

Maximilian Kretzschmar

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EDUCATION

- **Dresden University of Technology** Dresden, Germany
PhD in Applied AI *Oct 2023 – Present*
- **Dresden University of Technology** Dresden, Germany
Master of Science in Mechanical Engineering; Grade: First Class Honours *Oct 2017 – Sep 2023*
- **European School Culham** Oxfordshire, United Kingdom
European Baccalaureate; Grade: AAA / 87.21% *2003 – 2016*

EXPERIENCE

- **MAN Truck & Bus SE & Dresden University of Technology** Dresden / Munich
Research Scientist & PhD Candidate *Oct 2023 – Present*
 - **AI Systems:** Architecting AMPLIFY, a multi-agent system orchestrating 7 specialised agents with 40+ tools automating FE simulation workflows in a human-in-the-loop system for ~50 engineers across Germany and India; MAN IT Innovation Award finalist, projected to save ~10% of engineering hours across key simulation workflows.
 - **Human-AI Collaboration:** Built React/TypeScript frontend for real-time agent monitoring with execution graphs, 3D visualisation, human feedback and test & evaluation tooling; validated with 7 domain experts using a 23-item assessment framework co-developed with University of Bayreuth
 - **Systems Integration:** Developed Ansys DPF tool integration layer as part of the modular multi-agent framework, connecting simulation data via gRPC across 3 analysis domains for production vehicle models.
 - **Cloud Deployment:** Deployed on AWS (EC2, Bedrock, S3, Cognito) with a ~€15,000 infrastructure budget, enabling scalable execution of workflows and reducing manual intervention in engineering analysis pipelines.
 - **Scientific Research:** 9 peer-reviewed papers at international journals & conferences (Cambridge University Press, IEEE, Elsevier) on hybrid AI systems combining LLMs with structured knowledge representations.
 - **Project Management:** Leading €320,000, 3-year industry research project as sole researcher managing stakeholders, aligning academic goals with MAN's AI development roadmap including project scoping, legal coordination, budget management, delegation of research activities.
 - **Teaching & Mentorship:** Coordinating 8-person team delivering coursework to ~250 students/semester; designed recruiting process, screened 70+ candidates; supervised several master's students across 6-month placements; leading the cross-disciplinary development curriculum for 30+ PhD candidates organising multi-day workshops.
- **Robert Bosch GmbH** Bamberg
Intern – Optimisation of High-Volume Production Lines *Mar 2022 – Aug 2022*
 - **Machine Learning:** Implemented the Bosch Center for AI's Anomaly Detection Engine across 9 fully automated drilling laser lines producing ~26,000 parts per day/€9.5M annual production value; identified systematic quality anomaly causing redundant testing, enabling rapid correction of throughput losses.
 - **Data Analysis:** Built Python tooling (pandas, NumPy, seaborn) for automated preparation, analysis, and visualisation of machine and CMM data across daily production cycles.
 - **Process Optimisation:** Planned, led and moderated a factory layout workshop with a 15-person cross-functional team affecting 25+ workers in manufacturing, driving process improvements using lean production methods such as one-piece-flow.
 - **Initiative:** Independently identified a recurring assembly process inefficiency, prototyped a 3D-printed solution, documented for replication; adopted as standard across plants in 3 countries (Germany, US, Turkey).
- **Fraunhofer IWS** Dresden
Working Student – Product Design Engineering *Apr 2021 – Mar 2022*
 - **Product Development:** Designed, developed, and integrated hardware for hyperspectral imaging systems, including the institute's smallest-ever diffuser component, from concept to manufacturing-ready documents, coordinating 3 teams.
- **SPEZ GmbH** Dresden
Working Student / Quality Manager / Key Client Manager *May 2018 – Sep 2020*
 - **Operations & Quality:** Progressed through three roles in 2.5 years: end-to-end quality management, employee training programme development, key client order fulfilment and cutting plan optimisation.

VOLUNTEERING & IMPACT

- **Leverage AI – Finetuned for Good (2026–Present):** Founded international Moral Ambition Circle recruiting 6 professionals across 5 countries spanning AI research, digital policy, and management to explore pathways to greater positive impact. Facilitating the 8-month peer-led programme where members develop personal Theories of Change connecting their skills to measurable impact on pressing global challenges.
- **Sports Coach – Kait-Bu-Rin Muay Thai (2015–2016):** Volunteer martial arts instructor for groups of children and teens.
- **Kuzuko Foundation – Volunteer (2013):** Converted a disused barn into an environmental education centre and organised fundraising events to support the initiative.

PROJECTS

- **planetmax.dev:** Full-stack portfolio and LLM console built with Next.js, Supabase, and Vercel AI SDK featuring multi-provider inference and real-time streaming.
- **CNC Plasma Cutter:** Designed and built a 3-axis CNC plasma cutting system from scratch – mechanical design, electrical integration, software, sourcing, and testing – to launch metalworking business for under £1000.
- **Synthetic BlenDR:** Investigated domain gap effects on CNN models using synthetic data for object detection of real machine components via a custom Blender rendering pipeline & trained YOLOv7 model.

CONTINUOUS LEARNING

- EA Career Bootcamp – High-Impact Careers: *Centre for Effective Altruism, 2026*
- Project Management: *TUD Graduiertenakademie, 2026*
- Business Administration Fundamentals for Researchers: *TUD Graduiertenakademie, 2026*
- Stakeholder Management: *CapGemini, 2025*
- Summer School on Engineering Design Research: *The Design Society, 2025*
- Generative AI with Large Language Models: *DeepLearning.AI & AWS, 2024*
- Computer Science: CS50x (Harvard) & Python for Everybody (Michigan): *2022*

PUBLICATIONS

- Designing and Validating Affordant Interfaces for Hybrid Intelligence Systems: *HIPPE, 2026*
- A labelled property graph framework for managing vitrimer formulation-, manufacturing-, and material-data: a proof-of-concept study on glass transition temperature: *Digital Chemical Engineering, 2026*
- Multi-Agent System Approach for Constructing Three-Layer Knowledge Graph Architectures for Efficiently Leveraging Engineering Data: *AAIML, 2026*
- Design Patterns for Multi-Agent LLM Systems in Engineering: An Industry Case Study: *Elsevier, 2026*
- A Team of Three: The Role of Generative AI in the Development of Design Automation Systems for Complex Products: *Cambridge University Press, 2025*
- Using Role-Specialized LLM Agents for Workflow Execution in a Product Development Setting: *IEEE, 2025*
- Evaluating the Role of Generative AI in Product Development and Design – A Systematic Review: *NordDesign, 2024*
- Key Concepts, Potentials and Obstacles for the Implementation of Large Language Models in Product Development: *EEE, 2024*
- Towards a Process for the Creation of Synthetic Training Data for AI-Computer Vision Models Utilising Engineering Data: *Cambridge University Press, 2024*

SKILLS

Languages: English (native C2), German (native C2)

Technical: Machine Learning, LLM Systems, Python, React/TypeScript, AWS, Knowledge Graphs

Research: Systematic evidence synthesis, empirical/quantitative evaluation methods, DOE, grant proposals

Leadership: Project management, stakeholder coordination, mentoring, recruitment, workshop facilitation