Midterm Project: Spaceship Game

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GPR-350 Game Physics
Instructor: Daniel S. Buckstein
Midterm Project: Spaceship Game

Summary:
In the first half of the course we have learned a number of fundamental topics in game physics: integration, forces and torques, collision detection and basic collision response. The midterm project ties it all together in a simple 2D game in which the player controls a spaceship. Your game may be improved, more physically accurate version of classics such as Asteroids or Lunar Lander, as long as it meets the requirements below.

Submission:
Submit a link to your online repository with the completed assignment's branch name and commit ID/index. If you have not created an online repository to keep track of your work, you should do so as part of this assignment; it will be checked. ***Work in pairs***.

Main requirements:

Part 1: Spaceship

The spaceship will be your player-controlled entity. It must have at least four independently-controlled thrusters: rear (controls forward motion), front (controls reverse motion), rear-left (controls CCW yaw), rear-right (controls CW yaw). The spaceship should update using kinematic integration for position and rotation, explicit Euler/first-order integration for velocities, and Newton-2 for accelerations. Constrain the rotation to the range [-pi, +pi].

Part 2: Collision Detection

With the spaceship implemented, your game has interactivity but could still use some sort of imminent threat. In Asteroids, the threat is a bunch of large rocks hurling through space; in Lunar Lander it is the world itself. Implement some sort of obstacle/hazard for the player to avoid and the appropriate algorithms to detect when the ship collides with hazards. Use

the most appropriate types of hulls to accurately describe the problem. Test collision detection by clearly indicating when a collision occurs between the ship and a hazard/obstacle.

Part 3: Collision Response

Improve upon the existing systems by adding simple physical collision response. E.g. instead of just destroying the ship if it collides with an asteroid, have it get knocked off its trajectory. Collision response can be used to drive other game mechanics.

Additional requirements:
Your game should be more than just a tech demo: it should be playable, have an explicitly-defined win/lose condition and be aesthetically pleasing (e.g. more than just boxes and spheres). Since we are set in space (a vacuum), there should be no environmental forces by default, so find creative ways to add to the experience.

Points 20

Submitting a text entry box

Due	For	Available from	Until
-	Everyone	-	-

+ **Rubric**