# Antoni Dudij

Student

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## PROFESSIONAL SUMMARY

I am a student of Computational Engineering Science (CES) at RWTH Aachen University, with a strong focus on full-stack development, artificial intelligence, and automation. Passionate about building scalable web and mobile applications, I thrive in fast-paced environments and enjoy leveraging cutting-edge AI tools to accelerate development and learning.

## WEBSITES, PORTFOLIOS, PROFILES

- https://github.com/sheydHD
- https://www.linkedin.com/in/antoni-dudij
- https://kusch-innovation-consulting.de/
- https://doi.org/10.1016/j.memsci.2025.124205

## SKILLS

- **Languages & Programming:** Python (Expert), MATLAB (Expert), C++ (Advanced), JavaScript, Bash
- **AI & Data Tools:** TensorFlow, PyTorch, Graph Neural Networks, MongoDB, PostgreSQL, SQLite
- **Simulation & Engineering:** MS Office, LaTeX, Autodesk Inventor, RoboDK
- **DevOps & Workflow:** Linux, Docker, GitHub, CI/CD pipelines, VS code / Cursor / Warp
- **ML & AI Focus:** Advanced prompt engineering, Code, text & image generation, AI agents creation and automation workflows

## WORK HISTORY

### HIWI, 07/2025 - Current

**RWTH Aachen, Lehr- Und Forschungsgebiet Kontinuumsmechanik** - Aachen, Germany

- Adjusted **Deep Symbolic Optimization (DSO)** code (2022) to modern standards using **Python 3.11** and **TensorFlow 2.x**.
- Increased code functionality extending the framework from **MISO (Multiple Input Single Output)** to **MIMO (Multiple Input Multiple Output)**.
- Documented codebase and adapted software for compatibility across diverse operating systems.

### Working Student, 11/2024 - Current

**Deutsches Zentrum für Luft- und Raumfahrt (DLR)** - Köln, Germany

- Designed and deployed **DLR-AutoMat**, a full-stack web app (Python/FastAPI backend, React frontend) for automated generation of material cards for LS-Dyna simulations.
- Integrated a **MongoDB-based metadata search engine** to enable fast and efficient retrieval of experimental and simulation data.
- Deployed **Chemotion ELN** with PostgreSQL on company servers and ensured seamless interoperability with DLR-AutoMat and MongoDB.
- Connected all systems to the company's **cloud infrastructure**,
  ensuring scalability, reliability, and maintainability through Docker and Git-based DevOps workflows.

### Bachelor Thesis, 06/2024 - 09/2024

**Mercedes-Benz Group AG** - Sindelfingen, Germany

- Bachelor thesis topic: "Evaluation of ML-based models for the detection of corrosion-prone areas during the vehicle development process"
- **Created and structured datasets** to train and **evaluate ML models** for identifying corrosion-prone areas during a vehicle design.
- Conducted interviews with field experts and further evaluated in-depth performance with applied statistical metric like **MCC**.
- Improved segmentation quality by identifying model weaknesses and refining feature engineering methods in **MATLAB**.

### Internship, 10/2023 - 04/2024

**Mercedes-Benz Group AG** - Sindelfingen, Germany

- Contributed to development of ML-based models for the detection of corrosion-prone areas during vehicle development
- Improved segmentation of door components by **enhancing neural network training datasets** and applying advanced **feature engineering methods in MATLAB**.
- Retrained and optimized models for detecting corrosion protection layers (e.g., PVC, adhesives), **evaluated using MCC** and custom visualizations.
- Developed and integrated algorithms for detection of crucial car structural elements (e.g. hem flange)

### HIWI, 10/2021 - 10/2023

**RWTH Aachen, Verfahrenstechnik** - Aachen, Germany

- **TriggerInk Project** - Surgical Robotic Arm Prototype
  - Programmed robotic arm movement for a knee surgery simulation using **RoboDK** and **Python**.

  - Connected the robotic arm and an extruder with an external pump system for precise cartilage extrusion control.

- **Flow, Fouling, and Backwashing with Membrane Filter Modules**

  - Designed and conducted experiments on various membrane modules, including AVT-developed hollow fibers and clinical blood filters.
  - **Operated MRI equipment to generate high-resolution images** of membrane structures; enhanced image clarity with custom **MATLAB** scripts.
  - Contributed to a peer-reviewed **publication in Journal of Membrane Science**: https://doi.org/10.1016/j.memsci.2025.124205

## LANGUAGES

- Polish (Native)
- English (professional proficiency)
- German (professional proficiency)
- Spanish (Advanced proficiency)
- Russian (Basic proficiency)

## EDUCATION

### Bachelor of Science: Computational Engineering Science, 08/2025

**RWTH Aachen, Germany** Expected graduation date in September 2025

### High School Diploma: 07/2020

**I Liceum Ogólnokształcące Im. Mikołaja Kopernika** - Gdańsk, Poland High School Diploma (Matura-Abitur) with extended courses in Mathematics, Physics, and German

## INTERESTS

- Coding
- Traveling
- Light athletics, volleyball, sailing
- Furniture crafting
- Cocktail making and organizing large-scale events

## PUBLICATIONS

- Wypysek, D., Wennemaring, S., Dudij, A., Wessling, M. (2025). Flow and fouling visualization in modules having multiple multichannel membranes.
  Journal of Membrane Science: DOI:
  https://doi.org/10.1016/j.memsci.2025.124205

## PERSONAL PROJECTS

- Kusch-innovation-consulting.de
- Object Detection System
- Time Tracker Application
- AI Trading-Bot
- AI Family Tree App