Computer Graphics

1 - Course Intro

Yoonsang Lee

Spring 2021

Course Information

- Instructor: Yoonsang Lee (이윤상)
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- Teaching Assistant: 김민관
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- Course Hompage
  – The LMS course homepage at portal.hanyang.ac.kr (or learning.hanyang.ac.kr)
  – Slides will be uploaded to Lecture Contents(**강의콘텐츠**)**,** probably *just before the lecture*. So, **download lecture slides at the beginning of each lecture.**
  – If you want to study the lecture slides **in advance**, please refer to last year's lecture slides (They won't change much): https://cgrhyu.github.io/courses/2020-spring-cg.html
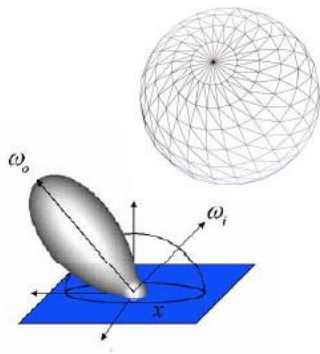
Live Online Lecture Policy

- This semester's lectures and labs will be given in "live online lectures" until further announcement.
- All students are required to join lecture and lab sessions for each week on time.

- Questions:
  - In lecture sessions, you can ask questions using slido.com (will be explained later).
  - In lab session, TA will guide you on how to ask questions.

- Attendance check - Lecture session
  - Online quiz submission (will be explained later)
  - Session participation records
- Attendance check - Lab session
  - Minimum session participating time for attendance: **20%** of session duration

What is Computer Graphics?

- The study of creating, manipulating, and using visual images in the computer.

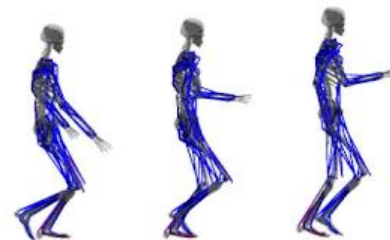이미지 → 모델 : 컴퓨터비젼

모델 → 이미지 : CG

Image

Animation (a series of images)

Modelling

Simulation & Rendering

Computer vision inverts the process
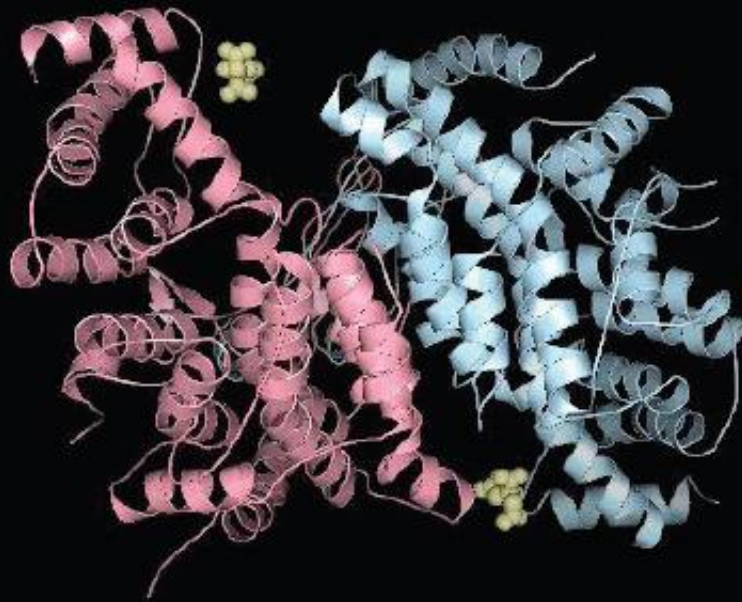Image processing deals with images

Movies & Games

Star Wars: The Last Jedi
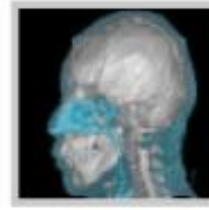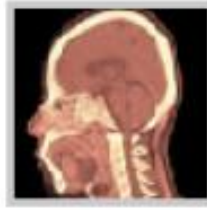

Assassin's Creed Odyssey

Science and Engineering

Simulated deformation of citrate synthase during substrate binding

Kalju Kahn, UCSB

Computer-Aided Design

Medical Applications
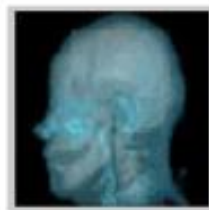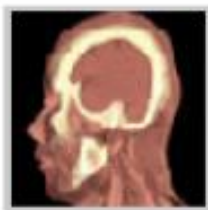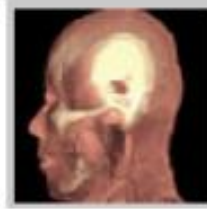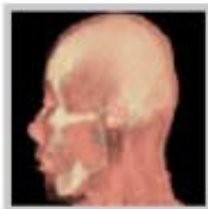
Rapidia homepage

Course Overview

- Computer Graphics: Mathematics made visible

- In this course, you will
  - Explore fundamental computer graphics & mathematics ideas
  - Write cool programs (using Python and legacy OpenGL)

- You will not
  - Learn sophisticated computer graphics techniques
  - Learn about modern OpenGL APIs
  - Write large programs

Course Overview

- As "implementation examples" of the fundamental computer graphics ideas, we'll use:

- Legacy OpenGL (mainly)

- On-line WebGL demos (sometimes)

- Blender: An open-source 3D graphics tool (sometimes)

Prerequisites

- Basic knowledge of linear algebra
  - Vectors, matrices, and related operations (dot product, cross product, determinants...) are the most common tools in computer graphics.
  - But don't worry. I think that if you know how to calculate matrix multiplication, it is enough to take this course.

- Basic knowledge of programming skill
  - We'll use Python in this class.

- You don't need artistic sense!

Textbook

- **Textbook : Lecture slides**

Schedule (subject to change)

Week	Topic	Mon	Tue
1	1 - Course Intro		3/2
2	2 - Introduction to NumPy & OpenGL / Lab1 - Environment Setting	3/8	3/9
3	3 - Transformation 1	3/15	3/16
4	4 - Transformation 2	3/22	3/23
5	5 - Affine Geometry, Rendering Pipeline	3/29	3/30
6	6 - Viewing, Projection	4/5	4/6
7	7 - Hierarchical Modeling, Mesh	4/12	4/13
8	Midterm Exam	4/19	4/20
9	8 - Lighting & Shading	4/26	4/27
10	9 - Orientation & Rotation	5/3	5/4
11	10 - Animation	5/10	5/11
12	11 - Curves	5/17	5/18
13	12 - More Lighting, Texture	5/24	5/25
14	13 - Rasterization & Visibility	5/31	6/1
15	Final Exam	6/7	6/8

Lectures & Labs

- Lecture (Mon) + Lab (Tue)

- Lecture (by instructor)
  - Traditional classroom-based learning.

- Lab (by TA)
  - Time for solving lab assignment problems by yourselves.
  - TA and an undergraduate mentor will help you.

Lab assignments

- 1 lab assignment per each lab session.
  - with 1~2 problems

- The goal is to let you understand what you've just learned in lectures every week.
  - The problems would not be too difficult.
  - TA and the undergraduate mentor will help you to solve the problems as much as possible.

- Due: 23:59 on the day of the lab session.

Class assignments

- 3 class assignments during the semester.

- More challenging programming assignments.

- The due date will be two to three weeks after the assignment is given.

Policy for Assignments

- **NO SCORE** for late submissions
  - Submit before the deadline!

- **NO SCORE** for copying
  - If A copies B's code, A and B will get 0 point.
  - If A, B, C copies the same code from the internet, they will all get 0 point.
  - Collaboration encouraged, **but assignments must be your own work.**

Midterm / Final Exams

- By default, "monitored" online exam.
  - You MUST
    - Share 2 screens to prevent cheating
      - Display screen: Share the screen you're taking the exam
      - Phone camera: A side view of you, your hands, and the display
    - Find a place to be alone
  - You cannot leave your seat until the exam is over.
  - Details may change later.

- We hope that the covid-19 pandemic situation improves so we can take the offline test.

Grading

Midterm exam	30%
Final exam	30%
Lab assignments	15%
Class assignments	15%
Attendance	5%
Class attitude	5%

- You will get "F" for more than 5 absences in lectures or 5 absences in the labs.

- Absences from the midterm or final exam -> F

Grading Policy

- Basic principle: Separating the grades where there is a big gap between points.

- Guideline:

A	25%~30%
B	30%~35%
C	40%

About Laptop

- Lecture
  - The lecture slides contains many Python code.
  - During lectures, you can run and test the code on your laptop.

- ~~Lab~~
  - ~~The lab is held in a laptop-only training room.~~
  - ~~If you want to borrow a laptop, contact the TA by email until the lab in this week.~~
  - ~~But, I strongly recommend you to bring your laptop at lab sessions.~~

Questions – Slido.com

- After lecture, if you have questions, ask on the "Q&A Board" ("문의게시판") of the LMS course home.
  - TA will check and respond at least once a day.

- In lecture, we'll use an online, anonymous Q&A platform – slido.com to encourage questions.

Just Try Asking a Question!

- Go to https://www.slido.com/

- Join #**cg-ys**

- **Do not bookmark a slido event page** because new events will be created every week!

- Ask any questions ~~in English~~!

Questions – Slido.com

- In slido.com, you can
  - **Ask** your own questions anonymously
  - **Upvote** other questions

- We'll use the slido Q&A **only during lecture time.**
  - Not after lecture time
  - Not in the lab sessions
  - No written answers

- Please ask questions **anonymously**.
  - Just leave your name blank when post a question.

Quiz & Attendance – Slido.com

- 3 quiz problems per each lecture (using slido.com polls).

- Very simple questions – you have to submit in two minutes.

- **I'll check attendance using quiz submission.**

Quiz & Attendance – Slido.com

- You **MUST** submit your answer in the following format:
  - **Student ID: Your answer**
  - **e.g. 2017123456: 4)**

- Attendance checking:

Attendance	Number of submissions in the format - **3 times &&** You are **in the classroom (session)**
Late	Number of submissions in the format – **1~2 times &&** You are **in the classroom (session)**
Absence	Number of submissions in the format – **0 times** || You are **NOT in the classroom (session)**

  - **3 lates are regarded as 1 absence.**

Quiz & Attendance – Slido.com

- If submitting a quiz answer without attending the class (session) is detected,

- I think he or she has been also absent from the previous lecture.

- → Check as "Absence" for these two lectures

Just Try a Quiz!

- Go to https://www.slido.com/
- Join **#cg-ys**
- Click "Polls"

- Submit your answer in the following format:
  - **Student ID: Your answer**
  - **e.g. 2017123456: 4)**

- Note that you must submit all quiz answers **in this format** to be checked for "attendance".

My Recommendation for This Class

- DO NOT recommend to those who...
  - want to easily earn good credits.
  - ~~expect lectures in fluent English.~~

- Recommend to those who...
  - wonder how movies/games render scenes.
  - are interested in the movement of objects/characters.
  - like to visualize something by coding.
  - have passion for computer graphics!

Lastly...

- If you agree on all these policies, see you next time!

- If not, please consider taking other classes instead.

Next Time

- Lab in this week:
  - No lab in this week

- Next lecture:
  - 2 - Introduction to NumPy / OpenGL

- Preparations:
  - Install Python 3 and Numpy before the next lecture

- Acknowledgement: Some materials come from the lecture slides of
  - Prof. Taesoo Kwon, Hanyang Univ., http://calab.hanyang.ac.kr/cgi-bin/cg.cgi
  - Prof. Steve Marschner, Cornell Univ., http://www.cs.cornell.edu/courses/cs4620/2014fa/index.shtml