Curriculum Vitae
Arun Kumar Singh

Contact Details

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Research Interests

Information Theory, Wireless Communications, Spread Spectrum Systems, Satellite based Navigation Systems

Education

2/2012	Ph.D., Electronics and Communications, Télécom Paris, France
12/2002	M.Tech., Communication and Radar Engg., Indian Institute of Technology Delhi, India

Positions

Indian Institute of Technology Jodhpur, India

3/2019–Present	Associate Professor, Department of Electrical Engineering
9/2020 – 8/2022	Head, Department of Electrical Engineering
9/2019 – 8/2021	Convener, Institute Innovation Council
9/2019 – 11/2020	Chairman, Joint Entrance Examination (Advanced) 2020
11/2016 – 10/2018	Faculty Member In-Charge - Innovation and Incubation Center
2/2015–3/2019	Assistant Professor, Department of Electrical Engineering
5/2013–2/2015	Assistant Professor, Center of Excellence for Information and Communication Technology

EURECOM, France

5/2012–4/2013	Research Engineer, Mobile Communications Department

Space Applications Centre, Indian Space Research Organisation, India

7/2005–1/2009	Scientist-SD, Navigation System Development Division
4/2003–6/2005	Scientist-SC, Advanced Payload Development Division

Affiliations

4/2019–3/2022	Adjunct Faculty (Part-Time), Bharti School of Telecommunications Technology and Management, Indian Institute of Technology Delhi, India
10/2020–Present	Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
5/2020–Present	Member, Communication Services Sectional Committee (SSD 08), Bureau of Indian Standards (BIS)

Research Publications

Journal Publications

S. Dahiya, V. Saini and **A. K. Singh**, "GNSS Signal Processing Based Attitude Determination of Spinning Projectiles", *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 58, No. 5, pp. 4506-4516, Oct. 2022. [Impact Factor=3.491]

A. Jaitawat and **A. K. Singh**, "Online Transmission Policy for Energy Harvesting Sensor Node with Energy Loss", *IEEE Communications Letters*, Vol. 25, No. 2, pp. 551-554, Feb. 2021. [Impact Factor=3.419]

A. Jaitawat and **A. K. Singh**, "Uniform Thresholding Based Transmission Policy for Energy Harvesting Wireless Sensor Nodes in Fading Channel", *Wireless Networks*, 27, 1001–1010, Feb. 2021. [Impact Factor=2.659]

A. Kumar and **A. K. Singh**, "A Novel Multipath Mitigation Technique for GNSS Signals in Urban Settings", *IEEE Transactions on Vehicular Technology*, Vol. 69, No. 3, pp. 2649-2658, Mar. 2020. [Impact Factor=5.339]

A. Jaitawat and **A. K. Singh**, "Battery and Supercapacitor Imperfections Modeling and Comparison for RF Energy Harvesting Wireless Sensor Network", *Wireless Networks*, 26, 843-853, Feb. 2020. [Impact Factor=2.659]

S. Dahiya, A. Kumar and **A. K. Singh**, "Average power allocation based sum-rate optimization in massive MIMO systems", *Annals of Telecommunications*, Vol. 73 (11-12), pp. 689-701, Dec. 2018. [Impact Factor=1.901]

S. Dahiya and **A. K. Singh**, "Channel estimation and channel tracking for correlated block-fading channels in massive MIMO systems", *Digital Communications and Networks*, Vol. 4(2), pp. 138-147, Apr. 2018. [Impact Factor=6.348]

H.-F.(Francis) Lu, P. Elia and **A. K. Singh**, "Performance-Complexity Analysis for MAC ML-based Decoding with User Selection", *IEEE Transactions on Signal Processing*, Vol. 64, No. 7, pp. 1867-1880, Apr. 2016. [Impact Factor - 4.203]

A. K. Singh, "Achieving ergodicity in quasi-static MIMO with polynomial-time complexity and one bit of feedback", *IEEE Wireless Communication Letters*, vol. 58, no. 6, pp. 533-536, Oct. 2014. [Impact Factor - 3.096]

A. K. Singh, P. Elia, and J. Jaldén, "Achieving a vanishing performance gap to exact lattice decoding at a subexponential complexity", *IEEE Transactions on Information Theory*, vol. 58, no. 6, pp. 3692-3707, Jun. 2012. [Impact Factor - 2.679]

Conference Publications

A. K. Singh, P. Elia, and H.-F. F. Lu, "Performance-Complexity Analysis for MIMO Multiple-Access Channels with Lattice based Sphere Decoders", in proceedings of *IEEE Vehicular Technology Society Asia Pacific Wireless Communication Symposium (APWCS'14)*, Aug. 2014, Taiwan.

A. K. Singh, P. Elia and J. Jaldén, "Rate-Reliability-Complexity tradeoff for ML and Lattice decoding of full-rate codes", in proceedings of *IEEE International Symposium on Information Theory (ISIT'13)*, pp. 1267-1271, Jul. 2013,Istanbul, Turkey.

A. K. Singh and P. Elia, "Feedback-aided complexity reductions in ML and Lattice decoding", in proceedings of *IEEE International Symposium on Information Theory (ISIT'12)*, pp. 2826-2830, Jul. 2012, Cambridge, MA, USA.

A. K. Singh, P. Elia and J. Jaldén, "Complexity analysis for ML-based sphere decoder achieving a vanishing performance-gap to brute force ML decoding", in proceedings of *2012 Int. Zurich Seminar on Communications (IZS'12)*, pp. 127-130, Feb. 29-Mar. 2, 2012, Zurich, Switzerland.

A. Dantcheva, **A. K. Singh**, P. Elia and J.-C. Dugelay, "Search pruning video surveillance systems: Efficiency-reliability tradeoff", ICCV 2011, Workshop IWITINCVPR, *1st IEEE Workshop on Information Theory in Computer Vision and Pattern Recognition in the International Conference on Computer Vision*, pp. 1356 - 1363, Nov. 6-13, 2011, Barcelona, Spain.

A. K. Singh, P. Elia and J. Jaldén, "Vanishing the gap to exact lattice search at a subexponential complexity: LR-aided regularized decoding", in proceedings of *49th Annual Allerton Conference on Communication, Control and Computing (Allerton)*, pp. 531-538, Sep. 28-30, 2011, Allerton, IL, USA.

A. K. Singh, P. Elia, K. T. Gowda and D. Gesbert, "Diversity-multiplexing tradeoff for the non-separated two-way relay DF channel", in proceedings of *12th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC 2011)*, pp. 196-200, Jun. 2011, San Francisco, USA.

J. Chen, **A. K. Singh**, P. Elia and R. Knopp, "Interference neutralization for separated multiuser uplink-downlink with distributed relays", in proceedings of *2011 Information Theory and Applications Workshop (ITA 2011)*, Feb. 2011, La Jolla, USA.

A. K. Singh, P. Elia and D.T.M. Slock, "Rate-of-decay of probability of isolation in dense sensor networks with bounding constraints", in proceedings of *IEEE International Symposium on Information Theory (ISIT'10)*, pp. 1898-1902, Jun. 2010, Austin, Texas, USA.

A. K. Singh, A. K. Sisodia and V. K. Garg, "Candidate Modulation Designs for Indian Regional Navigation Satellite System", in proceedings of *59th International Astronautical Congress (IAC)*, Sep. 2008, Glasgow, Scotland.

A. K. Sisodia and **A. K. Singh**, "Interference Analysis for Digital Modulation Systems in Ka-band Multi Beam Satellites", in proceedings of *13th Ka and broadband Communication Conference*, Sep. 2007, Italy.

A. K. Singh, J.K. Hota, A. K. Sisodia and V. K. Garg, "Co-channel Interference Analysis for Digital Modulation Systems in Co-located Satellites", in proceedings of *International Union of Radio Science General Assembly (URSIGA 2005)*, Oct. 2005, India.

Invited Talks

"Rate, reliability and complexity limits in MIMO communications", *Gujarat Technological University*, Ahmedabad, India, March 2014.

"Diversity-Multiplexing Tradeoff for the Non-Separated, Two-Way DF Channel", *Fifth IEEE Workshop on Advanced Information Processing for Wireless Communication Systems*, Copenhagen, Denmark, October 2010.

"Status of the Indian Regional Navigation Satellite System (IRNSS) and GAGAN", *Munich Satellite Navigation Summit 2007*, Germany, March 2007.

Unpublished Conference Presentations

"Can few flops and one bit of feedback provide near-ergodic behavior to non-ergodic MIMO? Rate-reliability-complexity analysis", *2012 Information Theory and Applications Workshop (ITA 2012)*, San Diego, USA, Feb. 2012.

Sponsored Research

As Principal/Cheif Investigator

Design and Development of NavIC Receiver [10/2017 - 06/2022], Ministry of Electronics and Information Technology, India, Partner Institutions - IIT Bombay, IIT Madras, IIST Thiruvananthapuram, SAMEER

Computationally-efficient fixed-complexity sphere decoders for multiuser MIMO communications [01/2016-01/2019], Science and Engineering Research Board, Department of Science and Technology, India

Development of Binary Offset Carrier Modulator for IRNSS [07/2006 - 12/2007], Indian Space Research Organisation, India

As Other Investigator

Next Generation Wireless Research and Standardization on 5G and Beyond [08/2021 - 07/2024], Ministry of Electronics and Information Technology, India

Spectrum and energy efficiency in 4G and beyond communication systems [05/2012 - 04/2013], Celtic-Plus Europe

Home-eNodeBS Project: Two-way relaying in femto cells , Mitsubishi Electric R&D Center Europe

Research Guidance

Ph.D.

Suresh Dahiya, Thesis work - Massive MIMO Systems: Channel Modeling and Efficient System Architecture, October 2018. (Current Status - Assistant Professor, NIT Surat)

Arpita Jaitawat, Novel Strategies for Lifetime Enhancement of Energy Harvesting Sensor Nodes. (Submitted)

Ongoing Ph.D.

Vaibhav Saini, Thesis area- GNSS based Attitude Determination of Spinning Projectiles.

Yogesh Lingwal, Thesis area Receiver Design for Precise Positioning using Radio Navigation Systems.

M. Tech.

Atal Tewari, Thesis work - Novel Technique for Precise Positioning using GNSS SPS Signals, 2018.

Anil Kumar, Thesis work - Multipath and Interference Mitigation in GNSS Receiver, 2017.

Deepa, Thesis work - Carrier Recovery Algorithm at Low SNR for QPSK, 2014.

Shakti Gaurav, Design and Simulation of Signal Detection Algorithm and Timing Synchronization, 2014.

Teaching

Courses Taught - Wireless Communications, Digital Communication, Mobile and Wireless Communication, Information Theory and Coding, Communication Systems, Data Communication, Mobile Communication Systems, Contemporary Communication Systems, MIMO Wireless Communication, Cellular Communication Networks, Digital Signal Processing and Applications, Statistical Signal Analysis, Design and Implementation of Information Systems, Real-Time Communications, Data Communication Networks, Communication Systems Lab, Communication Engineering lab.

New Courses Developed - Wireless Communications, Information Theory and Coding, Communication Systems, Mobile Communication Systems, Contemporary Communication Systems, MIMO Wireless Communication, Cellular Communication Networks, Real-Time Communications, GNSS Signal Processing, Satellite Communications, Machine Learning for Communication.

Industrial Research

Space Applications Centre, ISRO [4/2003-1/2009]

Indian Regional Navigation Satellite System (IRNSS) - Definition of the IRNSS navigation payload architecture, Design and development of novel composite signal generator for IRNSS, Performance analysis to assess the impact of co-channel interference from global navigation satellite systems (GPS, GLONASS, Galileo and COMPASS) on IRNSS signal acquisition and ranging accuracy, Inputs for completion of advance publication information (API) for IRNSS frequency clearance.

GPS Aided Geo Augmented Navigation (GAGAN) - System engineering of the GAGAN payload, Definition and lab demonstration of test procedures for navigation specific parameters of GAGAN payload, Development of testbed to characterize the ranging performance of qualification and flight models for GAGAN payload.

Ka-band Satellite GSAT-4- Assessment of system performance of Ka-band satellite with multiple spot beams employing frequency reuse and optimization of cross-polarization isolation of on-board antenna for GSAT-4.

EDUSAT/GSAT-3- Co-channel interference analysis to assess the performance of the EDUSAT signals in the presence on interference from INSAT-4C signals for planned co-location of EDUSAT and INSAT-4C at 74 degree East GEO slot. Based on this analysis, INSAT-4C frequency plan and antenna cross-polarization isolation were optimized.

ISRO Induction Training Program Project- Development of a novel numerical method to determine the location of antenna phase center. The developed software module can be used to determine phase center of any type of antennas, till date no other commercial software is available with similar capabilities. This project was adjudged the best project of IITP-04.

Awards

5G Hackathon Phase-1 Winners for the innovation "Smart Ambulance for 5G based Healthcare System", 5G Hackathon conducted by Department of Telecommunications, Ministry of Communications, Government of India, New Delhi in 2021

Best Student Paper Award at the 12th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC 2011)

Institut Telecom Fellowship for Doctoral studies at Telecom ParisTech, Paris, France [2009-2011]

HRD Fellowship, Government of India for Graduate studies [2001-2002]

S. J. Jindal Trust Fellowship for Undergraduate studies [1998-2001]

Achievements

University Rank 1 in Bachelor of Engineering 2001

Rank 19 *out of* 1 *Million students* in the 12th standard Board Examination 1997

Highest marks 99/100 (out of 500 Thousand students) in Science in High School Board Examination 1995

Professional Service

Conference Committees

Symposium Co-chair, *Ninth National Frontiers of Engineering Symposium*, June 2015, Indian National Academy of Engineering (INAE) and IIT Jodhpur.

Referee Service - *IEEE Transactions on Signal Processing, IEEE Transactions on Vehicular Technology, IEEE Transactions on Wireless Communications, IEEE Signal Processing Letters, IEEE International Symposium on Information Theory*