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Research Page: **WEBSITE**

EXPERIENCE

Associate Professor (October 2023 - Present),
Assistant Professor (February 2019 - October 2023),
Department of Electrical Engineering,
Indian Institute of Technology (IIT) Indore

Distinguished Visitor (Feb 2025 to March 2025),
School of Computer Science and Electronic Engineering,
University of Essex, United Kingdom

Research Fellow (June 2015 - February 2019),
Visiting Faculty (July 2023 to August 2023 & June 2024 to July 2024),
School of Computer Science and Engineering,
Nanyang Technological University (NTU) Singapore

EDUCATION

IIT Kharagpur, India
PhD - Electronics and Electrical Communication Engineering, July 2011 - January 2016
Date of Submission : 13 May 2015 Date of Completion: 14 Jan 2016
C.G.P.A. 9/10 (in course works)

Anna University, Chennai, India
College of Engineering Guindy (CEG) campus
M.E - Communication systems, Aug. 2009 - May 2011
C.G.P.A. 9.78/10, First Class with distinction
University gold medallist in the Department of Electronics and Communication Engineering

SASTRA University, Thanjavur, India
B.Tech - Electronics and Communication Engineering, July 2005 - May 2009
C.G.P.A. 8.8571/10, First Class with distinction

RESEARCH INTERESTS/AREAS

5G and 6G Wireless Systems (Physical Layer), Space-Air-Ground Integrated Networks (SAGIN), Hybrid FSO/RF Communication, Terahertz Communication, Aerial Platforms (UAV/HAPS)-based FSO/RF Communication, Intelligent Reflecting Surfaces-based FSO/RF/THz Communications, Vehicular Communications, Blind Modulation/Channel Code/Interleaver Recognition using Conventional and DL/ML Techniques

PUBLICATION DETAILS

- Number of Textbooks: 1
- Number of Journal papers: 40 (**IEEE - 26, OSA - 3, IET - 4, Elsevier - 5, Wiley - 1, Springer - 1**)
- Number of Conference papers: 57 (**IEEE - 55, Others - 2**)
- Number of Book chapters: 2
- Number of Patents Filed: 1
- Number of Technical Disclosures: 3

TEXTBOOK

- Vivek Ashok Bohara and **Swaminathan R**, "Optical and Wireless Access Networks," Textbooks in Telecommunication Engineering, Springer, ISBN 978-3-031-89695-8, September 2025.

JOURNAL PUBLICATIONS (Peer Reviewed)

Published

- **Swaminathan R**, M. D. Selvaraj, and R. Roy, "Exact error analysis of MPAM signaling-for a cooperative diversity system with correlated links using paired error approach," *IEEE Communications Letters*, vol. 18, no. 2, pp. 273-276, Feb. 2014.
- M. D. Selvaraj* and **Swaminathan R***, "Performance of hybrid selection and switch-and-stay combining with decode-and-forward relaying," (* Equal contributions) *IEEE Communications Letters*, vol. 18, no. 12, pp. 2233–2236, Dec. 2014.
- **Swaminathan R**, M. D. Selvaraj, and R. Roy, "On the error and outage performance of decode-and-forward cooperative selection diversity system with correlated links," *IEEE Transactions on Vehicular Technology*, vol. 64, no. 8, pp. 3578–3593, Aug. 2015.
- **Swaminathan R**, R. Roy, and M. D. Selvaraj, "Performance comparison of selection combining with full CSI and switch-and-examine combining with and without post-selection," *IEEE Transactions on Vehicular Technology*, vol. 65, no. 5, pp. 3217–3230, May 2016.
- **Swaminathan R**, G. K. Karagiannidis, and R. Roy, "Joint antenna and relay selection strategies for decode-and-forward relay networks," *IEEE Transactions on Vehicular Technology*, vol. 65, no. 11, pp. 9041–9056, Nov. 2016.
- **Swaminathan R** and R. Roy, "HSSEC strategy for decode-and-forward-relaying systems over Nakagami-m fading channels," *IET Communications*, vol. 10, no. 18, pp. 2621–2635, Dec. 2016.
- **Swaminathan R**, A. S. Madhukumar, N. W. Teck, and S. C. M. Samson, "Parameter estimation of block and helical scan interleavers in the presence of bit errors," *Elsevier Digital Signal Processing*, vol. 60, pp. 20–32, Jan. 2017.
- **Swaminathan R**, A. S. Madhukumar, N. W. Teck, and S. C. M. Samson, "Parameter estimation of convolutional and helical Interleavers in a noisy environment," *IEEE Access*, vol. 5, pp. 6151–6167, 2017.
- **Swaminathan R** and A. S. Madhukumar, "Classification of error correction codes and estimation of interleaver parameters in a robust environment," *IEEE Transactions on Broadcasting*, vol. 63, no. 3, pp. 463–478, Sept. 2017.
- **Swaminathan R**, A. S. Madhukumar, W. Guohua, and T. S. Kee, "Blind reconstruction of Reed-Solomon encoder and interleavers over noisy environment," *IEEE Transactions on Broadcasting*, vol. 64, no. 4, pp. 830–845, Dec. 2018.
- **Swaminathan R**, A. S. Madhukumar, W. Guohua, and T. S. Kee, "Blind recognition of LDPC code parameters over erroneous channel conditions," *IET Signal Processing*, vol. 13, no. 1, pp. 86–95, 2 Feb. 2019.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Switching-based cooperative decode-and-forward relaying for hybrid FSO/RF networks," *IEEE/OSA Journal of Optical Communications and Networking (JOCN)*, vol. 11, no. 6, pp. 267–281, June 2019.

- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Effect of pointing errors on the performance of hybrid FSO/RF networks," *IEEE Access*, vol. 7, pp. 131418–131434, 2019.
- **Swaminathan R** and A. S. Madhukumar, "Blind parameter estimation of turbo convolutional codes: noisy and non-synchronized scenario," *Elsevier Digital Signal Processing*, vol. 95, Article. 102577, Dec. 2019.
- **Swaminathan R**, A. S. Madhukumar, and W. Guohua, "Blind Estimation of code parameters for product codes over noisy channel conditions," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 56, no. 2, pp. 1460–1473, April 2020.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Performance optimization for dual-hop hybrid FSO/RF system with selection combining," *IET Optoelectronics*, vol. 14, no. 6, pp. 422–433, Dec. 2020.
- M. Siddharth, S. Shah, N. Vishwakarma, and **Swaminathan R**, "Performance analysis of adaptive combining based hybrid FSO/RF terrestrial communication," *IET Communications*, vol. 14, no. 22, pp. 4057–4068, Dec. 2020.
- N. Vishwakarma and **Swaminathan R**, "Performance analysis of hybrid FSO/RF communication over generalized fading models," *Elsevier Optics Communications*, vol. 487, Article 126796, May 2021.
- **Swaminathan R**, S. Sharma, N. Vishwakarma, and A.S. Madhukumar, "HAPS-based relaying for integrated space-air-ground networks with hybrid FSO/RF communication : A performance analysis," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 57, no. 3, pp. 1581 - 1599, June 2021.
- S. Shah, M. Siddharth, N. Vishwakarma, **Swaminathan R**, and A. S. Madhukumar, "Adaptive-combining-based hybrid FSO/RF satellite communication with and without HAPS," *IEEE Access*, vol. 9, pp. 81492 - 81511, 2021.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "MIMO hybrid FSO/RF system over generalized fading channels," *IEEE Transactions on Vehicular Technology*, vol. 70, no. 11, pp. 11565-11581, Nov. 2021.
- N. Vishwakarma and **Swaminathan R**, "On the capacity performance of hybrid FSO/RF system with adaptive combining over generalized distributions," *IEEE Photonics Journal*, vol. 14, no. 1, pp. 1-12, Feb. 2022.
- N. Vishwakarma and **Swaminathan R**, "On the maximal-ratio combining of FSO and RF links over generalized distributions and its applications in hybrid FSO/RF systems," *Elsevier Optics Communications*, vol. 520, pp. 1-17, Oct. 2022.
- G. Kumar, P. Date, R. B. Pachori, **R. Swaminathan** and A. K. Singh, "Wrapped Particle Filtering for Angular Data," *IEEE Access*, vol. 10, pp. 90287-90298, 2022.
- Deepshikha Singh and **Swaminathan R**, "Comprehensive performance analysis of hovering UAV-based FSO communication system," *IEEE Photonics Journal*, vol. 14, no. 5, pp. 1-13, Oct. 2022.
- Deepshikha Singh and **Swaminathan R**, "Comprehensive performance analysis of Hybrid FSO/RF space-air-ground integrated network," *Elsevier Optics Communications*, vol. 527, pp. 1-14, Jan. 2023.
- S. Uniyal, N. Vishwakarma and **Swaminathan R**, "Multihop IRS-assisted free space optics communication with DF relaying: A performance analysis," *OPTICA (OSA) Applied Optics*, vol. 62, no. 18, pp. 4716-4726, June 2023.
- V. Bankey, S. Sharma, **Swaminathan R**, and A. S. Madhukumar, "Physical layer security of HAPS-based space-air-ground integrated network with hybrid FSO/RF communication," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 59, no. 4, pp. 4680-4688, Aug. 2023.
- N. Vishwakarma, **Swaminathan R**, P. D. Diamantoulakis, and G. K. Karagiannidis, "Performance analysis of optical reflecting surface-assisted optical space shift keying-based MIMO-FSO system," *IEEE Transactions on Communications*, vol. 71, no. 8, pp. 4751-4763, Aug. 2023.

- G. Kumar, Y. Gopal, **Swaminathan R**, and A. K. Singh, "Fractionally delayed bayesian approximation filtering under non-Gaussian noisy environment," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 59, no. 5, pp. 5823-5834, Oct. 2023.
- G. Kumar, A. Naik, R. B. Pachori, **Swaminathan R**, and A. K. Singh, "Improved Gaussian filtering for handling concurrent delayed and missing measurements," *Asian Journal of Control*, vol. 25, no. 6, pp. 4244-4256, Nov. 2023.
- S. Uniyal, N. Vishwakarma, **Swaminathan R**, and A. S. Madhukumar, "Intelligent-reflecting-surfaces-assisted hybrid FSO/RF communication with diversity combining: A performance analysis," *OPTICA (OSA) Applied Optics*, vol. 62, no. 35, pp. 9399-9413, Dec. 2023.
- G. Kumar, A. K. Naik, **Swaminathan R**, and A. K. Singh, "Gaussian filtering with cyber-attacked data," *IEEE Signal Processing Letters*, vol. 31, pp. 546-550, Jan. 2024.
- Deepshikha Singh, **Swaminathan R**, and Anh T Pham, "Multiple HAPS-based space-air-ground network with FSO communication: A performance analysis," *OPTICA (OSA) Applied Optics*, vol. 63, no. 9, pp. 2362-2375, March 2024
- N. Vishwakarma, **Swaminathan R**, R. Premanand, S. Sharma, and A. S. Madhukumar, "RIS-assisted hybrid FSO/THz system with diversity combining schemes: A performance analysis," *IEEE Internet of Things Journal*, vol. 11, no. 17, pp. 28605-28622, Sept. 2024.
- Prashant Sharma, **Swaminathan R.**, and Deepshikha Singh, "Multi-hop UAV-based FSO system over doubly inverted gamma-gamma turbulence channel," *IEEE Communications Letters*, vol. 28, no. 10, pp. 2313-2317, Oct. 2024.
- N. Vishwakarma, **Swaminathan R**, P. D. Diamantoulakis, and G. K. Karagiannidis, "Cascaded FSO systems with optical reflecting surfaces," *IEEE Internet of Things Journal*, vol. 11, no. 23, pp. 38631-38644, Dec. 2024.
- N. Ahamed, **Swaminathan R.**, and B. Naveen, "Blind interleaver recognition using deep learning techniques," *IEEE Access*, vol. 12, pp. 158714-158730, 2024.
- Manojkumar B. Kokare, **Swaminathan R.**, and Sumit Gautam, "Performance analysis and optimization with deep learning assessment of multi-IRS-aided IoV network," *IEEE Internet of Things Journal*, vol. 12, no. 9, pp. 11581-11599, May 2025
- K. Tripathi. P. Sharma, and **Swaminathan R.**, "System-level analysis of hybrid VLC/IRS-enhanced RF communication," *Optical and Quantum Electronics (Springer)*, vol. 57, no. 398, pp. 1-27, June 2025.

CONFERENCE PUBLICATIONS (Peer Reviewed)

- **R. Swaminathan** and T. Laxmikandan, "Study of physical layer simulation of Wimax systems," *in proc. 2011 National conference on recent trends in communication, computation and signal processing (RTCSP)*, Amrita University Coimbatore, pp. 126-130.
- **Swaminathan R**, M. D. Selvaraj, and R. Roy, "Performance analysis of double correlated selection combining for cooperative diversity systems," *in proc. 2013 IEEE National conference on communications (NCC)*, IIT Delhi, New Delhi, pp. 1-5.
- **Swaminathan R**, M. D. Selvaraj, and R. Roy, "Error Analysis of NC-BFSK for cooperative diversity with correlated links," *in proc. 2013 Fourth nordic workshop on system and network optimization for wireless (SNOW)*, Yllas, Finland.
- **Swaminathan R**, R. Roy, and M. D. Selvaraj, "Performance analysis of triple correlated selection combining for cooperative diversity systems," *in proc. 2013 IEEE International conference on communications (ICC)*, Budapest, Hungary, pp. 5483-5388.
- M. Vinod Kumar, **Swaminathan R**, and R. Roy, "Green cooperative communication techniques for intelligent transportation systems," *in proc. 2013 IEEE International conference on signal processing, computing, and control (ISPCC)*, Waknaghat, India, pp. 1-5.
- **Swaminathan R** and A. S. Madhukumar, "Joint recognition of error correcting codes and interleaver parameters in a robust environment," *in proc. 2016 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, Valencia, Spain, pp. 1–6.

- **Swaminathan R**, A. S. Madhukumar, W. Guohua, and T. S. Kee, "Parameter identification of Reed-Solomon codes over noisy environment," *in proc. 2017 IEEE Vehicular Technology Conference (VTC) Fall*, Toronto, Canada, pp. 1–5.
- S. Sharma, A. S. Madhukumar, **Swaminathan R**, and C. J. Sheng "Performance analysis of hybrid FSO/RF transmission for DF relaying system," *in proc. 2017 IEEE Global Communication Conference (GLOBECOM) Workshops*, Singapore, pp. 1–6.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Switching-based hybrid FSO/RF transmission for DF relaying system," *in proc. 2018 IEEE Wireless Communications and Networking Conference (WCNC)*, Barcelona, Spain, pp. 1–6.
- **Swaminathan R**, A. S. Madhukumar, W. Guohua, and T. S. Kee, "Joint reconstruction of Reed-Solomon encoder and convolutional interleaver in a noisy environment," *in proc. 2018 IEEE International Symposium on Information Theory and its Applications (ISITA)*, Singapore, pp. 715 - 719.
- **Swaminathan R** and A. S. Madhukumar, "Code parameter estimation from noisy data: TPC," *in proc. 2018 ISITA*, Singapore, pp. 491.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Capacity analysis for hybrid FSO/RF networks," *in proc. 2018 ISITA*, Singapore, pp. 501.
- S. Sharma, J. Tan, A. S. Madhukumar, and **Swaminathan R**, "Switching-based transmit antenna/aperture selection in a MISO hybrid FSO/RF system," *in proc. 2018 IEEE GLOBECOM*, Abu Dhabi, UAE, pp. 1–6.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Asymptotic analysis of switching-based hybrid FSO/RF system with DF-relaying," *in proc. 2019 IEEE Asia-Pacific Conference on Communications (APCC)*, Ho Chi Minh city, Vietnam, pp. 425–430.
- M. Siddharth, S. Suyash, and **Swaminathan R**, "Outage analysis of adaptive combining scheme for hybrid FSO/RF communication," *in proc. 2020 IEEE NCC*, IIT Kharagpur, India, pp. 1–6
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Performance of dual-hop hybrid FSO/RF system with pointing errors optimization," *in proc. 2020 IEEE VTC Spring*, Antwerp, Belgium, pp. 1–5.
- **Swaminathan R**, S. Sharma, and A. S. Madhukumar, "Performance analysis of HAPS-based relaying for hybrid FSO/RF downlink satellite communication," *in proc. 2020 IEEE VTC Spring*, Antwerp, Belgium, pp. 1-5.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**, "Performance of hybrid FSO/RF system with transmit aperture selection," *in proc. 2020 IEEE ICC Workshops*, Dublin, Ireland, pp. 1-6.
- S. Sharma, A. S. Madhukumar, and **Swaminathan R**,"Space shift keying-based hybrid FSO/RF system," *in proc. 2020 IEEE VTC Fall*, Victoria, Canada, pp. 1-5.
- N. Vishwakarma and **Swaminathan R**, "On the performance of hybrid FSO/RF system over generalized fading channels," *in proc. 2020 IEEE International Conference on Advanced Networks and Telecommunication Systems (ANTS)*, IIIT Delhi, pp. 1-6
- N. Vishwakarma and **Swaminathan R**, "Capacity analysis of adaptive combining for hybrid FSO/RF satellite communication system," *in proc. 2021 IEEE NCC*, IIT Roorkee & Kanpur, India, pp. 1–6.
- Deepshikha Singh and **Swaminathan R**, "On the performance of UAV-based FSO communication system," *in proc. 2021 IEEE ANTS*, IDBRT Hyderabad, pp. 1-6.
- K. S. G. Kiran and **Swaminathan R**, "Performance analysis of DF-relaying-based cooperative NOMA System with partial relay selection," *in proc. 2022 IEEE International Conference on Communication Systems and Networks (COMSNETS)*, Bengaluru, pp. 574-580.
- A. Dinesh and **Swaminathan R**, "Codeword length estimation of LDPC codes with limited data," *in proc. 2022 IEEE COMSNETS*, Bengaluru, pp. 270-274.
- K. S. G. Kiran and **Swaminathan R**, "Performance analysis of SWIPT-enabled cooperative NOMA system with partial relay selection," *in proc. 2022 IEEE NCC*, IIT Bombay, pp. 1-6.

- A. Dinesh and **Swaminathan R**, "Blind reconstruction of BCH encoder over erroneous channel conditions," *in proc. 2022 IEEE NCC*, IIT Bombay, pp. 1-6.
- S. Sharma, N. Vishwakarma, and **Swaminathan R**, "Performance analysis of IRS-assisted hybrid FSO/RF communication system," *in proc. 2022 IEEE NCC*, IIT Bombay, pp. 1-6.
- G. Kumar, **Swaminathan R**, and A. K. Singh, "High-degree cubature quadrature Kalman filter with fractional delayed measurement," *in proc. 2022 IEEE INDICON*, Cochin, pp. 1-5.
- Deepshikha Singh, Cheguri Reddy, and **Swaminathan R**, "Hovering UAV-Based FSO Communications with DF Relaying: A Performance Analysis," *in proc. 2023 IEEE NCC*, IIT Guwahati, pp. 1-6.
- S. Uniyal, N. Vishwakarma, S. Sharma, and **Swaminathan R**, "Intelligent reflecting surfaces-aided mixed FSO/RF communication system," *in proc. 2023 IEEE WCNC*, Glasgow, Scotland, pp. 1-6.
- N. Vishwakarma and **Swaminathan R**, "Performance analysis of multiple optical reflecting surfaces assisted FSO communication," *in proc. 2023 IEEE WCNC*, Glasgow, Scotland, pp. 1-6.
- S. Uniyal, N. Vishwakarma, Deepshikha Singh, and **Swaminathan R**, "IRS-aided hybrid FSO/RF communication system with selection combining," *in proc. 2023 IEEE GLOBECOM Workshops*, Kuala Lumpur, Malaysia, pp. 1-6.
- Aman Gupta and **Swaminathan R**, "Blind estimation of polar encoder parameters," *in proc. 2023 IEEE ANTS*, MNIT Jaipur, pp. 1-6.
- Manojkumar Kokare, **Swaminathan R**, and Sumit Gautam, "Performance of multiple IRS-enabled V2V communication over double generalized gamma fading channel," *in proc. 2024 IEEE COMSNETS*, Bengaluru, pp. 913-919.
- Deepshikha Singh, **Swaminathan R**, Aravind Marrapu, and A S Madhukumar, "Performance analysis of multiple HAPS-based hybrid FSO/RF space-air-ground network," *in proc. 2024 IEEE COMSNETS*, Bengaluru, pp. 920-926.
- Nayim Ahamed, Naveen B, and **Swaminathan R**, "Classification of channel encoders using convolutional neural network," *in proc. 2024 IEEE COMSNETS*, Bengaluru, pp. 1079-1082.
- Smriti Uniyal, N. Vishwakarma, Deepshikha Singh, and **Swaminathan R**, "Reconfigurable intelligent surfaces-aided mixed THz/FSO communication system," *in proc. 2024 IEEE NCC*, IIT Madras, pp. 1-6.
- Prashant Sharma, Deepshikha Singh, and **Swaminathan R**, "Performance analysis of UAV-based FSO communication over doubly inverted gamma-gamma turbulence channel," *in proc. 2024 IEEE NCC*, IIT Madras, pp. 1-6.
- Manojkumar Kokare, Sumit Gautam, and **Swaminathan R**, "On efficient resource allocation strategies for multi-RIS enhanced V2I SWIPT systems," *in proc. 2024 IEEE WCNC*, Dubai, pp. 1-6
- Deepshikha Singh and **Swaminathan R**, "Multiple UAV-based FSO system with opportunistic relay selection over Malaga turbulence channel," *in proc. 2024 IEEE VTC Spring*, Singapore, pp. 1-6.
- Tinh V. Nguyen, Hoang D. Le, Vuong Mai, **Swaminathan R**, and Anh T. Pham, "Deep reinforcement learning for UAV placement over mixed FSO/RF-based non-terrestrial networks," *in proc. 2024 IEEE Asia Pacific Wireless Communications Symposium (APWCS)*, Singapore, pp. 1-5.
- Nayim Ahamed, Naveen B, **Swaminathan R**, and Yepuri Sudhakara Rao, "Blind identification of interleavers using deep learning neural network," *in proc. 2024 IEEE APWCS*, Singapore, pp. 1-5.
- Nayim Ahamed, **Swaminathan R**, and Yepuri Sudhakara Rao, "Blind interleaver classification using deep learning techniques over Rayleigh fading," *in proc. 2024 IEEE APCC*, Indonesia (Bali), pp. 359-364.
- Nayim Ahamed, and **Swaminathan R**, "Hardware implementation of channel encoder classification using deep learning," *in proc. 2024 IEEE ANTS*, IIT Guwahati, pp. 1-6.

- Kishan Tripathi and **Swaminathan R**, "Outage analysis of hybrid VLC/multi-IRS-aided RF communication system," *in proc. 2025 IEEE COMSNETS*, Bengaluru, pp. 931-935.
- Prashant Sharma, Manda Sarvani, and **Swaminathan R**, "Energy harvesting in multi-hop UAV-assisted FSO communication systems," *in proc. 2025 IEEE COMSNETS*, Bengaluru, pp. 258-265.
- Neha Sharma, Manojkumar Kokare, **Swaminathan R**, and Sumit Gautam, "Distributed RIS SWIPT-IoT systems: Optimizing spectral efficiency and energy harvesting," *in proc. 2025 IEEE WCNC*, Milan, Italy, pp. 1-6.
- Manojkumar Kokare, Rishikesh Mishra, Neha Sharma, **Swaminathan R**, and Sumit Gautam, "Performance of integrated relay-RIS in UAV systems: a selection combining approach," *in proc. 2025 IEEE NCC*, IIT Delhi, pp. 1-6.
- Vaishali Rohilla and **Swaminathan R**, "Multi-relay-enhanced dual-hop terahertz communication: A performance analysis," *in proc. 2025 IEEE NCC*, IIT Delhi, pp. 1-6.
- Aniket Redasni, N. Vishwakarma, and **Swaminathan R**, "Adaptive-combining-based RIS-aided hybrid FSO/RF system: A performance analysis," *in proc. 2025 IEEE NCC*, IIT Delhi, pp. 1-6.
- Manojkumar Kokare, Sumit Gautam, **Swaminathan R**, Neha Sharma, Aryan Kaushik, and Symeon Chatzinotas, "Optimizing SWIPT in multi-RIS aided V2I networks: A deep learning approach," *presented in 2025 IEEE ICC*, Montreal, Canada.
- Neha Sharma, Manojkumar Kokare, **Swaminathan R**, and Sumit Gautam, "Maximizing weighted function in STAR-RIS aided SWIPT-IoT with discrete phase shifting," *presented in 2025 IEEE VTC*, Oslo, Norway.
- Prashant Sharma and **Swaminathan R**, "Performance analysis of UAV-based IRS-assisted FSO communication systems," *presented in 2025 IEEE VTC*, Oslo, Norway.
- N. Vishwakarma, R. Premanand, **Swaminathan R**, and A. S. Madhukumar, "RIS-assisted hybrid FSO/THz system with maximal ratio combining," *presented in 2025 IEEE VTC*, Oslo, Norway.
- Prashant Sharma, **Swaminathan R**, and Mohammed Elamassie, "Comprehensive performance analysis of aerial-platforms-enabled mixed FSO/RF communication with NOMA framework," *accepted in 2025 IEEE PIMRC*, Istanbul, Turkey.
- Nayim Ahamed and **Swaminathan R**, "Hardware implementation of LDPC encoder classification for Wi-Fi and 5G via deep learning," *accepted in 2025 IEEE PIMRC*, Istanbul, Turkey.
- Prashant Sharma, Deepak Jaladi, Nayim Ahamed, and **Swaminathan R.**, "Unified performance analysis of multi-hop ORS-assisted FSO communication systems," *accepted in 2025 IEEE PIMRC*, Istanbul, Turkey.

BOOK CHAPTERS

- G. Kumar G, V. K. Mishra, **Swaminathan R**, and A. K. Singh, "Parameter identification of coulomb oscillator from noisy sensor data," *Communication and Control for Robotic Systems*, vol. 229, pp. 327-338, 2022, Springer, Singapore (Book Chapter)
- Manojkumar B. Kokare, Purva Sharma, **Swaminathan R**, Vimal Bhatia, and Sumit Gautam, "Reinforcement learning and deep learning assisted spectrum management for RIS-SWIPT enabled 6G systems," *Intelligent Spectrum Management: Towards 6G*, DOI:10.1002/9781394201235, Wiley-IEEE Press (Book Chapter).

PATENTS

- **Swaminathan R** and Nayim Ahamed, Methods and Systems for Interleaver Identification in a Communication System, Indian Patent, Patent application no. 202521074893, Filed: 06 Aug 2025.

TECHNICAL DISCLOSURES

- **Title:** Hybrid Free Space Optics/Millimeter-Wave Radio Frequency Communication for Dual-Hop Relaying System
  Inventors: 1) A. S. Madhukumar; 2) Swaminathan R; 3) Shubha Sharma
  Ref: 2018-278
- **Title:** Hybrid Free Space Optics/Millimeter-Wave Radio Frequency Communication for Dual-Hop Relaying System to Counteract Fog, Atmospheric Turbulence, And Pointing Errors
  Inventors: 1) A. S. Madhukumar; 2) Swaminathan R; 3) Shubha Sharma
  Ref: 2018-279
- **Title:** Switching-Based Transmit Antenna/Aperture Selection for Hybrid Free Space Optics/Millimeter-Wave Radio Frequency Communication
  Inventors: 1) A. S. Madhukumar; 2) Swaminathan R; 3) Shubha Sharma
  Ref: 2018-280

RESEARCH GRANTS AND CONTINUING EDUCATION PROGRAM DETAILS

- Number of Sponsored Projects Secured as Principal Investigator: 6
- Number of Sponsored Projects Secured as Co-Principal Investigator: 2
- Number of Consultancy Projects Completed: 2
- Number of Continuing Education Programme Courses Organized: 7

PARTICULARS OF RESEARCH GRANTS

- **Project Title:** High-Altitude Platform Station based Hybrid FSO/RF Communication for Future Satellite Communication Systems
  Principal Investigator: Dr. Swaminathan R
  Scheme: Start-up Research Grant (SRG)
  Duration: 30 Months
  Funding Agency: Science and Engineering Research Board (SERB)
  Budget: Rs. 13,94,396
  Status: Completed
- **Project Title:** Development of Landslide Early Warning System and Real-time Monitoring, Uttarakhand
  Principal Investigator: Dr. Neelima Satyam
  Co-Principal Investigator: Dr. Swaminathan R and Dr. Aruna Tiwari
  Duration: 36 Months
  Funding Agency: Department of Science and Technology (DST), Natural Resources Data Management System (NRDMS) division
  Budget: Rs. 60,00,000
  Status: Completed
- **Project Title:** Statistical Modelling and Analysis of Reconfigurable-Intelligent-Surfaces-Assisted Hybrid FSO/RF System
  Principal Investigator: Dr. Swaminathan R
  Scheme: Mathematical Research Impact-Centric Support (MATRICS)
  Duration: 36 Months
  Funding Agency: SERB
  Budget: Rs. 6,60,000
  Status: Completed
- **Project Title:** 3-D Printed Metamaterial Based EM Designs for Stealth Applications
  Principal Investigator: Dr. Saptarshi Ghosh
  Co-Principal Investigator: Dr. Swaminathan R
  Duration: 36 Months
  Funding Agency: Defense Research and Development Organization (DRDO)
  Budget: Rs. 30,66,000
  Status: Ongoing from Sep 2022

- **Project Title:** Modelling, Analysis, and Design of Aerial-Platform-based Free Space Optics Communication for 6G Networks
  Principal Investigator: Dr. Swaminathan R
  Co-Principal Investigator: Dr. Saptarshi Ghosh
  Scheme: Core Research Grant (CRG)
  Duration: 36 Months
  Funding Agency: SERB
  Budget: Rs. 35,64,260
  Status: Ongoing from Jan 2023
- **Project Title:** Blind Reconstruction of Channel Encoder and Interleaver for Future Generation Communication Systems
  Principal Investigator: Dr. Swaminathan R
  Co-Principal Investigator: Dr. Puneet Gupta
  Scheme: Extramural Research (EMR) II
  Duration: 36 Months
  Funding Agency: Council of Scientific and Industrial Research (CSIR)
  Budget: Rs. 21,09,599
  Status: Ongoing from October 2023
- **Project Title:** Deep Learning based RF Signal Identification Techniques for Cellular Wireless Standards
  Principal Investigator: Dr. Swaminathan R
  Co-Principal Investigator: Dr. Prabhu Chandhar, Chandhar Research Labs Pvt. Ltd.
  Scheme: Telecom Technology Development Fund (TTDF)
  Duration: 24 Months
  Funding Agency: Department of Telecommunications (DoT)
  Budget: Rs. 39,56,920
  Status: Ongoing from April 2025
- **Project Title:** IRS-Aided UAV Networks: A Resilient Communication Solution for Disaster Scenarios
  Principal Investigator: Dr. Swaminathan R
  Scheme: SwaYaan
  Duration: 12 Months
  Funding Agency: Ministry of Electronics and Information Technology (MeitY)
  Budget: Rs. 2,50,000
  Status: Ongoing from April 2025
- **Consultancy Project Title:** Opinion on Functionality of Telecommunication towers and Telecommunication Equipment installed on Telecom Tower
  Consultants: Dr. Swaminathan R and Prof. Vimal Bhatia
  Funding Agency: Bharti Airtel Limited - Madhya Pradesh
  Duration: 2 Months
  Budget: Rs. 1,47,500
  Status: Completed
- **Consultancy Project Title:** Development of Massive Open Online Course (MOOC) on Optical Wireless Communications: Fundamentals and Potential Applications with a vision for 5G and Beyond
  Consultant: Dr. Swaminathan R
  Funding Agency: Danish Management A/S (consulting firm for India - European Union standardization project
  Budget: 3600 EUR
  Status: Completed

PARTICULARS OF CONTINUING EDUCATION PROGRAMMES

- **Title:** Online Short-Term Course (STC) on 5G and Beyond Wireless Technologies: Modelling and Simulations using MATLAB
  Funding Agency: TEQIP III

Dates: Dec. 24 to 26, 2020, **Role:** Course Coordinator and Instructor
Budget: Rs. 6,00,000, **No. of Participants:** 80

- **Title:** Online STC on Statistical Modelling and Analysis of Advanced Wireless Communication Systems
  Funding Agency: AICTE-QIP scheme
  Dates: March 17 to 23, 2022, **Role:** Course Coordinator and Instructor
  Budget: Rs. 93,000, **No. of Participants:** 92
- **Title:** High-end Workshop on Vehicular Communications for Next-Generation Intelligent Transportation Systems
  Funding Agency: SERB KARYASHALA Scheme
  Dates: July 13 to 19, 2022, **Role:** Course Coordinator and Instructor
  Budget: Rs. 5,00,000, **No. of Participants:** 23
- **Title:** Faculty Development Programme (FDP) on Entrepreneurship and Leadership Management
  Funding Agency: ATAL Academy
  Dates: Aug 1 to 12, 2022, **Role:** Course Coordinator and Instructor
  Budget: Rs. 3,00,000, **No. of Participants:** 50
- **Title:** Startup Bootcamp
  Funding Agency: MP Startup Centre
  Duration: January to March 2023, **Role:** Coordinator and Instructor
  Budget: Rs. 4,00,000, **No. of Participants:** 529
- **Title:** Online FDP on Foundation for Entrepreneurship
  Duration: June 12 to 24, 2023, **Role:** Course Coordinator and Instructor
  No. of Participants: 52
- **Title:** Advanced Entrepreneurship Skill Development Programme on Foundation for Entrepreneurship
  Funding Agency: Ministry of MSME
  Duration: Feb 18 to 22, 2025, **Role:** Course Coordinator and Instructor
  Budget: Rs. 7,63,200, **No. of Participants:** 35

TEACHING EXPERIENCE

- **Teaching at IIT Indore**: 1) Vehicular Communication Systems (Spring 2022, 2023, 2024, 2025), 2) Basic Electrical and Electronics Engineering (Autumn 2021), 3) Digital Signal Processing (Spring 2019, 2020, 2021), 4) Wireless Communications (Spring 2020, 2021, 2022, 2023, 2024, 2025), 5) Probability and Random Processes (Autumn 2019, 2020, 2021, 2022, 2023), 6) Applied Probability for Communication Engineering (Autumn 2024, 2025), 7) Mathematical Methods in Signal Processing (Autumn 2020), 8) Error Correcting Codes (Autumn 2022, 2023, 2024), 9) Basic Electrical and Electronics Engineering Lab (Autumn 2019, Spring 2021, 2023, Summer 2023) 10) Communication Systems Lab (Spring 2024, 2025) 11) Foundation for Entrepreneurship (Autumn 2023, 2024, 2025)

PHD GUIDANCE

- **Name:** Guddu Kumar (July 2019 - May 2023)
  Admission Category: TA
  Title: Nonlinear Filtering with Various Irregularities in Measurement Data
  Main Supervisor: Dr. Abhinoy Kumar Singh
  Status: Graduated
- **Name:** Narendra Vishwakarma (July 2019 - Nov 2023)
  Admission Category: Teaching Assistant (TA) till Dec 2020, Fellowship Awardee (FA) from Dec. 2020
  Funding: Prime Minister's Research Fellow (PMRF) Scheme
  Title: Investigations On the Performance Enhancement Techniques for Free Space Optical Communication Systems

Status: Graduated
Highlights: PMRF Fellowship Awardee, IEEE WCNC 2023 Travel Grant Awardee

- **Name:** Deepshikha Singh (Aug. 2020 - Nov. 2024)
  Admission Category: FA (JRF) till May 2022, TA from June 2022
  Funding (Till May 2022): Science and Engineering Research Board (SRG Project)
  Title: Statistical Modelling and Analysis of Aerial-Platform-Based Free Space Optical Communication Systems
  Status: Graduated
  Highlights: SERB ITS Grant Awardee
- **Name:** Manojkumar Kokare (July 2022 - Current)
  Admission Category: TA
  Topic: Modelling, Analysis, and Optimization of Intelligent-Reflecting-Surfaces Assisted Energy Harvesting Systems for Vehicular Communications
  Main Supervisor: Dr. Sumit Gautam
  Status: Ongoing
  Highlights: COMSNETS 2024 Travel Grant Awardee
- **Name:** Nayim Ahamed (Jan 2023 - Current)
  Admission Category: FA
  Funding: Visvesvaraya PhD scheme of MeitY
  Topic: Joint Modulation and Code Classfication Techniques for Future Generation Communication Systems
  Status: Ongoing
  Highlights: COMSNETS 2024 Travel Grant Awardee
- **Name:** Prashant Sharma (May 2023 - Current)
  Admission Category: FA
  Funding: SERB-CRG
  Topic: Design and Development of Aerial-Platform-based Free Space Optics Communication for 6G Networks
  Status: Ongoing
  Highlights: COMSNETS 2025 Travel Grant Awardee
- **Name:** Pranshu Singh (June 2024 - Current)
  Admission Category: FA
  Funding: CSIR
  Topic: Blind Reconstruction of Channel Encoder and Interleaver for Future Generation Communication Systems
  Status: Ongoing

M.TECH THESIS SUPERVISED

- **Name:** Rohit Lilhare (2020-2021)
  Thesis Title: Study and Analysis of Power Optimization Techniques for High Speed Cache Memory Architecture
  Highlights: (a) Thesis work was done as a part of internship at Qualcomm, (b) Jointly supervised with Mr. Abhishek Sakharwade (Qualcomm)
- **Name:** Nikita Golait (2020-2021)
  Thesis Title: LE AUDIO : The Next Generation of Bluetooth Audio
  Highlights: (a) Thesis work was done as a part of internship at NXP Semiconductor, (b) Jointly supervised with Mr. MaheshKumar Nahar (NXP Semiconductor)
- **Name:** Kalla Satya Ganapathi Kiran (2020-2021)
  Thesis Title: Performance Analysis of SWIPT-Enabled Cooperative NOMA Networks for 5G and Beyond Wireless Communications
  Highlights: IEEE Conference Publications (IEEE NCC 2022 and IEEE COMSNETS 2022)
- **Name:** Marrapu Aravind (2021-2022)
  Thesis Title: HAPS-based Integrated Space Air Ground Networks with Hybrid FSO/RF Communication
  Highlights: IEEE Conference Publication (IEEE COMSNETS 2024)

- **Name:** Sandesh Sharma (2021-2022)
  Thesis Title: Intelligent Reflecting Surfaces Assisted FSO and RF Systems for 5G and Beyond Wireless Communications
  Highlights: IEEE Conference Publications (IEEE NCC 2022 and IEEE WCNC 2023)
- **Name:** B. Naveen (2022-2023)
  Thesis Title: Automatic Code and Interleaver Classification Technique for Future Generation Communication Systems
  Highlights: IEEE Conference Publication (IEEE COMSNETS 2024)
- **Name:** Smriti Uniyal (2022-2023)
  Thesis Title: Performance Analysis of IRS-assisted FSO/RF/THz Systems for 6G Wireless Communications
  Highlights: (a) OSA (OPTICA) Applied Optics Journal Publications, (b) IEEE Conference Publications (IEEE WCNC 2023, IEEE GLOBECOM 2023, and IEEE NCC 2024), (c) Nominated for institute silver medal
- **Name:** Chanda Sucharita (2023-2024)
  Thesis Title: Blind Recognition of RS Code and Interleaver Parameters using GFFT Technique
- **Name:** Vaishali Rohilla (2024-2025)
  Thesis Title: Modeling and Analysis of THz Communication Systems
  Highlights: (a) IEEE Conference Publication (IEEE NCC 2025).
- **Name:** M. Sai Vamshi (2024-2025)
  Thesis Title: Blind Parameter Estimation of 5G Channel Coding Schemes

M.S (RESEARCH) THESIS SUPERVISED

- **Name:** Kishan Rajesh Tripathi (2023-2025)
  Thesis Title: Statistical Modeling and Analysis of hybrid VLC/IRS-aided RF/THZ Communication Systems
  Highlights: (a) Springer Optical and Quantum Electronics Journal Publication, (b) IEEE Conference Publication (IEEE COMSNETS 2025).

ADMINISTRATION RESPONSIBILITIES

- Nodal officer, 100 5G Use Case Labs Project funded by Department of Telecommunications (DoT)
- Professor-In-Charge, Sports Promotion of the Institute, since May 2024.
- Professor-In-Charge, Centre for Entrepreneurship Education and Development (CEED), from July 2022 to Feb 28, 2025.
- CEO, IITI Advanced Centre for Entrepreneurship (ACE) Foundation, from July 2022 to Feb 28, 2025.
- Head, Center of Innovation, Incubation, Entrepreneurship, and Industry Relations (CIIEIR), IIT Indore, from September 2020 to July 2022.
- Department Post-Graduate Committee (DPGC) Convener, Department of Electrical Engineering (EE), from November 2020 to November 2023.
- Program Coordinator, M.Tech Communication and Signal Processing (CSP) program, Department of EE, from April 2019 to April 2022
- Convener, Department Safety and Security Committee, since January 2020
- Member Secretary, EE Department meetings, from October 2019 to September 2023
- Member, Institute Sports Committee, from January 2020 to June 2021
- Member, Institute Committee for Center for Innovation and Entrepreneurship (CIE), from January 2020 to September 2021
- Member, Institute Safety and Security Committee, from February 2020 to December 2021
- TEQIP Co-coordinator - TEQIP III program since February 2020

- Placement Faculty Coordinator, Department of EE, from June 2019 to January 2020
- Member, Institute PMRF Committee, since July 2020
- Internal Member, Research and Development Advisory Committee, since September 2021
- Committee Member, Entrepreneurship Education and Accelerator Program in Ujjain Satellite Campus, since October 2022
- Member, Institute project on "Capacity Building for Human Resource Development in UAS" funded by MeitY, since Oct 2022.

AWARDS/RECOGNITION/ACHIEVEMENTS

- Recipient of the Best Research Paper Award for the manuscript titled "Multi-hop UAV-based FSO System Over Doubly Inverted Gamma-Gamma Turbulence Channel," IIT Indore, 2025.
- Elevated to IEEE Senior Member Grade, since May 2023
- Honored as Exemplary Reviewer for IEEE Communication Letters, 2021, by IEEE Communications Society
- University Gold medal winner in M.E communication systems degree programme Anna University.
- Recipient of COMSNETS 2015 travel grant award for presenting research proposal at IEEE COMSNETS 2015 held in Bangalore.
- Recipient of Microsoft student travel grant award for presenting research paper at IEEE International Conference on Communications (ICC) (ICC-2013) held in Budapest.
- MHRD doctoral fellowship, Govt. of India (July 2011 - May 2015).
- Qualified Graduate Aptitude Test in Engineering (GATE) 2010.
- Recipient of Deans merit list scholarship for securing within top 10% ranks in SASTRA university examinations held during academic year 2007 - 2008.
- Received merit certificates from SASTRA university for having secured second mark in Digital electronics and Analog modulation system semester papers.

PROFESSIONAL SERVICE

- **Reviewer** for IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, IEEE Transactions on Signal Processing, IEEE Transactions on Vehicular Technology, IEEE Access, IEEE Transactions on Aerospace and Electronic Systems, IEEE Communication letters, IEEE Wireless Communications Letters, IEEE Signal Processing Letters, IET Communications, IET Optoelectronics, Elsevier Digital Signal Processing, Elsevier Physical Communication, Wiley transactions on emerging telecommunications technologies, Springer Circuits, Systems & Signal Processing.
- **Technical Programme Committee (TPC) member** for IEEE National Conference on Communications (NCC), IEEE European Conference on Networks and Communications (EUCNC) & 6G Summit, IEEE International Conference on Signal Processing and Communications (SPCOM), IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), IEEE Global Communications Conference (GLOBECOM).
- **Organizing Committee Member** for IEEE NCC 2022
- **Workshop Chairs** for IEEE ANTS 2025
- **Session Chair** for IEEE Vehicular Technology Conference 2017.
- **Advisory member** of Technology Innovation and Incubation Centre (TIIC) at Atal Bihari Vajpayee-Indian Institute of Information Technology and Management (ABV-IIITM), Gwalior Advisory Board from November 07, 2022 to October 31, 2023.

PERSONAL INFORMATION

Nationality: Indian
Date of Birth: 19 June 1988
Marital status : Married
Languages: Tamil, English, and Hindi