

SIDHARTH S. NAIR

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SUMMARY

Machine Learning researcher specialising in generative models, embodied AI, and visual computing, with research experience at leading European AI laboratories (MPI-INF, DFKI). Experienced in developing diffusion-based motion controllers, LLM-driven systems, and physics-based simulation tools, with two peer-reviewed publications.

SKILLS

Programming Languages: Python, MATLAB, C++

AI, ML & Computer Vision Frameworks: PyTorch, TensorFlow, Hugging Face, OpenCV, scikit-learn, IsaacGym, Blender

Software Engineering Tools: Git, Linux, Docker, Weights & Biases (wandb), \LaTeX

Applied Knowledge:

- **Computer Vision & Graphics:** Scene Understanding, Image Processing, 3D Reconstruction, SLAM, Diffusion Models, Neural Rendering, Physics-based Simulation, Ray Tracing, Motion Synthesis
- **NLP:** Large Language Models (LLMs), LLM fine-tuning, Structured output generation, Human-in-the-loop systems

EXPERIENCE

Max Planck Institute for Informatics (MPI-INF)

Saarbrücken, Germany

Research Assistant — Master's Thesis

Oct 2025 – Present

- Augmenting a diffusion-driven physics based humanoid motion prior with biomechanics-inspired loss guidance to improve stability under external perturbations
- Designed and trained a neural network to estimate ground reference points that influence stability and supervised on insole sensor data

Interactive Machine Learning (IML) Lab, DFKI

Saarbrücken, Germany

Research Assistant

Jul 2024 – Present

- Built **AuditCopilot**, a hybrid LLM-driven anomaly detection system for accounting data, combining learned anomaly scoring with rule-based audit logic and natural language explanations for model decisions
- Achieved **99% reduction in false positives** and **F1 improvement from 0.50 to 0.94** vs. traditional audit rules on synthetic financial ledgers
- Deployed the system via FastAPI and validated end-to-end through a user study with domain experts

Signal and Information Processing Lab, Indian Institute of Science

Bangalore, India

Research Assistant — Bachelor's Thesis

Jun 2022 – Dec 2022

- Co-developed an unsupervised neural precoder for Integrated Sensing and Communication (ISAC) systems [PDF](#)
- Formulated joint beamforming as an unsupervised learning problem, optimising sensing and communication objectives end-to-end without labelled data
- Achieved **8 dB higher** sensing target illumination while **maintaining user SINR of 5 dB**, with the model generalising to user distributions up to **13x larger** than training conditions

PUBLICATIONS

Md Abdul Kadir, [Sidharth S. Nair](#), S.S.M. Vasu, and D. Sonntag, “*AuditCopilot: Leveraging LLMs for Fraud Detection in Double-Entry Bookkeeping*”, **NeurIPS 2025 Workshop on Generative AI in Finance**, San Diego, CA, USA, 2025. [arXiv]

R. S. P. Sankar, [Sidharth S. Nair](#), S. Doshi, and S.P. Chepuri, “*Learning to Precode for Integrated Sensing and Communication Systems*”, **EUSIPCO 2023** (31st European Signal Processing Conference), Helsinki, Finland, 2023. [arXiv]

PROJECTS

SceneChat

Jul 2024 – Aug 2024

- LLM-based modular pipeline with user feedback to convert natural language queries to 3D indoor scenes in Blender

DittoRenderer |

Oct 2023 – Feb 2024

- Custom ray-tracing engine rendering a full scene with global illumination, reflections, and shadows [Website]

EDUCATION

Universität des Saarlandes

M.Sc. Visual Computing

Saarbrücken, Germany
Oct 2023 – Mar 2026 (Expected)

Birla Institute of Technology and Science (BITS) Pilani

B.E. Electrical and Electronics Engineering, CGPA: 8.47/10

Rajasthan, India
Aug 2019 – May 2023

RELEVANT COURSEWORK

Universität des Saarlandes: Machine Learning, Computer Graphics, 3D Computer Vision, High Level Computer Vision, Image Processing and Computer Vision, Advances in Neural Rendering and Reconstruction, Convex Analysis and Optimisation, Image Acquisition Methods, Software Engineering

BITS Pilani: Deep Learning, Computational Learning Theory, Linear Algebra, Probability and Statistics, Optimization, Graphs and Networks, Signals and Systems, Digital Signal Processing, Digital Design

TUTORING

Neural Networks: Theory and Implementation

Course Tutor

Universität des Saarlandes

Oct 2025 – Present

- Designed assignments and taught weekly tutorials for **25+ students** with a focus on deep neural networks and modern architectures

CERTIFICATIONS & SCHOOLS

London Geometry and Machine Learning (LOGML) Summer School

July 2022

- Selected attendee (~100 from 1000+ applicants) at competitive summer school on Geometry and ML, organised by researchers from Imperial College London, Harvard, and UPenn

EXTRACURRICULAR ACTIVITIES

Inspired Karters Formula Student

High Voltage Subsystem Lead

BITS Pilani, Rajasthan, India

Sep 2019 – Jan 2022

- Team Lead for the BMS and Accumulator subsystem of a Formula Student Electric Vehicle (FSEV); team placed **1st overall** at the 2020 FSEV Concept Challenge, Formula Bharat

The Radio Astronomy Club

Lead Project Coordinator

BITS Pilani, Rajasthan, India

Feb 2020 – Jan 2022

- Led LIGO (Laser Interferometer Gravitational-Wave Observatory) based research activities of the club; worked on deep learning methods for gravitational wave detection and parameter inference