Nouman Ahmad

Research Associate | Applied AI & Automation

Germany | noumanahmad3@gmail.com
LinkedIn | TH Köln profile | noumanahmad.de

Research associate and automation engineer working on reusable AI systems, condition monitoring, and natural-language interfaces for digital twins. Experience spans applied research, machine learning, industrial automation, and scientific communication.

PROFESSIONAL EXPERIENCE

Research Associate

TH Köln | Cologne Lab for Building Automation and Optimization (COLABO)
Oct 2024 - Present | Cologne, Germany

- Lead the modKI team's work on reusable and scalable AI modules for building automation.
- Developed a residual-based method to estimate remaining equipment capability from operational data and an LLM-based agentic orchestration layer for application across buildings.
- Built a modular digital-twin chatbot combining graph-based retrieval, RAG, and MCP server integration, in active use by the team.
- Contributed to comparative LLM evaluation, defining metrics and assessing output quality.
- First-authored research at AUTOMATION 2026 and co-authored papers at CISBAT 2025 and AUTOMATION 2025.

Automation Engineer

SMG İnovasyon Mak. Müh. San. Tic. Ltd. Şti.
Oct 2019 - Oct 2021 | Kayseri, Türkiye

- PLC programming for automated production machines, component selection, and cost analysis.

EDUCATION

M.Eng. Automation and IT

TH Köln, Gummersbach | Oct 2023 - Jun 2026

Final grade: 1.6 | Thesis: 1.3

Thesis: Development and Evaluation of a Generic Method for Determining the Functional Reserve of Technical Building Components Based on Synthetic and Real Process Data.

M.Sc. Mechatronics Engineering (without thesis)

Boğaziçi University, Istanbul | Oct 2021 - Aug 2023

Final grade: 3.45 / 4.00

B.Sc. Mechatronics and Robotics

Erciyes University, Kayseri | 2014 - 2019

Final grade: 3.47 / 4.00

Research & technical profile

Nouman Ahmad

PEER-REVIEWED PUBLICATIONS

1. Scalable Estimation of Functional Reserve in Technical Building Equipment Using Data-Driven and Physics-Informed Methods

Ahmad, N.; Krüttgen, M.; Müller, J.

AUTOMATION 2026, Baden-Baden, 17-18 June 2026, pp. 153-162. VDE Verlag. IEEE Xplore

2. Automated Performance Evaluation of Buildings Based on a Taxonomy of Building Functions with NLP-Supported Exploration in Building Information Networks

Krüttgen, M.; Ahmad, N.; Magsi, T. H.; Müller, J.

Journal of Physics: Conference Series, 3140, 042018. CISBAT 2025, Lausanne. Open-access paper

3. Automatisierte Performancebewertung der Technischen Gebäudeausrüstung auf Basis einer ganzheitlichen Ordnungsmethode für Gebäudefunktionen

Krüttgen, M.; Fessler, T. G.; Magsi, T. H.; Ahmad, N.; Müller, J.

AUTOMATION 2025, Baden-Baden, 1-2 June 2025, pp. 471-482. Publisher / DOI

TECHNICAL EXPERTISE

Programming & data: Python, pandas, NumPy, SciPy, scikit-learn, matplotlib, Streamlit, Git; data preprocessing and sensor integrity assessment.

Machine learning: PyTorch, TensorFlow, Keras, time-series analysis, anomaly detection, residual-based prognostics, synthetic data generation, model evaluation, MLflow, Weights & Biases.

AI systems & LLMs: Agentic AI, LangChain, LangGraph, RAG, vector databases, graph-based retrieval, MCP integration, NLP and comparative LLM evaluation.

Systems & infrastructure: InfluxDB, MongoDB, Linux shell, Docker; AI clusters and LLMs through KI:connect.nrw.

Engineering: Predictive maintenance, fault detection and diagnosis, condition monitoring, modular AI architectures, interoperability and industrial automation.

PRESENTATIONS & ACADEMIC EXCHANGE

- Presented at the VDI Automation Congress in Baden-Baden in 2025 and 2026.
- Poster presentation at CISBAT 2025, Lausanne.
- Co-presented the team's solution at the NAMUR General Assembly, Neuss, November 2025.
- Presented COLABO research at the Ooka Laboratory, University of Tokyo, 1-5 June 2026.

LANGUAGES

English: professional working proficiency (C1) | German: limited working proficiency | Turkish: C1 | Urdu and Hindi: native