Computer Animation & Physical Simulation (CS275)

Spring, 2024
Time: Tue/Thu 15:00-16:40
Location: SIST 2-515

Introduction

Computer animation has been in wide-spread use nowadays, from special effects in movies and games, to industrial product design, education, as well as research. This course focuses on introducing a broad range of computer animation techniques, their original ideas, formulations, as well as some of the implementations, which can be considered as an extension course for computer graphics with a central focus on generating animated contents. Although non-physically-based computer animations will be introduced, the course will put more emphasis on physically-based simulation techniques for computer animations. This will basically include rigid body simulations, deformable body simulations and fluid simulations, as well as their constraints and coupling. Fundamental and more advanced techniques will be explained in the lectures, but the course will encourage students to present recent technical papers in order to better understand the literature and the vast number of methods by organizing several presentations.

Prerequisites:

Programming (C/C++), Data Structures and Algorithms, Numerical Methods, Some Physics, Basics on Computer Graphics

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Course Instructors

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Teaching Assistant

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Piazza link: https://piazza.com/shanghaitech.edu.cn/spring2024/cs275

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Course Materials

Physically-based rendering (third edition)

Assignments

Assignment1: Skeleton-based animation
Assignment2: Cloth Simulation with the Mass Spring System
Assignment3: Unconditionally stable fluids

Final Project

Grading

Programming assignments (x 3 = 45%): The students will complete four programming assignments. Each assignment will take scores based on their difficulties (specified in detail in their corresponding assignment documents).
Presentations (6% x 4 = 24%): There will be four presentations for the students to introduce the technical papers in the literature.
Final project (31%): The final project will be group-based (if there are sufficient number of students enrolled in this course, otherwise just individual-based), which will include an accomplishment of a larger project (20%) as well as a formal presentation with Q&A (6%) together with a technical report (5%).

Late hand-in policy: Each student is allotted a total of five late-day points for the *whole semester*, which work as follows:
- A student can extend a programming assignment deadline by one day using one point.
- If a student does not have remaining late-day points, late hand-ins will deduce 10% of the total score per day.
- No assignments will be accepted more than five days after the deadline. This is true whether or not the student has late-day points remaining.
- We will strictly follow the rule above for late-hand-in policy unless you have a **VERY STRONG** reason, which should be explained to the course instructor and TAs.

Collaboration Policy

Students in this course are absolutely encouraged to talk to each other, to the TAs, to the instructor, or to anyone else about course assignments. Any assistance, though, must be limited to the discussion of the problems and sketching general approaches to a solution. Each student

should write their own code and technical report **independently**. Consulting another student's solution is prohibited and submitted solutions may not be copied from any source. These and any other form of collaboration on assignments constitute cheating. If you have any question about whether some activity would constitute cheating, just be cautious and ask the instructor before proceeding!
