

BHUPENDER KUMAR SAINI

Applied AI Researcher | LLM Multi-Agent Systems & Decision Support | Ex-Siemens Engineer

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PROFESSIONAL SUMMARY

Applied AI Researcher with over 4 years of experience building LLM and multi-agent systems, supported by 8 years of prior experience in industrial automation at Siemens. I specialize in turning complex AI research into reliable, production-grade products, including RAG pipelines and decision-support tools. I have successfully led cross-functional teams to deliver more than 5 AI-driven products from concept to launch. By combining my background in large-scale industrial systems with modern generative AI, I focus on creating practical solutions that are easy for non-technical users to adopt and understand.

CORE COMPETENCIES

Generative AI Strategy | Multi-Agent Architectures | LLM Engineering | LLM Evaluation (LLM-as-Judge) | Containerization (Docker) | Production AI Systems | Machine Learning | Human-in-the-Loop AI | Semantic Search | NLP | Knowledge Graphs | Context Engineering | Memory Management | MVP Development | Decision Support Systems | Industrial Automation | Quality Assurance

PROFESSIONAL EXPERIENCE

Applied AI Researcher, Aug 2022 - Present

Fraunhofer IAO, Stuttgart, Germany

Python, LangChain, LangGraph, LlamaIndex, Haystack, CrewAI, AG2, Agno, Open Agent SDK, Zetta, Semantic Kernel, LanceDB, Neo4j, Vector DBs, Graph RAG, Fine-tuning, Memory Management, SQL

- **MindsetTwin (Oct 2025 - Present):** Technical lead for the extension of **SozioMimic** toward **behavioral digital twins modeling cognition**, preference formation, and decision-making, combining market datasets with psychographic and longitudinal profiles across multiple consumer segments into a reusable human behavior simulation framework.
- **SozioMimic (Feb 2025 - Oct 2025):** with the Baden-Württemberg Ministry of Economic Affairs: **Design, development, and evaluation of eight LLM agent variants from a six-week, 13-participant longitudinal study** (interviews, diaries, surveys), showing contextualized agents reach up to **0.78 response similarity versus 0.60-0.68 without personal context**. Published at CHI EA 26.
- **Multi-Agent Decision Support System (2023 - Present):** Self-initiated, grew from a hobby prototype, **built a role-based multi-agent architecture on open-source 8B models (OpenChat, Mistral, LLaMA) with tool-calling and memory, supporting user-defined YAML workflows** so non-technical users can configure evaluation criteria and agent steps without code changes. Informed that a peer-reviewed framework was accepted at HCI International 2026, and a second paper is under review at IPDMC 2026.
- Provided AI strategy **consultation to SMEs with the Baden-Württemberg Ministry**, supporting regional business digitalization, while managing small to medium research projects end-to-end.

Researcher Aug 2022 - Jul 2025

University of Stuttgart, Stuttgart, Germany

Python, Hugging Face, LLMs, Semantic Search, Databricks, Neo4j, RDF, SPARQL, SQL, Power BI, Unity, Protege, C#, DALL-E, UX Prototyping

- Evaluated multiple retrieval approaches to identify the best fit for **FEGA and Schmitt Elektro's tender document workflow**, then deployed a semantic search and retrieval system into production on Databricks, achieving **95% Accuracy@3 and 90% Precision@3** and cutting offer preparation time. Led the code handover and knowledge transfer workshop after go-live.
- Led the technical development with **Lotus Tech in Frankfurt** to define **proactive HMI use cases for luxury vehicles**, validating 5 prototypes with full stakeholder sign-off and **generating 4 patentable ideas in proactive in-vehicle experiences**.
- Designed and developed the multi-agent architecture for project **CARE-LLM, a multi-agent LLM framework and patient-facing dashboard simplifying discharge information for CKD patients**, with **Fraunhofer FIT and University Hospital Cologne**, reducing cognitive load in communicating complex medical information and reaching prototype-ready stage for clinical evaluation.

Sr. Software Test Specialist, May 2011 - Feb 2019

Siemens, Bangalore, India

Role progression: Associate Consultant → Consultant → Sr. Test Engineer → Test Specialist

Earlier at Siemens: Network Engineer to Software Engineer, Bengaluru and Delhi (2009 - 2011)

Cross-functional role spanning testing, automation, development, and consultation for the SIRIUS motor management portfolio over PROFINET and PROFIBUS.

C#, PowerShell, PROFINET, PROFIBUS, OPC UA, Wireshark, Siemens PCS 7, STEP 7, VMware, VirtualBox, Functional Safety, Industrial Automation

- Drove innovation and quality across an **8-year tenure spanning development, testing, automation, and technical consultation**, contributing 26 proposed improvement ideas and **2 patent filings (1 granted)**, recognized with **5 Siemens awards, including Tech Expert status, while resolving approximately 500 hardware and software issues** and delivering 4 working prototypes across 6 lean initiatives.

- Designed and developed a patented prototype for dynamic virtualization of industrial devices, which became an internal Siemens product, **driving 90% test coverage and automation while enabling shift-left testing.**
- Developed **AR-based device control prototypes** to enhance process efficiency, while advising developers and customers on technical issue resolution, and was recognized with Tech Expert status for contributions in time synchronization and device virtualization.

Research Assistant, *Sept 2020 - Feb 2021*

University of Koblenz and Landau, Koblenz, Germany

Python, BERT, Transformers, Mean Teacher, VAT, Pseudo-labelling, Encoder-Decoder Architectures

- Developed and evaluated weakly supervised fake news detection models under limited-label, noisy-data conditions, achieving **0.731 ± 0.01 test accuracy with pseudo-labelling, outperforming a supervised BiLSTM baseline at 0.687 ± 0.02**, validated through precision, recall, F1-score, and loss analysis. This work formed the basis of my Master's thesis on Mean Teacher and adversarial training approaches for BERT-based text classification.

Data Science and Engineering Intern, *March 2021 - July 2021*

Schaeffler, Germany

- Built and deployed a **Power BI dashboard for real-time industrial IoT device** status that went into production use, **alongside plant production data visualizations to identify scrap reasons**, and generated synthetic industrial data to demonstrate prototypes to customers.

PATENTS AND PUBLICATIONS

Peer-Reviewed Publications

- Saini, B.K., Guertler, L.I., Auspurg, D., Kumar, C., and Peissner, M. (2026). A Human-Centered Interaction Framework for Multi-Agent AI Reasoning in Enterprise Decision-Making. Accepted, HCI International 2026, Springer proceedings.
- Saini, B.K., Kumar, C., Guertler, L., Auspurg, D., Peissner, M., and Hoelzle, K. (2026). Toward AI-Supported Decision Making in Innovation: Requirements and Design of LLM-Based Multi-Agent Systems. Under review, IPDMC 2026.
- Saini, B.K., Kumar, C., Pollmann, K., Bierkandt, J., Janssen, D., Knecht, C., and Fronemann, N. (2026). Simulation of Human Survey Responses for Market Research: The Role of Contextualization in LLM-Based Agents. CHI EA 26, ACM. Found that contextualized agents achieve up to 0.78 response similarity, versus 0.60-0.68 without personal context.
- Bovie, T., Saini, B.K., Kumar, C., and Bace, M. (2026). DUPLet: Dynamic User Modeling for Personalized Cover Letter Generation. UMAP 2026.
- Kumar, C., Knecht, C., Lange, J., Saini, B.K., and Peissner, M. (2026). Virtual User Lab: An Interactive System for Simulating User Perspectives with AI Personas for Ideation and Evaluation. UMAP 2026.
- Kumar, C., Saini, B.K., and Staab, S. (2024). Enhancing Online Meeting Experience through Shared Gaze-Attention. CHI EA 24, ACM. Introduced a shared gaze-attention mechanism to improve focus and engagement in online meetings.

Patents

- US11316748B2, Method and System for Generating and Managing Virtual Industrial Devices in an Industrial Network. Granted; filed at Siemens, became an internal product driving 90% test coverage and automation, an early precursor to current digital twin work.
- WO2017076433A1, Intelligent Heat, Ventilation, and Air Conditioning System. Published, filed at Siemens; not granted.
- EP4520570, Improvement of Systems and/or Improvement of Vehicle Systems. Published from the Lotus Tech HMI project.

LANGUAGES

- Hindi, Native
- English, C1
- German, A2

EDUCATION

- MSc, Web and Data Science, University of Koblenz and Landau, Germany, 2019 - 2022
- BE, Electrical, Electronics, and Communications Engineering, University of Rajasthan, India, 2005 - 2009