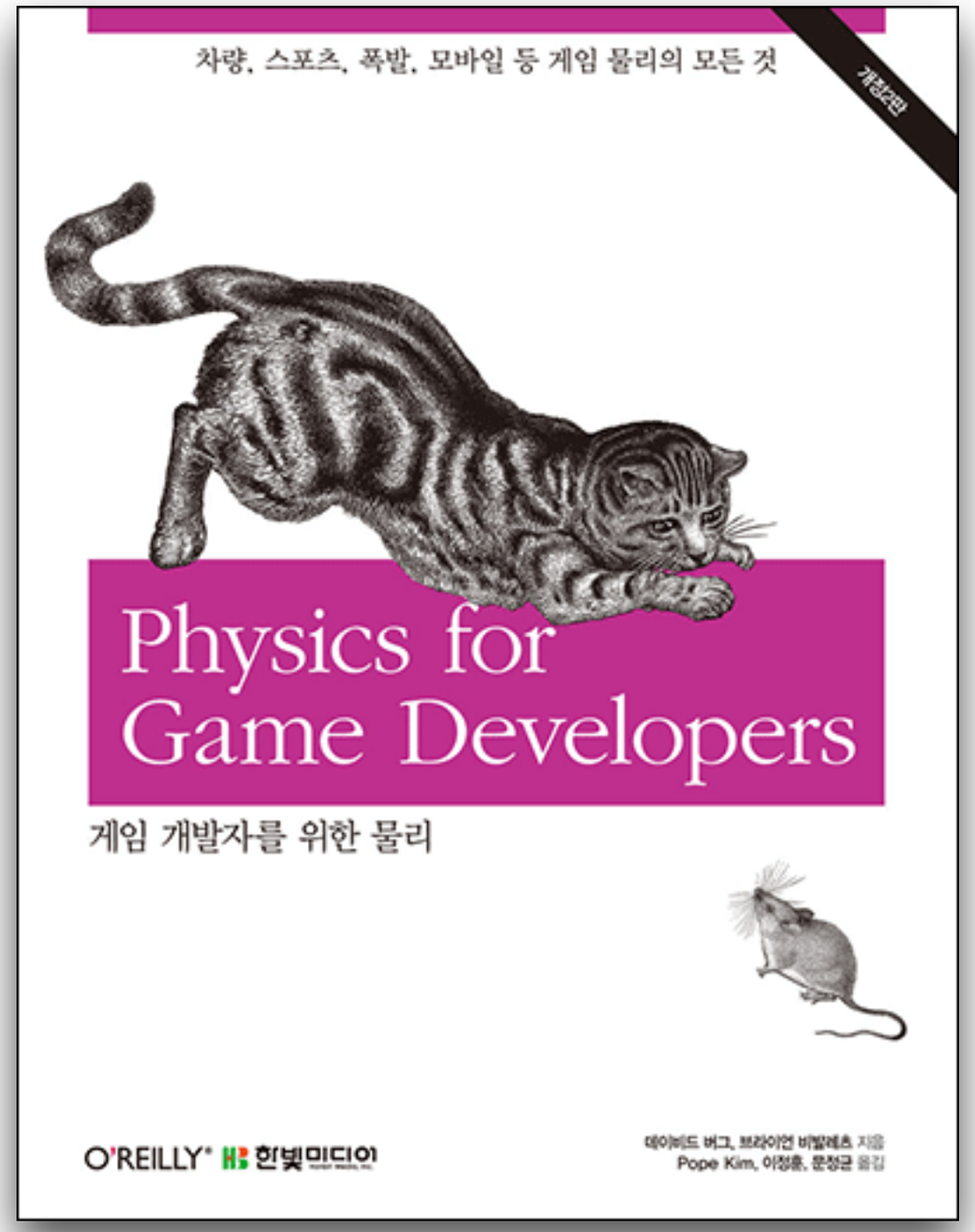
Physics for Game Developers

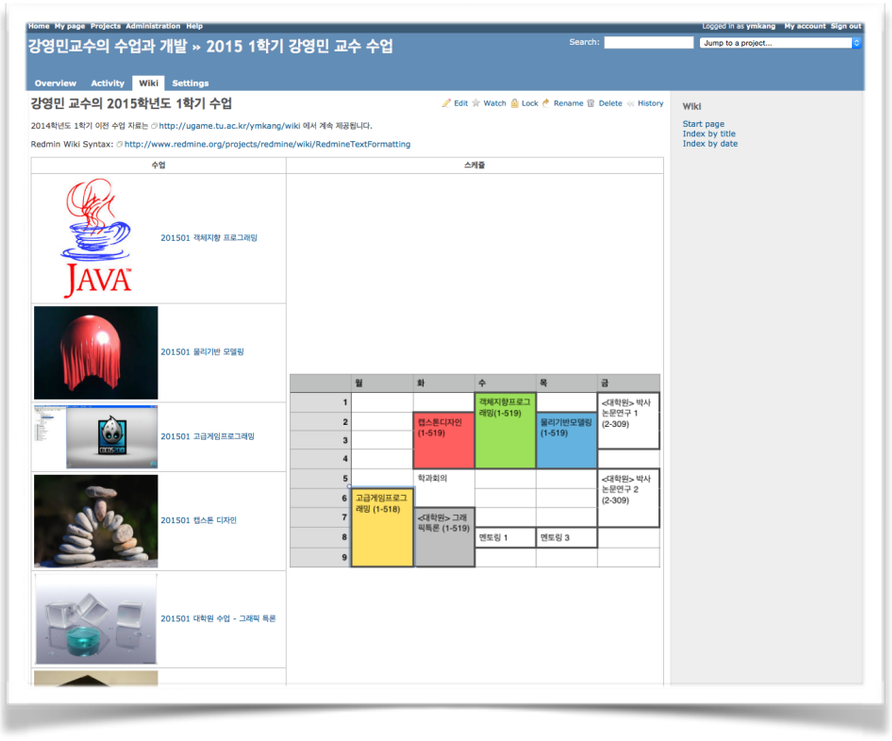
Young-Min Kang
Tongmyong University

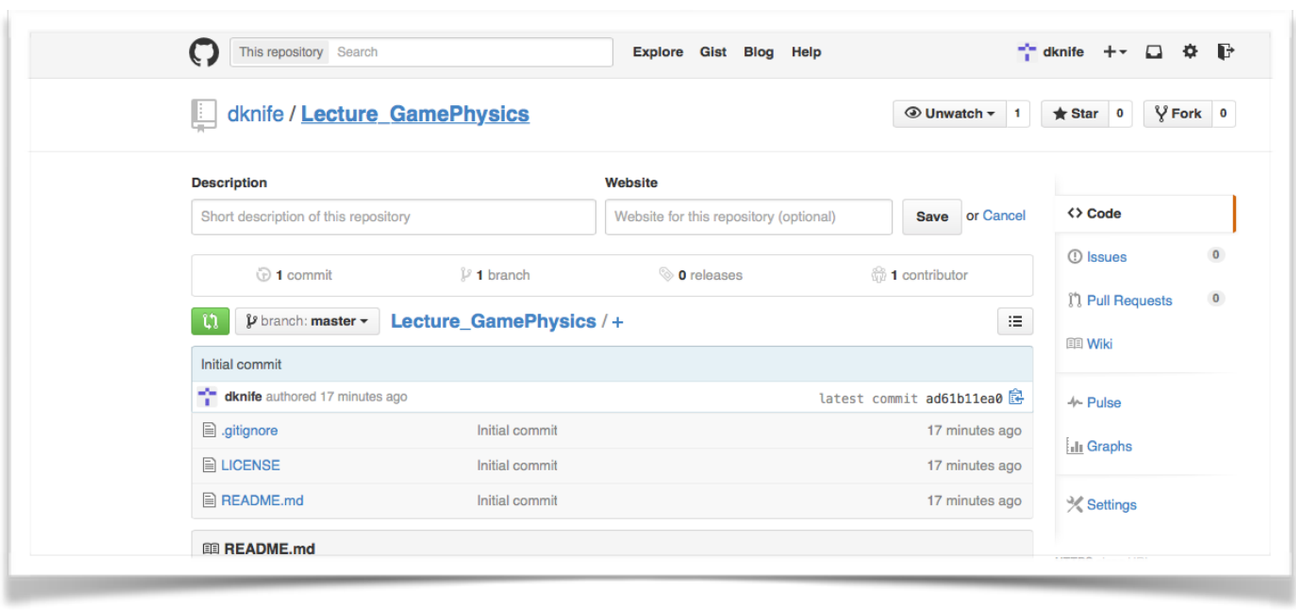
Required Text



Lecture Info

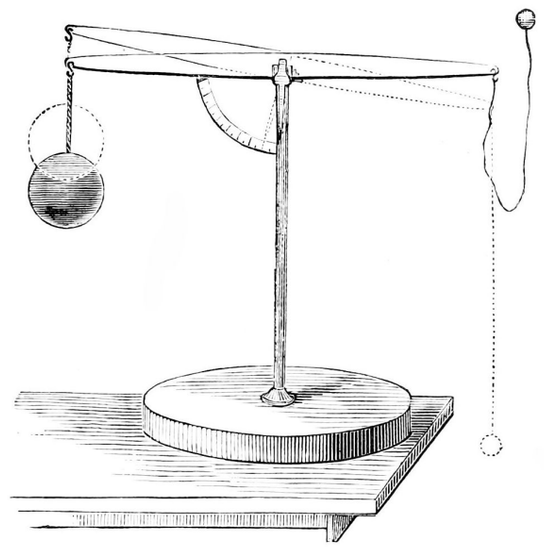
- Lecturer: Young-Min Kang (강영민) - Dept. of Game Engineering, Tongmyong University
  - Office: Room 309, Building 16
  - Contact: 051-629-1253 / ymkang@tu.ac.kr
- Lecture Materials are available at
  - Lecture homepage: http://210.110.195.15
  - GitHub: https://github.com/dknife/Lecture_GamePhysics



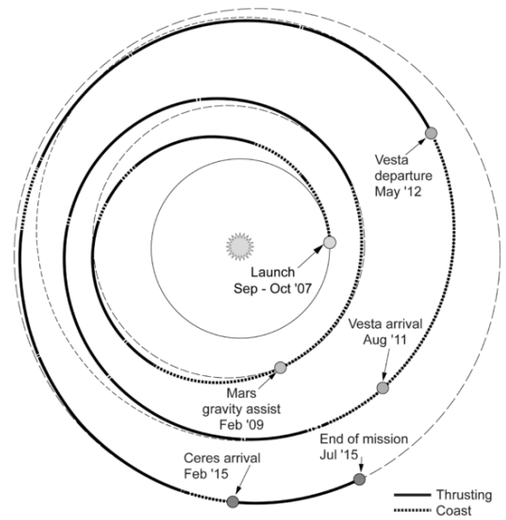


Why is Physics needed?

- Game
  - based on Computer Graphics
    - Modelling, Animation, and Rendering

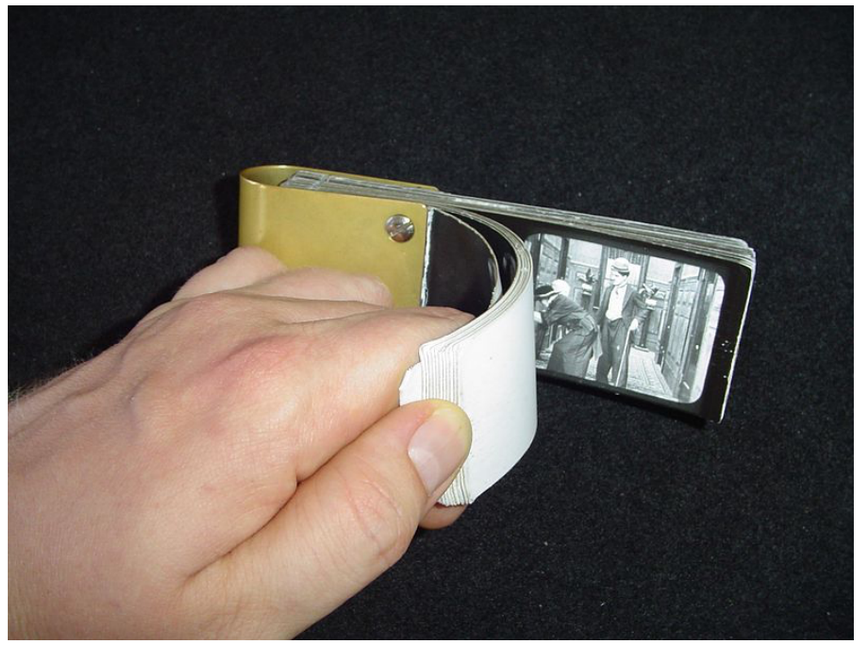


- Plausible (realistic) Animation
  - requires “physically correct” motion



Animation

- Animation
  - consecutive images
  - illusion of motion
  - change over time



- What can be changed
  - position, scale, colour, and any other *visual* properties
  - quantities of changing properties
    - functions of “time”

Computer animation

- Computer-aided animation
  - what will actually computer help?
    - computing…
      - the motion based on dynamics: simulation
      - the motion based on kinematics
      - interpolated values between keys: keyframe animation

Physics basics

- Newton
  - a super hero in physics
    - "*Philosophiae Naturalis Principia Mathematica*"
  - Newton's laws
    - 1: Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it
    - 2: The relationship between an object's mass m, its acceleration $\mathbf{a}$, and the applied force $\mathbf{F}$ is $\mathbf{F}=m\mathbf{a}$.
    - 3: for every action there is an equal and opposite reaction.

units

- International System of Units (SI)
  - Why called SI?
  - mass: kg
  - length: m
  - time : s
  - velocity: m/s
  - accleration: m/s^2
  - force: $kg\ m/s^2 = N$