Assignment 8, EECS 397/600: DARPA Robotics Challenge
Static Balancing
due by 5pm, Tuesday, 4 November

Refer to the documents: "Introduction to static balancing and whole-body Jacobians" and " A simple low-pass filter example." Also, refer to the example code in packages …/examples/example_filter and …/examples/example_whole_body. See also the "README" files in these packages.

The example in "example_shift_cg_xdir.cpp" shows how to register with the LLJC, how to subscribe to and use published leg Jacobians, and how to subscribe to published filtered foot force/torque sensor values. Additionally, this example shows how to define a "twist" vector (6x1) to perform a correction to null out net ankle torques about the y axis (sagittal-plane leaning).

In this assignment, you should extend this example to more interesting moves. You may, for example, use a playfile to move only the arms and torso (leaving the leg joints unclaimed in your trajectory script), and run this together with a balancing program to moves the leg joints to re-center the robot's center of mass over the middle of the support polygon (the convex hull of the footprints).

Submit your code, a description of your theory of operation, and movies of your more dramatic moves. Explore limits of motion, e.g. with squatting, bending over, moving the arms in front, or any other dramatic moves. Show that your balancing code keeps Atlas upright, in contrast to what happens if you freeze the leg joints.