Rajshekhar Vishweshwar Bhat – Curriculum Vitae

Contact Information

Assistant Professor,
IIT Dharwad, Chikkamalligwad Village,
Dharwad, Karnataka 580007, India

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Research Interests

Semantic Communications, Machine Learning for Low-Latency Physical Layer Communications, Age of Information Minimization in Wireless Networks, Green Wireless Communications.

Current Position

Indian Institute of Technology Dharwad, Dharwad, Karnataka, India

Assistant Professor (Grade I), Department of Electrical, Electronics and Communication Engineering, from Mar 2022

Academic Experience

Indian Institute of Technology Dharwad, Dharwad, Karnataka, India

Assistant Professor (Grade II), Department of Electrical Engineering, Aug 2019 - Mar 2022

Tata Institute of Fundamental Research, Mumbai, Maharastra, India

Visiting Fellow, School of Technology and Computer Science, Nov 2018 - Jul 2019

- Research Topic: Age of Information Minimization in Wireless Fading Channels.
- Mentor: Prof. Rahul Vaze

Education

National University of Singapore, Singapore

Ph.D., Electrical and Computer Engineering, Aug 2014 - Feb 2019

- CAP: 4.5/5.0
- Thesis Topic: Energy Harvesting Communications with Non-Ideal Batteries and Circuit Power.
- Advisors: Prof. Mehul Motani and Prof. Teng Joon Lim

Indian Institute of Technology Kanpur, Kanpur, India

M.Tech., Signal Processing, Communications and Networks, Aug 2010 - May 2012

- GPA: 9.25/10.0
- Thesis Topic: Ranging Accuracy Comparison of FMCW Based Ranging Technique with TOA and RSS Based Ranging Techniques in Indoor Wireless Channels
- Advisor: Prof. Yatindra Nath Singh

National Institute of Technology Karnataka, Surathkal, Karnataka, India

B.Tech., Electronics and Communications Engineering, Jul 2006 - Apr 2010

- CGPA: 8.42/10.0
- Major Project: Permutation-Box Based Scrambler/Descrambler for Audio Signals
- Advisor: Prof. U. Sripathi

Industry Experience

Analog Devices Inc., Bengaluru, India

Design Engineer (Mixed-Signal Design Group) Aug 2012 - Jul 2014

- Waveform design and analysis for built-in-self-test in MEMS accelerometers and gyroscope ASICs.
- Fixed-point implementation of digital IIR filters.
- Control signal design for digitally-assisted analog filters.

Internship Experience

Indian Institute of Science, Bengaluru, India — Summer 2017
- Topic: Energy Harvesting Communications with Non-Ideal Batteries
- Mentor: Prof. Chandra R Murthy

Indian Institute of Technology Kharagpur, Kharagpur, India — Summer 2008
- Topic: Microprocessor Design
- Mentor: Prof. Santanu Chattopadhyay

Teaching and Administrative Experience

Indian Institute of Technology Dharwad, Dharwad, India

Linear Algebra	Aug 2019 - Dec 2019
Digital Signal Processing - Theory and Lab	Jan 2020 - May 2020
Digital Signal Processing - Theory and Lab	Aug 2020 - Dec 2020
Optimization Theory and Algorithms	Jan 2021 - Apr 2021
Digital Signal Processing - Theory and Lab	Aug 2021 - Dec 2021
Linear Algebra	Aug 2021 - Dec 2021
Optimization Theory and Algorithms	Jan 2022 - Apr 2022
Probability Models and Applications	Mar 2022 - Apr 2022
Signals and Systems	Aug 2022 - Nov 2022
Introduction to Communication Systems	Jan 2023 - Feb 2023
Optimization Theory and Algorithms	Jan 2023 - April 2023
Digital Communications and Coding Theory	Aug 2023 - Dec 2023
Wireless Communications	Jan 2024 to April 2024

National University of Singapore, Singapore

Teaching Assistant for the Emerging Technologies in Electrical Engineering Course (Flipped Classroom Model) — 2014-2017
- Management of the Coursera (MOOC) platform.
- Assessment of student performance (quiz, report and presentation).

Teaching Assistant for the Computer Communication Networks Course — 2015 - 2017
- Handled course labs on socket programming.
- Conducted tutorials on network and transport layers.
- Assessment of student performance (quiz, project and report).

Teaching Assistant for the Communication Systems Course — 2016 - 2018
- Actively involved in setting up and managing the course lab to teach analog and digital modulation techniques with USRP software defined radios.
- Classroom teaching of frequency and pulse coded modulation concepts.
- Conducted tutorials on analog and digital modulation techniques.
- Involved in procurement of softwares and hardwares for the course lab.
- Assessment of student performance (quiz and assignment).

Indian Institute of Technology Kanpur, Kanpur, India

Administrative Assistant — 2011-2012
- Involved in processing applications for M.Tech. and Ph.D. admissions.
- Coordinated with the short-listed applicants and the faculty for scheduling and managing personal interviews.

Honors and Awards

- C V Raman Post-Doctoral Fellowship, IISc, Bangalore
- Post-Doctoral Fellowship, TIFR, Mumbai — Nov 2018 - Jul 2019
- NUS Research Scholarship — Aug 2014 - Aug 2018
- MHRD GATE Scholarship — Aug 2010 - May 2012
- Ranked 195 in the Graduate Aptitude Test in Engineering (GATE). — 2010
- Foundation for Excellence Scholarship — Aug 2006 - Apr 2010
- Recipient of CBSE Merit Certificate for securing 100% marks in Mathematics and Physics subjects in class XII. — 2006
- Ranked 2405 (Karnataka State Rank 32) in the All India Engineering Entrance Examination (AIEEE). — 2006
- Ranked 35 in the Sixth National Science Olympiad. — 2004

Professional Activities

Journal Reviewer

- IEEE/ACM Transactions on Networking
- IEEE Transactions on Communications
- IEEE Transactions on Wireless Communications
- IEEE Transactions on Green Communications and Networking
- IEEE Transactions on Vehicular Technology
- IEEE Wireless Communications Letters
- IEEE Journal on Selected Areas in Communications

Conference Reviewer

- IEEE ISIT, IEEE ITW, IEEE ICCS, IEEE ICC, IEEE Globecom, IEEE Infocomm

Volunteer for organizing the Shannon Centenary in Singapore

TPC Co-Chair for Networks Symposium in IEEE NCC, 2022

Award Committee Member for Networks Symposium in IEEE NCC, 2022

TPC Member for 1ST WORKSHOP ON BEYOND URLLC, IEEE ICC, 2023

Short Courses Conducted

Indian Institute of Technology Dharwad, Dharwad, India

Machine Learning (Kannada Medium) — Jan 2023

- Conducting an online course on Machine Learning in Kannada medium under the Continuing Education Programme of IIT Dharwad.

Indian Institute of Technology Dharwad, Dharwad, India

An Introduction to Machine Learning — May 2022

- Conducted a week-long course for students from Dharwad.

Bharat Electronics Limited, Bangalore, India

Machine Learning for Multi-Target Tracking — 2021-22

- Conducted a five-day course along with a colleague from IIT Dharwad.

Broadridge Financial Solutions, Hyderabad, India

Machine Learning for Financial Applications Oct 2020

- Conducted a three-day course along with five colleagues from IIT Dharwad.

Indian Telephone Industries Limited, Bengaluru, India

5G Technology and Its Applications Dec 2019

- Conducted a five-day workshop with colleagues from IIT Dharwad.

Projects (Ongoing and Completed)

ISRO-RESPOND, ISRO

DVB-S2X Implementation March 2023 -

BITS BioCyTiH Foundation, BITS Pilani under NMICPS, DST

Developing Efficient Communication Infrastructure for Precision Agriculture Feb 2023 -

Science and Engineering Research Board, Government of India

AI-Powered Ultra-Reliable Near-Zero-Latency Intelligent Wireless Networks for Enabling I4.0: Design, Optimization and Prototyping Dec 2020 - Dec 2022

Bharath Electronics Limited, Central Research Laboratory, Bengaluru

Deep Learning Based Multi-Target Tracking May 2021 - Mar 2022

Antrix Corporation Limited, Bengaluru, CSR Grant

Setting up a Space Data Science Lab

IIT Dharwad, Seed Fund for MultiDisciplinary Project

Design of Efficient Communications Protocols for Precision Agriculture, Mar 2021 - Mar 2022

IIT Dharwad, SGNF

Optimization of Freshness of Information in Emerging Wireless Networks, Mar 2020 - Mar 2022

Arista Networks, CSR Grant for Training an MS Student

On Next-Generation WiFi Networks, Aug 2020 - Dec 2022

Journal Publications

1. G. K. Gupta, **R. V. Bhat** and M. S. Balan, "Improving Satellite-Derived Bathymetry Estimation With a Joint Classification–Regression Model," in IEEE Geoscience and Remote Sensing Letters, vol. 21, pp. 1-5, 2024.
2. S. Kar, S. Babu, D. Jain, Y. Shali, D. S. Saritha, **R. V. Bhat**, B. N. Bharath, "Deep Learning-Based Track Prediction and Correction for a Radar Target," in IEEE Transactions on Radar Systems, vol. 1, pp. 395-400, 2023.
3. C. T. Leung, **R. V. Bhat** and M. Motani, "Low Latency Energy-Efficient Neural Decoders for Block Codes," in IEEE Transactions on Green Communications and Networking, vol. 7, no. 2, pp. 680-691, June 2023.
4. S. Jayanth and **R. V. Bhat**, "Age of Processed Information Minimization Over Fading Multiple Access Channels," in IEEE Transactions on Wireless Communications, vol. 22, no. 3, pp. 1664-1676, March 2023.
5. **R. V. Bhat**, R. Vaze and M. Motani, "Minimization of Age of Information in Fading Multiple Access Channels," IEEE Journal on Selected Areas in Communications, vol. 39, no. 5, pp. 1471-1484, May. 2021.

6. **R. V. Bhat**, R. Vaze and M. Motani, "Throughput Maximization with an Average Age of Information Constraint in Fading Channels," IEEE Transactions on Wireless Communications, vol. 20, no. 1, pp. 481-494, Jan. 2021.
7. **R. V. Bhat**, M. Motani, C. R. Murthy and R. Vaze, "Energy Harvesting Communications with Batteries having Cycle Constraints." in IEEE Transactions on Green Communications and Networking, vol. 4, no. 1, pp. 263-276, Mar 2020.
8. **R. V. Bhat**, M. Motani and T. J. Lim, "Hybrid NOMA for an Energy Harvesting MAC With Non-Ideal Batteries and Circuit Power," in IEEE Transactions on Wireless Communications, vol. 18, no. 8, pp. 3961-3973, Aug. 2019.
9. Z. Ni, **R. V. Bhat** and M. Motani, "On Dual-Path Energy-Harvesting Receivers for IoT with Batteries having Internal Resistance," in IEEE Internet of Things Journal, vol. 5, no. 4, pp. 2741-2752, Aug. 2018.
10. **R. V. Bhat**, M. Motani and T. J. Lim, "Energy Harvesting Communications Without Transmitter Channel State Information Using Layered Coding," in IEEE Transactions on Green Communications and Networking, vol. 2, no. 1, pp. 127-142, Mar 2018.
11. **R. V. Bhat**, M. Motani and T. J. Lim, "Energy Harvesting Communication Using Finite-Capacity Batteries With Internal Resistance," in IEEE Transactions on Wireless Communications, vol. 16, no. 5, pp. 2822-2834, May 2017.

Conference Publications

1. A. K. Jose, G. Karevvanavar, **R. V. Bhat**, "An Encoder-Decoder Approach for Packing Circles," IEEE ISIT, Athens, Greece, 2024.
2. B. A. Madhabhavi, G. Karevvanavar, **R. V. Bhat** and Nikolaos Pappas, "Semantic Text Transmission via Prediction with Small Language Models: Cost-Similarity Trade-off," IEEE ICC Workshops, Denver, USA, 2024.
3. S. R. Raikar and **R. V. Bhat**, "Optimizing Reported Age of Information with Short Error Correction and Detection Codes," IEEE WCNC, Dubai, UAE, 2024 (Accepted for presentation).
4. J. S, N. Pappas and **R. V. Bhat**, "Distortion Minimization with Age of Information and Cost Constraints," WiOpt, Singapore, Singapore, 2023, pp. 1-8
5. G. Karevvanavar and **R. V. Bhat**, "Importance-Aware Fresh Delivery of Versions Over Energy Harvesting Multiple Access Channels," IEEE ICC Workshops, Rome, Italy, 2023, pp. 1307-1312.
6. R. Roy, **R. V. Bhat**, P. Hathi, N. Akhtar and N. M. Balasubramanya, "Maximization of Timely Throughput with Target Wake Time in IEEE 802.11ax,", IEEE ICC 2023.
7. S. Joshi, R. Roy, **R. V. Bhat**, P. Hathi and N. Akhtar, "Dynamic Distributed Threshold Control for Spatial Reuse in IEEE 802.11ax," IEEE NCC 2022.
8. S. Agarwal, **R. V. Bhat**, "Age of Information Minimization in Energy Harvesting Sensors with Non-Ideal Batteries," IEEE Globecom 2021.
9. Gagan G B, Jayanth S and **R. V. Bhat**, "Age of Information Minimization with Power and Distortion Constraints in Multiple Access Channels," WiOPT 2021.
10. B. Joshi, **R. V. Bhat**, B. N. Bharath and R. Vaze, "Minimization of Age of Incorrect Estimates of Autoregressive Markov Processes," WiOPT 2021.
11. C. T. Leung, M. Motani and **R. V. Bhat**, "Multi-Label and Concatenated Neural Block Decoders," IEEE ISIT, 2020.
12. **R. V. Bhat**, R. Vaze and M. Motani, "Throughput Maximization with an Average Age of Information Constraint in Fading Channels," IEEE ICC ULMC6GN Workshop, 2020.

13. **R. V. Bhat**, R. Vaze and M. Motani, "Age of Information Minimization in Fading Multiple Access Channels," IEEE INFOCOM Workshop, 2020.
14. C. T. Leung, **R. V. Bhat** and M. Motani, "Multi-Label Neural Decoders for Block Codes," IEEE ICC, 2020.
15. C. T. Leung, **R. V. Bhat** and M. Motani, "Low-Latency Neural Decoders for Linear and Non-Linear Block Codes," IEEE GLOBECOM, Hawaii, USA, 2019.
16. **R. V. Bhat**, M. Motani, C. R. Murthy and R. Vaze, "Energy Harvesting Communications with Batteries having Full-Cycle Constraints," IEEE ICC, Shanghai, 2019.
17. **R. V. Bhat**, M. Motani and T. J. Lim, "Hybrid NOMA-TDMA for Multiple Access Channels with Non-Ideal Batteries and Circuit Cost," IEEE ISIT, Vail, 2018.
18. **R. V. Bhat**, M. Motani and T. J. Lim, "Superposition Coding for Energy Harvesting Communication without CSIT," IEEE GLOBECOM, Singapore, 2017.
19. Z. Ni, **R. V. Bhat** and M. Motani, "Performance of Energy-Harvesting Receivers with Batteries Having Internal Resistance," IEEE WCNCW, San Francisco, CA, 2017.
20. **R. V. Bhat**, M. Motani and T. J. Lim, "Distortion minimization in energy harvesting sensor nodes with compression power constraints," IEEE ICC, Kuala Lumpur, 2016.
21. **R. V. Bhat**, M. Motani and T. J. Lim, "Dual-Path Architecture for Energy Harvesting Transmitters with Battery Discharge Constraints," IEEE GLOBECOM, San Diego, CA, 2015.

Presentations

Young Indians, Confederation of Indian Industries (CII), April 2024

Institute of Engineers, Dharwad, Karnataka, India Jan 2023

KLS VDIT, Haliyal, Uttara Kannada, Karnataka, India Dec 2022

Jawahar Navodaya Vidyalaya, Dharwad, Karnataka, India Dec 2022

Indian Institute of Technology Dharwad, Dharwad, Karnataka, India
- Energy Harvesting Applications for 5G/6G Communications Dec 2021

Tata Institute of Fundamental Research, Mumbai
- STCS Annual Talks Mar 2019

Indian Institute of Technology Dharwad, Dharwad, India
- Research Talk Aug 2018

National University of Singapore
- Fifth Graduate Student Symposium May 2015
- Shannon Centenary (Poster) May 2016

Conferences
- IEEE Globecom, San Diego, CA, USA Dec 2015
- IEEE ICC, Kuala Lumpur, Malaysia May 2016
- IEEE Globecom, Singapore Dec 2017
- IEEE ICC, Shanghai, China May 2019
- IEEE ICC Workshops (Online) June 2020
- IEEE Infocom Workshops (Online) Jul 2020

Analog Device Inc.
- India Technical Day, Bengaluru, India 2014
- Industry Demonstration, 13th International Conference on Embedded Systems Design, IIT Bombay, Mumbai, India 2014