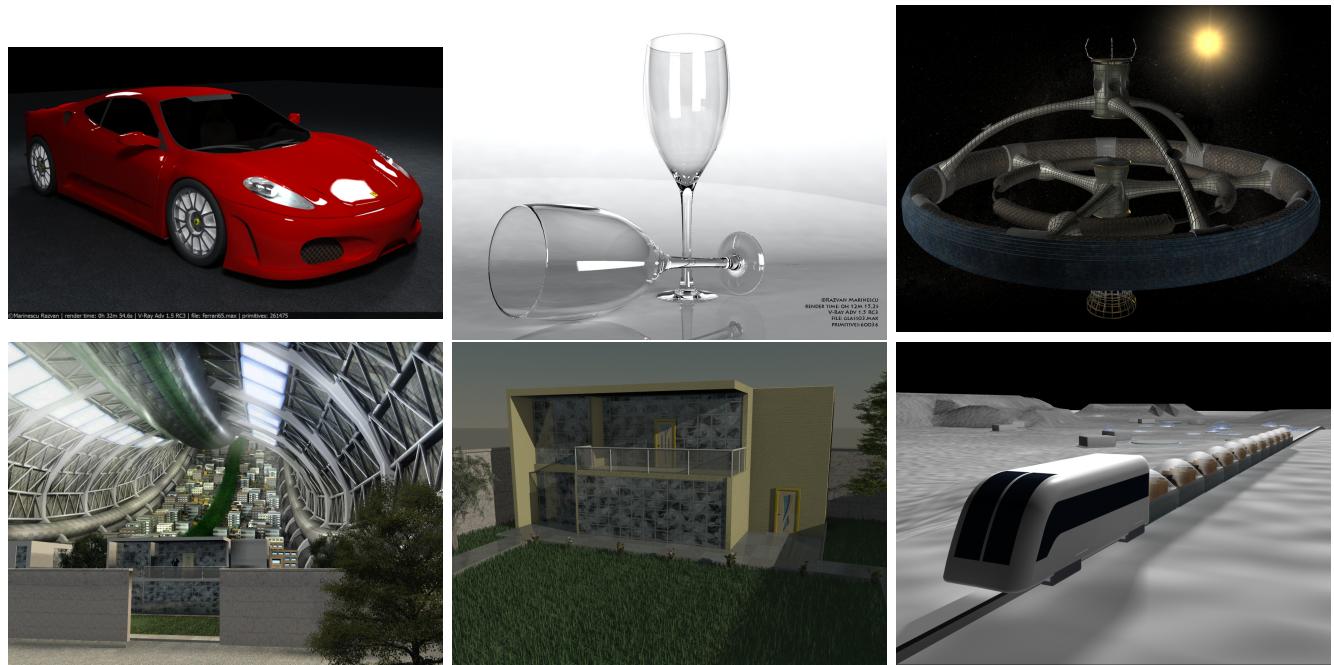


Figure 4: Collage of 3D computer-generated images that I've done so far.

6 Materials Required

- One computer for every student with Autodesk 3d Studio Max already installed (I'm happy to install it beforehand)
- Projector + sound system for the PowerPoint presentation

7 Availability and Time Slots

I am available anytime apart from Tue 29 Aug and Wed 30 Aug. The course would ideally run for 3.5h, otherwise for a minimum of 3h. Any continuous time slot is ok.