Experimental setup for TimeVarying 1D Disturbance

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1. Background

Control systems regulate processes and reject disturbances via closed-loop feedback, ensuring robustness against uncertainties and noise.

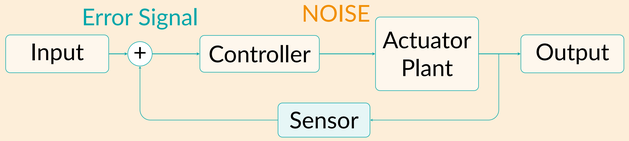


Figure 1. Closed-loop control diagram.

2. Motivation

- **Experimental setup:** Configurable disturbance for control research.
- **Validation:** Test real-world performance of control algorithms.

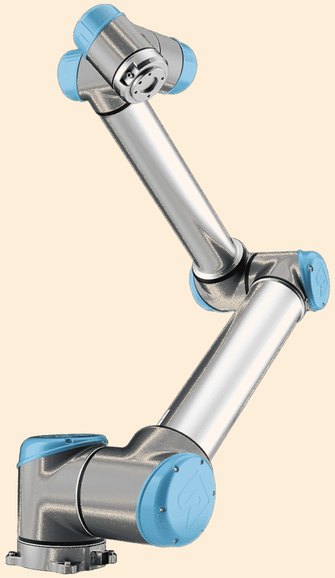


Figure 2. UR10e robot arm.

3. Objective

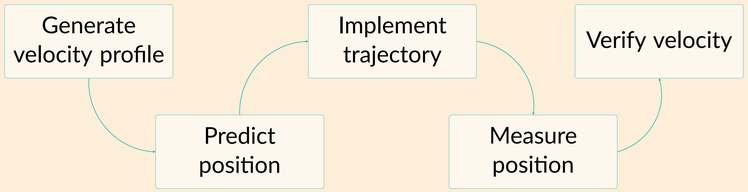
Goal: Develop a flexible platform to generate **time-varying 1D disturbance profiles**.

- Generate multiple disturbance profiles
- Precise, repeatable robot motion

4. Experimental Setup

- **UR10e 6-DoF Robot Arm:** Programmable disturbance generator.

- Poses
- Safety
- Singularities
- Smoothing
- Kinematics
- Vel/Acc



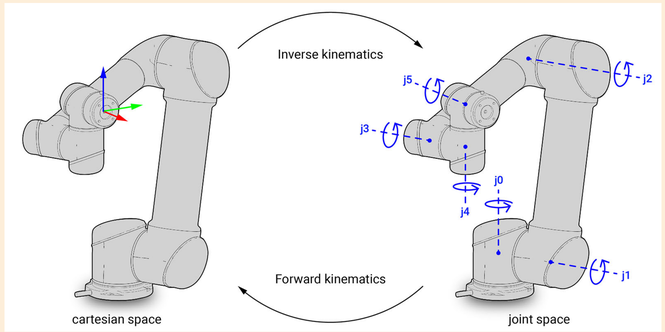


Figure 3. Profile generation via robot motion.

5. Results

Planned Disturbance Profiles:

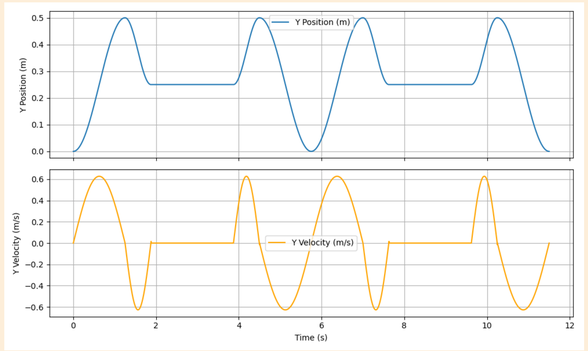


Figure 4. Intended velocity trajectory.

Result Disturbance Profiles:

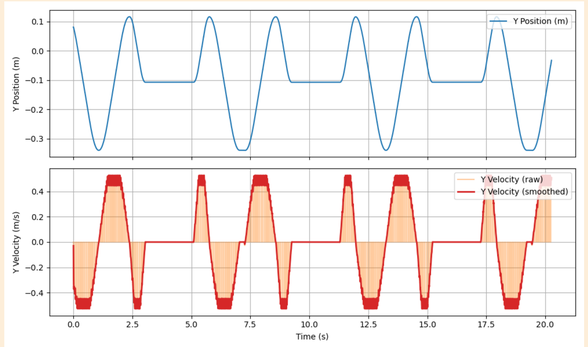


Figure 5. Position capture via ROS.

6. Challenges

- Time-varying velocity
- Minimal setup
- Verifiable
- Extendable