Computer Graphics

COMP3421/9415
2021 Term 3 Lecture 1

Introductions - Course Staff

Say Hello!

- https://discord.gg/YrFE7DAN
- Lecturer: Marc Chee
- Admin: Matt Turner
- Tutors: Jack Robbers, Kaiqi Liang, Sam Schreyer, Simon Haddad, Xavier Poon
- Contact email: cs3421@cse.unsw.edu.au (for admin purposes only)

Before we start

Sydney COVID Lockdown and Online Learning

- We understand. Things are not good.
- This is not normal and we're not going to pretend it is
- Let's try to hang out and have some fun with learning instead of trying to hammer through a difficult course with so little support
- This term's iteration of Graphics has been designed with the understanding that the majority of students are in lockdown and probably will be for the length of the course

What are we covering today?

An Introduction to Computer Graphics

- Why Graphics?
- History of Graphics
- Human Vision and Computer Simulation of Vision
- What's in the Course?

Why study Graphics?

Interested in the Visuals of Computing?

- Games?
- Films?
- VR?
- Ever thought about making games yourself?

Image credit: Walt Disney Pictures

Image credit: id Software

Image credit: Joi Ito from Inbamura, Japan

History of Computer Graphics

The Dawn of Modern Computing (1940s - 1970s)

- Early games like SpaceWar (1962)
  - Uses a spectrograph style display
- Asteroids (1979)
  - Vector Graphics

Image credit: Joi Ito from Inbamura, Japan

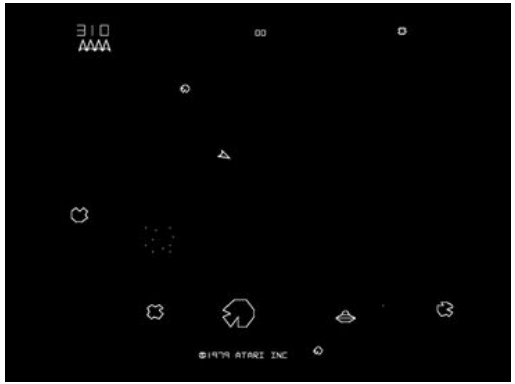


Image credit: Atari

History of Computer Graphics

Computer Gaming becomes reality (1980s - 90s)

- 2d, sprites, arcade machines (Space Invaders to Street Fighter 2)
- The birth of 3D (Doom, Quake)

Image credit: Capcom

Images credit:
id Software

History of Computer Graphics

Film gets involved (1980s-1990s)

Tron (1982), Jurassic Park (1993), Toy Story (1995)

Image credit: Walt Disney Pictures

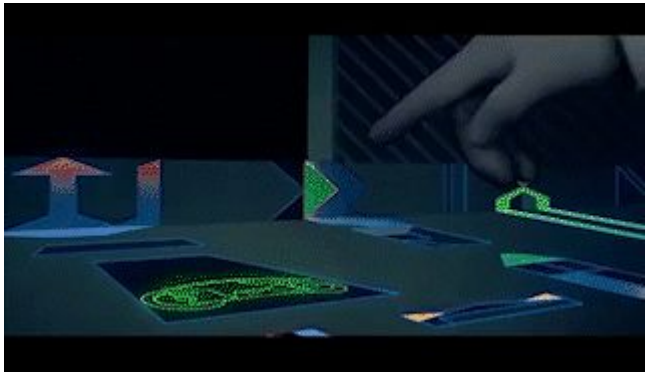


Image credit: Walt Disney Pictures

Image credit: Universal Studios

History of Computer Graphics

Big budget CG becomes mainstream (2000s onwards)

- AAA Games like Grand Theft Auto Series (1997-2013)
- Blockbuster Movies like Avatar (2009)
- The Marvel Cinematic Universe (2008-present)
- $$$$$$$ means more development

Image credit: Rockstar Games

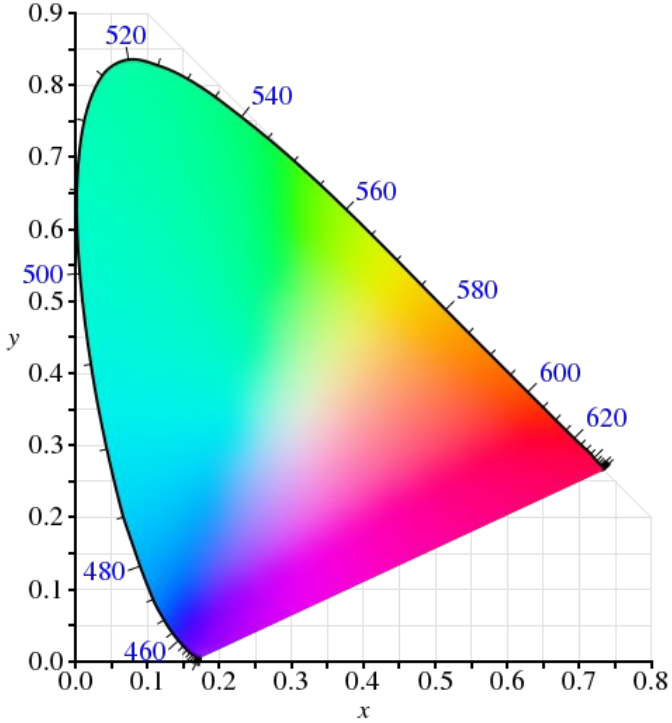
Image credit: Disney

Image credit: 20th Century Fox

How do things look?

How does vision work in the real world?

- Reality of light reflections
- What is light?
- What is colour?



Human Eyes … weird things

A physical device for detecting light

- How humans perceive electromagnetic radiation
- Rods and Cones
- RGB?

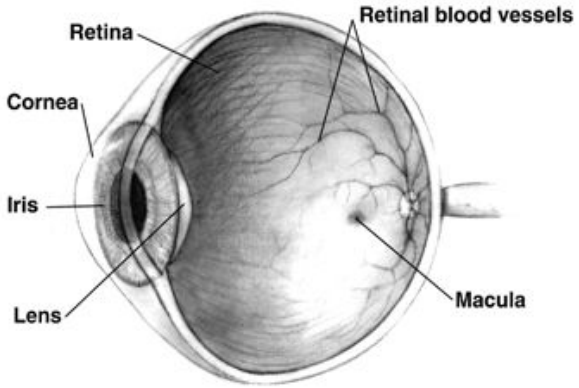


Image credit: NIH National Eye Institute

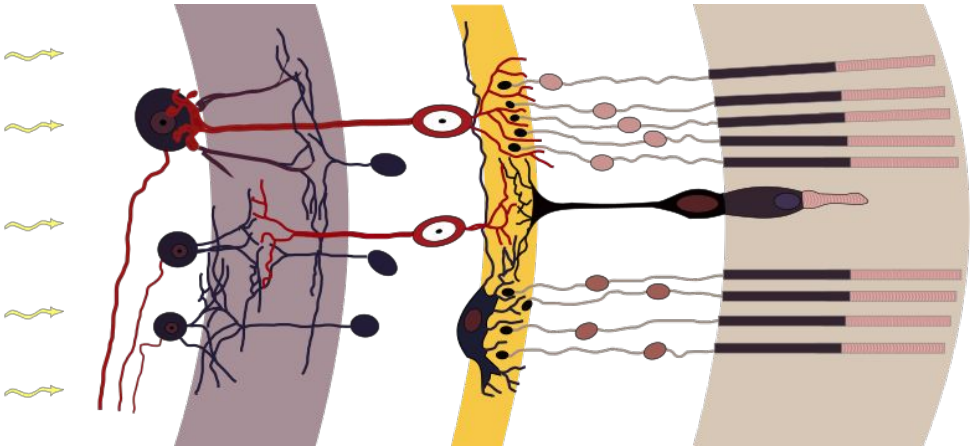


Image credit: Ramón y Cajal

Mimicking Human Vision in a Virtual Space

How do computers mimic physical light and vision

- Computer Monitors, Pixels and RGB
- Virtual environments and objects
- Computing things like light
- More on this next lecture . . .

Break Time

What to play/watch from this lecture

- *Street Fighter 2* (1991) and other arcade games, sprite based rendering
- *Doom* (1993) pseudo 3D Graphics
- *Quake* (1996) genuine 3D
- *Tron* (1982) lightcycle sequence is one of the longest and earliest CG sequences in movies
- *Jurassic Park* (1993) CG mixed with real film
- *Toy Story* (1995) full CG film launches new genre
- Some of these will get a closer look in later lectures . . .

What's in the Course?

Course Overview

- The Course Outline: https://webcms3.cse.unsw.edu.au/COMP3421/21T3/outline
- Lectures
- Tutorials
- Assignments

Topics we're covering

Course Details

- We're going to get you up to maybe the year 2000ish at most
- C++ and OpenGL
- Making objects and making them look like something
- Lighting them
- Some cool effects on top of that (Reflections and maybe shadows)

Lectures

Background and Theory

- Not going too deep into code, there isn't really time for it
- The context of what we're learning
- The techniques and how they work
- Why we might use these things

Tutorials

Getting stuck into details

- Actual Graphics coding
- Implementation of techniques shown in lectures
- One hour per week (this is not enough)
- Extension content is given for you to continue outside of hours

Help outside of Lectures and Tutorials

Where to contact us

- Discord (https://discord.gg/YrFE7DAN)
- Course Forums (setting up soon)
- Help Sessions (we'll schedule these if necessary)
- Course "Textbook" (https://learnopengl.com/)
- Course email (cs3421@cse.unsw.edu.au)
- CSE has Student Representatives (stureps@cse.unsw.edu.au)

Assignments

Three Assignments

- Assignment 1 is getting set up and "Hello World"
- Assignment 2 is historical graphics implementations
- Assignment 3 is like a long take-home exam where you can show off anything/everything you've learnt

Course Assessment

Marks Breakdown

- Assignment 1: 20%
- Assignment 2: 40%
- Assignment 3: 40%

Assignments

First Assignment is releasing in Week 1 (I hope)

- Basic setup and use of OpenGL and C++
- Uses a lot of early Tutorial content
- Some freedom to get creative

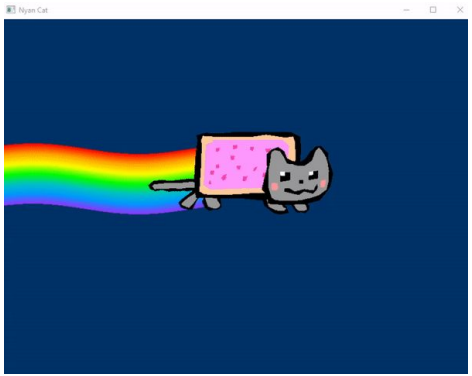


Image credit: Xavier Poon

How are Assignments Marked

This will be the same for all three

- Your code must run with our Cmake project
  - More details on this on Wednesday and in tutorials etc
- A written document showing what was completed
  - We will provide you with a template, this is not an essay
- 90% marks split into different technical criteria
- 10% "subjective" mark (coolness factor/artistic expression)

What did we cover today?

The first introduction

- Some of the history that got us here
- Familiarity with human vision
- Possible familiarity with Computer Graphics
- An idea about what we're going to teach
- Assessment details also