

THE MINISTRY OF SCIENCE AND HIGHER EDUCATION  
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ITMO University  
(ITMO)

Faculty of Control Systems and Robotics

Report of 4th lab  
for the subject  
*“Simulation of Robotic Systems”*

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# 1 PROBLEM

In this work, we have to create a model of 2 planar connected using tendon.

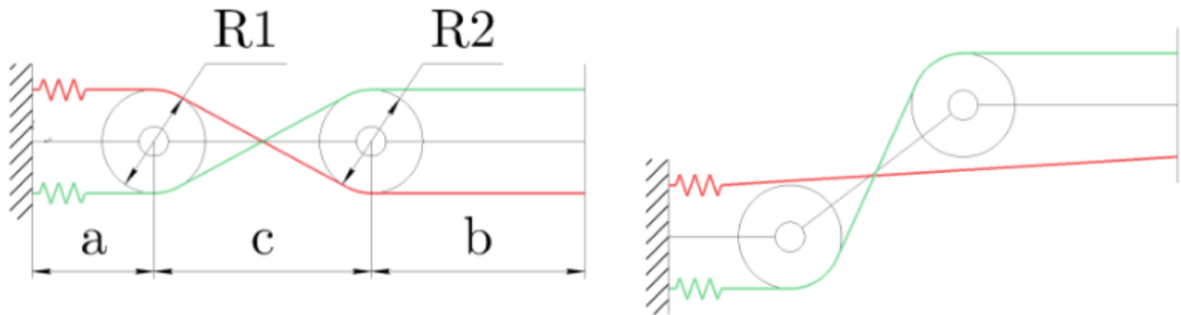


Figure 1 — Schema from the task

My variant for the problem is shown below:

R1	R2	a	b	c
0.021	0.017	0.045	0.099	0.043

Table 1 — System parameters

Then we have to add the actuators which attached to the tendons with the following parameters:

q	Amplitude	Frequency	Bias
1	3.616	36.16	3.21
2	4.97	2.24	-3.58

Table 2 — Parameters for actuators

## 2 SOLUTION

The model can be viewed in the included XML file.

We use this helper function to set the torque for the actuator.

```
1 def set_torque(mj_data, actuator:int, time, a, f, p):
2     mj_data.ctrl[actuator] = a * np.sin(time * f + p)

1 ...
2 AMP_1 = 3.616
3 FREQ_1 = 36.16
4 BIAS_1 = 3.21
5
6 AMP_2 = 4.97
7 FREQ_2 = 2.24
8 BIAS_2 = -3.58
9 ...
10
11 for i in range(STEP_NUM):
12     if viewer.is_alive:
13         set_torque(data, 0, data.time, AMP_1, FREQ_1, BIAS_1)
14         set_torque(data, 1, data.time, AMP_2, FREQ_2, BIAS_2)
15
16         ...
17
18     else:
19         break
20 viewer.close()
```

### 3 RESULT

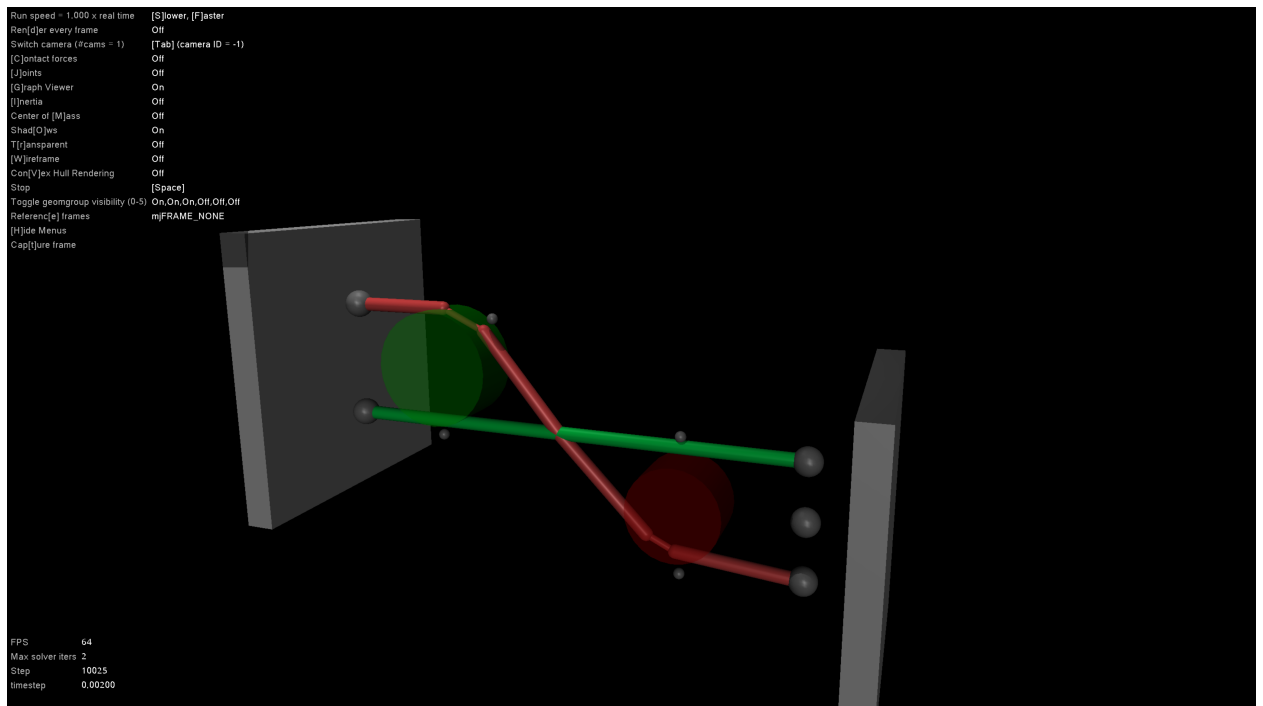


Figure 2

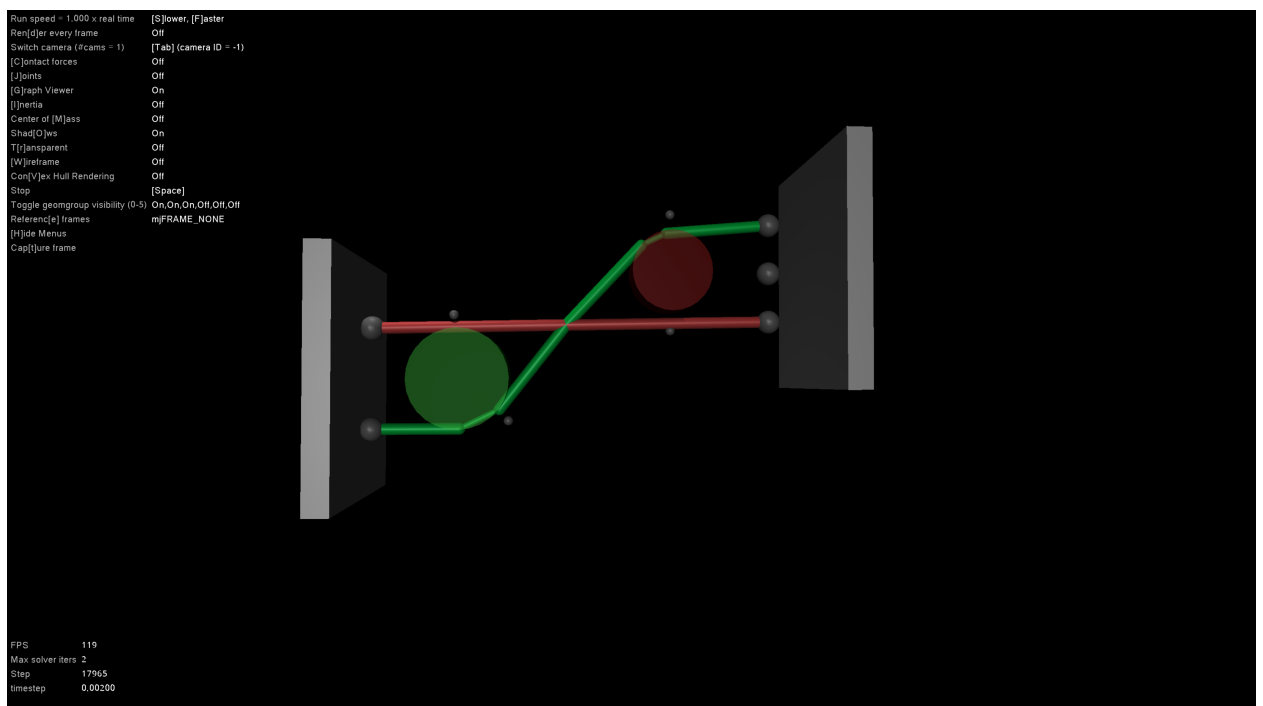


Figure 3

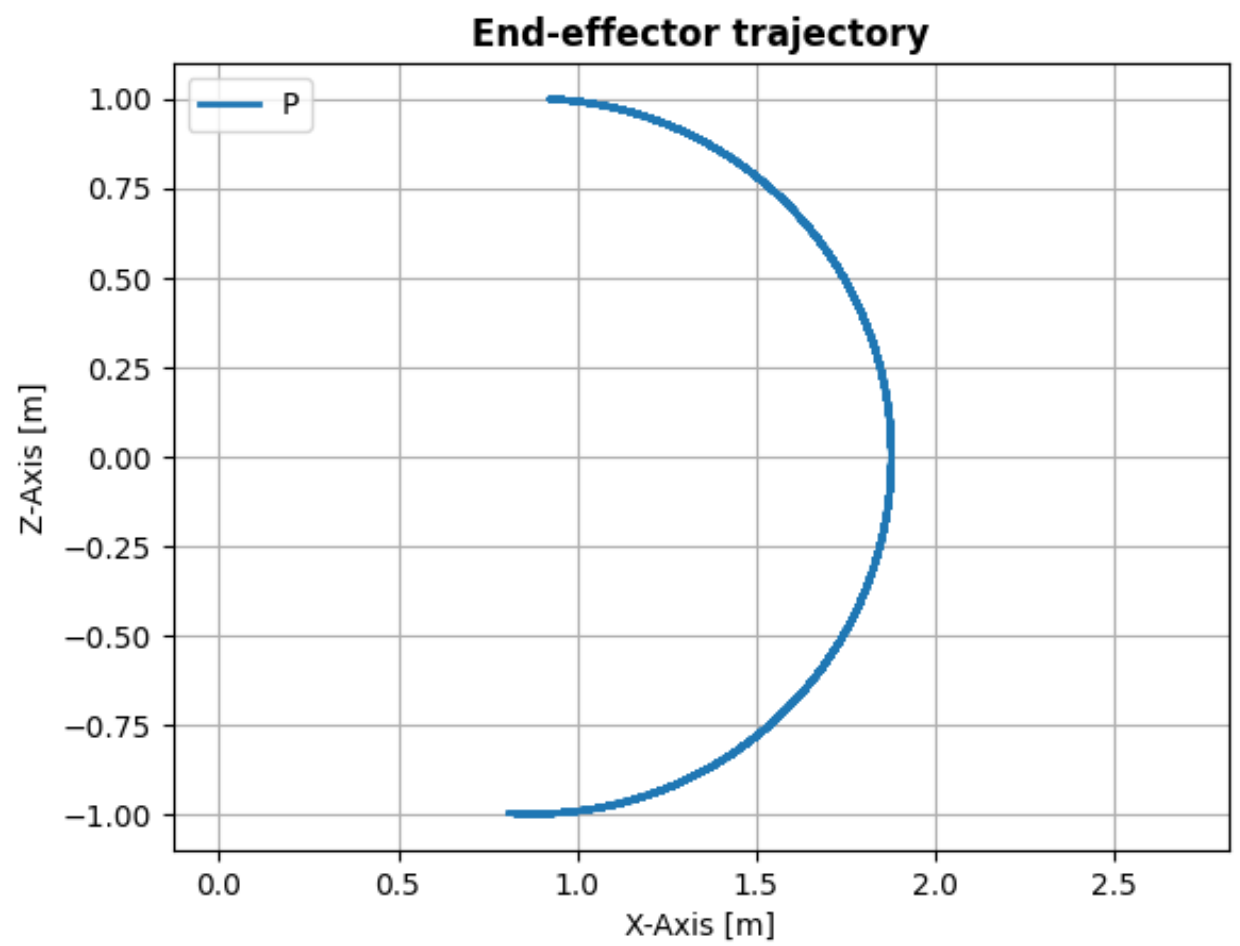


Figure 4 — Trajectory of the effector