Intelligent Machine Programming Lab
05.2022 - 07.2022

- **Task:** Implement a control loop with **FCI*** to let robot do a circular motion. A force should be applied to the desk surface while the end effector is moving circularly.

$$\rho = \begin{cases} 1 & f_d^T \tilde{x} > 0 \\ \frac{1}{2}(\cos(\frac{|\tilde{x}|}{d_{max}}\pi) + 1) & f_d^T \tilde{x} \leq 0 \end{cases}$$

Above the desk

Under the desk

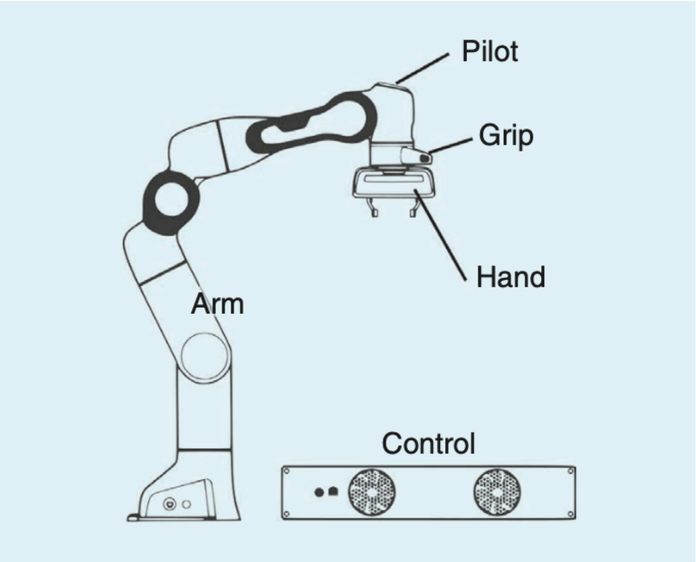
- **Challenge:** When stiffness must be set high, the end effector might rush downwards aggressively if it exceeds the desk edge.

- **Approach:**

  - Applied impedance control for the force command:

```
tau_d << jacobian.transpose() * ro * desired_force_torque;
```

  - It is also necessary to add the corioli force to the desired force for the PI controller because it is introduced by the circular motion.



*__FCI__: Franka Control Interface