Robots in contact 2020

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Exercise 1:

The aim of the first exercise is to implement and test DMPs. Therefore:

- Download the AAU_LbD_lecture.zip folder and extract the folder.
- In the folder under DMP_lib/Test_CDMP.m open the file.
- The file acts as a blueprint in which some of the equation and definitions are missing.
- Add the equations and definitions and replicate the recorded trajectory with the DMP in position (DMP), Orientation (QDMP) and Joint (JDMP) space.
- Try to change the time and goal constants and comment the results.

Exercise 2:

The aim of the second exercise is to encode the demonstrated motion (test_trj.mat) with DMPs and execute them in simulation.

- Start with MoveDMP_Mujoco.m file and add your code,
- in the folder program run mjhaptix.exe to start the simulator,
- open the model LWR_table, which you can find in the folder Haptix_models.
- run the simulation and Matlab code.

Exercise 3:

In exercise 3, you are asked to couple the dynamic simulation with DMPs to execute a simple Pick and Place action with the simulated robot. To start:

- Open the file Test_move_grasp.m and run the simulation and script. The robot should start to execute the pick and place task.
- Modify the script in such a way that that you replace the point to point interpolation functions (Jmove and Cmove) with a function for linear DMPs and plan the paths between the given points.

Exercise 4:

In exercise 4, you are asked to make a Matlab function for detecting contacts based on simulated forces.

- Start with placing the simulated robot into q1 configuration from the previous task.

- Write a function which takes as an input (movement for an amount in a specific axis (vector [1x3])- Orientations are constant, desired force (vector [1x3]), time (constant in [s]), tcp (vector [1x3])). Start with CCmoveForM.mat function.
- Add the necessary conditions in the function, so that the simulated forces will be monitored during the execution of the movement and stop the movement when the Fm = Fd.
- Retract the robot.