

## ASHWIN KUMAR KARNAD

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🌐 [Webpage: ashwinschronicles.github.io](https://webpage.ashwinschronicles.github.io)  Github: iamashwin99  LinkedIn

### Publications

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- Senapati, T., **Karnad, A.K.** & Senapati, K. Phase biasing of a Josephson junction using Rashba–Edelstein effect. **Nature Communications** 14, 7415 (2023)

### Relevant Work Experience

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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. Supported scientists in creating open-source, reproducible scientific software workflows.

### Education

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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 12<sup>th</sup>  
*KSEB Board. Marks : Physics - 100%, Chemistry - 96 %, Mathematics 99%*

2015     DEMONSTRATION SCHOOL - CLASS 10<sup>th</sup>  
*CBSE Board. 9.8/10 CGPA*

### Interests

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

### Honors and Awards

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2023     2nd place, Kühne+Nagel and Google hackathon: Created AutoQuote, an AI service that automatically replies to customer email with a price quote for shipment requests.

2023     2nd place, ADLIFE hackathon: Created an LLM based solution to classify statements in a medical guidelines into diagnostic, therapeutic, warning remarks.

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

## Projects and Experiences

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### 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](https://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.

## Relevant Coursework

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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

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**Computational**: • **Python** (pytest, numpy, pandas, xarray, scipy, plotting libraries) • Shell (bash, zsh, nu) • Git • LabVIEW • LTspice • Docker •  $\text{\LaTeX}$  • 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

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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,  
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