Sagar Kumar

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EDUCATION

Indian Institute of Science (IISc), Bangalore, India *Jan 2022 – Present*
Mtech Research (Ongoing)
CGPA: 7.5/10

National Institute of Technology (NIT), Silchar, India *Aug 2019 – June 2021*
M.Tech in Communication and Signal Processing
CGPA: 9.67/10

Ambedkar Institute of Advanced Communication Technologies & Research, New Delhi, India *Aug 2015 – June 2019*
B.Tech in Electronics and Communication Engineering
CGPA: 9.01/10

PUBLICATIONS

(Journal) Wireless-Powered UAV-Enabled Communications Over Mixed LoS and NLoS Channels (Wireless Personal Communications)
Sagar Kumar, Devendra Singh Gurjar, Ha H. Nguyen, Wasim Arif
- Analyzed a wireless-powered UAV communication network under mixed Line-of-Sight (LoS) and Non-Line-of-Sight (NLoS) conditions.
- Developed a generalized framework incorporating various scenarios, including LoS/NLoS conditions and different fading environments.
- Examined the impact of UAV positioning on network performance across diverse environments and altitude variations.

(Journal) Dual-circular slotted low-profile ultrawideband textile MIMO antenna with ground slot stub for Sub-6G, ISM, and IoT applications (Optical and Quantum Electronics)
A.B. Dey, S. Kumar, S. Modak, S. Debnath, W. Arif
- Designed a novel compact dual-port MIMO antenna for ultrawideband, Sub-6 GHz, Industrial, Scientific, and Medical (ISM) band applications.
- Developed a low-profile textile-based antenna with dual-circular slots and ground slot stub for enhanced performance.
- Achieved excellent isolation characteristics and wideband operation suitable for IoT and wearable communication systems.

(Conference) Machine Learning-Assisted Microwave Probing System for Comprehensive Human Tibial Fracture Detection (IEEE-CONNECT)
R. Mondal, A.B. Dey, W. Arif, S. Kumar
- Designed a novel compact ultra-wideband (UWB) MIMO antenna for fracture detection.
- Collected data using the developed MIMO probe.

- Applied machine learning algorithms, including Random Forest, AdaBoost, and Gradient Boosting, to predict fractures with high accuracy.

(Journal) Elastomeric Textile Substrates for Compact, Low-Profile AMC-Based Antennas in Medical and IoT Applications (IEEE Internet of Things Journal)
A.B. Dey, S. Kumar, W. Arif, J. Anguera
- Designed a flexible artificial magnetic conductor (AMC)-integrated antenna using elastomeric textile substrates.
- The antenna operates within the 4.76–6.08 GHz range, covering the 5.8-GHz ISM band and 5-GHz Wi-Fi band for IoT applications.
- Demonstrated stability and high efficiency under structural deformations and human body loading, outperforming monopole antennas.

(Journal) Provably Convergent Algorithms for HS-MS Fusion (Submitted to Inverse Problems)
S. Kumar, V.S. Unni, Kunal N. Chaudhury
- Developed a novel denoiser for hyperspectral image processing.
- Integrated the denoiser into the fusion framework, providing mathematical guarantees for convergence and achieving high-quality fusion results.

(Conference) From Heuristic to Theory: iVAT as a Subdominant Ultrametric with Robustness Guarantees (Submitted to ICASSP)
A. Mazumder, A. Roy, S. Kumar,Punit Rathore
- Formal analysis of iVAT algorithm

WORK EXPERIENCE

Trainee Patent Analyst
Dolcera Pvt. Ltd., Hyderabad
June 2021 – December 2021
- Analyzed patent landscapes and provided insights to major corporate clients regarding potential infringements in emerging communication technologies.
-Conducted in-depth research on 5G technologies, prepared detailed reports, and presented findings to the team.
-Played a key role in the WLAN technologies team, thoroughly reviewing WLAN standards and presenting comprehensive landscape analyses.

ACADEMIC PROJECTS

Provably Convergent Algorithms for HS-MS Fusion
M.Tech Research Thesis, Guide: Prof. Kunal Narayan Chaudhury, IISc Bangalore Jan 2022 – Present
Integrated the denoiser into the fusion framework, providing mathematical guarantees for convergence and achieving high-quality fusion results.

UAV-Assisted Wireless-Powered Communication Over Mixed LoS/NLoS Channels
*Master's Thesis (**A**$^+$)*, Guide: Dr. Wasim Arif & Dr. D. S. Gurjar Aug 2020 – June 2021
- Conducted performance analysis of wireless-powered UAV communication under mixed Line-of-Sight (LoS) and Non-Line-of-Sight (NLoS) channel conditions.
- Developed a generalized framework to evaluate the impact of UAV positioning on network efficiency in varying environments.

Design of a Rectenna System for Wireless Energy Harvesting at 2.45 GHz
*Bachelor's Thesis (**A**$^+$)*, Guide: Dr. Sanjeev Kumar Jan 2019 – May 2019
- Designed a microstrip patch antenna and a 4×1 antenna array operating at 2.45 GHz for wireless energy harvesting.
- Developed and optimized rectifier circuits to efficiently convert RF energy into usable DC power at 2.45 GHz.

INTERNSHIP / TRAINING

Data Structure Algorithm with Java
New Delhi, India July 2018 – August 2018
- Completed comprehensive training on data structures and algorithms using Java programming language.
- Gained proficiency in implementing various data structures and algorithmic approaches for problem-solving.

Swachh Bharat Mission
New Delhi, India June 2018 – July 2018
-Participated in national cleanliness campaign focusing on community development and social responsibility.
-Contributed to awareness programs and implementation of cleanliness initiatives in local communities.

ARM Microprocessor with Embedded C
New Delhi, India January 2018 – February 2018
-Gained hands-on experience with ARM microprocessor architecture and embedded C programming.
-Developed practical skills in embedded systems design and microcontroller programming.

MTNL Industrial Training
New Delhi, India June 2017 – July 2017
-Completed industrial training at Mahanagar Telephone Nigam Limited (MTNL).
-Gained exposure to telecommunications infrastructure and network operations.
-Learned about practical aspects of communication systems and network management.

TEACHING EXPERIENCE

Signal Processing in Practice (Lab Course)
Department of Electrical Engineering, IISc Bangalore
Jan 2024 – Apr 2024

-Taught total variation regularization for one-dimensional signals.
-Guided students in implementing iterative solutions using proximal gradient descent.

Digital Electronics
Department of Electronics and Communication Engineering, NIT Silchar
Jan 2021 – Apr 2021
-Taught fundamental digital circuit concepts, including logic gates and digital circuit verification.

SCHOLARSHIPS

MHRD Scholarship (2022–2025)
Awarded by the Ministry of Education, Government of India, for the duration of the program at IISc Bangalore.

PG Scholarship (GATE) (2019–2021)
Awarded by the Ministry of Education, Government of India, for the duration of the M.Tech program at NIT Silchar.

RELEVANT COURSEWORK

Linear Algebra and Applications
Random Processes
Computational Methods of Optimization
Advanced Convex Optimization
Digital Image Processing
Advanced Image Processing
Statistical Signal Processing
Detection and Estimation
Wireless Communication
Information Theory
MIMO Systems
Digital Communication
Communication Networks
Machine Learning

REVIEWER ACTIVITY

IEEE Internet of Things Journal
Journal of Autonomous Intelligence
IEEE Signal Processing Letters
Qeios
MLIS 2024 (Conference)
Scientific Reports (Nature)