

SHASHI BHUSHAN JHA

Communication Systems Researcher | Wireless Communications & Emerging 6G

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RESEARCH PROFILE

M.Tech graduate in Electrical Engineering (Communication and Signal Processing) with research experience in mathematical modeling and simulation of wireless systems. My thesis combined analytical derivations with MATLAB Monte Carlo validation for multi-user NOMA, including BER, throughput, and SIC error modeling. Seeking doctoral research across wireless communications and emerging 6G technologies, building on communication theory, signal processing, and UAV simulation experience. My interests include intelligent networks, ISAC, NTN, optical and quantum communication; these are directions for further study, not claims of completed research.

RESEARCH INTERESTS

- Wireless communications and emerging 6G; multiple access, PHY-layer signal processing, and performance analysis
- AI/ML for wireless networks; integrated sensing and communication (ISAC), sensing, and localization
- Non-terrestrial networks (NTN), satellite and UAV communications, and optical communication
- Quantum communication and information, QKD, quantum channels and networks, and post-quantum security

EDUCATION

Master of Technology in Electrical Engineering

2024–2026

Indian Institute of Technology Ropar

CGPA: 7.78/10

Specialization: Communication and Signal Processing

Relevant Coursework: RF Systems for Communication; Analytical Techniques for Signal Processing; Detection and Estimation Theory

Thesis: "Generalization of Downlink and Uplink NOMA Framework for Future Generation Technology"

Supervisor: Dr. Satyam Agarwal

Bachelor of Engineering in Electrical Engineering

2016–2022

Purbanchal University, Biratnagar, Nepal

CGPA: 2.98/4.00

Major: Power Systems

MANUSCRIPT IN PREPARATION

Analytical BER Study with Hardware Validation for N-User NOMA

Internal review

Prepared for submission to an IEEE Transactions journal; currently undergoing internal faculty review.

RESEARCH EXPERIENCE

Master's Thesis Research — Power-Domain NOMA

Jul 2025–May 2026

Indian Institute of Technology Ropar

Communication and Signal Processing

- Developed a unified BER and throughput framework for 2–4-user uplink and downlink power-domain NOMA over flat Rayleigh fading with explicit SIC-error modeling.
- Derived closed-form two-user downlink BER expressions and SIC-consistent uplink and generalized multi-user formulations.
- Evaluated power allocation, distance-based user ordering, SIC depth, NOMA–OMA throughput, and oversampling through Monte Carlo simulation.
- Showed how oversampling reduces effective noise variance while user ordering and error propagation continue to govern SIC reliability.

Research Intern — Autonomous Systems

Sep 2025–Mar 2026

SkyFlock Uavation Pvt. Ltd.

Remote

- Studied swarm-drone architectures and inter-drone communication protocols.
- Used C++, ROS 2, MAVLink, Gazebo, PX4, and MAVSDK for UAV simulation, testing, control, and telemetry analysis.

PROFESSIONAL EXPERIENCE

- Trainee Associate — Prosecution and Drafting Department

InventIP Legal Services LLP

18 May 2026–12 Aug 2026

Gurugram

- Worked in the Prosecution and Drafting Department, gaining professional experience with patent prosecution and drafting workflows.
- Instructor — Computer Science and Mathematics

Delhi Public School, Dharan

Apr 2022–Dec 2023

Nepal

- Taught Python programming, computational thinking, and mathematics; developed course materials and mentored senior students.

SELECTED TECHNICAL PROJECTS

- Rat-Race Hybrid Coupler

Course project

- Designed and simulated a rat-race hybrid coupler in Ansys HFSS for the RF Systems for Communication course.
- Echo Cancellation Using Adaptive Filtering

Jan–May 2025

- Implemented normalized least-mean-square adaptive filtering in MATLAB to suppress acoustic echo and assess convergence and signal-quality behavior.
- Audio Signal Analysis

2024

FFT, spectrogram, and MFCC-based time-frequency analysis using Python, SciPy, and Librosa.
- Smart Surveillance

2024

Real-time motion detection and object tracking using Python, OpenCV, edge detection, and frame differencing.

TECHNICAL SKILLS

Wireless and DSP	Power-domain NOMA, SIC, BER analysis, Rayleigh fading, communication theory, detection and estimation, adaptive filtering
Research Methods	Analytical modeling, Monte Carlo simulation, performance characterization, technical writing, literature review
Programming	MATLAB, Python, C ++; NumPy, Pandas, SciPy, scikit-learn, OpenCV
Tools and Platforms	Ansys HFSS, Linux, Git/GitHub, ROS 2, Gazebo, PX4, MAVSDK, Docker

ADDITIONAL INFORMATION

Certifications	WIPO General Course on Intellectual Property; WIPO Essentials of Patents; CS105: Introduction to Python; Introduction to the Internet of Things
Languages	English (professional), Hindi (full professional), Nepali (native/bilingual), Maithili (native/bilingual)