

ASHWIN KUMAR KARNAD

✉ ashwin-kumar.karnad@mpsd.mpg.de ✉ ashwinkumar.k.rao@gmail.com
🌐 Webpage: ashwinschronicles.github.io 🐙 Github: [iamashwin99](https://github.com/iamashwin99)

Education

2022 BITS - PILANI UNIVERSITY, INDIA
 *Int. MSc. **Physics and B.E Electronics and Instrumentation** (Dual Major) CGPA - 7.71 / 10.0*

2017 VVS GJ PU COLLEGE, MYSORE - CLASS 12th
 KSEB Board. Marks : Physics - 100%, Chemistry - 96 %, Mathematics 99%

2015 DEMONSTRATION SCHOOL - CLASS 10th
 CBSE Board. 9.8/10 CGPA

All India Rank in competitive examinations: TOEFL (score) 106/120, NGPE- Top 30, KVPY-55, UGC -CSIR NET 67

Interests

- **Experimental and computational condensed matter physics (magnetism and superconductivity).**
- Instrument design, Electrical drive system, Interfacing sensors with microcontrollers, Power management.
- Solving real-world problems using Distributed Ledger Technology and **Neuromorphic Computing**.

Relevant Work Experience

2022-23 *Research Software Engineer, MPI FOR THE STRUCTURE AND DYNAMICS OF MATTER, Hamburg.*
 Worked on **Computational Scientific support**, massively parallel **HPC codes** and **HPC infrastructure** maintenance (hardware and software), contributed to the **development of python packages** like: Postopus - POSTprocessing of OctoPUS simulations; mpsd-software-manager.

Projects and Experiences

Past Projects

- **Studying the effect of high spin orbit coupling material in Josephson Junctions**, at *Superconductivity lab, NISER, Bhubaneswar, India.*
- **Design of a cryogenic probe for transport measurements at Superconductivity lab**, NISER, Bhubaneswar, India.
- Design and Simulation of Battery Management System Algorithms for Electric Vehicle Applications. *Kaynes Technology India Pvt Limited, Mysore, India.*
- Simulation of IR seeker missiles and its counter measure in *Defence Avionics Research Establishment - DRDO, Bangalore, India.*

- **GrayBlock Power:** Decentralized financing of energy projects via smart contracts written on public blockchains. (Worked as software developer and project coordinator)
- **Team Imitato:** Designing an exosuit to control a humanoid that can be beneficial in reaching in-accessible and non-human conditions. (Worked as Electronics, Communication and Haptics Control head)
- **A Novel Stove Stand:** Designed and built a contraption to harness electricity (about 20W) from the otherwise wasted heat energy produced while burning LPG gas for cooking. It also reduced the cooking time.
- **Pressure sensitive mat:** A mat that can sense touch, enabling the determination of different poses such as Running, Jumping, one leg hop etc.. (Worked in electronics and algorithm design).
- Past electronics team member of **Hyperloop India** and **Project Kratos**.

For more completed projects visit my web page, ashwinschronicles.github.io

Ongoing Projects

- **comfybikes.de:** A simple and smart app that helps you find the optimal saddle height for your bike using image detection techniques.
- **Mechanistic interpretability of Neural networks:** reverse-engineering neural networks from the learned weights down to human-interpretable algorithm.

Articles and Publications

- Senapati, T., **Karnad, A.K.** & Senapati, K. Phase biasing of a Josephson junction using Rashba–Edelstein effect. **Nature Communications** 14, 7415 (2023)
- Presented a paper entitled “Algorithms in ancient Indian Mathematics and Astronomy” at “National Conference on Ancient Indian Knowledge: Science and Technology 2018”, *National Council of Educational Research and Training, New Delhi*.
- “Gravitational waves really exist!”. *Dream 2047 (Vigyanprasar)*, 18(7): 28–29, Apr. 2016.
- Review articles on scientific and hobbyist instruments on element14.com

Honors and Awards

2023	1st place, Rad-Daten-Hackathon: worked on comfybikes.de an app to suggest optimal saddle height for your bike using image detection.
2022	1st place, COMPAR EU hackathon: Created an AI-based solution for a data platform which helps patients manage their serious chronic illness.
2019	National top 30 in NGPE-19 exam (Graduate physics exam with 11372 candidates).
2019	3 rd place in Open CBR Hackathon organised by University of Leeds.
2018	Awarded Kishore Vaigyanik Protsahan Yojana (KVPY) 2017 Fellowship by Govt. of India .

- 2018 Offered Innovation in Science Pursuit for Inspired Research (INSPIRE) 2017 Scholarship by Govt. of India.
- 2016 Awarded ISCA Travel award by Infosys Foundation.
- 2014-16 Participated in 103rd Indian Science Congress held at Mysore, India (2016); IRIS science fair organised by Intel at Delhi, India (2016); Rashtriya Kishore Vaigyanik Sammelan of 102nd Indian Science Congress held at Mumbai, India (2015); 41st Jawaharlal Nehru National Science Exhibition at Chandigarh (2014) (Presenting the device stated as “A Novel Stove Stand”).

Relevant Coursework

PHYSICS : • Quantum Mechanics I&II • **Non-Linear Dynamics** • **Solid State Physics** • **Atomic and molecular Physics** • Nuclear and Particle Physics • **Quantum Information and Computing** • Quantum Information Theory • Electromagnetic theory I&II • Classical Mechanics • Statistical Mechanics

ELECTRONICS : • **Analog and Digital VLSI design** • Microelectronics • Microprocessors and interfacing • Digital circuits • Electric Machines • Signals and Systems • Control Systems • Digital Image Processing • Modern Control Systems • **Transducers and measurement techniques** • **Electronics instruments & instrumentation technology** • Object Oriented Programming

Skills

Computational: • **Python** (pytest, numpy, pandas, xarray, scipy, plotting libraries) • **Shell** (bash, zsh, nu) • **Git** • **LabVIEW** • **LTspice** • **LaTeX** • 3D CAD modeling (Onshape, Fusion 360) • PCB Design (Eagle CAD) • **Matlab** • JavaScript • C++

Instrumentation: • Photolithography • DC Magnetron sputtering • Physical Property Measurement System (DCR and VSM) • **SEM, FIB and GIS**

List of Referees

1. PROF. KARTIKESWAR SENAPATI (*Master's Thesis supervisor*)
Associate Professor
School of Physical Sciences
National Institute of Science Education and Research,
Bhubaneswar – 752050, Odisha, India.
Email: kartik@niser.ac.in
2. PROF. HANS FANGOHR (*Current Supervisor*)
Head - SSU Computational Science
Max Planck Institute for Structure and Dynamics of Matter
Luruper Chaussee 149
22761 Hamburg, Germany
Email: hans.fangohr@mpsd.mpg.de
3. DR. DHAVALA SURI (*Research Mentor*)
Assistant Professor
Centre for Nano Science and Engineering (CeNSE),
Indian Institute of Science,
Bangalore, Karnataka, India.
Email: dsuri@iisc.ac.in