The George Washington University
Department of Computer Science

CS6555 Computer Animation, Fall 2019

Assignment 3 Due: November 14, 2019
Physics-Based Motion Control System

Description: Implement a system to generate the motions of rigid bodies using physical principles. Include the effect of gravity and collision between objects. You may make some simple approximations for rotational dynamics. For collisions, reflect the velocity. Collision detection becomes easy if you consider a bounding sphere of the objects in the scene.

Input: a) Geometric data for a number of objects
b) Physical properties of the objects (e.g. mass, moment of inertia, friction, coefficient of restitution)
c) Initial conditions

Output: Animated view of a bunch of objects colliding with each other and the floor.

Upload (Blackboard):
a) A description of your system (short documentation) that will make it easier to understand your code.
b) The source code.

Upload (Blackboard forum): Movie of your animation

Format of the source code: It is important that the grader understand your code. Put enough comments to make it clear what you are doing.

Extensions: For those of you who have had advanced graphics or for those who feel less than challenged by the project, you might want to consider extending the lab. Some suggestions:

- Consider the rotational motion more rigorously.
- Solve a more accurate collision model.
- Have kinematically controlled objects interact with dynamic models (e.g. walking figure from the previous lab kicking a soccer ball.)
- Implement a real-time system (e.g. the user interacts w/ physical objects in real time).
- Solve a different dynamics problem:
    - Articulated figures
    - Deformable object (e.g. cloth) represented as point masses connected to each other by a network of springs.