Simulated robot (Optional)

courseworks2.columbia.edu/courses/134953/assignments/709744

- Due Dec 21 by 11:59pm
- Points 100
- Submitting a file upload
- File Types pdf

The goal of this step is to simulate your robot in a physics simulator. We will be using PyBullet as the simulator of choice.

Build a model of your robot as a URDF and animate it using Python, as shown in class. Make your robot move forward using hand coded pattern and measure your top speed in meters per second.

Present screenshots of your modeled robot and videos of your moving gait.

Hand in:

A PowerPoint presentation of your animated robot. Include side-by-side images of simulated robot, CAD model, and physical robot (if available). Show frame sequence of animated robot, and include movie of fastest gait achieved. Calculate speed in m/sec. Include full copy of the URDF; use multiple slides, one slide per link or joint, and include a picture of the robot highlighting the part or joint being modeled.

Append this assignment's slides to all previous slides from previous assignments. This assignment should be last, starting with a clear title slide. Save everything as a single PDF and upload the PDF. Any movies should be shown as a representative video frame plus a link to a video online.

PowerPoint Format

1. Page 1: Title slide: Robotics Studio MECE 4611, Semester, "Robot Simulation", Full name(s), UNI(s), Date/Time Submitted, Grace hours (before submission, used/gained, after submission), Title of robot, Rendering of simulated robot
2. Page 2-X: Simulation information as described above

Grading

Grading of this part is incremental. You get points for various aspects and the more you do the more you get. Maximum 100 points. Following are tentative rubrics you can receive points for:

1. 8 points Title page correct and complete

2. 8 points Slides nicely formatted (e.g. consistent fonts/sizes, aligned images/text)
3. 8 points posting some video of the simulated robot on Discussion Boarda (show screenshot, provide link)
4. 8 points screenshots of simulated robot
5. 8 points robot moving (frames + link to video)
6. 8 points Position of robot centroid determined and speed calculated
7. 8 points plotted motor angles/speed/torque as function of time.
8. 8 points mass/inertia properties included in URDF
9. 8 points contact/collision included in URDF
10. 8 points joint limits included in URDF
11. 8 points sinusoidal gait used
12. 8 points forward kinematics calculated
13. 8 points inverse kinematics used in motion planning
14. 8 points other locomotion patterns tried
15. 8 points other goals tried (e.g. jumping)
16. 8 points other environments tried (e.g. obstacles, wind)
17. 8 points post video of your simulated robot on your online portfolio (include screenshot and link)