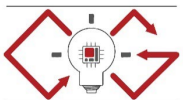


Lecture slides (AI3501/CT4201/EC4215 – Computer Graphics)

# Intro.

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Lecturer: Bochang Moon



Computer Graphics  
Laboratory

# About Me

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- Associate professor at GIST (Sep. 2016 – current)
- Post-Doctoral researcher at Disney Research (Nov. 2014 – July 2016)
- Ph.D. from KAIST (Feb. 2008 – Aug. 2014)
  
- Main research topics:
  - Computer graphics
  - Photorealistic rendering

# About TA

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- Hyunjin Jung (정현진)
- TA email: [hjjung0810@gm.gist.ac.kr](mailto:hjjung0810@gm.gist.ac.kr)



# Information

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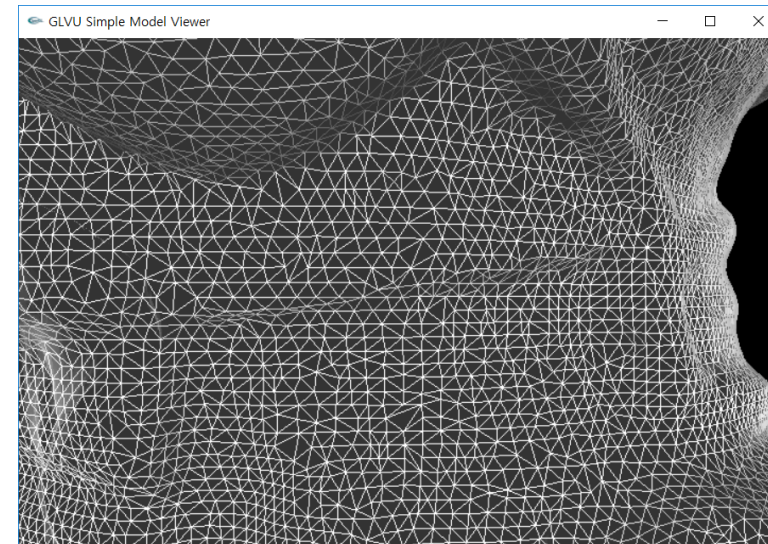
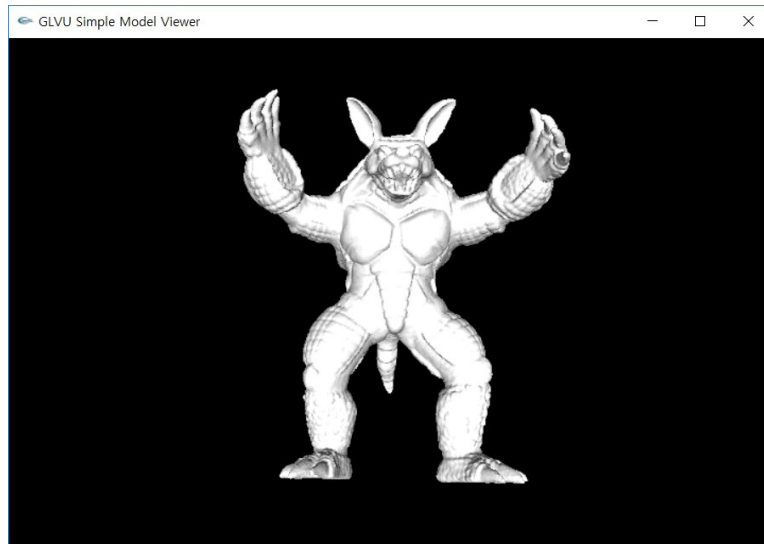
- Instructor: Bochang Moon
- Email: [bmoon@gist.ac.kr](mailto:bmoon@gist.ac.kr)
- Office: 106 Dasan Building
- Class time
  - 13:00 – 14:30pm on Mon. and Wed.
- Course webpage
  - <https://cglab.gist.ac.kr/courses/spring2025CG/>

# Graphics Areas

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- Modeling

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

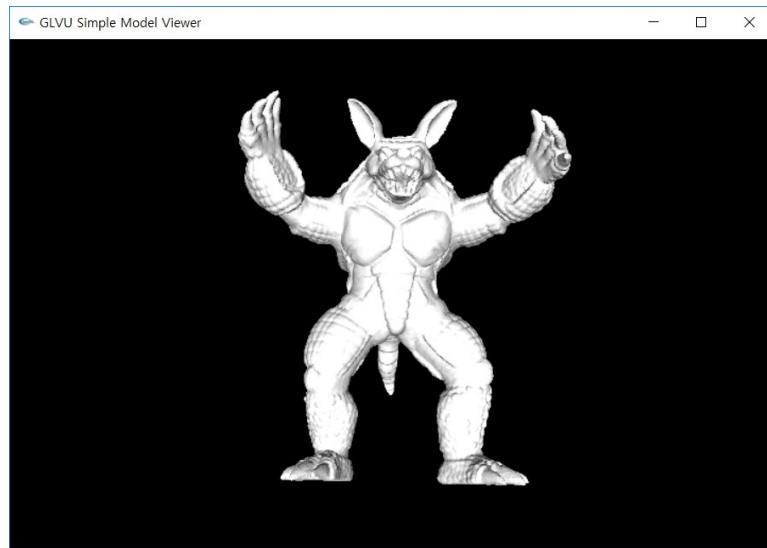


e.g., triangle mesh

# Graphics Areas

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



3D model



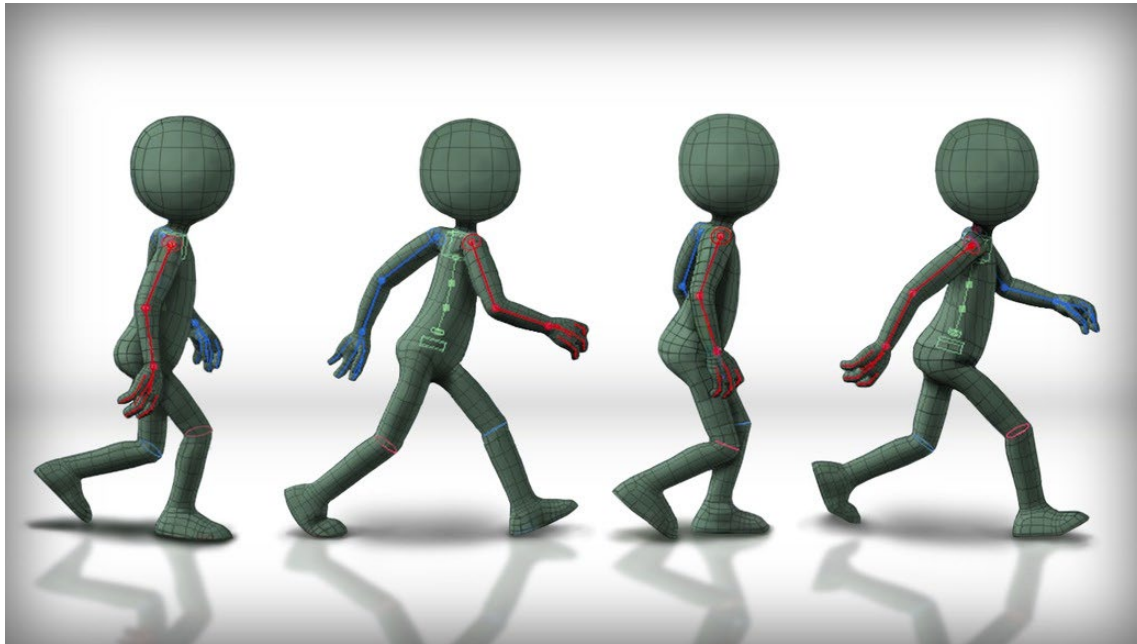
Rendered image

# Graphics Areas

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- 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

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- 3D Animation



# Application of Computer Graphics

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- Visual Effects in Movies



from <http://wonderfulengineering.com>

# Application of Computer Graphics

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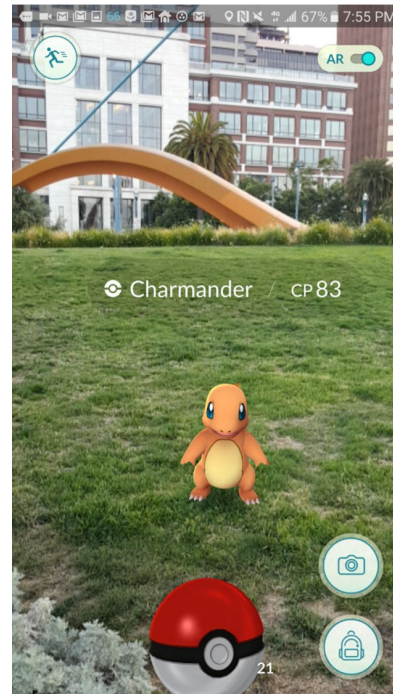
- Games



# Application of Computer Graphics

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- Augmented and virtual reality



# Application of Computer Graphics

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- Visualization



# Some Recent Images



from pbrt.org

# Some Recent Images

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from pbrt.org

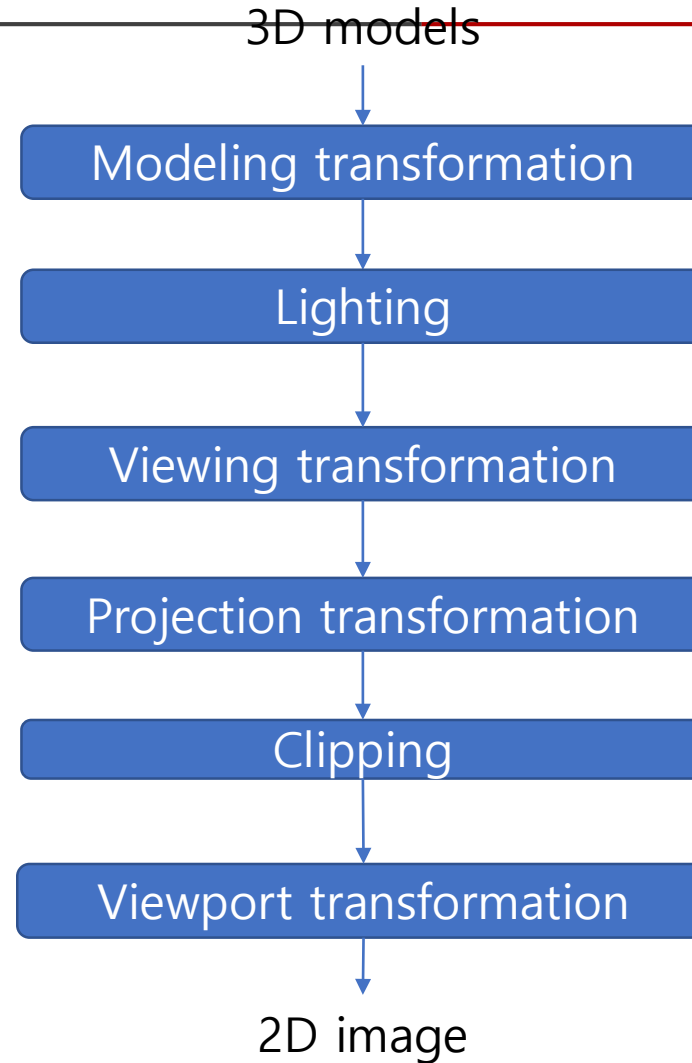
# Course Overview

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- Provide fundamental concepts of compute graphics such as graphics
  - Graphics pipeline & rasterization
  - Transformation
  - Local illumination and shading
  - Texture mapping
  - Ray casting
  - Ray tracing
  - Global illumination
  
- Learn how to generate digital images from virtual objects, lights, etc.

# Graphics Pipeline and Rasterization

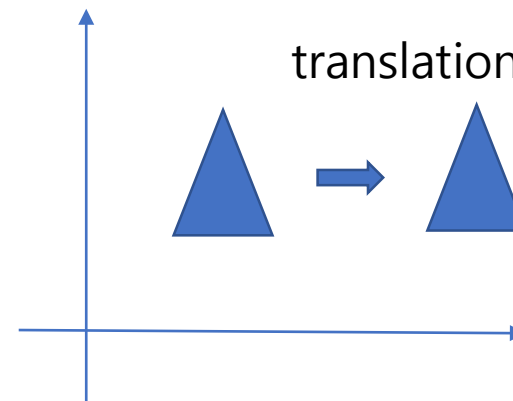
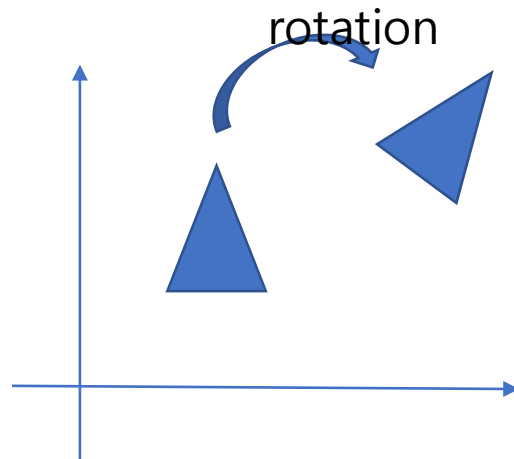
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# Transformations

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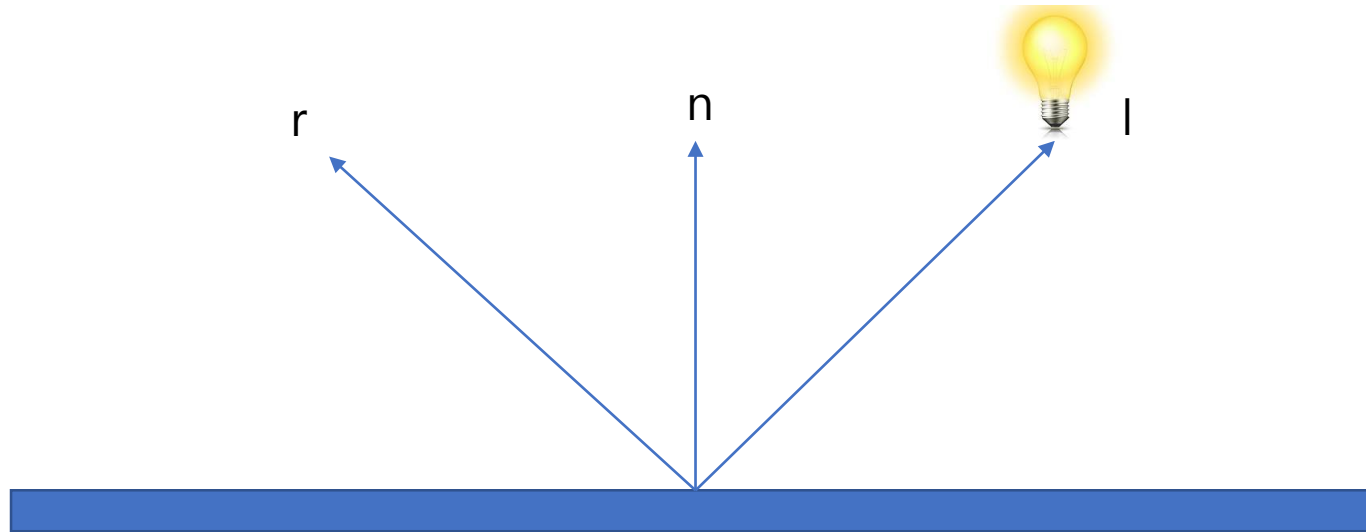
- Affine transformations
- Viewing transformation
- ...



# Local Illumination and Shading

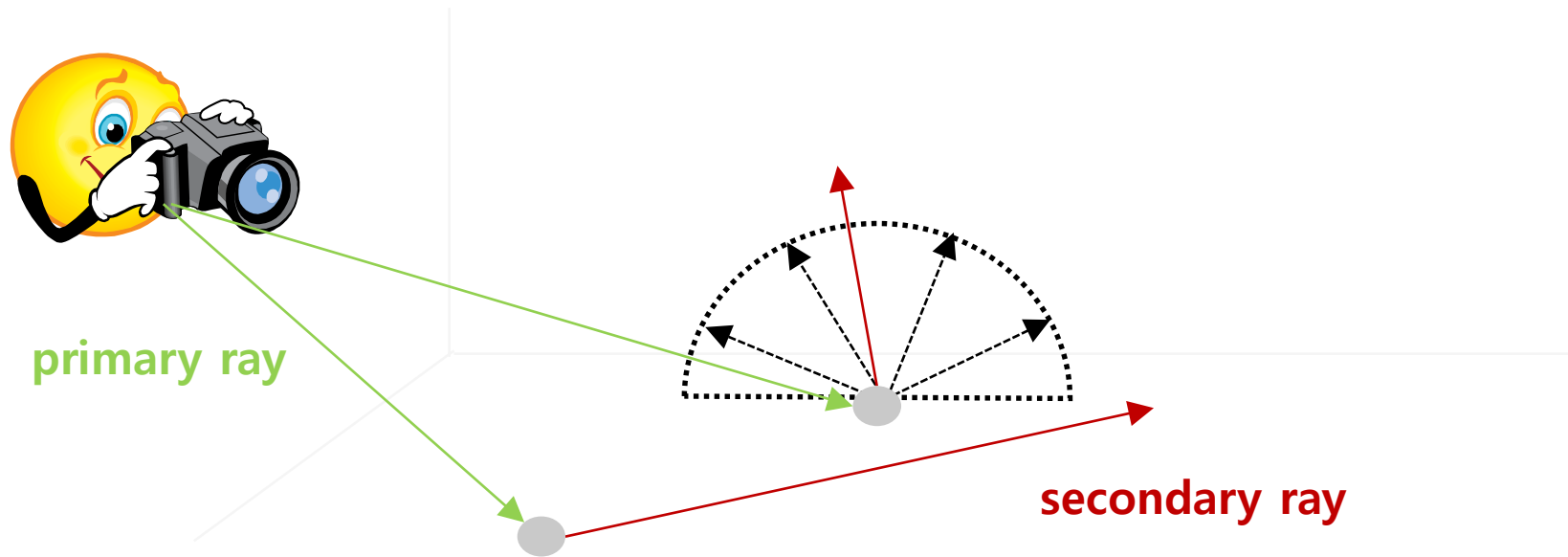
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- Shading
  - Flat
  - Gouraud
  - Phong
- Shadow



# Ray Casting and Tracing

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# Global Illumination

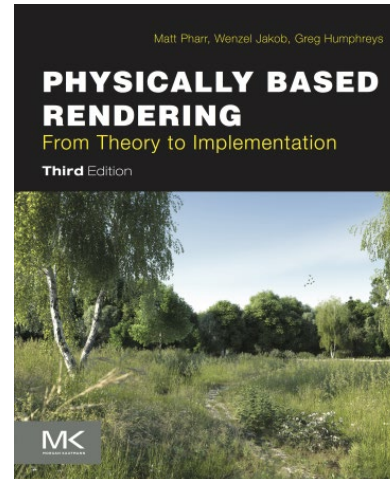
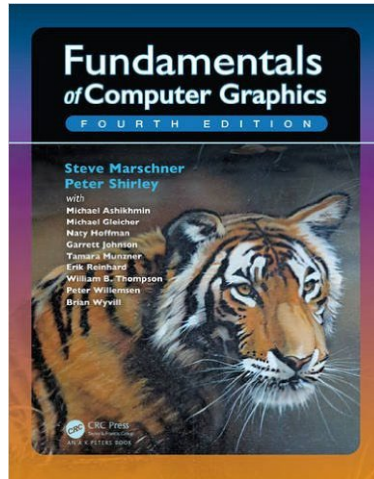
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- Simulate realistic lighting
  - Reflections
  - Refractions
  - Shadows
  - Diffuse inter-reflections
  - Caustics
  
- Global illumination methods
  - Path tracing
  - Photon mapping

# Textbook and References

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- Book



- Papers

- <http://kesen.realtimerendering.com/>
- SIGGRAPH, SIGGRAPH Asia, etc.

# Grading

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- No midterm exam
- Final term exam: 50%
- Programming assignment: 40%
  - Four assignments will be given.
- Attendance: 10%
  - No absences: 10, One absences: 9, Two absences: 7, Three absences: 4
  - Four or more absences: 0

# Prerequisites for This Course

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- We assume you are a 3<sup>rd</sup> or 4<sup>th</sup>-year student in a CS-related major
  - Or, you should have equivalent backgrounds
- In particular, you should have enough C/C++ programming skills and backgrounds in linear algebra and data structures
  - Check the previous PAs at <https://cglab.gist.ac.kr/courses/spring2024CG/>
- Please don't take this course if:
  - You are unfamiliar with C/C++ programming.
  - You don't know what basic programming concepts (vectors, matrices, stack, and queue) are.