University of BRISTOL

COMS 30115

Introduction

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Introduction

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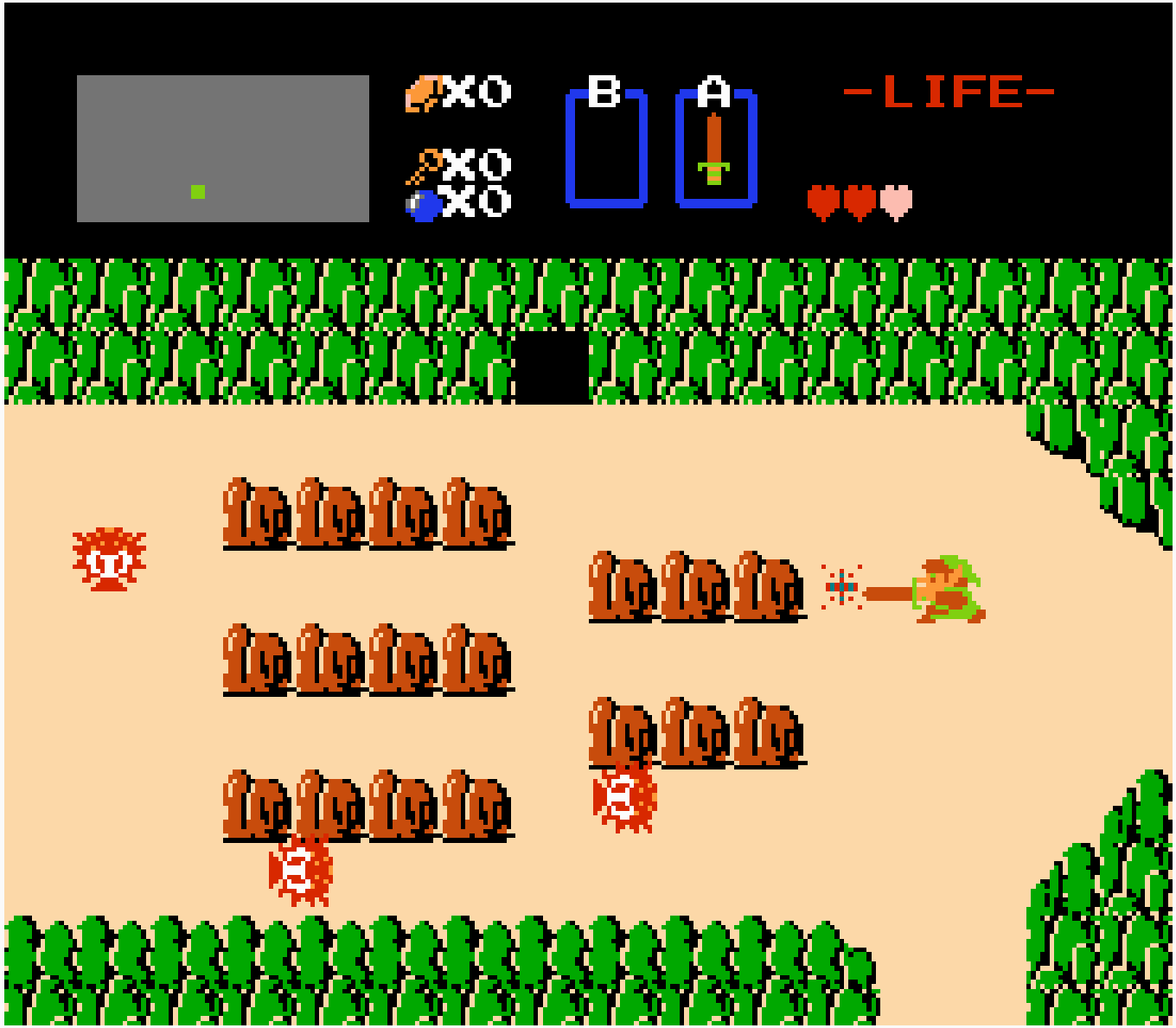
Zelda

The Legend of Zelda [1]

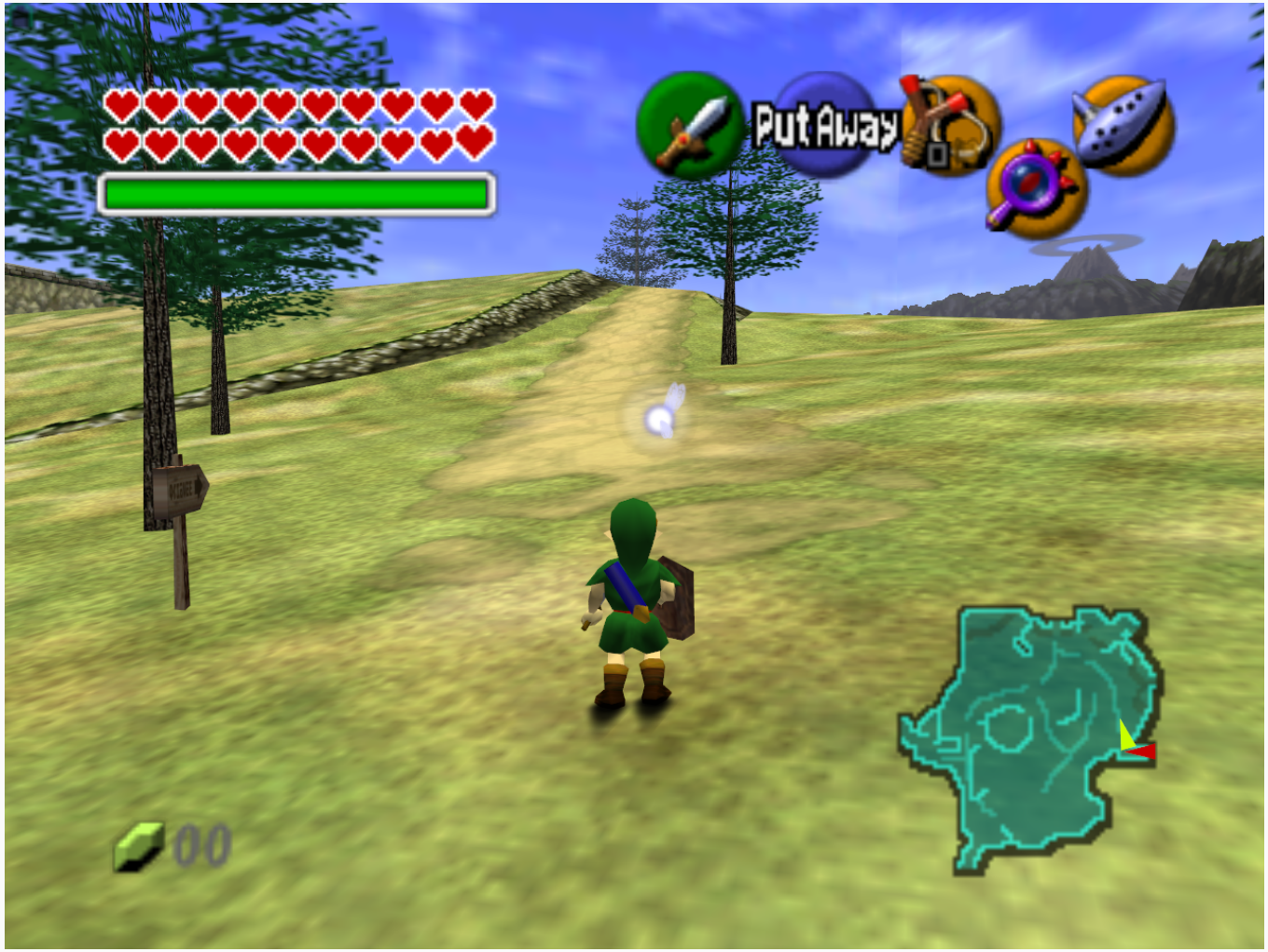


[1] The Legend of Zelda 1986

A Link to the Past [2]

[2] A Link to the Past 1991

Occarina of Time [3]



[3] Occarina of Time 1998

The Wind Waker [4]

[4] The Wind Waker 2002

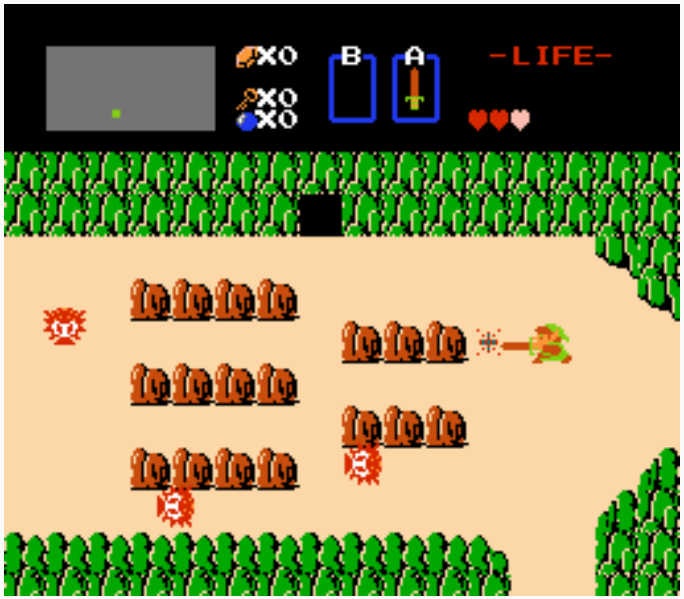
Twilight Princes [5]

[5] Twilight Princess 2006

Breath of the Wild [6]

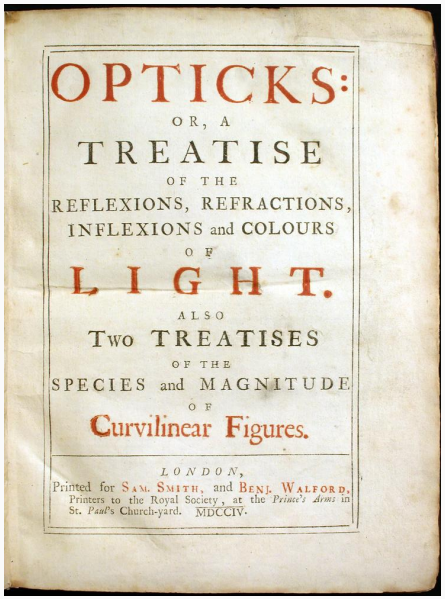
[6] Breath of the Wild 2017

1986 - 2017



Hardware

Newton



OPTICKS:

OR, A

TREATISE

OF THE

REFLEXIONS, REFRACTIONS,
INFLEXIONS and COLOURS

OF

LIGHT.

ALSO

Two TREATISES

OF THE

SPECIES and MAGNITUDE

OF

Curvilinear Figures.

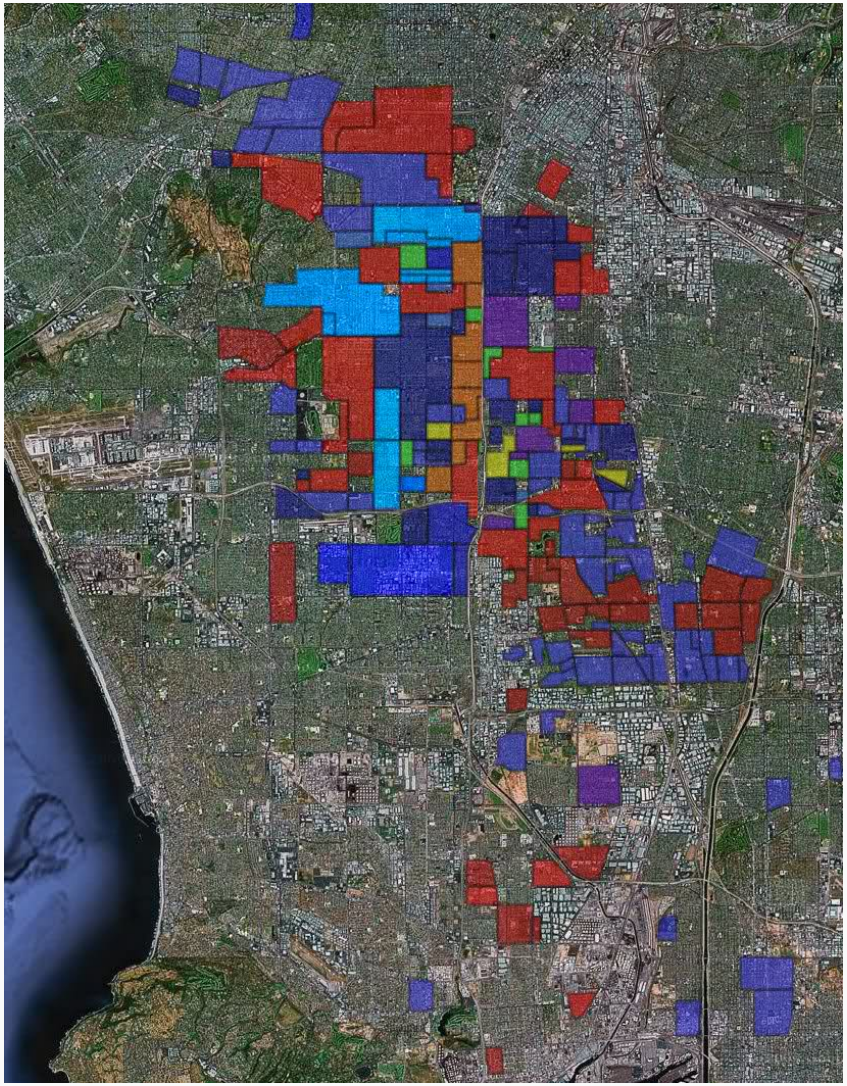
LONDON,

Printed for SAM. SMITH, and BENJ. WALFORD,
Printers to the Royal Society, at the *Prince's Arms* in
St. *Paul's* Church-yard. MDCCIV.

Why him?

so why is this buffoon talking to me?

Why



Why

Why

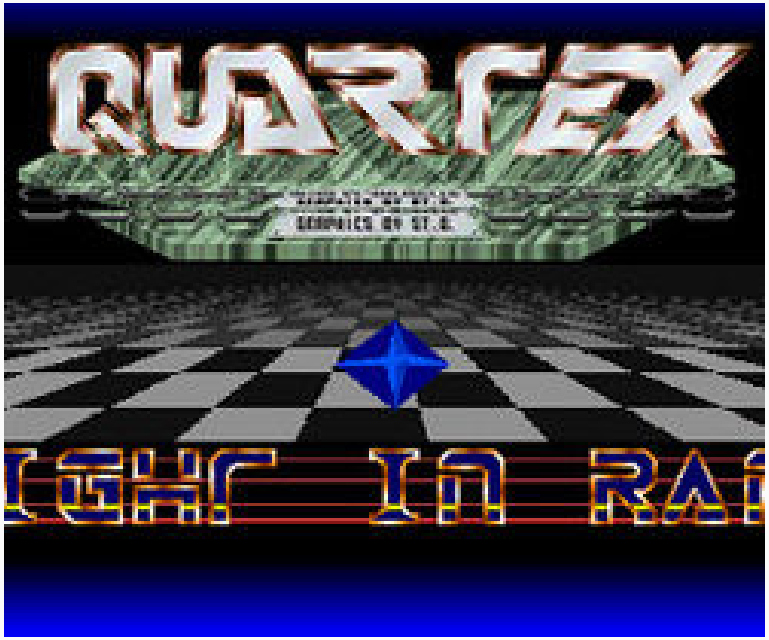
Why

Why

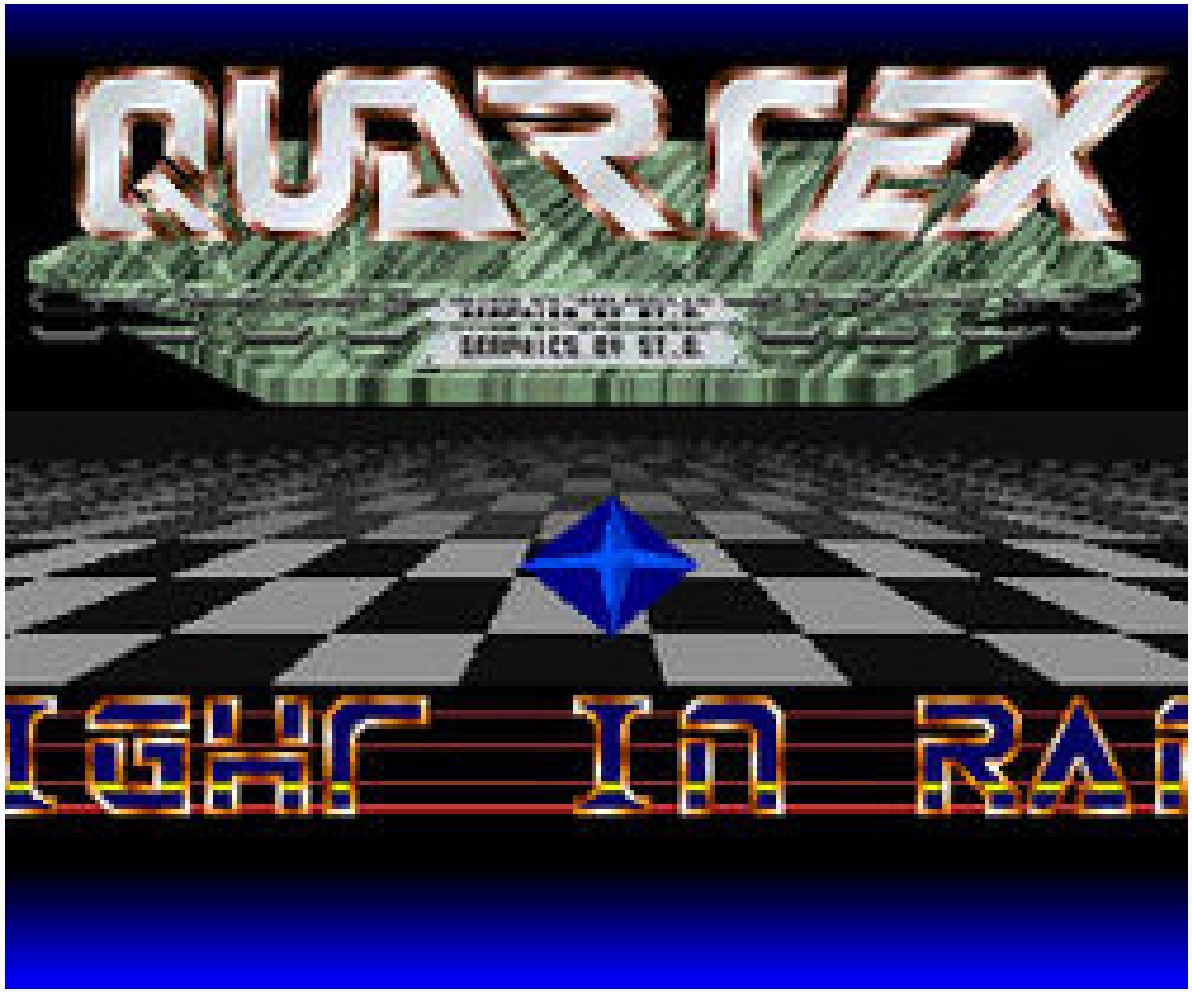
Why

Why

Why



Why



Cracktro Video

You

Who do I think you are?

- Comfortable programmers
- Capable of finding information on your own
- Excited about Computer Graphics
    - games, special effects, demo-scene

You

Who do I hope that you will become?

- Understand the inner workings of different rendering engines
- Understand the challenges of computer graphics
- Better at mathematical modelling

You

Who do I hope that you will become?

- Understand the inner workings of different rendering engines
- Understand the challenges of computer graphics
- Better at mathematical modelling
- Finding an outlet for creativity

This Unit

Lectures

- Four parts
  1. Introduction (this week)
  2. Raytracing (3 weeks)
  3. Rasterisation (3 weeks)
  4. Global Illumination (2 weeks)

Assesment

- 100% Coursework
- Two sets of coursework

  Raytracer 50%

  Rasteriser 50%
- Each coursework
  - 50% basic mark
  - 50% extensions
  - report and viva

Deadlines

Raytracer 27th of April

- Submit to SAFE

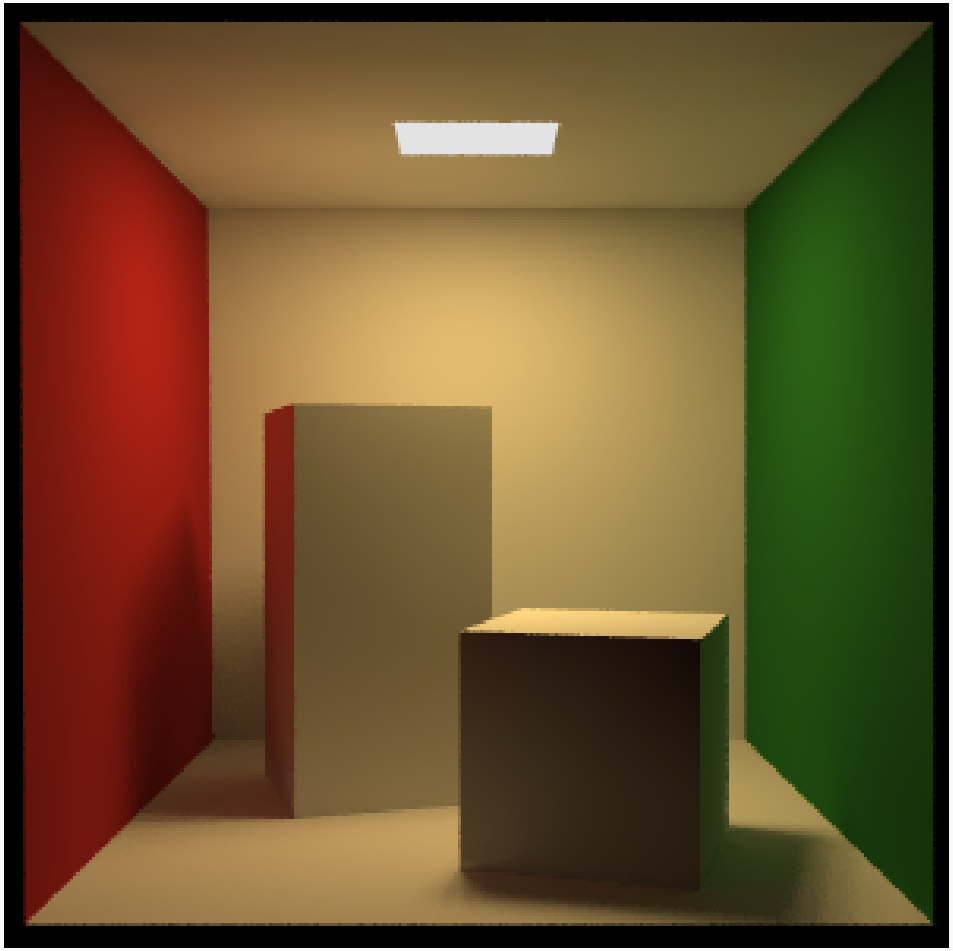
Rasteriser 27th of April

- Submit to SAFE

Report

Viva

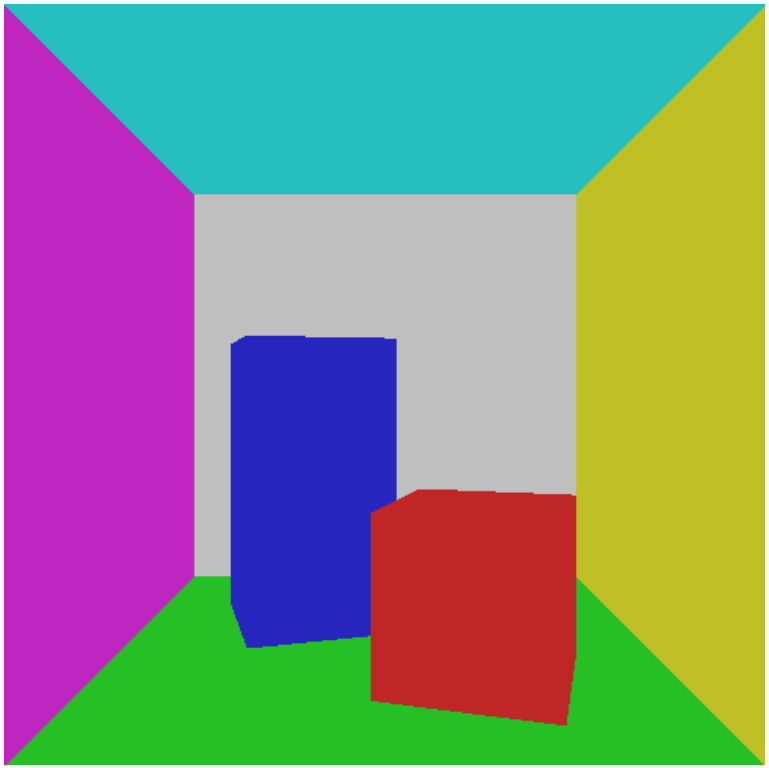
Cornell Box

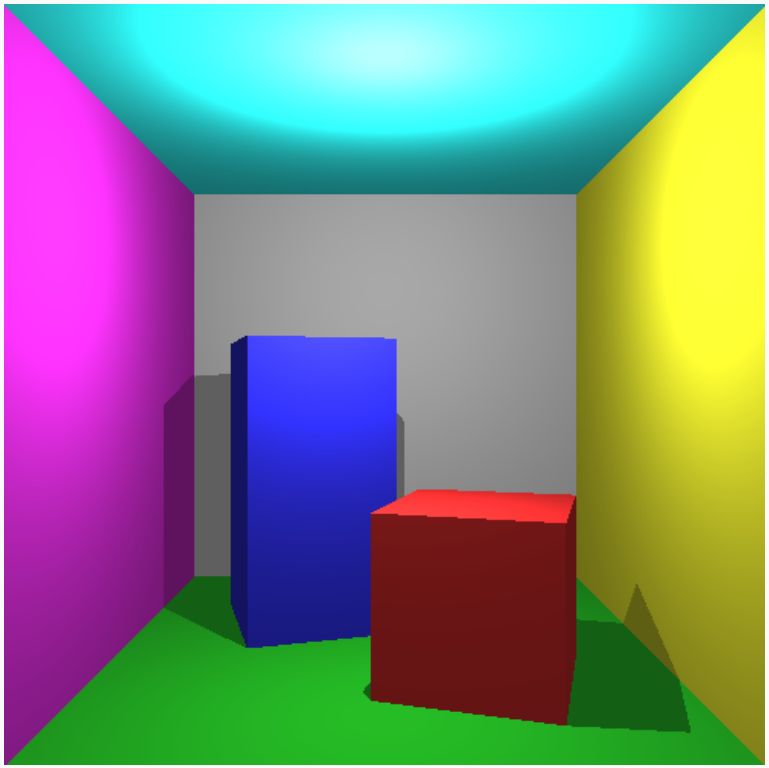


Standard rendering test image first introduced in 1984[7]

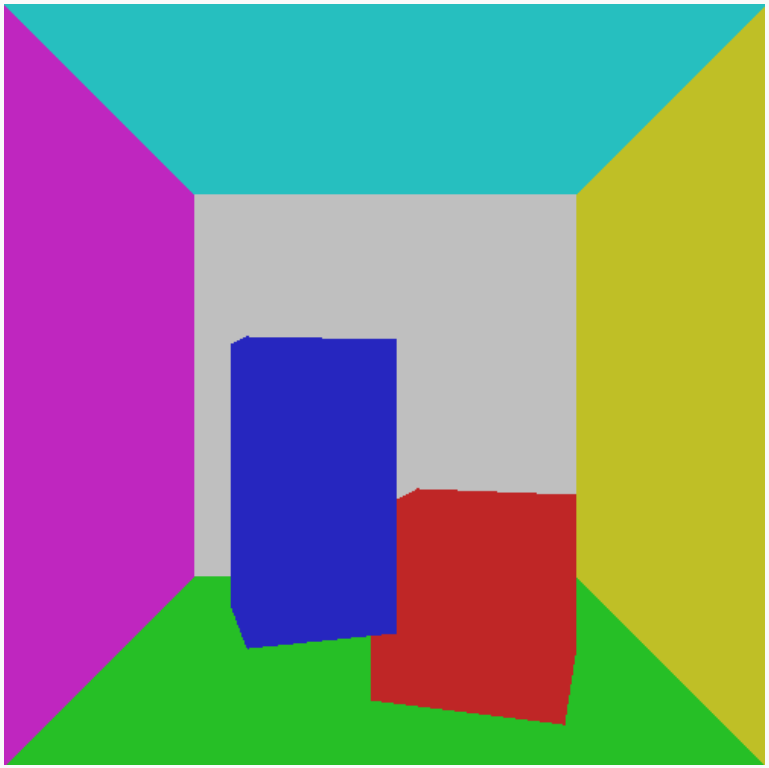
[7] https://en.wikipedia.org/wiki/Cornell_box

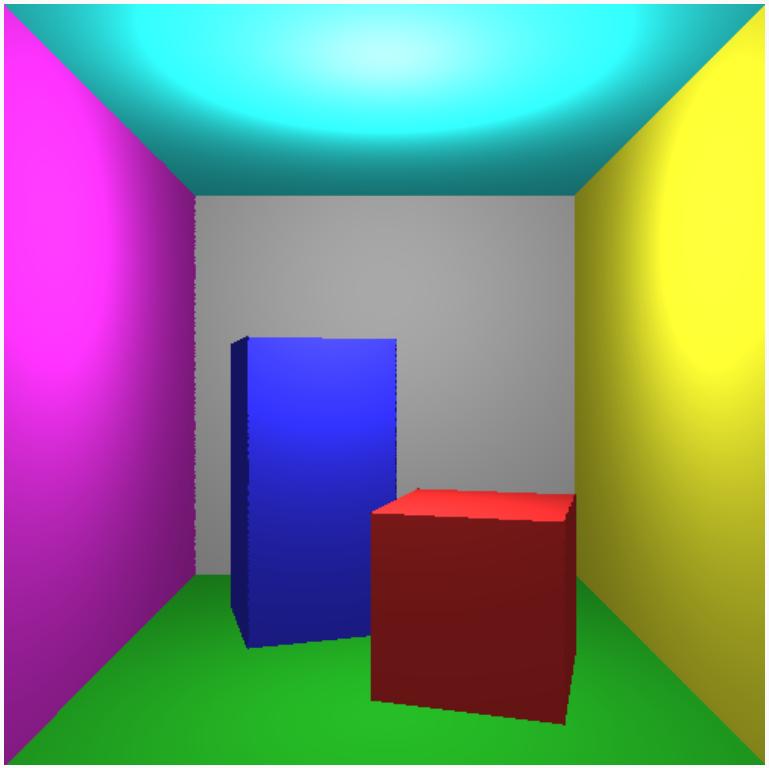
Raytracer



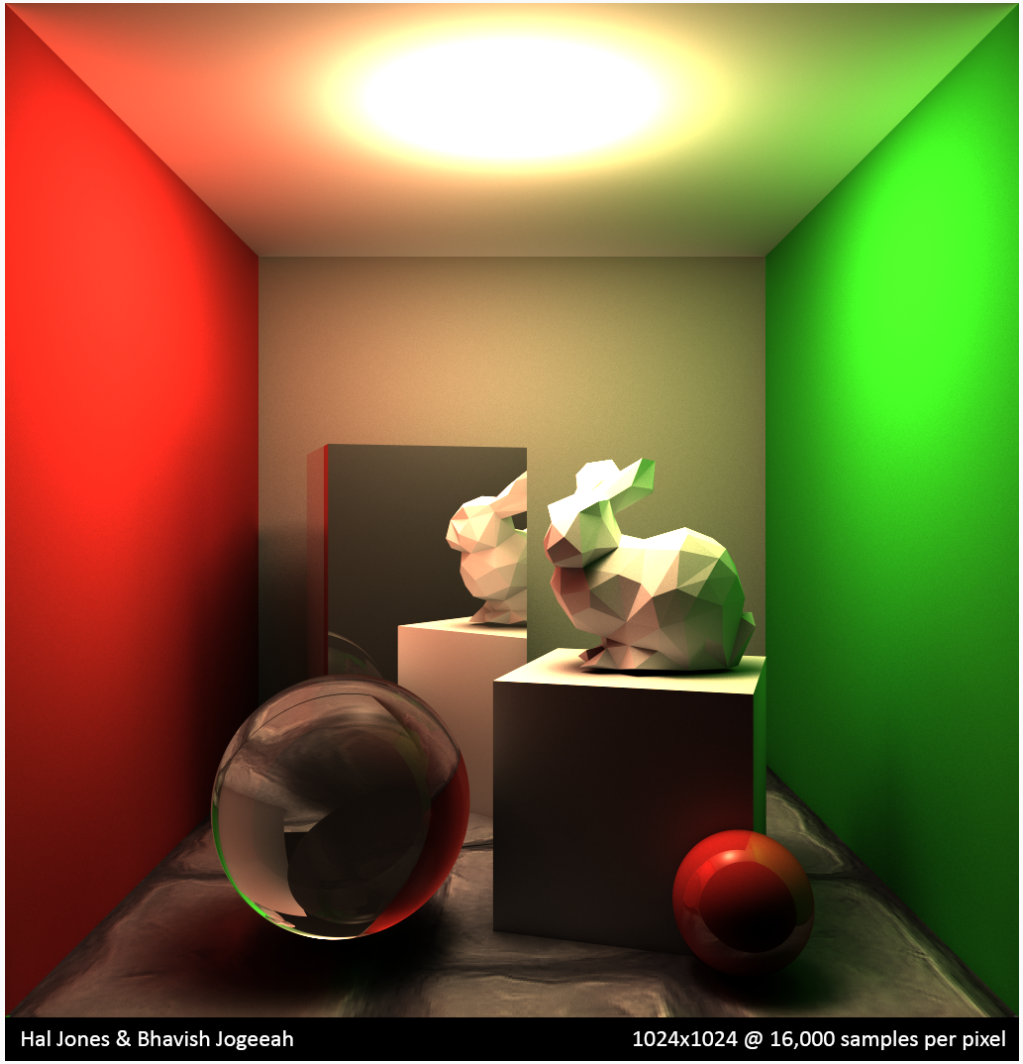


Rasteriser



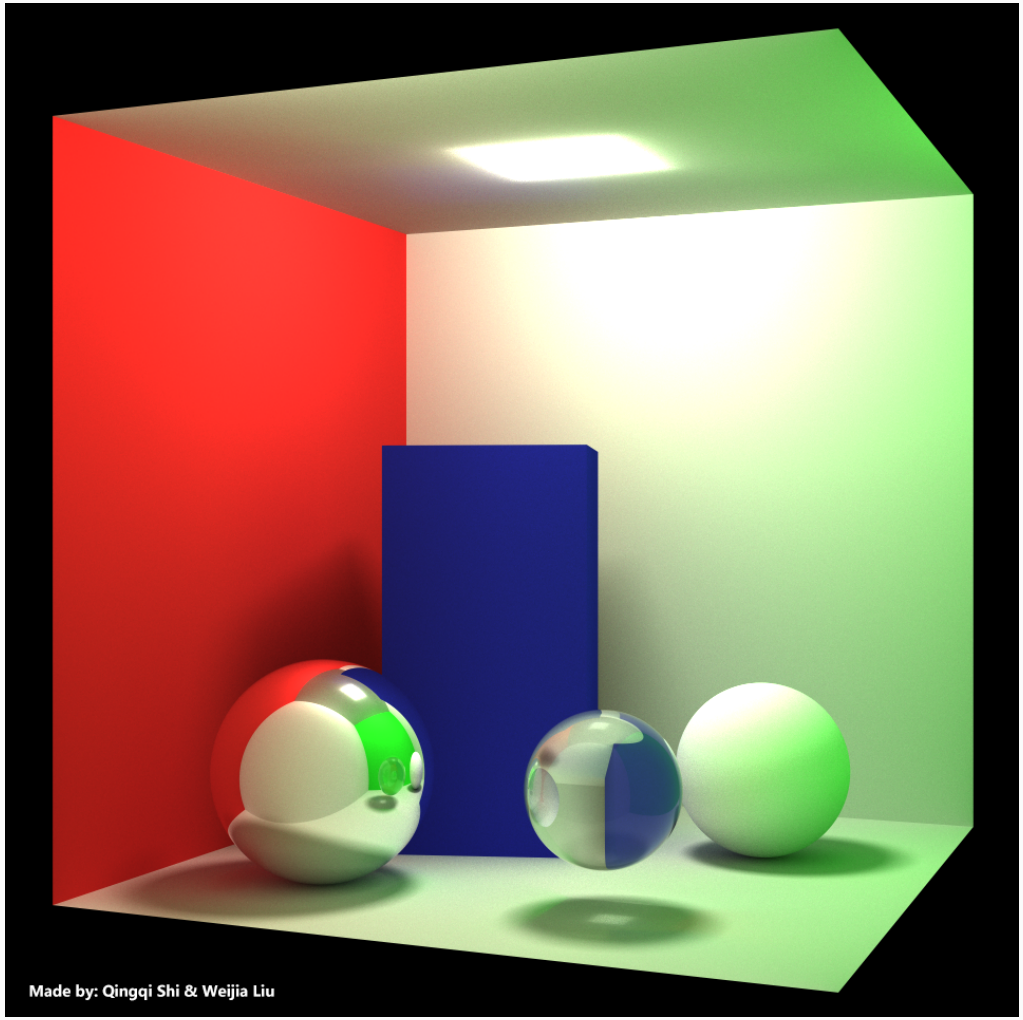


Extension



Hal Jones & Bhavish Jogeeah

Extension

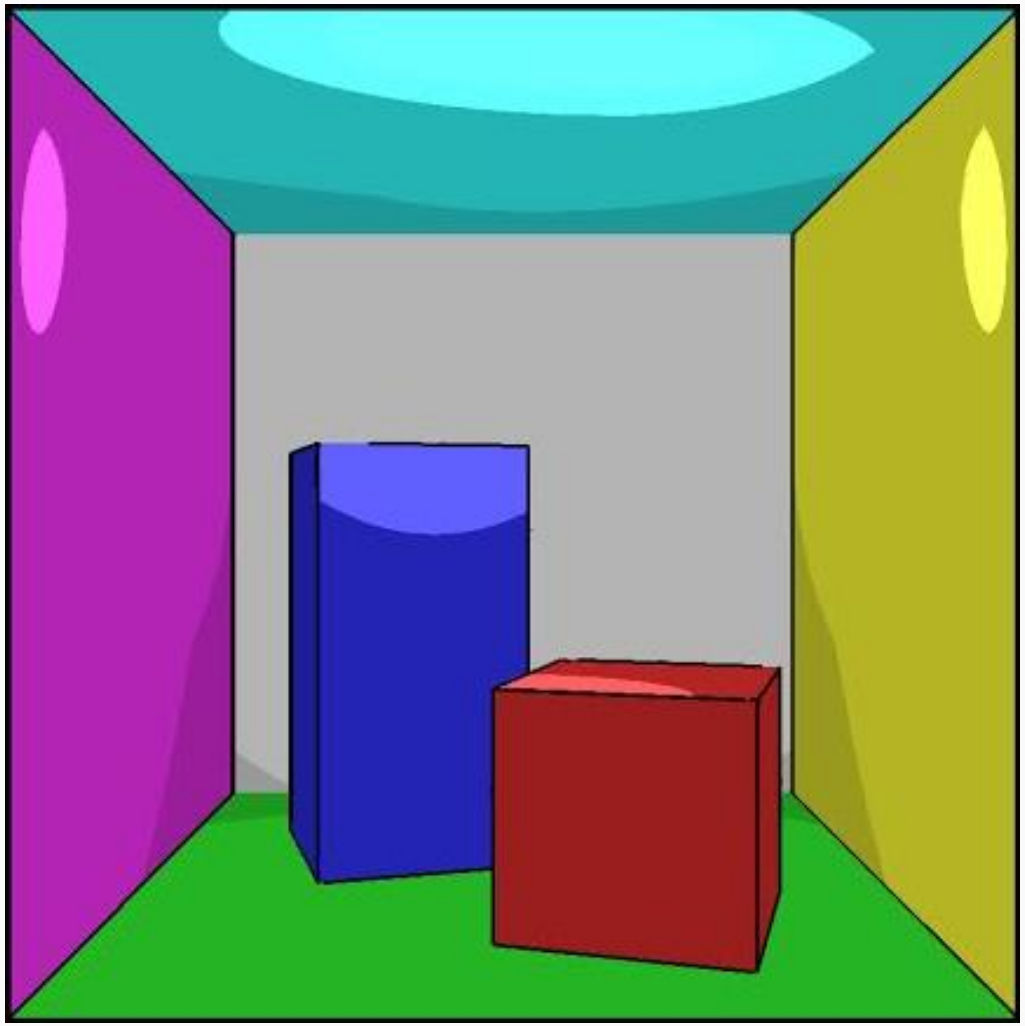


Qingqi Shi & Weijia Liu

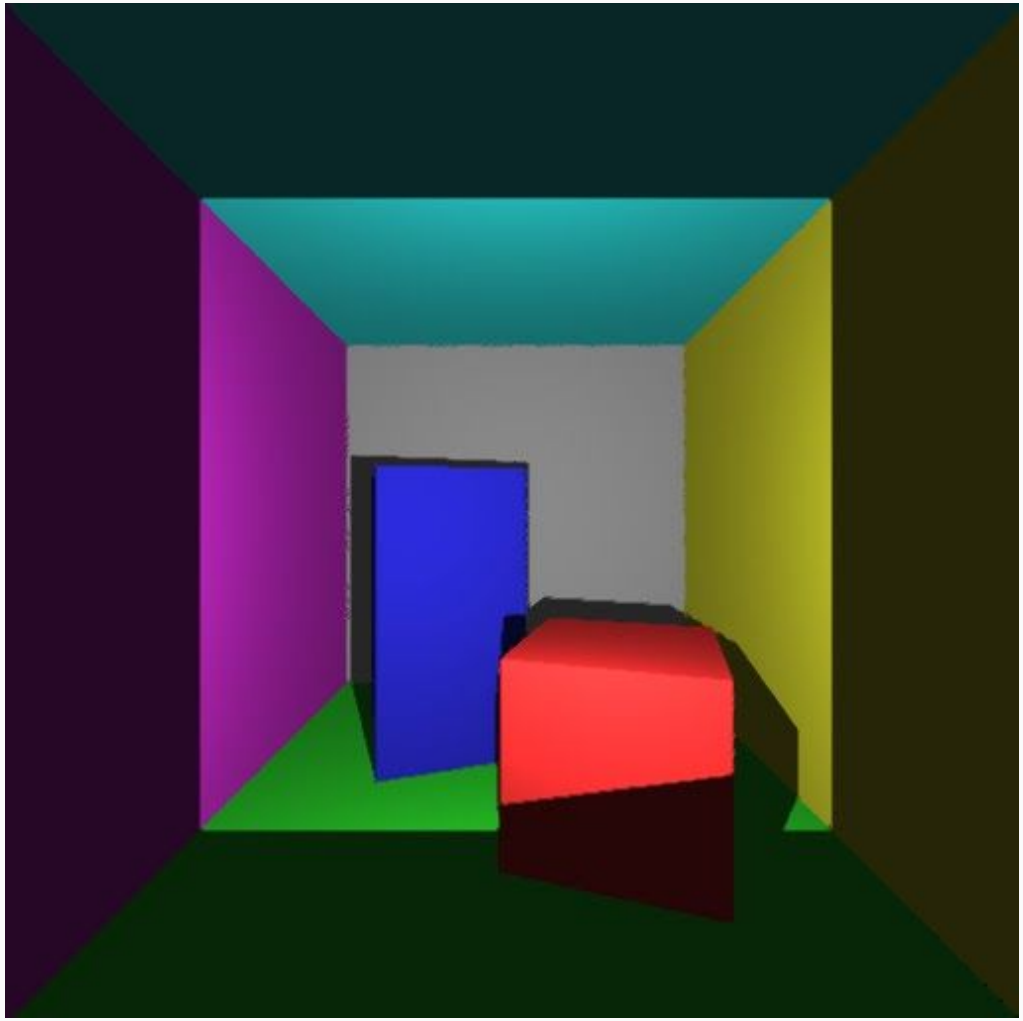
Extension

Michael Fitzpatric & Michael Parkin-White

Extension

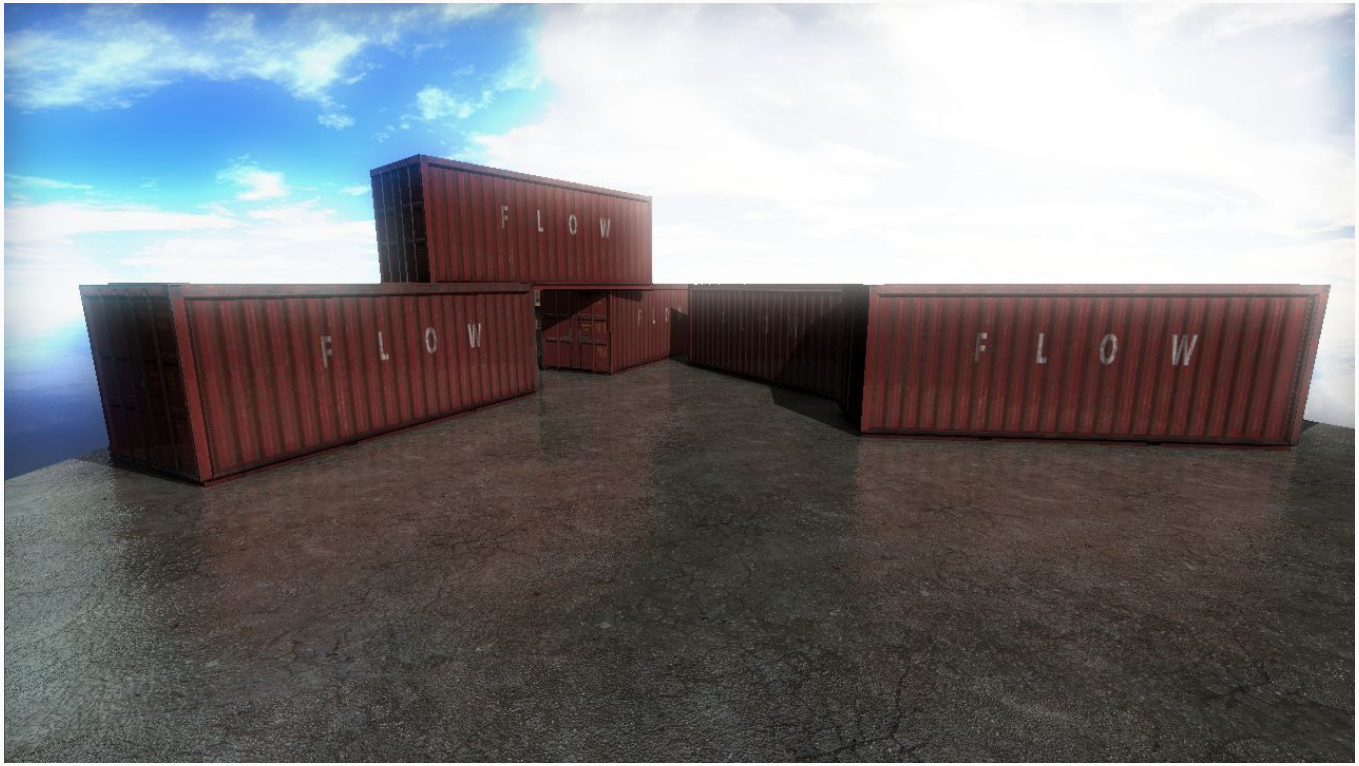


Extension



Jamie Willis & Harry Mumford-Turner

Extension



Michael Fitzpatric & Michael Parkin-White

Material

Scratchapixel [8]

- Free online textbook
- I will provide references in lecture notes
- The outline of the book is different to the unit structure

Immersive Linear Algebra [9]

- Graphics is mostly linear algebra
- Interactive online textbook
- Chapter 1-4 relevant for this unit

[8] Scratchapixel
[9] Immersive Linear Algebra

Resources

`/r/coms30115`

Resources

https://github.com/carlhenrikek/COMS30115

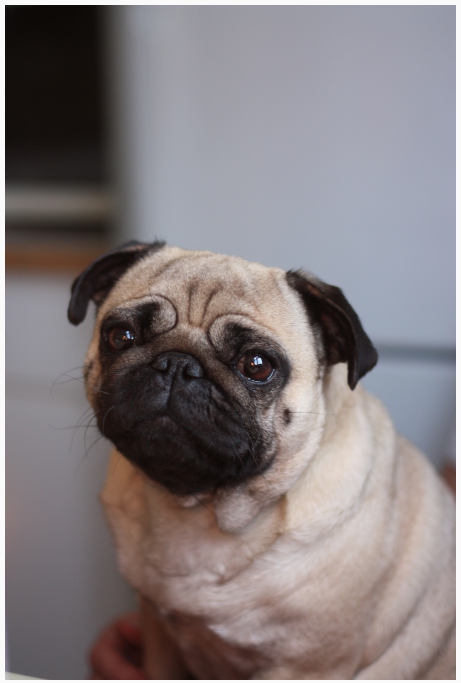
Office Hours

Office Hours

- 10-12 Mondays
- MVB 3.24

Computer Graphics

Rendering[10]



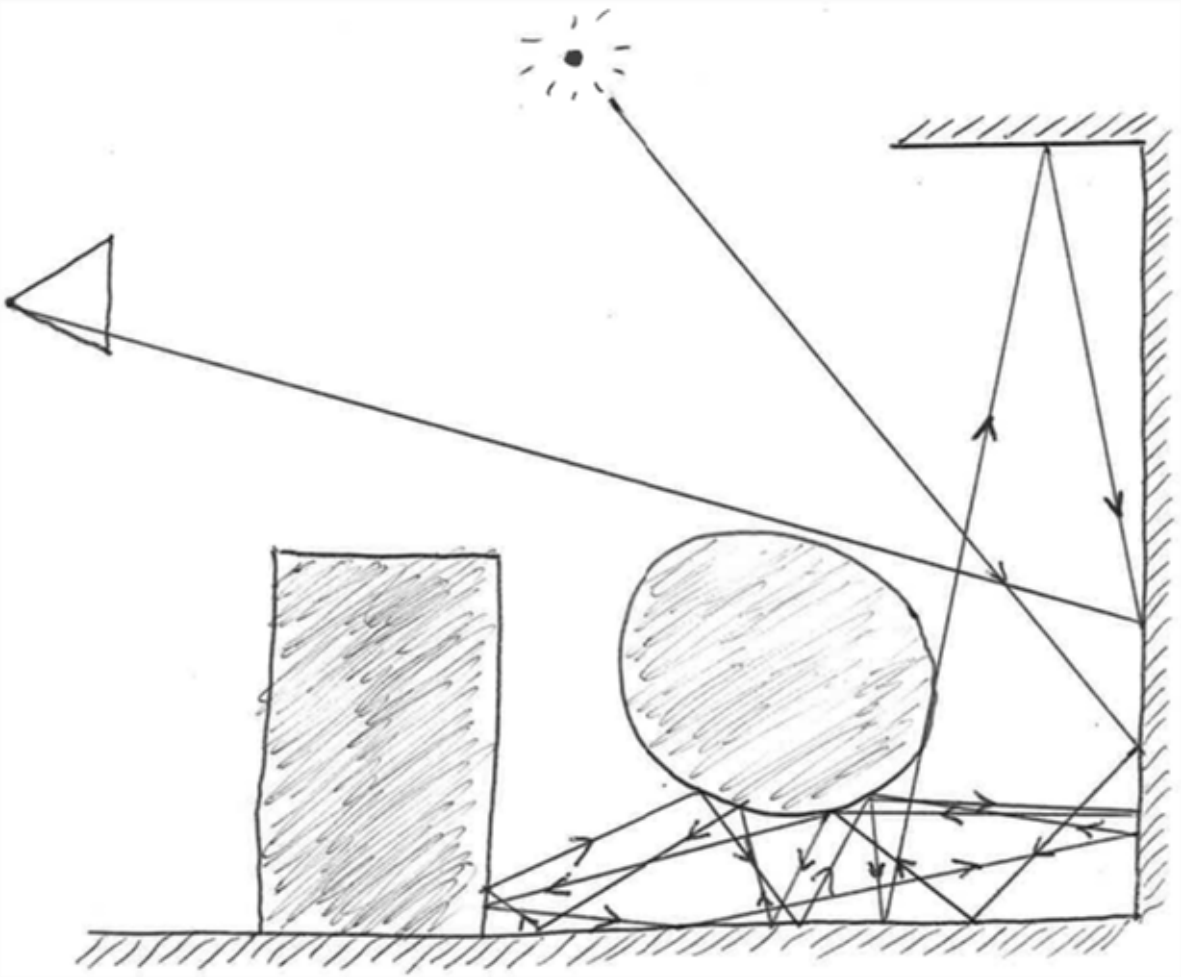
- The task of calculating the colour of each part in the world and then take a photo of it

[10] Stella

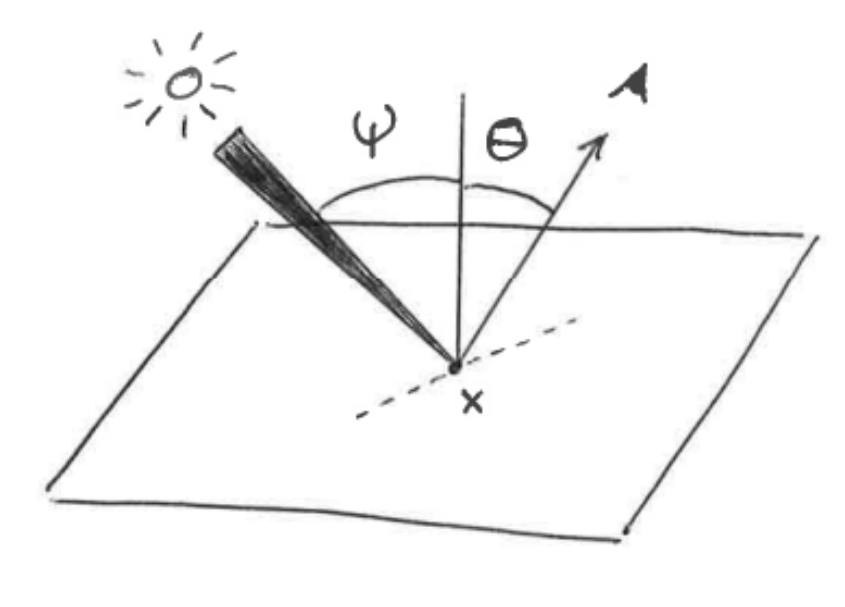
Light

- Light
  1. Emitted/Created
  2. Travels
  3. Reflected/Refracted etc.
- Transport
- Surfaces
  - colour
  - texture
  - surface
  - etc.

Global Illumination



Rendering Equation



$$L(x \to \Theta) = L_e(x \to \Theta) + \int_{\Omega_x} f_r(x, \Psi \to \Theta) L(x \leftarrow \Psi) cos(\mathbf{n}_x, \Psi) d\omega_\Psi$$

- Kajiya, J. T. (1986). The rendering equation.

Images

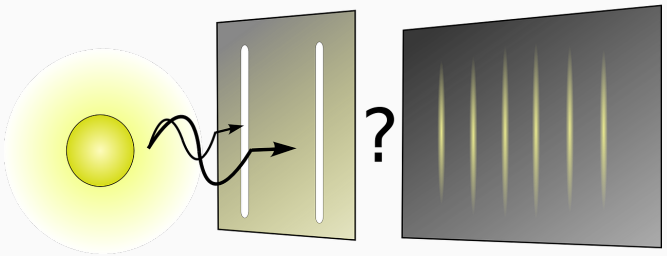

X-A2
FUJINON ASPHERICAL LENS
SUPER EBC XC 16-50mm 1:3.5-5.6 OIS II ø58

From next week

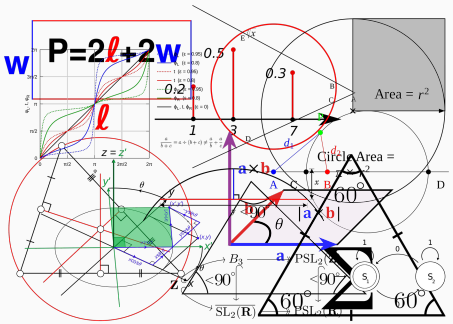
- Build Mathematical models of
  - light
  - surfaces
  - cameras
  - etc.
- Parametrise the image generation process

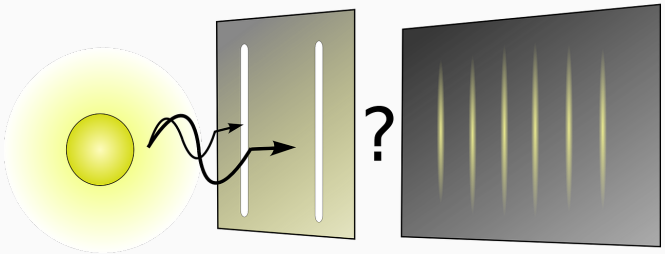
$$I = f(x)$$

The Rendering Process

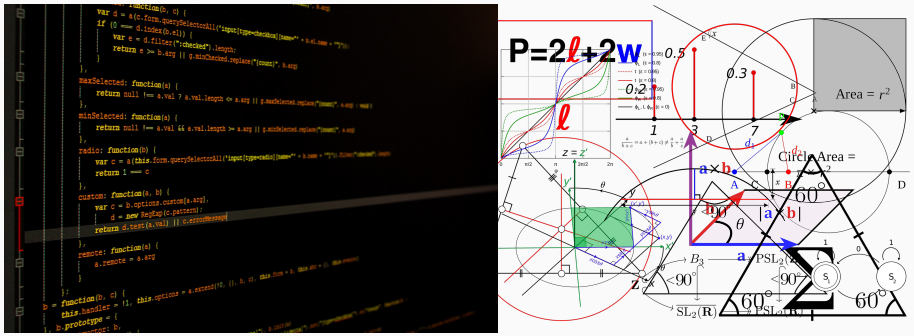


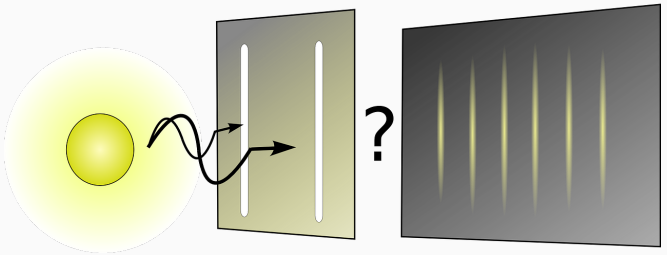
The Rendering Process





The Rendering Process





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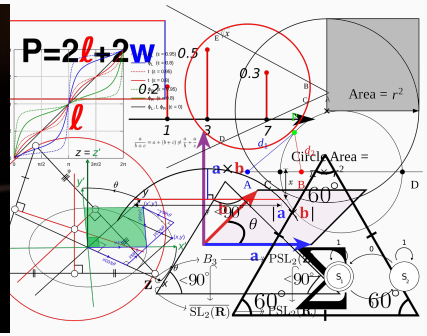
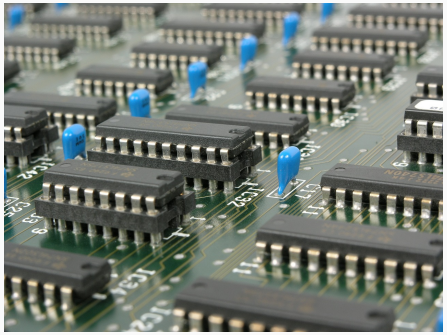
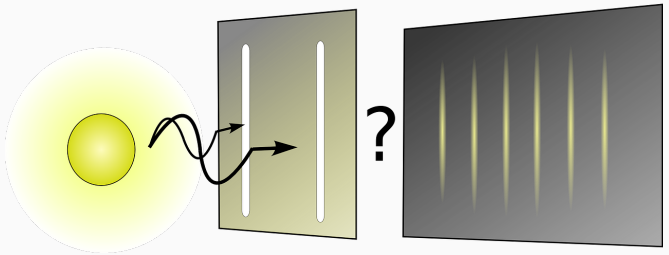
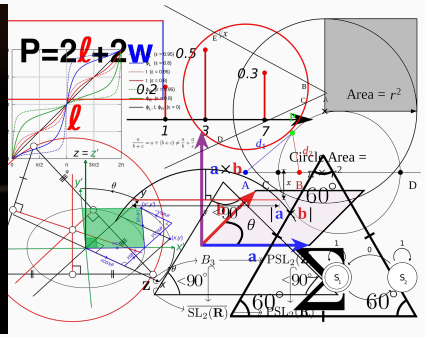
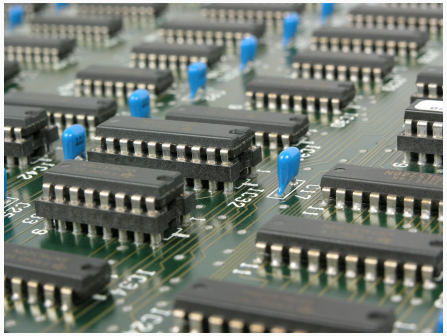


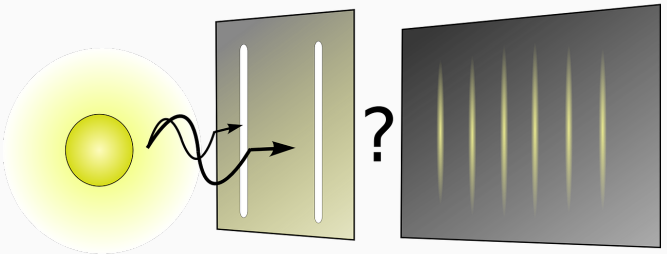




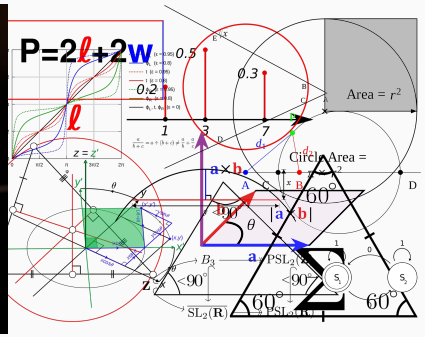
The Rendering Process

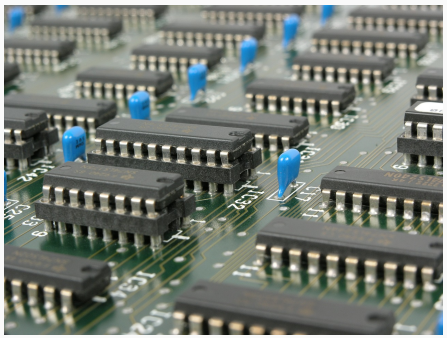


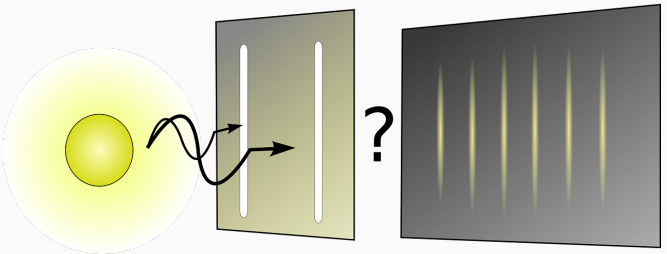




The Rendering Process







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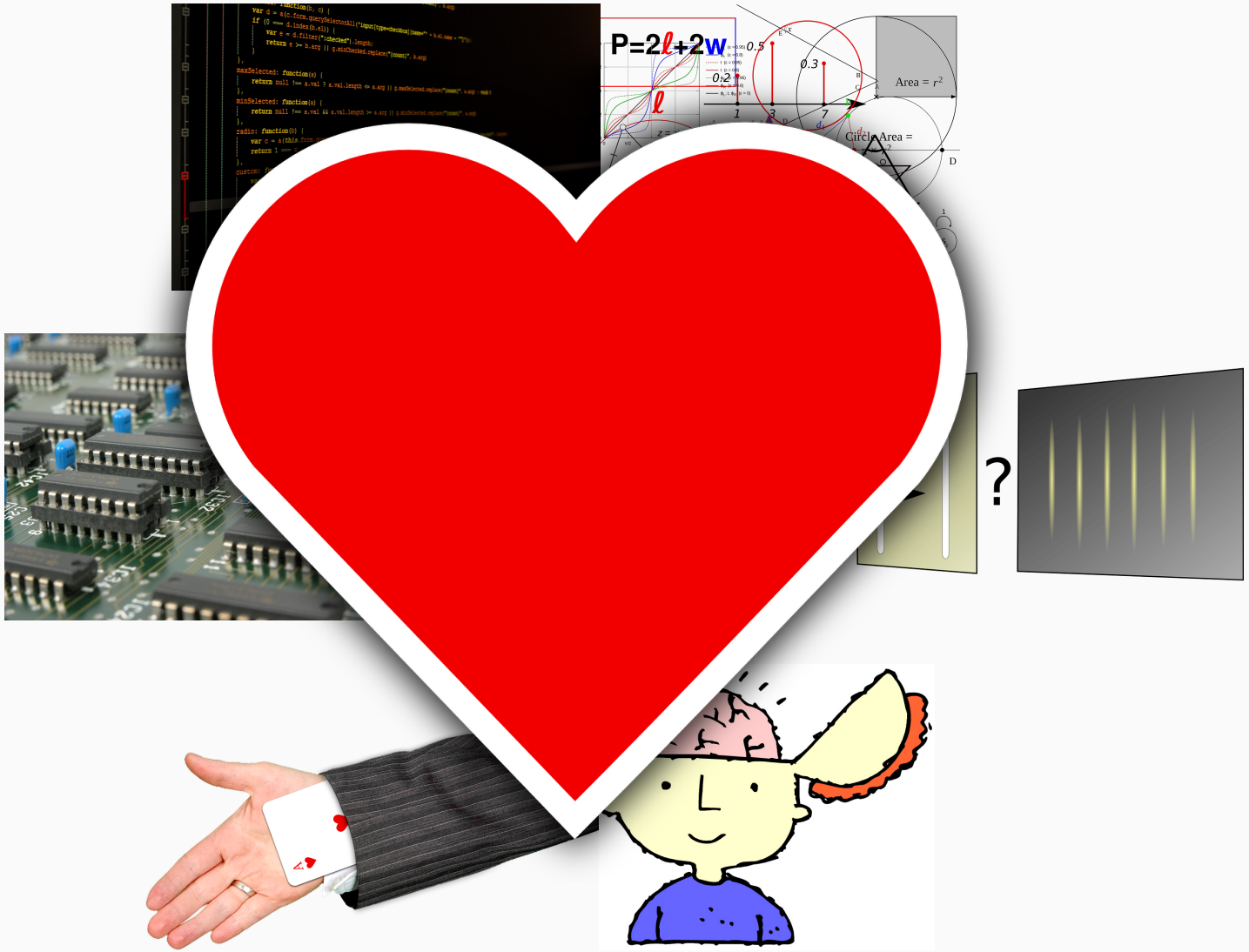

Next Time

Next Time

Lab Today 13-15 MVB 2.11

- Set-up environment

Lecture Friday 26th of January

- Queens Building: 1.15
- Parametrise images

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