

Dr Aakash Bansal (Early Career Researcher)

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1 SUMMARY

A Royal Academy of Engineering UK Intelligence Community Research Fellow at Loughborough University (LU), I finished my PhD in September 2022. I have 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 16 journal papers (+8 submitted) and presented 28 conference papers/posters (+6 submitted). I have won multiple research and outreach awards. My research is focused on active mmWave beam-steering antenna, dielectric lenses, metasurfaces, satellite communications on the move, and orbital angular momentum waves.

2 WORK EXPERIENCE

- ❖ **Lecturer (Eq. to Assistant Professor) in Applied Electromagnetics, Loughborough University, UK** (Sept 24 onwards)
Starting as a new 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

- ❖ **UK Intelligence Community Research Fellowship** (Jan 24 – Dec 25)
Royal Academy of Engineering
Value: GBP 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. [Link](#)
- ❖ **Innovation Launchpad Network+ Researcher in Residence Funding** (Aug 24 – Mar 26)
Engineering and Physical Science Research Council (EPSRC)
Value: GBP 49,500
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.

Information about new submitted funding applications available on request.

6 AWARDS AND ACHIEVEMENTS

- ❖ Most Cited Paper in Electronics Weekly 2023.
- ❖ 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 RESPONSIBILITY

- ❖ Co-Lead, Active Metamaterials SIG, UK Metamaterials Network (2024 – Present)
- ❖ Guest Editor, European Physical Journal – Applied Metamaterials (Special Issue on Global Advancements in Metamaterials for Non-Terrestrial Networks)
- ❖ Publicity Committee 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: Advances in Additive Manufacturing & 3D Printing: Novel Materials & Metamaterial Structures for Antennas and Other Electromagnetic Devices).
- ❖ Review Editor, Frontiers in Antennas and Propagation.
- ❖ Reviewer, IEEE Antennas and Wireless Propagation Letters.
- ❖ Reviewer, IET Microwave, Antennas and Propagation.
- ❖ Reviewer, IET Electronics Letters.
- ❖ Reviewer, Progress in Electromagnetics Research.
- ❖ Head of Project, STEM Action, Loughborough Students' Union (2019 – 2021)
- ❖ Advisor, Atal Innovation Mission, Govt. of India (2017 – 2019)
- ❖ Mentor, IEEE India Council Student Support Network (2018 – 2019)
- ❖ Mentor, IEEE Delhi Section Student Support Network (2017 – 2019)
- ❖ Volunteer Lead, Intel K-12 Education Campaign, India (2016 – 2018)
- ❖ Student Section Representative, IEEE Delhi Section Student Support Network (2016 – 2017)
- ❖ Head for Industrial-Academic Collaboration, IEEE India Council (2016 – 2017)
- ❖ Chairperson, IEEE MSIT Student Branch (2016 – 2017)

8 JOURNAL PUBLICATIONS: 8 PAPERS SUBMITTED (1-8), 16 PAPERS PUBLISHED – LISTED HERE FOR LAST 3 YEARS ONLY

- 1) (Under Review) S. Ghosh, A. Chakraborty, A. Bansal, S. Chakraborty, B. Gupta, W. G. Whittow, "Comprehensive Analytical Characterization of Statistically Distributed Slotted SIW-based LWA for SLL and HPBW Reduction," IEEE Transactions on Antennas and Propagation, 2024.
- 2) (Under Review) N. Tewari, A. Bansal, et al, "Novel High Gain Miniaturized Hexagonal Cavity-Backed MIMO SIW Antenna with 3D Homogeneous Lens Loading at Ka Band," IEEE Transactions on Antennas and Propagation, 2024 ([TechRxiv](#)).
- 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, 2024.
- 4) (Under Review) A. Bansal, W.G. Whittow, "Figuring Out Impaired Reconfigurable Intelligent Surfaces," IEEE Antennas and Propagation Magazine, 2024 ([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, 2024 ([TechRxiv](#)).
- 6) (Under Review) A. Patel, A. Bansal, W. G. Whittow, "Wideband End-Fire Antenna Based on a Modulated Grooved Surface Plasmon Polaritons," IEEE Transactions on Antennas and Propagation, 2024.
- 7) (Under Review) P. K. Sharma, A. Bansal, J. Y. Chung, "Conformal Holographic Metasurface-Based Beamforming Antenna using a 3D-Printed Flexible Substrate," Submitted to IET Microwave Antennas and Propagation, 2024 ([TechRxiv](#)).
- 8) (Under Review) N. Faisal, V. Rajendran, S. Kaniapan, V. Ramalingam, A. Prathuru, R. Ahmed, N. Katiyar, A. Bansal, T. Whittaker, P. Isherwood, W. Whittow, M. Egiza, S. Goel, "Air plasma sprayed multi-material composite coatings for enhanced light absorption and thermal emission," Journal of Thermal Spray Technology, 2024.
- 9) 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](#).
- 10) 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 Satellite Applications Catapult and Science & Technology Facilities Council, 2024. [Link](#).
- 11) 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](#).
- 12) 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](#).
- 13) 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](#).
- 14) 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](#).
- 15) 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](#).
- 16) 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](#)

9 CONFERENCE PRESENTATIONS AND PUBLICATIONS: 6 UNDER REVIEW (1-6), 28 PRESENTED/PUBLISHED – LISTED HERE FOR 2024 ONLY

- 1) (Under Review) S. Ghosh, S. Ghosh, C. Saha, A. Bansal, W. Whittow, "Polarization Agile Multibeam Holographic Metasurface Antenna With Variable Excitation," IEEE Microwave, Antennas and Propagation Conference, 2024.
- 2) (Under Review) A. Bansal, W. G. Whittow, "Optically Transparent Corrugated Substrate Integrated Waveguides," IEEE Microwave, Antennas and Propagation Conference, 2024.
- 3) (Under Review) A. Bansal, M. Singh, N. Formosa, "Real-Time Road Traffic Data Monitoring Using Novel Leaky-Wave Antennas in a Connected and Autonomous Vehicles Environment," IEEE Microwave, Antennas and Propagation Conference, 2024.
- 4) (Under Review) A. Bansal, C. J. Panagamuwa, W. G. Whittow, "Parametric Analysis and Design Methodology for Interdigitated Capacitor-based Corrugated SIW," IEEE Microwaves, Antennas and Propagation Conference, 2024.
- 5) (Under Review) P. K. Sharma, A. Bansal, J. Y. Chung, W. G. Whittow, "Two-Dimensional Holographic Metasurface-Based Antenna for Beamforming Applications," IEEE Microwaves, Antennas and Propagation Conference, 2024.
- 6) (Under Review) A. Bansal, "Lens-Based Approach for Bespoke Contour Beam Generation with Single Feed Source for Satellite Applications," European Conference on Antennas and Propagation, 2024.
- 7) A. Bansal, W. G. Whittow, "Structural Morphing Metasurface for Electromagnetic Beam Manipulation," 42nd European Space Agency Antennas Workshop 2024. [DOI](#).
- 8) (Presented) A. Bansal, W. G. Whittow, "Generating Mode 2 OAM Beam Using a Circular Leaky-Wave Antenna on a Corrugated Half-Mode SIW with Beam-Scanning," IEEE Space, Aerospace and Defence Conference 2024.
- 9) (Presented) P. K. Sharma, A. Bansal, J. Y. Chung, "Holographic Metasurface Design for Flexible Beamforming Antennas," IEEE Space, Aerospace and Defence Conference 2024.

- 10) (Presented) S. Ghosh, A. Bansal, C. Saha, W. G. Whittow, "Single Feed Dual-Beam Linearly Polarized Holographic Metasurface Antenna," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting 2024.
- 11) (Accepted) A. Bansal, W. G. Whittow, "Bespoke Lens Design for a High Gain Circularly Polarized Leaky Wave Antenna," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting 2024.
- 12) (Presented) A. K. Patel, A. Bansal, C. J. Panagamuwa, W. G. Whittow, "Backward to Forward Radiating Leaky Wave Antenna on a Half Mode Corrugated SIW," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting 2024.
- 13) (Presented) A. Bansal, W. G. Whittow, "Millimeter-Wave Dual Beam Corrugated Substrate Integrated Waveguide Based Leaky Wave Antenna," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting 2024.
- 14) (Presented) A. Bansal, C. J. Panagamuwa, M. Khalily, W. G. Whittow, "Conformal Millimeter-Wave Corrugated Substrate Integrated Waveguide Slot Array Antenna," IEEE Intl Conf on Microwaves, Communications, Antennas, Biomedical Engineering and Electronic Systems 2024.
- 15) (Presented) A. Bansal, C. J. Panagamuwa, M. Khalily, W. G. Whittow, "Bespoke Homogeneous Dielectric Lens for Meander Line-based Leaky Wave Antenna," IEEE Intl Conf on Microwaves, Communications, Antennas, Biomedical Engineering and Electronic Systems 2024.
- 16) (Presented) A. Bansal, M. Al-Nuaimi, T Whittaker, H Eskandari, W. G. Whittow, "Optically Transparent Metasurface for Microwave Applications," IEEE Intl Conf on Microwaves, Communications, Antennas, Biomedical Engineering and Electronic Systems 2024.

List of Published Conference Papers Available on [Google Scholar](#)