Interim Report

Group: Dynamic Analysis/Optimization of SCARA Pick and Place Operation (will be changed)

Contributors: Karter Krueger (kkrueger2@wpi.edu), Krutarth Ambarish Trivedi (ktrivedi@wpi.edu), Kyle Mitchell (kgmitchell@wpi.edu), Malte Ricklefs (mricklefs@wpi.edu) and Sumeet Dinesh Shanbhag (sshanbhag1@wpi.edu)

Objective: Two 6 DoF robots should pick up a wall-like object together and place it to a desired location. There for, the center of mass of the object should follow a desired trajectory. Both robots must behave regarding the trajectory. That means, that the distance between both end effectors must be constant.

Present Status:

A simulation environment with PyBullet is set up. Two 6 DoF robots are spawned. All next steps are chosen. Ideas exist to complicate the project.

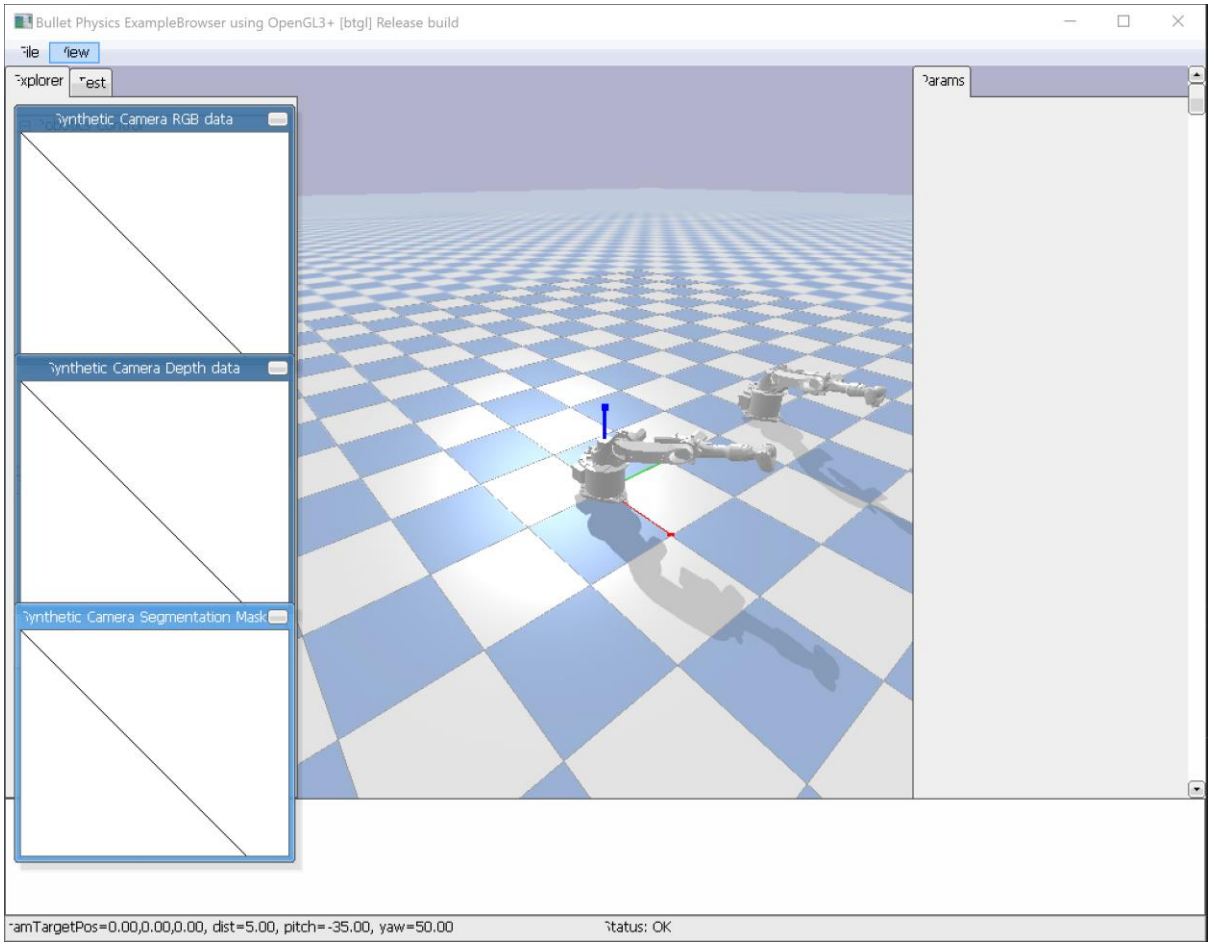

Figure 1 PyBullet simulation environment of two 6DoF robots

Next steps:

1. convert matlab functions to python
    a) fkine, adjoint etc.
    b) create URDF model of block/wall
2. Choose robot model (maybe just stick to the one right now)
    a) once block is grabbed, treat robot and block as one body
3. implement IK, once we learned about it in class (with singularity problem)
4. trajectory planning
    a) center of mass of the wall
    b) both robots
    c) maybe treat it as a 11 DoF problem (one DoF is lost due to both robots grabbing the object)
    d) maybe treat is a 2-legged robot, where the wall is the robot body: Virtual leg control/model
    e) move one robot, that the robots are not mirroring each other

Ideas to complicate a working environment:

5. The robots use force, instead of a vacuum gripper, for lifting the object.
6. Use two different types of robots.
7. The grabbed object is not solid.