Introduction to Computer Graphics

2017 Fall

National Cheng Kung University

Instructor: Min-Chun Hu 胡敏君

About This Course

- Lectures:
  - p.m. 6:10~9:00, Tuesday
  - R4202, CSIE
- Prerequisites
  - Programming skills in C/C++/Java
  - Data structures
  - Linear Algebra
- Lecturer
  - Min-Chun Hu, Assistant Professor
  - Email: anita_hu@mail.ncku.edu.tw
  - Office: R65601, 6F, CSIE New Building

Supporting Lecturer : Shih-Chin Weng（翁士欽）

- Passionate software developer with 10+ years experience specializing in
  - computer graphics
  - rendering algorithms
  - production pipeline of computer animation
- Implemented production tools at CGCG for the animated TV-series like
  - Star Wars: The Clone Wars, Star Wars Revels. Lucasfilm
  - How to Train Your Dragon, Trollhunters. DreamWorks Animation
- Interested topics
  - Global Illumination, Physically-Based Rendering & appearance modeling
  - Production pipeline of computer animation and VFX
  - VR/AR for education or storytelling
- Basically, curious about everything & love to learn new things (NERD!)
- Now working on Style.Me
  - Exploring new possibilities of fashion and computer graphics!

@shihchinw
shihchin.weng@gmail.com
http://shihchinw.github.io/

Supporting Lecturer : Min-Hsiang Hung（洪敏翔, Tana）

- TAVAR 連署發起人
- 國立台北教育大學 玩具與遊戲設計研究所 碩士
- 現任 闇橡科技股份有限公司 產品開發部 總監
- 曾任 宇峻奧汀科技股份有限公司 研發中心 VR遊戲專案 製作人兼產品經理
- iPAS行動遊戲程式設計師能力評鑑 評鑑委員

  iPAS行動APP企劃能力評鑑 命題委員
- 4C數位創作競賽 跨領域組 評審主席

  放視大賞數位內容競賽 遊戲組與跨領域組 評審
- 台北科大互動系, 雲林科大資工系, 台南應大多動系, 南台科大多樂系等多所大學之課程規劃委員

About This Course (Cont.)

- TAs:
  - 許友綸
  - 林季伯
  - Plugin TAs ☺
  - cg@mislab.ncku.edu.tw
  - Office: R65601, 6F, CSIE New Building

About This Course (Cont.)

- Textbooks:
  - E. Angel, Interactive Computer Graphics (7th Ed.), Addison-Wesley, 2014.
  - D. Hearn, M.P.Baker, W. Carithers, Computer Graphics with OpenGL (4rd Ed.), Prentice Hall, 2010.
  - Tomas Akenine-Moller, Eric Haines, Naty Hoffman, Real-Time Rendering, 3rd Ed., 2008.
  - Matt Pharr, Greg Humphreys, Physically Based Rendering, From Theory To Implementation, 3nd Ed., 2016.
  - Christer Ericson, Real-Time Collision Detection (The Morgan Kaufmann Series in Interactive 3-D Technology), 2004.
  - Watt. 3D Computer Graphics, 3rd ed., Addison-Wesley, 1999.

What Can I Learn from This Course?

- How a game engine works
- Fundamentals of computer graphics techniques
  - Animation pipeline
  - Game development pipeline
  - 3D surface reconstruction
- Programming ability of OpenGL Shading Language (GLSL)
- Some of 2D image special effects
- Applications of AR/VR

Syllabus

- 9/20 Overview of Computer Graphics + Computer Animation Pipeline + HW1
- 9/26 Game Development Pipeline
- 10/3 Graphics Pipeline + HW2
- 10/10 National Day
- 10/17 Basic Shading Algorithms
- 10/24 Introduction of GLSL by TA (HW2)
- 10/31 3D Surface Reconstruction + HW3
- 11/7 Physically Based Rendering
- 11/14 Proposal & Paper Presentation
- 11/21 Image Processing
- 11/28 Global Illumination
- 12/5 參訪
- 12/12 Introduction of AR/VR
- 12/19 3D Stereo and 3D Compression
- 12/26 Simulation (I)
- 1/2 Project Check Point
- 1/9 Simulation (II)
- 1/16 Final Project Demo

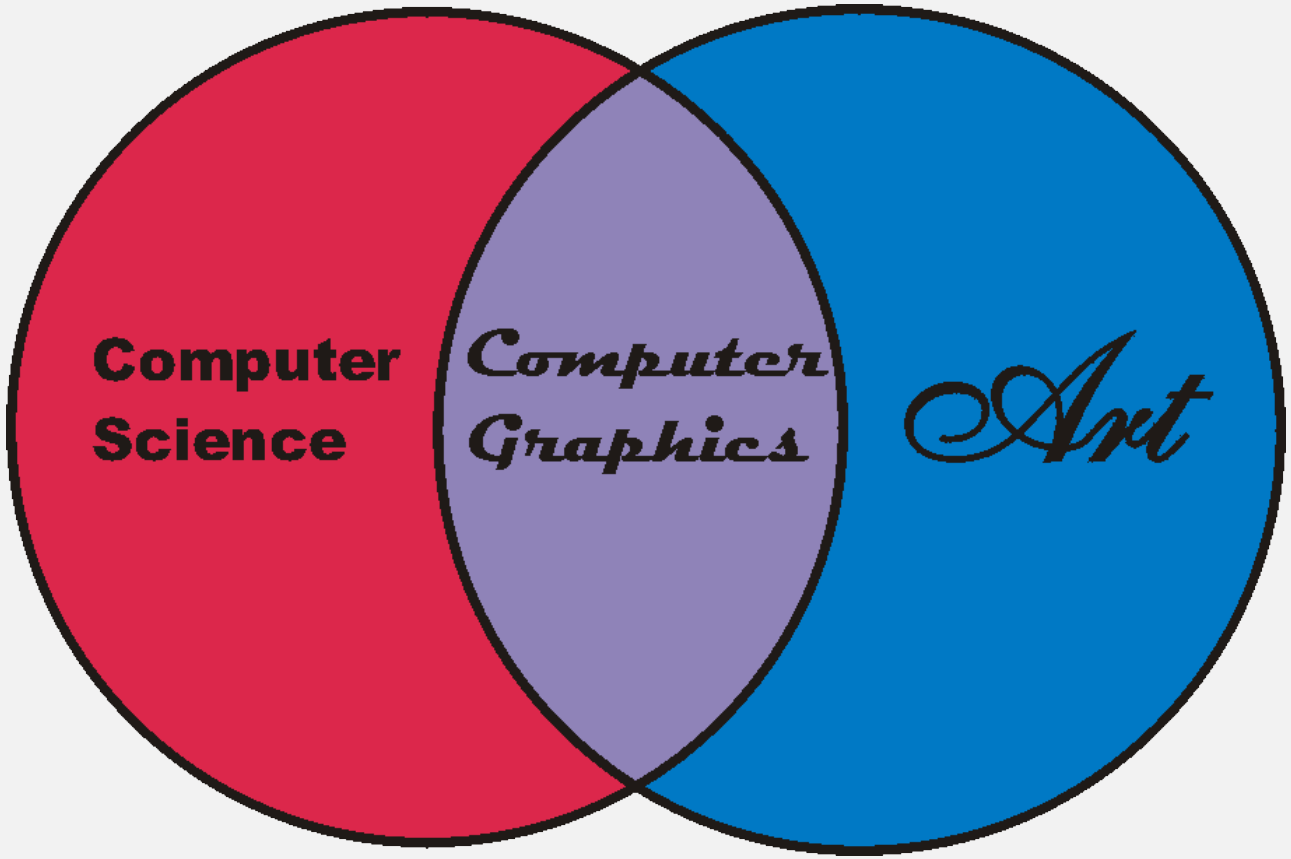
Grading

- Class Participation (5%)
- HW1: Unreal Engine 4 Practice (10%)
  - Deadline: 10/2 pm 10:00
  - https://goo.gl/nB19Fc
- HW2: GLSL (25%)
  - Deadline: 10/30 pm 10:00
- HW3: Marching Cube (15%)
  - Deadline: 11/6 pm 10:00
- Project (45%)
  - Proposal & Paper Presentation (15%) 11/14
  - Check Point (5%) 1/2
  - Video (5%) 1/15 pm 10:00
  - Demo& Final Presentation (20%) 1/16

Course Notice

- Office hour:
  - By an appointment
- No late submission of HW !
- Discussion is encouraged, but plagiarize (even the codes from websites) is not allowed !
- Food is ok~
- Zzz…not that ok~

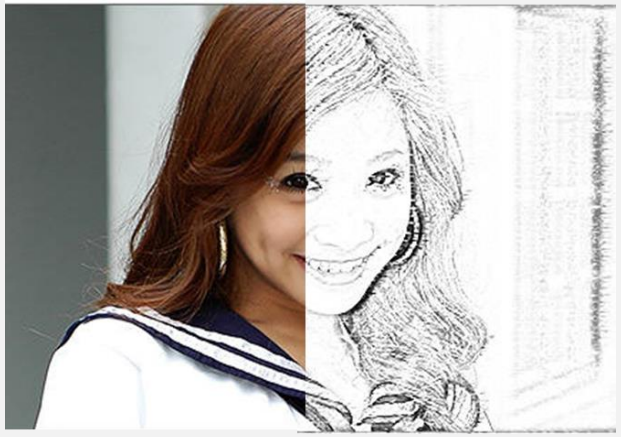
What's Computer Graphics (CG)



What's Computer Graphics (CG)

What's Computer Graphics (CG)

- Computer Graphics
  - Producing pictures or images using computer.
  - Displaying a realistic virtual environment or synthesizing virtual objects in real time.
    - Mainly focusing on 3D graphics
  - Displaying a real scene/object with specific styles.



Behind The Scenes: Angry Birds 2 Launch Film

Netto – The Easter Surprise

Behind the Scenes – The Easter Surprise

Face Transformation

Real Digital Human Face

Facial Reenactment

3D Avatar Creation

Meet Mike

SIGGRAPH 2017 Technical Papers Trailer

CG or Magic ??

Q & A ?