Laboratory for Product Development and Lightweight Design
TUM School of Engineering and Design
Technical University of Munich

TUM

Motion planning of a robotic bimanual manipulation system for e-commerce clothing returns

Open for Masterarbeit positions

Robot Systems Group
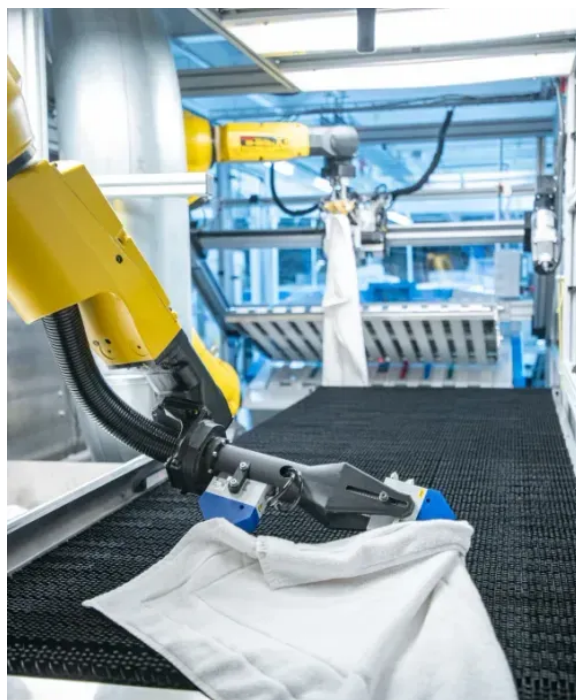Laboratory for Product Development and Lightweight Design

Figure 1 The existing industrial robot based automatic cloth handling robotic system setup at SEWTS (https://www.sewts.com/)

Project Description

The current process for handling e-commerce clothing returns is labor-intensive and inefficient, relying heavily on manual sorting, inspection, and folding. This increases operational costs and slows down the processing time, leading to delays in restocking and potential customer dissatisfaction.

To address these challenges, we aim to develop an advanced robotic solution that leverages bimanipulation techniques to automate the bin-picking, sorting, and folding of returned clothing items. The solution must efficiently handle overlapping workspace of dual-arm robots, ensuring collision-free and safe operation.

The problem is a challenging one due to (1) crumpled items, (2) overlapping robot workspace, (3) dynamic task conditions, and (4) reliability and integrability. The objective of the thesis would be to develop a motion planning system compatible with the existing system to improve cloth handling performance. The tasks involve,

Desired Skills

(1) Dual-arm motion planning for dynamic cloth folding, (2) integrate the system with existing robotic solution. The candidate is expected to have the following skills:

1. Comfortable with Python, C++ or Julia

2. Experience working with ROS/ROS2

3. Experience with a robotics simulator like MuJoCo

4. Experience with robot motion planning and control

The following are bonus:

1. Worked with motion planning of multi-robot systems

2. Experience working with industrial robots

3. Experience with real-time control of hardware

LPL ❁ sewts

Contact
Akhil Sathuluri,
Room: 5506.02.630
E-mail: akhil.sathuluri@tum.de