

CT5201: Computer Graphics and its Applications

# Introduction

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Lecturer: Bochang Moon

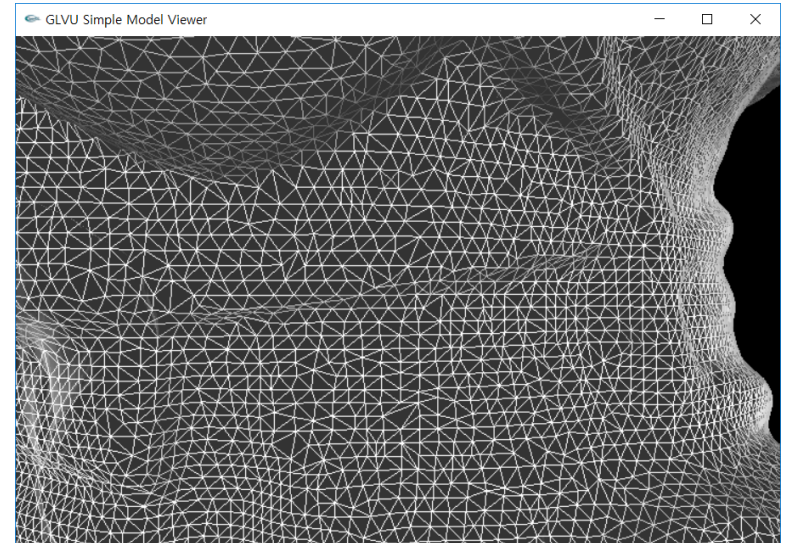
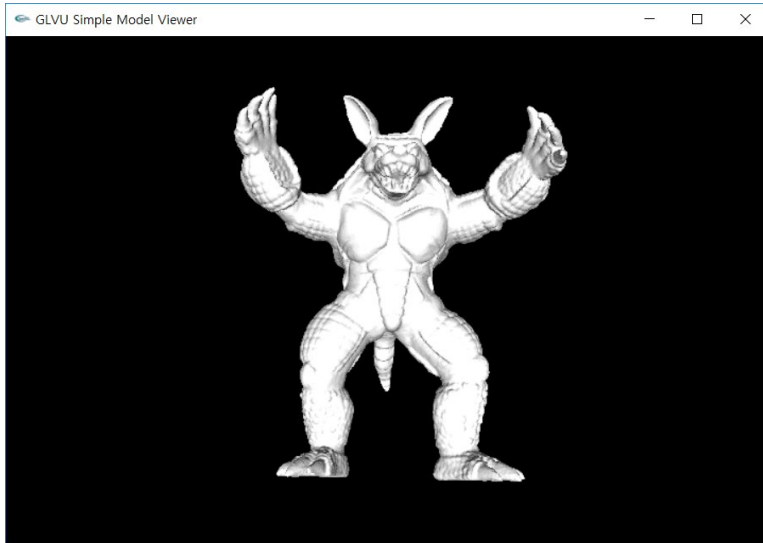
# Information

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- Instructor: Bochang Moon
- Email: [bmoon@gist.ac.kr](mailto:bmoon@gist.ac.kr)
- Office: 106 Dasan Building
  
- Office hours
  - 16:00 – 18:00pm on Mon. or by appointment (via email)
  
- Class time
  - 14:30 – 16:00pm on Mon. and Wed.

# Graphics Areas

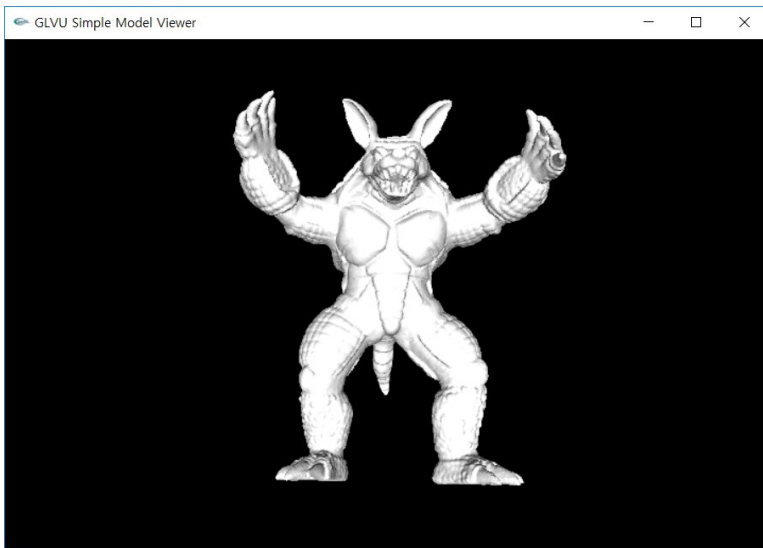
- Modeling
  - A technique to deal with mathematical specification of shape and appearance that can be stored in computers



e.g., triangle mesh

# Graphics Areas

- Rendering
  - A algorithm to generate digital images from 3D models



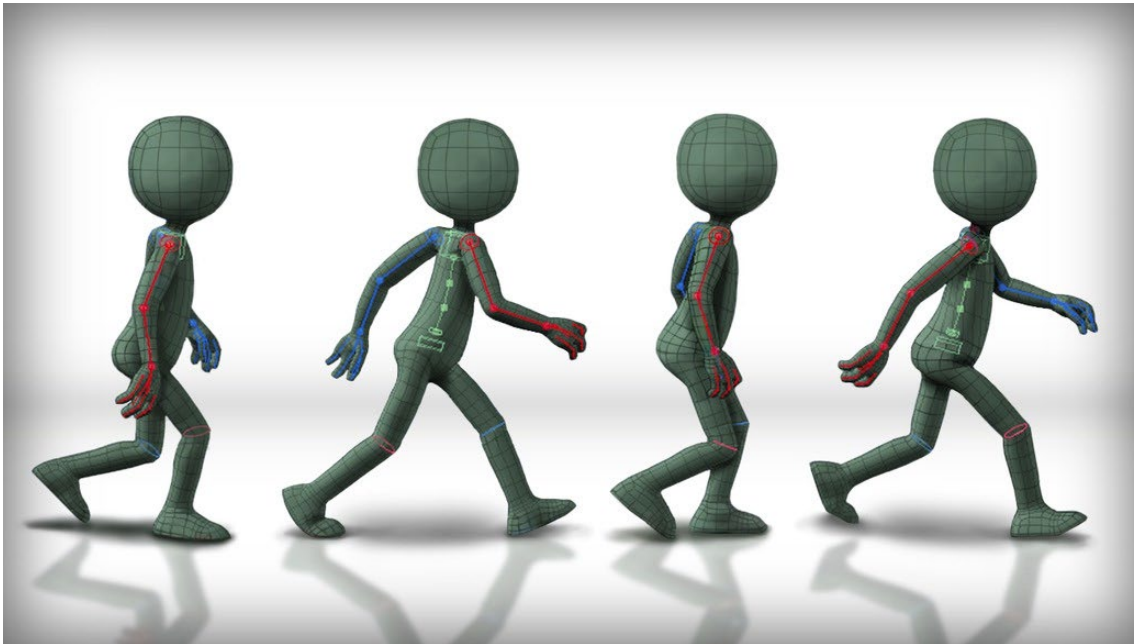
3D model



Rendered image

# Graphics Areas

- Animation
  - Address how to create motion of virtual models over time



Images from <http://www.digitaltutors.com>

# Graphics Areas

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- Core areas
  - Modeling
  - Rendering
  - Animation
- Other areas
  - User Interface
  - Virtual Reality
  - Visualization
  - Image Processing
  - 3D scanning
  - Computational photography
  - etc.

# Application of Computer Graphics

- 3D Animation



# Application of Computer Graphics

- Visual Effects in Movies

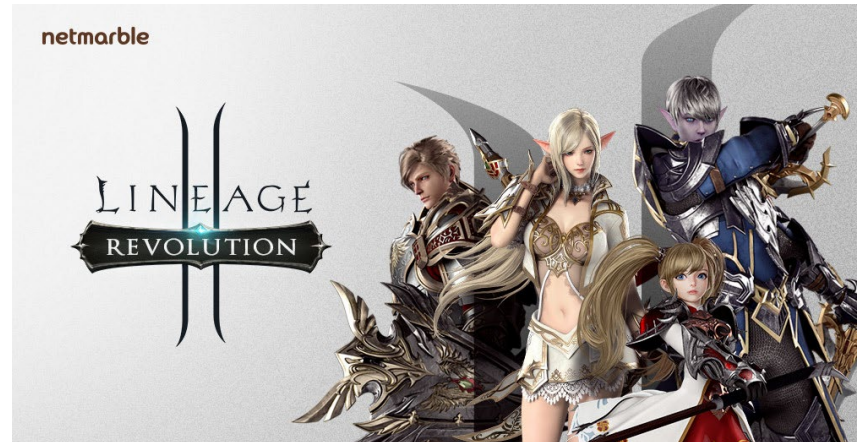


from <http://wonderfulengineering.com>



# Application of Computer Graphics

- Games



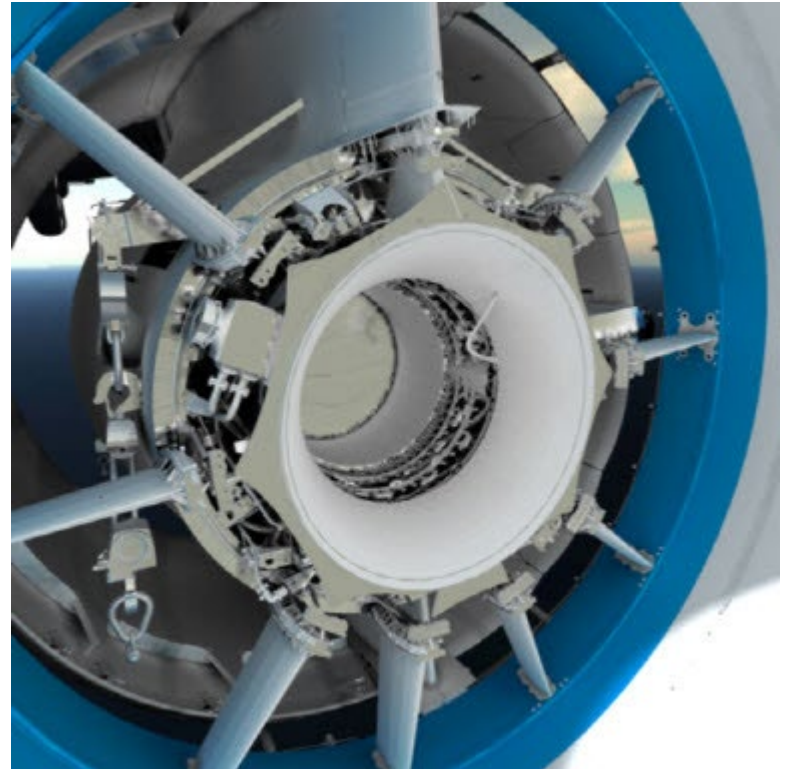
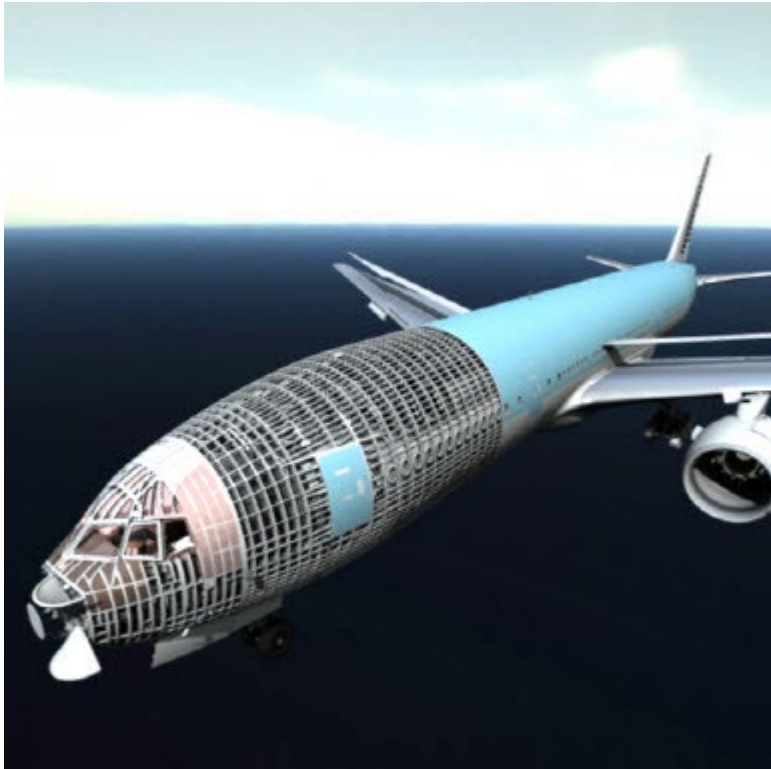
# Application of Computer Graphics

- Augmented and virtual reality



# Application of Computer Graphics

- Visualization



# Course Overview

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- Target Applications
  - 1. Physically-based AR rendering
    - Warning! Image composition via empirical models will not be covered here
  - 2. Physically-based inverse rendering (differentiable rendering)
    - Warning! We will not cover empirical model-based inverse rendering (rasterization / Neural Radiance Fields (NeRF))
- Student paper presentation for graphics applications
- Student project

# Course Overview

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- A Quick Overview of Photorealistic Rendering
- Rendering Application (AR & Differentiable Rendering)
- Paper Presentation I, II
- Project Proposal Talk & Final Presentation
- You should:
  - 1) Pick either AR rendering or differentiable rendering for your project
  - 2) Present two recent papers related to your topic
  - 3) Do a proposal talk and a final talk
  - 4) Write a technical report

# Prerequisite

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- Should take an undergraduate computer graphics course (or have an equivalent background), e.g., CT4201/EC4215 Computer Graphics
- Checklist
  - 1) You know the technical details in a graphics pipeline
  - 2) You are familiar with ray tracing
  - 3) You have programming experience with open-source ray tracing (e.g., PBRT or Mitsuba)
  - If you have “NO” for any of the lists above, please take other courses

# References

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- Papers
  - (Graphics) SIGGRAPH, SIGGRAPH Asia (<http://kesen.realtimerendering.com/>)
  - (Visualization) IEEE Transactions on Visualization and Computer Graphics
  - (AR & VR) International Symposium on Mixed and Augmented Reality (ISMAR)
  - (AR & VR) IEEE VR
  - (Vision) CVPR, ICCV, ECCV

# Grading

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- Paper presentation (Q&A discussion): 40%
- Project presentation: 20%
- Final exam (or final report): 30%
- Attendance: 10%
  - No absences: 10, One absences: 9, Two absences: 7, Three absences: 4
  - Four or more absences: 0
  - Late two times: one absence
    - I will call your name at the beginning of the class