INTRODUCTION TO ROBOTICS
(MTS -417)
DE-44 Mechatronics
Syndicate– C

Lab Report 3

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Task 1: Velocity Control

Lua Script:

```
function sysCall_init()
    sim = require('sim')
    prismaticJoint = sim.getObjectHandle('Prismatic_joint')
    targetVelocity = 0.1
    -- do some initialization here
end

function sysCall_actuation()
    sim.setJointTargetVelocity(prismaticJoint, targetVelocity)
end

function sysCall_sensing()
    -- put your sensing code here
end

function sysCall_cleanup()
    -- do some clean-up here
end

-- See the user manual or the available code snippets for additional callback functions and
details
```

Simulation Snippet:

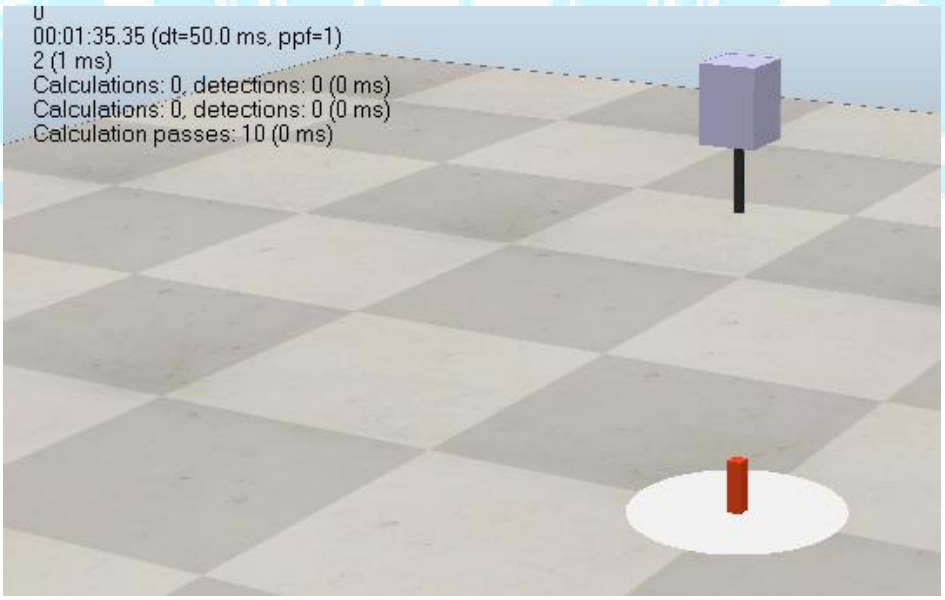

Figure 1

Task 2: Position Control

Lua Script:

```
function sysCall_init()
    sim = require('sim')
    prismaticJoint = sim.getObjectHandle('Prismatic_joint')
    targetPosition = 0.2
    -- do some initialization here
end

function sysCall_actuation()
    sim.setJointTargetPosition(prismaticJoint, targetPosition)
end

function sysCall_sensing()
    -- put your sensing code here
end

function sysCall_cleanup()
    -- do some clean-up here
end

-- See the user manual or the available code snippets for additional callback functions and
details
```

Simulation Snippet:

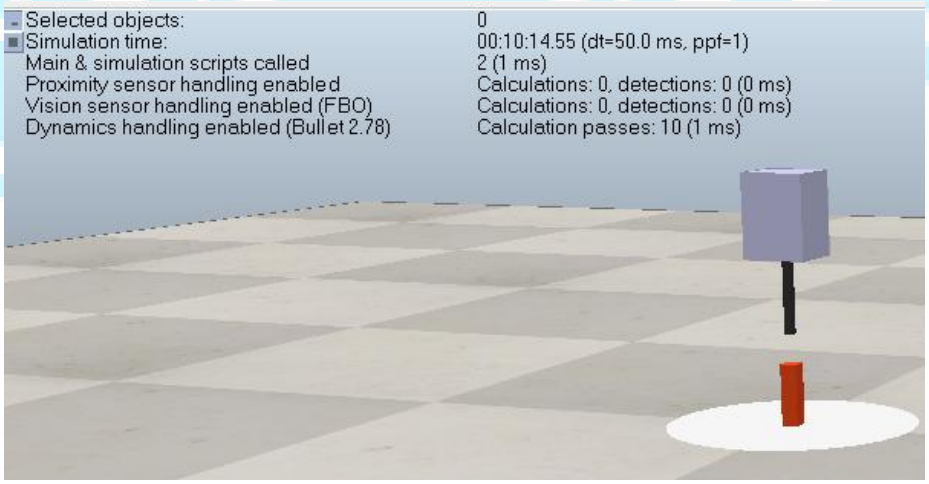

Figure 2

Results:

- The prismatic joint moved linearly along its defined axis under both velocity and position control.
- In velocity control mode, the cuboid moved at a steady constant speed according to the target velocity value.
- In position control mode, the cuboid smoothly reached the specified target position and then stopped precisely.
- Changing the target values directly affected motion behavior — higher velocity made the cuboid move faster, while higher position values increased the displacement.
- The control response was stable and linear, with no oscillations or abrupt motion.

Discussion:

- The experiment confirmed that the same control functions used for revolute joints can be applied to prismatic joints, with the difference being **linear translation** instead of **rotation**.
- **Velocity control** is suitable for continuous linear movement, while **position control** provides accurate displacement control for specific tasks.
- This behavior is similar to real-world **linear actuators** used in robots for precise pushing or sliding motions.
- The simulation demonstrated how **joint control parameters** (velocity, position) directly influence motion performance and system stability.

Conclusion:

The lab successfully demonstrated velocity and position control of a prismatic joint connected to a cuboid. Velocity control achieved consistent linear motion, while position control accurately reached target positions. The setup and script can be extended for more complex robotic tasks.