



M-APR: Handling of Flexible Materials Using Robot Arms

9. Juni 2026

Flexible materials such as films, textiles, plastics, cables or limp components are gaining increasing importance across many industries. With rising production automation, reliable and precise handling of these materials is becoming a key challenge, as conventional robot systems are primarily designed for rigid workpieces. This M-APR project (3 semesters, starting WiSe 2026/2027) addresses the handling of flexible materials by robot arms. The exact focus is agreed jointly and can cover **hardware aspects** (specialised gripping technologies) or **software/AI aspects** (simulation, learning-based control, Deep Reinforcement Learning, Vision-Language-Action models). The work concludes with implementation and evaluation in a physical robot cell at the TTZ Nürnberger Land.

Work Packages (selection by focus)

- Analysis of gripping principles for flexible materials (vacuum, adhesive, form-adaptive)
- Development and fabrication of a specialised gripper (hardware focus)
- Building a simulation environment for deformable objects (software focus)
- Model-based control or Deep Reinforcement Learning (DRL)
- Vision-Language-Action (VLA) models for flexible manipulation
- Sim-to-real transfer and evaluation in the robot cell at TTZ

Requirements

- Bachelor's degree in electrical engineering, computer science, mechatronics, robotics or equivalent
- Programming in C++ and/or Python
- Basic knowledge of machine learning and robotics
- Independent and goal-oriented working style

This topic is designed as an **M-APR (3 semesters)**, but can also be completed as a project or master's thesis subject to agreement.

TTZ Nürnberger Land / Mobile Robotics Lab

Location: Martin-Luther-Str. 18, 91207 Lauf an der Pegnitz

Supervisor: Prof. Dr. Christian Pfitzner
E-Mail: christian.pfitzner@th-nuernberg.de
Co-Supervisor: M.Sc. Patrick Fußy
E-Mail: patrick.fussy@th-nuernberg.de