



Harsh Raj
Doctor of Philosophy (Ph.D.)
In Electronics and Electrical Engineering
Indian Institute of Technology Guwahati

+91-9679290157
h.raj@iitg.ac.in
harshraone@gmail.com
GitHub: Harshra1-ultra
LinkedIn: harsh-raj-0a3a72203
Website

EDUCATION

Degree	Institute / Board	CGPA / Percentage	Year
Ph.D.	Indian Institute of Technology Guwahati	8.25	2022 – Present
M.Tech.	Indian Institute of Technology, Ropar	8.45	2020 – 2022
B.E.	University Institute of Technology, Burdwan	79.4%	2015 – 2019
Senior Secondary	Bihar School Examination Board (B.S.E.B.)	65.8%	2014
Secondary	Bihar School Examination Board (B.S.E.B.)	80.4%	2012

PUBLICATIONS

- [Journal] I. Agrawal*, **H. Raj***, and B. R. Manoj, “NOMA-Assisted ISAC System: Downlink and Uplink Performance in Rician Fading Channels,” *IEEE Transactions on Cognitive Communications and Networking*, vol. 12, pp. 3073–3087, 2026. (*Equal Contribution)
- [Conference] **H. Raj** and B. R. Manoj, “Cascaded Channel Statistics and Target Detection Analysis for IRS-Assisted ISAC Employing NOMA,” in *Proc. IEEE National Conference on Communications (NCC)*, IIT Delhi, India, Mar. 6–9, 2025, pp. 1–6.
- [Conference] **H. Raj**, U. Singh, and B. R. Manoj, “On the Performance of IRS-Assisted SSK and RPM over Rician Fading Channels,” in *Proc. IEEE 99th Vehicular Technology Conference (VTC2024-Spring)*, Singapore, Jun. 24–27, 2024, pp. 1–5.
- [Book Chapter] B. R. Manoj*, N. M. Baishya*, and **H. Raj***, “Machine Learning for Wireless Communications: Applications and Security,” in *Next-Generation Wireless Systems: Fundamentals and Applications*, Springer, Singapore, pp. 309–368, 2025. (*Equal Contribution)

EXPERIENCE & TRAINING

- Vocational Training in Advanced Telecom** July 2017 – Aug 2017
Engineering Trainee CTTC, BSNL, Kolkata
 - Comprehensive training on Telecom Networks, Switching, Signaling and Routing, IN/ISDNA, TCP/IP, OFC, GSM, SDH, CDMA, DWDM, and GPRS/3G.
 - Hands-on exposure at C-DOT Lab, Broadband & NIB Lab, Optical Fiber Cable (OFC) Lab, SDH, and Power Plant Lab.

PROJECTS

- Super Resolution Using Deep Learning** June 2021 – June 2022
M.Tech. Dissertation under Prof. J. S. Sahambi, IIT Ropar GitHub
 - Developed deep learning architectures (ResNet and Auto-Encoders) to reconstruct high-resolution images up to 8× scaling factor for wireless IoT devices, remote sensing, and surveillance.
 - Evaluated performance against traditional interpolation schemes using GPU (CUDA) acceleration in TensorFlow and Python.
- IoT Based Smart Farming** June 2018 – June 2019
B.E. Capstone Project, University Institute of Technology Burdwan
 - Built an automated crop irrigation system using capacitive soil moisture sensors and an Arduino-UNO microcontroller.
 - Interfaced ESP8266 NodeMCU Wi-Fi module to stream sensor data to the Blynk IoT cloud platform for remote water control.
- Face Detection Using CNN (Convolutional Neural Network)** Mar 2021 – Apr 2021
Digital Image Processing under Dr. Subrahmanyam Murala, IIT Ropar GitHub
 - Implemented a real-time face detection and recognition pipeline using VGG-16 deep convolutional neural network in OpenCV and TensorFlow.
- Probabilistic Approach For Image Detection in Real-Time Video** Mar 2021 – June 2021
Estimation & Detection Theory under Dr. Satyam Kumar, IIT Ropar GitHub
 - Applied Bayesian Detection Theory with prior probabilities to identify specific target images in live webcam video streams.

TECHNICAL SKILLS

- Programming Languages:** C, C++, Python, MATLAB, Verilog HDL
- Frameworks & Libraries:** TensorFlow, Keras, PyTorch, OpenCV, Scikit-learn, Skimage
- Tools & Platforms:** MATLAB, L^AT_EX, Kaggle, Google Colaboratory, GitHub, Linux, Xilinx Vivado
- Domains of Expertise:** Integrated Sensing & Communication (ISAC), Intelligent Reflecting Surfaces (IRS), NOMA, MIMO, Deep Learning, Image Super-Resolution

ACHIEVEMENTS & EXTRACURRICULAR ACTIVITIES

- Awarded the prestigious **Ministry of Education (MoE) Doctoral Fellowship**, Government of India, for Ph.D. at IIT Guwahati (2022 – Present).
- Presented poster on “*Super-Resolution Using Deep Learning*” at the Electrical Engineering Research Scholar’s Forum (EE-RSF), IIT Ropar.