Dr Aakash Bansal (Early Career Researcher)

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1 SUMMARY

A Royal Academy of Engineering UK Intelligence Community Research Fellow and Lecturer in Applied Electromagnetics at Loughborough University (LU), I am a multi-award-winning early career researcher. I finished my PhD in September 2022. Since 2024, I have built a team of eight researchers (3 Post-Doctoral Research Associates, 4 PhD Students and 1 PG Student) and have an extensive experience in RF design, reconfigurable antenna arrays, metamaterials & metasurfaces, RF lenses, microcontrollers, fabrication, and measurement. I have collaborated on > 30 consultancy projects for industries in India and UK. I have >60 peer-reviewed papers with three key research activities being commercialised. My research is focused on active mmWave beam-steering antenna, dielectric lenses, metasurfaces, orbital angular momentum waves, and satellite communications on the move.

2 WORK EXPERIENCE

- **Lecturer (Eq. to Assistant Professor) in Applied Electromagnetics, Loughborough University, UK** (Sept 24 – Present)
  Lecturer in parallel to the Royal Academy of Engineering Research Fellowship, responsible for supervising research students, writing new research grants, inviting and maintaining national and international collaborations, co-manage research facilities and teaching subjects such as microwave engineering, electromagnetics and antennas.
- **Royal Academy of Engineering UK IC Research Fellow, Loughborough University, UK** (Jan 24 – Present)
  Funded by the Royal Academy of Engineering under their prestigious scheme for UK Intelligence Community, working with multiple industrial partners on developing new beam-steering antennas for CubeSats. Additional responsibilities include writing new research grants, inviting and maintaining international collaborations, quasi-manage research labs and supervising students.
- **Research Associate, Loughborough University, UK** (Feb 23 – Dec 23)
  Collaborating on several projects focused on antennas, metasurfaces, orbital angular momentum, additive manufacturing for RF applications and satellite communication, consulting on industrial and academic projects, supervising research projects and writing new research grant applications.
- **Future Communications Engineer, Satellite Applications Catapult, UK** (Oct 22 – Jan 23)
  Responsible to work directly with CTO team on industrial consultation projects; developed a new Ku-Band beam-steering antenna for One Web satellite handover at ground stations; advised on new technology for applications in satellite communications.
- **Research Assistant, Loughborough University, UK** (Apr 19 – Sept 22)
  Assisting with projects focused on antenna design and measurement, consulting on industrial and academic projects, writing new grant applications and supporting teaching modules (antennas, digital systems, and electronic circuits).
- **Head of Innovation (Voluntary Position), National Indian Students & Alumni Union UK** (Jun 19 – Jul 21)
  Promoted within a year to Head of Innovation, lead a team of 12 volunteers providing end-to-end query and grievance redressal for students, and volunteer recruitment and lead projects to enable the organisation to leverage technology.
- **Innovation Coach and Consultant, Connecting Dreams Foundation** (Jul 18 – Feb 19)
  Responsible for consulting and training of students and faculty under Atal Tinkering Labs on design innovation, introduction to electronics and programming established among 2400 schools throughout India.
- **Research Associate, CSIR – Central Electronics Engineering Research Institute, Pilani (India)** (Jul 17 – Feb 19)
  Developed a computationally efficient, integrated, and dynamic model for the design of Staggered Double Vane Slow Wave Structure (SDVSWS) and beam-wave interaction analysis of a planar Traveling Wave Tubes (TWT) with a sheet electron beam to determine its RF performance.

3 EDUCATION

- **Doctor of Philosophy (Ph.D.)** (2019 – 2022)
  Loughborough University, UK
  Dissertation: Active Beam-Steering mmWave Antenna System for 5G and Beyond (DOI)
- **Bachelor of Technology (B.Tech.):** *78.3%, Ranked in top 15 out of 200.* (2013 – 2017)
  Guru Gobind Singh Indraprastha University, New Delhi (India)
  Major: Electronics and Communication Engineering
  Dissertation Project: Implementing Vehicular ad-hoc Network with off-the-shelf Components

4 SKILLS

- **Electromagnetic Simulation and Antenna Designing** with EM modelling tools such as CST Microwave Studio, Ansys HFSS, Empire XPU, Microwave AWR Office, and Keysight Advanced Design Suite (ADS).
- **Programming and Scripting** in C/C++, MATLAB, Python and MS Excel/Google Sheets for automation and data analysis; and building embedded systems and automation units using microcontroller/microprocessor boards including Arduino, AVR MCU, Raspberry Pi and NodeMCU.

- **Operating Lab Equipment** including anechoic chamber, network analysers, spectrum analysers, 3D-printers, etc; and manufacturing PCB based antenna designs.
- **Research Interests**: Electromagnetics, Antenna Arrays, Microwave and Millimeter Wave Communication, Metamaterial and Metasurfaces, Dielectric Lenses, Space Communication, 5G/6G, Beamforming/Beam Steering Antennas, OAM waves.

5 FUNDING SECURED

Received over £1M in research funding within one year of being an academic

- **S-Band Intelligent Antenna System for PNT in Remote Areas** (Oct 25 – Mar 27)
  European Space Agency
  Value: £ 235,000 to LU and £ 220,000 to GMV
  The project is to develop an intelligent S-band beamforming antenna that can sustain its gain in adversarial scenarios and provide PNT services in remote locations.
- **UK-US Alliance on New Physical Layer Security for Wireless Infrastructure** (Oct 25 – Mar 26)
  UKRI Engineering and Physical Sciences Research Council
  Value: £ 100,000 from EPSRC
  The project is a pre-funding to identify potential threats and vulnerabilities within future 6G wireless communication infrastructure, especially, reconfigurable intelligent surfaces at millimeter-wave bands.
- **Signal of Opportunity for LEO-based PNT Service with a Fast Beam-Steering Antenna** (Jun 25 – Mar 26)
  Defence and Security Accelerator
  Value: £ 90,000 to LU and £ 110,000 to GMV
  The project is to commercialise a Luneburg lens-based ground station antenna previously developed within the fellowship programme.
- **Innovation Launchpad Network+ Researcher in Residence Funding** (Aug 24 – Mar 26)
  Engineering and Physical Science Research Council (EPSRC)
  Value: £ 50,000
  Project focuses on developing an industrial demonstrator for beam-steering antennas hosted on a CubeSat. This project will aim to market the findings of RAEng UK IC Fellowship outcomes.

- **UK Intelligence Community Research Fellowship** (Jan 24 – Dec 25)
  Royal Academy of Engineering
  Value: £ 275,000 (£ 200k from RAEng and £ 50k from LU, with additional support worth £ 25k from Industrial Partners)
  Project titled Small Platform Antennas for CubeSats (SPACE) focuses on developing novel low-power beam-steering leaky-wave antennas at X-band using additive manufacturing techniques for applications in small satellites.

Information about new submitted funding applications available on request.

6 AWARDS AND ACHIEVEMENTS

- Most Cited Paper in Electronics Weekly 2024.
- Recipient of Royal Academy UK Intelligence Community Fellowship 2023.
- Recipient of *Loughborough University's Doctoral President's Award 2022* (LU most prestigious doctoral award).
- Recipient of *Sir Robert Martin University Prize 2020* (LU most prestigious student award).
- Runner-up for *Loughborough University's PhD Award for Overall Impact 2020*.
- Recipient of *Action Volunteer Bronze Award 2020* by LU Students' Union for STEM Promotion Activities.
- Recipient of *Electronics Weekly BrightSparks 2020 Award* for research and STEM Promotion in the UK.
- Recipient of *Young Engineer Award 2019* by CSIR-CEERI, Pilani for research and supporting collaborations.
- *Exemplary Performance Award for Student Training and Research 2017* by MSIT, India for developing collaborative research opportunities and training undergraduate students.
- Recipient of *IEEE Computer Society Richard E. Merwin Student Scholarship 2016*.
- Recipient of *MIT GSW Fellowship 2016* for the proposed idea of self-sustained LED Bulbs.
- Received Project Funding for Design of Self Sustained LED Bulbs from NGO: Sristi.
- Won *IEEE MTT-S YouTube/Youku Video Contest* for a demonstration of Offline GPS.
- Recipient of the *IEEE Delhi SAC Outstanding Student Volunteer Award 2016*.
- Winner of four hardware hackathons organised by TATA power, DTU 2015, IIIT 2016, etc.
- Winner of six paper presentation competitions organised by MSIT 2016, JMI 2016, etc.

7 POSITIONS OF RESPONSIBILTY

- Committee Member, IEEE Standards Committee (2025 – Present)
- Co-Lead, Active Metamaterials SIG, UK Metamaterials Network (2024 – Present)
- Publicity, YP and Technical Program Committee, IEEE Microwave, Antennas and Propagation Conference 2024, India.
- European Liaison, IEEE Space, Aerospace and Defence Conference 2024, India.
- Associate Editor, IEEE Open Journal of Antennas and Propagation Special Issue.

- ❖ Reviewer for IEEE TAP, AWPL, MWTL, OJAP, Access, IET EL, IET MAP, etc.
- ❖ Advisor, Atal Innovation Mission, Govt. of India (2017 – 2019)

8 JOURNAL PUBLICATIONS (KEY PAPERS FROM LAST 3 YEARS, PUBLISHED >60 PAPERS IN LAST 6 YEARS)

1) (Under Review), A. Kumar, A. Bansal, et al, "Additively Manufactured Multi-Functional Meta-lens Polarizer Antenna System for K/Ka Band Applications," IEEE Transactions on Antennas and Propagation, 2025.
2) (Under Review) S. Ghosh, A. Bansal, C. Saha, "Comprehensive Analytical Characterization of Statistically Distributed Slotted Substrate Integrated Waveguide-based Leaky Wave Antenna for SLL and HPBW Reduction," IEEE Transactions on Antennas and Propagation, 2025.
3) (Under Review) S. N. Narayanan, J. K. Varghese, A. Bansal, Y. W. Li, "Fifth-Generation Mobile Phone Radiation: Evolution, Specifics, and Biological Effects," Journal of Environmental Sciences, 2025.
4) (Under Review) A. Bansal, W.G. Whittow, "Figuring Out Impaired Reconfigurable Intelligent Surfaces," IEEE Antennas and Propagation Magazine, 2025 (TechRxiv).
5) (Under Review) A. Bansal, E. Mellios, H. Nagi, P. Febvre, W. G. Whittow, "Two-Dimensional Beam-Steering Lens Antenna with Fast Inter-Beam Handover for Satellite Communications," IEEE Transactions on Vehicular Technology, 2025 (TechRxiv).
6) (Accepted) A. Bansal, P. Sharma, J. Chung, "Design and Analysis of Holographic Metasurface Integrated Flexible Antenna for Directional Applications," Transactions on Emerging Telecommunications Technologies, 2025.
7) (Accepted) S. Pope, D. J. Rothe, A. Bansal, "The 2024 Active metamaterials Roadmap," IOP Physics D, 2025 (ArXiv).
8) A. Patel, A. Bansal, W. G. Whittow, "Wideband End-Fire Antenna Based on a Modulated Grooved Surface Plasmon Polaritons," Nature Scientific Reports, 2025 DOI.
9) L. Poli, A. Bansal, G. Oliveri, et al, "Time-Modulated EM Skins for Integrated Sensing and Communication," IEEE Journal of Selected Topics in Electromagnetics, Antennas and Propagation, 2025 DOI.
10) N. Tewari, A. Bansal, et al, "A Novel High Gain Hexagonal Cavity-Backed MIMO SIW Antenna with 3D Homogeneous Lens Loading at Ka-Band," IEEE Antennas and Wireless Propagation Letters, 2025 DOI.
11) N. Faisal, V. Rajendran, A. Bansal, et al, "Air plasma sprayed multi-material composite coatings for enhanced light absorption and thermal emission," Journal of Thermal Spray Technology, 2025. DOI.
12) P. K. Sharma, A. Bansal, J. Y. Chung, "Conformal Holographic Metasurface-Based Beamforming Antenna using a 3D-Printed Flexible Substrate," IOP Engineering Express, 2025 DOI.
13) A. Bansal, C. J. Panagamuwa, W. G. Whittow, "State-of-the-art Millimeter-Wave Beam-Steering Antennas for Beyond 5G and 6G Networks - A Comprehensive Survey," IEEE Antennas and Propagation Magazine, 2024. DOI.
14) A. Bansal, W. G. Whittow, "3D-Printing for Fast and Secure Satellite Communications," under *Why Space? The Opportunity for Materials Science and Innovation* – Position Paper by Science & Technology Facilities Council, 2024. Link.
15) U. Pandey, P. Singh, N. P. Gupta, R. Singh, A. Bansal, "Wideband Leaky-Wave Antenna with Dumbbell Shaped Slots on SIW with Twisted Corrugations," Electronics Letters, 2023. DOI.
16) A. Bansal, T. Whittaker, W. G. Whittow, "Beam-Scanning Orbital Angular Momentum Beam Circular Leaky Wave Antenna with Half Mode Corrugated Substrate Integrated Waveguide," IEEE Antennas and Wave Propagation Letters, 2023. DOI.
17) A. Bansal, C. J. Panagamuwa, W. G. Whittow, "Fixed frequency beam-steering using bow-tie slot-based dielectric filled waveguide antenna array," Electronics Letters, vol. 59, no. 13, 2023. DOI.
18) A. Bansal, C. J. Panagamuwa, W. G. Whittow, "Full 360° Beam Steering Millimeter-Wave Leaky-Wave Antennas Coupled with Bespoke 3D-Printed Dielectric Lenses for 5G Base Stations," Electronics Letters, vol. 59, no. 8, 2023. DOI.
19) A. Bansal, C. J. Panagamuwa, W. G. Whittow, "Novel Design Methodology of 3D-Printed Lenses for Travelling Wave Antennas," IEEE Open Journal of Antennas and Propagation, vol. 4, pp. 196-206, 2023. DOI.
20) A. Bansal, C. J. Panagamuwa, W. G. Whittow, "Millimeter-Wave Beam Steerable Slot Array Antenna Using an Inter-Digitated Capacitor Based Corrugated SIW", IEEE Transactions on Antenna & Propagation, vol. 70, no. 12, pp. 11761-11770, 2022. DOI.

Further publications available on Google Scholar