

Abstract

Conventional PID controllers performed poorly when commanding the arm to lift a heavy mass. Because the design of PID controller requires the accurate transfer function of the plant.

Aims and Objectives

Aim :

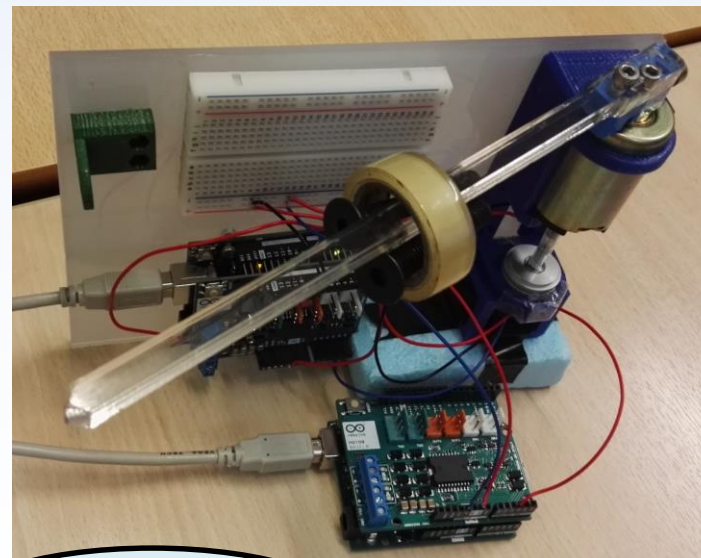
Design an Integral sliding mode controller for a 3 DOF robot arm.

Objectives :

1. Conducting tests on Single DC motor with a rotary arm
2. Measurements and Conducting analysis of the response of the rotary arm
3. Improve the Sliding Mode Controller and the Integral Sliding Mode Controller further

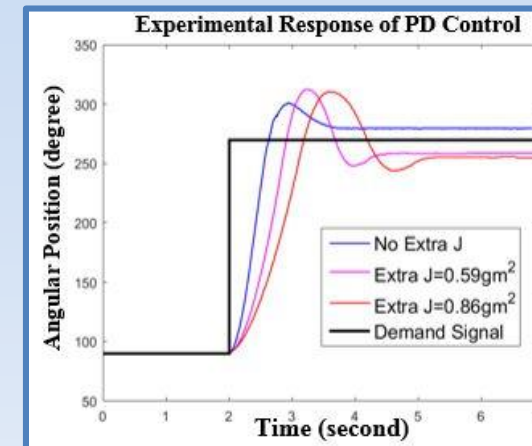
Methods

- Simulating the control of single motor with SMC and ISMC via Simulink
- Verification and conduct tests of the SMC and ISMC controllers on the DC motor
- Improvements of the control by including friction calculation of the system
- Implementation of SMC and ISMC controllers on the 3 DOF robot arm by an Arduino Board

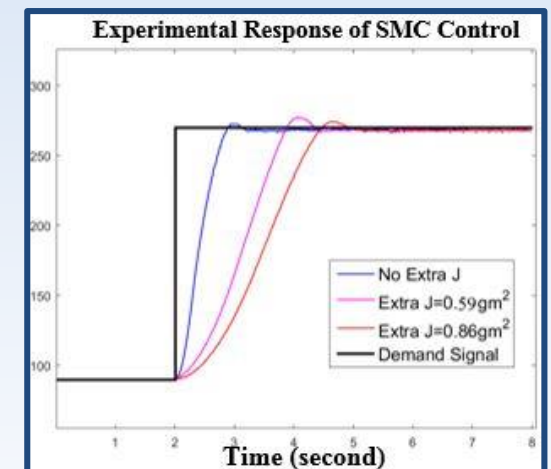


Motor
Testing Unit

Experimental Results



PD
Control



SMC
Control

Conclusion

The results exhibited the performance of the PD control is much lower than expected particularly for systems with modelling error in their plants. Contrary to the PD control, SMC and ISMC displayed a high robustness against uncertainties and friction.