

Dr. Rathin K. Joshi

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🌐 [Portfolio Website](#)

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Summary: Biomedical researcher/engineer with proficiency in real-time multi-channel signal acquisition, adaptive filtering, and frequency domain analysis for electro physiological data from humans and rodents. Proven track record in algorithm design, prototyping, and real-time data acquisition for the brain-computer interface (BCI) and wearable systems.

EDUCATION

- **Ph.D., Electronic Systems Engineering**
IISc Bangalore, 2018–2024 | CGPA: 7.9/10
Thesis: Event-Related Potential Interpretation Approaches for Neonatal Hearing Screening [\[Link\]](#)
Submitted: Dec 2023, Defended: Apr 2024.
- **M.Tech., VLSI and Embedded Systems**
DA-IICT, Gandhinagar, 2013–2015 | CGPA: 7.55/10
Thesis: SET-based 4-bit ALU Design, Simulation & Optimization [\[Link\]](#)
Submitted: May 2015, Defended: Jul 2015.

PROFESSIONAL EXPERIENCE

- **Postdoctoral Researcher, IISc Bangalore**
Jan 2024 – Present
 - Continued R&D for neonatal hearing screener and wearable ERP systems.
 - Developed invasive EEG analysis pipelines from rodent models.
 - Mentored 4+ doctoral and postgraduate researchers.
- **System Engineer, TCS Pune**
Aug 2015 – Dec 2017 — Client: Ford Motors, Detroit
 - Modular Logic Development and Validation for automotive electronics.
 - Coordinated with onsite testing teams to incorporate updates and new requirements.

KEY RESEARCH PROJECTS

- **Neonatal Hearing Screener:** Extracts cortical & brain-stem auditory responses
- **Epileptic Seizure Detection and Classification:** Mimics visual inspection of interictal EEGs for epilepsy classification.
- **Cognitive Screener:** Extracts visually evoked responses for attention and memory screening.
- **Neural Inference Extraction:** Analyzes ECoG/sEEG data for epilepsy and Parkinson’s using rodent MEAs.
- **Novel SET-based 4-bit ALU Design:** Compares SET-CMOS hybrid and standard CMOS for compact ALU design.

SKILLS

Expertise	Biomedical Signal Processing, Brain-Computer Interfaces, Wearables, EEG/ERP Analysis, Statistics, Machine Learning, Programming & Debugging
Software	MATLAB, Python, Audacity, COMSOL, Origin, HTML, LaTeX, SolidWorks, SPICE Simulators
Research	Methodology, Prototyping, Technology Transfer, Ethical Protocols, Regulations
Soft Skills	Research Documentation, Presentation Skills, Teaching, Adaptability, Team Work

SELECTED PATENTS

TOTAL: 6+

- **EEG Seizure Detector & Classifier**, 2022 – *Granted*
- **Sensory Pathway Scanner**, 2023 – *Granted*
- **Neonatal Headgear Interface**, 2025 – *FER Responded*
- **L-shaped Implant for Brain Stimulation**, 2024 – *FER Responded*

SELECTED PUBLICATIONS

TOTAL:13+

- Joshi et al., "Automated ABR and MMN using customized headband for Hearing Screening," *Biomed Sig Proc & Cont*, 2024. [\[Link\]](#)
- Joshi et al., "Spatiotemporal EEG analysis for seizure detection," *Biomed Sig Proc & Cont*, 2023. [\[Link\]](#)
- Chatterjee et al., "Microelectrode Array for Rodent Epileptic Models," *Biomed Microdevices*, 2023. [\[Link\]](#)
- Joshi et al., "P300 ERP Extraction using Wearable Device," *IEEE BIOCAS*, 2022. [\[Link\]](#)

AWARDS AND HONORS

- SITARE-GYTI Award for Neonatal Screener [\[Link\]](#)
- SHIFT Health Hackathon Runners-up [\[Link\]](#)
- SmartX Health Hackathon Winner [\[Link\]](#)

DEMONSTRATION

TOTAL: 20+

- Towards single Event P300 Extraction.
Project Completion Demonstration , (Jun. 08-09, 2022)
DIPAS, DRDO, Delhi [\[Link\]](#)
- ERP Extractor Development and Applications.
BCL Workshop, (Jan. 09-13, 2023)
Faculty Hall, Indian Institute of Science, Bangalore. [\[Link\]](#)

TEACHING

- **Neuroscience & Neuroinstrumentation** (*Online*):
[\[BCI Basics\]](#), [\[EEG Processing\]](#), [\[Microelectrode Arrays\]](#)
- **Advanced Neural Science for Engineers** (*Online*):
[\[Lithography\]](#), [\[Fourier Optics\]](#), [\[EEG Applications\]](#)
- **Mathematical Aspects of BioSystems** (*Online*):
[\[Signal Classification\]](#), [\[Signal Acquisition\]](#)
- **Analog Circuit Design** (*Offline*):
Topics Taught: OpAmp Basics, Arithmetic Circuits, ADC, DAC, Clippers, Clampers
- **Engineering Mathematics** (*Offline*):
Topics Taught: Calculus, Linear Algebra

ADDITIONAL ACHIEVEMENTS

- Intercollegiate chess player (UG & PG).
- MATLAB Cody: World Rank 314 / 162,098.
- GATE 2013: AIR 1667 / 2,56,135 (ECE).
- CSIR NET 2012: AIR 40 / 27216 (Engineering Sciences).