

Chandan Kumar Sahu

Research Scientist – Generative AI and Agentic Systems at ABB Inc

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inChandankSahu

🔗Scholar

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📍 Raleigh, NC

Profile

A professional researcher with 8+ years of experience in solving business problems with Artificial Intelligence. Skilled in Machine Learning (ML), Natural Language Processing (NLP), Generative Artificial Intelligence (GenAI), AI Agents, graph theory (network analysis), physics-guided machine learning and data visualization.

Applications include manufacturing, computer aided design (CAD), circuit design, information retrieval, Chatbots, Generative Search Engine Optimization (G-SEO), document analysis and requirement engineering.

Education

PhD, Clemson University, USA 2020-2024

Dissertation: Computational representation, analysis and verification of requirements of complex systems

Master of Science, The State University of New York at Buffalo, USA 2017-2020

Thesis: Modeling cyber-physical systems with physics-guided machine learning

Bachelor of Technology, National Institute of Technology Rourkela, India 2010-2014

Research

Skills	Deep learning, ML, NLP, GenAI, Reinforcement Learning Computer vision, Graph theory (Network analysis), A/B testing, Data visualization
Applications	Requirement engineering (RE), Software engineering, CAD Modeling, Additive manufacturing (AM), Circuit Design EDA, Information retrieval, Augmented reality
Programming	Python, Slurm, Matlab, HTML, Git, Linux/Bash
MLOps	Web scraping, CI/CD pipelines, Containerization, Cloud deployments, Version control

Professional Experience

Research Scientist – Generative AI and Agentic Systems at ABB US Corporate Research Center 2025-Present

- Developed MotorMaven, an information retrieval system, powered by a
 - Sales catalog agent for the customers to retrieve relevant ABB products
 - IEC Standards agent to assist the engineers to achieve compliance to industry standards
 - Orchestration agent that integrates multiple information retrieval modules at a single endpoint
- Developed the MiRAGE framework to create multihop multimodal question-answer pairs to evaluate information retrieval systems
- Created DraftGen, an agentic + geometric reasoning framework to generate CAD outline drawings from STEP files
- Created CircuitWeaver, an agentic pipeline to design power electronic circuits from human inputs
- Accelerated the electronic circuit design process by an agentic framework to generate the schematics, bill of materials and the PCB with simulation
- Identify potential opportunities for value creation for the motion and electrification business of ABB
- Develop and protect intellectual properties, disseminate knowledge through publications

Research Assistant at Clemson University – International Center for Automotive Research 2020-2025

Requirements Engineering

- Converted unstructured requirements to ERAS requirements with 27% improvement using LLMs
- Finetuned LLaMA3.1 (8b-instruct-fp16) for the requirement engineering domain using the LoRA PEFT adapter and SFTTrainer with PPO (RLHF) leading to a 13% increase in the well-formed nature
- Elicited verifiable requirements of a system using an agentic-RAG framework powered by GPT-OSS and chain of thought prompting that increased the verifiability by 42%
- Finetuned Sentence-BERT for the RE domain using HF Transformers and PyTorch; used the embeddings and graph theory to create requirement networks for traceability and change propagation
- Built ReqCity, a dockerized NLP tool with CI/CD for requirement visualization, resulting in a 29% reduction in time and 9% increased accuracy in requirement verification

Additive Manufacturing

- Predicted the size of the melt-pool of an AM process using an LSTM network with 90.7% accuracy and synthesized the shape of the melt-pool using cGAN with a SSIM score of 0.91
- Developed a physics-guided ML model that predicted the area of the melt pool with 94% accuracy

Executive at Honda Motorcycle and Scooter India Pvt. Ltd.

2014-2017

Project Leader in New Model Development

- Derived structured requirements from regulations and recognized named entities to identify applicable regulations using rule-based NLP
- Created and maintained the knowledge graph of requirements, regulations, GSRs, certificates and components in PostgreSQL and Neo4J databases – led to 31% reduction in decision making time
- Led cross-functional teams for regulatory compliance, planned and developed test scenarios and test cells; standardized the certification of new models
- Validated and certified seven new 2W models with 42 tests each by statistically analyzing the safety and emission test results

Publications

- Agentic Generation of Schematics: The Case of a DC-to-AC Three-Phase Voltage Source Inverter [Under review at IEEE ECCE 2026]
- MiRAGE: A Multiagent Framework for Generating Multimodal Multihop Question-Answer Dataset for RAG Evaluation [arXiv:2601.15487]
- ReqCity: A City-based Visualization tool for Verification of Requirements to Conform to ISO 29148:2018 [Under review at IEEE TSE]
- A Semantic Network of Requirements from the Contextual Embeddings of Req-sBERT [Under review at ASME IDETC 2026]
- Requirement Allocation from the Tree of a System Requirement Specification Document [Under review at ASME JMD]
- Power Circuit AI: Designing Power Electronic Circuits for Motor Drives with Generative Artificial Intelligence [Invited paper at IEEE IDCD 2026]
- Well-Formed Quality of System Requirements for Verifying to ISO 29148-2018: A Natural Language Processing (NLP) Based Framework and Quantitative Metric [ASME IDETC 2024]
- ReqNet and ReqSim: A Network and Semantic Similarity Dataset of Requirements from the Tree Structure of System Requirement Specifications [ASME JCISE]
- Machine learning based prediction of melt pool morphology in a laser-based powder bed fusion additive manufacturing process [T&F IJPR]
- Security in modern manufacturing systems: integrating blockchain in artificial intelligence-assisted manufacturing [T&F IJPR]
- Artificial intelligence (AI) in augmented reality (AR)-assisted manufacturing applications: a review [T&F IJPR]
- Driven by Data or Derived Through Physics? A Review of Hybrid Physics Guided Machine Learning Techniques with Cyber-Physical System (CPS) Focus [IEEE Access]

Patents

- Hypothetical product embedding for industrial devices [Filed]
- Methods for building domain knowledge databases from industrial data sources [Filed]

Achievements

- Served on review panel for the 'AI and Digital Transformation' and the 'Electronics and Microsystems' innovation spotlights sessions in the TechConnect World innovation Conference and Expo 2026
- National Center for Manufacturing Sciences (NCMS) listed ReqCity as a transformative entry in the Army Digital Transformation Challenge 2024
- NCMS CTMA Technology competition 2025 recognized ReqCity++ as one of the 35 innovative solutions for maintenance and sustenance challenges
- First position in ASME IDETC-CIE Hackathon 2020 for using physics guided machine learning for AM
- Second position in ASME IMECE Hackathon 2020 for additive manufacturing AI solutions
- Organized a workshop for K12 students to build phones to reduce dropout rates in Western New York
- Merit certificate in Mathematics for being among the top 0.1% of the successful candidates in AISSCE 2010