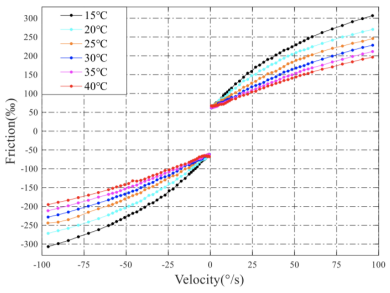
Temperature model of robot joints

Background

Precise knowledge about the dynamical behavior of robots increases the accuracy of robot control. Friction is a big factor in the robot dynamics, especially at joints with high gear ratios.

Description

This work aims to find a simple but precise model of the temperature-dependent friction behavior. Generally, the robot uses more energy when the temperature is low and less energy when the temperature is high. A model helps us to accurately predict robot motion depending on the temperature measured in the robot joints.



(a) Friction-velocity experimental data under different temperatures

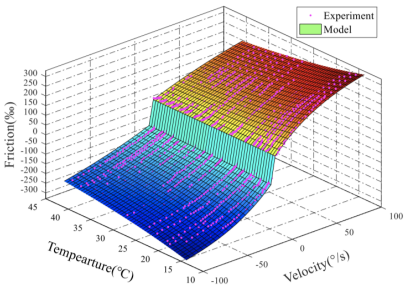


Figure 4. The temperature and velocity dependence of frciton

Tasks

- Literature research and choice on 1. temperature models for robot friction, 2. parameter identification method (machine learning)
- Design, plan, and execute identification experiments on a real robot.
- Evaluate the performance of the identified model via reachset conformance checking.

References

[1] Liming Gao, Jianjun Yuan, Zhedong Han, Shuai Wang, and Ning Wang. A friction model with velocity, temperature and load torque effects for collaborative industrial robot joints. In *Intelligent Robots and Systems (IROS), 2017 IEEE/RSJ International Conference on*, pages 3027–3032. IEEE, 2017.

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Research project:
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Type:
BA/MA

Research area:
Robotics, modelling and identification, experimental

Programming language:
MATLAB

Required skills:
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English

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