



# INDUSTRY CASE

## #09\_UR\_A

### TCP stabilization (physical)

#### Case description

UR strives to improve the quality of their cobots by utilizing cutting-edge technologies such as machine learning/AI. UR is currently investigating if machine learning can be applied for TCP stabilization. After a finishing a motion in a given pose, the time to stabilize the TCP position affects the cycle time, where sharp cycle times are among the most important performance indicators delivered by robot manufacturers.



Example of scenario where fast TCP stabilization is required

#### Challenge

Develop a real-time capable machine learning solution for TCP stabilization of a physical UR robot transporting a variety of payloads (known and unknown) which can positively impact cycle times for poses across the workspace.

To get the team started, consider the following:

- Can solutions exploit data from encoders and TCP accelerometer?
- Can solutions exploit data from force/torque sensor to estimate payload mass and inertia?

Keywords: Control optimization, velocity profile, acceleration profile

#### Tools, methods and materials

The challenge can be addressed with any machine learning tool allowing for generic time series data as input. The selection of tools and methods is left to the team. (Christoffer)

From UR, the team will receive a UR robot arm and documentation how to command user-defined motions and how to access data from the encoders, accelerometer and force/torque sensor. In addition, UR will be available to discuss details of the challenge along the way.

#### Contact

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Universal Robots, a Teradyne company, is a leading provider of collaborative robots (cobots) used across a wide range of industries and in education. Founded in 2005 and headquartered in Odense, Denmark, Universal Robots aims to create a world where people work with robots, not like robots. Its mission is simple: Automation for anyone. Anywhere. We have a unique set of values that guide our decision-making at all levels of the organization. We inspire our employees and global network of partners to think differently and innovate ground-breaking technologies that move people, industries and the world forward.