



# Aran Mohammad

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## Education

PhD in Robotics at Leibniz University Hannover, Hanover, Germany	Mar 2021 – Present
M.Sc. in Mechanical Engineering (grade: 1.0) at LUH, Hanover, Germany	Oct 2017 – Dec 2020
B.Sc. in Mechanical Engineering (grade: 2.2) at LUH, Hanover, Germany	Apr 2014 – Sept 2017

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## Experience

**Research Associate**, Institute of Mechatronic Systems – Hanover, Germany March 2021 – Present

- Developed open-source methods for perception and reactive safety strategies in robotic applications
- Technical focus included interaction control, dynamics, simulation, classification and transfer learning
- Authored five scientific publications, including a best-paper award; co-chaired sessions and presented research at major robotics conferences (ICRA, IROS, ...)
- Supervised 23 student theses and guided 17 research assistants in research and lecture projects
- Taught course (150 students) on parallel robots, optimization, vision-based control and machine learning

**Master Student**, IAV Automotive Engineering – Gifhorn, Germany Jun 2020 – Nov 2020

- Thesis on physics-based machine learning for emission modeling (graded 1.0) and published research results of dimensionality reduction and regression in peer-reviewed journal and international conference

**Research Intern**, UNESP – Bauru, Brazil Oct 2019 – Dec 2019

- Designed and executed structural analysis experiments on carbon fiber-reinforced polymers using piezoelectric membranes and MATLAB-based data acquisition
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## Projects

**Developed Robot-Agnostic Communication System** 🌐 [aranmoha/testbench](#)

- Designed and tested robot communication using EtherCAT, EtherLab, and Simulink for real-time kinematics, dynamics modeling, and logic implementation
- Integrated cameras, force-torque and inertial sensors using Python, C++ and ROS 1 for sensor fusion and reactive motion planning

**Designed Interaction Control and Real-Time Contact Classification** 🌐 [aranmoha/control](#)

- Developed safe impedance-controlled robots and combined physical modeling with machine learning in Python, and deployed contact detection on real robots via MATLAB/Simulink
- Applied domain randomization in simulation (MATLAB/MuJoCo) to train domain-adversarial neural networks with PyTorch for sim-to-real transfer

**Unified Contact Detection and Reaction Framework for Safe Robot Execution** 🌐 [aranmoha/reaction](#)

- Designed contact-aware motion-execution framework combining detection, classification, and handling of collision and clamping contacts through redundancy-based control
  - Integrated self-collision avoidance and singularity handling into multi-level robot-control schemes; validated in software-in-the-loop and real-world tests
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## Skills

**Software:** MATLAB/Simulink, Python, C++, ROS 1, Autodesk Inventor, MS Office

**Tools:** scikit-learn, PyTorch, Tensorflow, MuJoCo, Git, Bash, Jupyter Notebook, OpenCV, SciPy

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## Selected Publications ([Google Scholar](#))

- [1] A. Mohammad, M. Schappler, T. -L. Habich and T. Ortmaier, "Safe Collision and Clamping Reaction for Parallel Robots During Human-Robot Collaboration", 2023 IEEE/RSJ IROS, [DOI](#)
- [2] A. Mohammad, M. Schappler and T. Ortmaier, "Collision Isolation and Identification Using Proprioceptive Sensing for Parallel Robots to Enable Human-Robot Collaboration", 2023 IEEE/RSJ IROS, [DOI](#)
- [3] A. Mohammad, H. Muscheid, M. Schappler and T. Seel, "Quantifying Uncertainties of Contact Classifications in a Human-Robot Collaboration with Parallel Robots", 2023 Human-Friendly Robotics, Springer Proceedings in Advanced Robotics, [DOI](#)