Ugrasen Singh

Assistant Professor, IIT (ISM) Dhanbad

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Google Scholar: Profile

PROFESSIONAL SUMMARY

Assistant Professor at IIT (ISM) Dhanbad with research expertise in next-generation wireless communication systems, including URLLC, RIS-assisted networks, spatial modulation, and AI/ML-driven wireless optimization. Experienced in analytical modeling, stochastic performance analysis, and learning-based resource allocation for 6G systems. Published extensively in IEEE Transactions and flagship conferences.

RESEARCH INTERESTS

- Ultra-Reliable Low-Latency Communications (URLLC)
- Reconfigurable Intelligent Surfaces (RIS) and STAR-RIS
- AI/ML for Wireless Networks and Resource Allocation
- Terahertz (THz) and 6G Communication Systems
- Integrated Sensing and Communication (ISAC)
- Spatial Modulation and Physical Layer Security

EDUCATION

Ph.D., Telecommunication Technology IIT Delhi, 2018–2022

- Thesis: Design and Performance Evaluation of Space Modulation Techniques
- Advisor: Prof. Manav R. Bhatnagar
- CPI: 7.7/10

M.Tech., Communication & Signal Processing IIT Indore, 2016–2018

- Thesis: Analysis and Design of Wireless Two-Way Relay Network with Energy Harvesting
- Advisor: Prof. Prabhat Kumar Upadhyay
- CPI: 8.9/10

B.E., Electronics & Communication Engineering 2011–2015

- RGPV Bhopal, CPI: 7.2/10

ACADEMIC POSITIONS

Assistant Professor IIT (ISM) Dhanbad, Jan 2025–Present

Postdoctoral Research Fellow Aalto University, Finland, 2023–2024

- Developed analytical and AI-driven URLLC frameworks with reliability guarantees under dynamic wireless conditions
- Designed multi-agent reinforcement learning-based resource allocation for dense networks

Visiting Researcher Aalborg University, Denmark, Nov 2024

- Studied extreme value theory for rare-event modeling in URLLC systems

Visiting Researcher Aalto University, Finland, May 2022– August 2022

- Environmental optimization for 6G networks using RIS to control radio wave propagation.

Early Doc Fellow IIT Delhi, August 2022– November 2022

- Worked on STAR-RIS enabled wireless systems and NOMA/RSMA performance analysis

TEACHING EXPERIENCE

IIT (ISM) Dhanbad 2025–Present

- Statistical Signal Processing, Digital Communication, Internet of Things
- Signal Processing and Communication Labs

RESEARCH CONTRIBUTIONS

Key Contributions

- Developed analytical frameworks for URLLC under time-correlated fading channels
- Proposed RIS/STAR-RIS-assisted transmission schemes for 6G networks
- Designed spatial modulation and SSK-based secure communication techniques
- Developed AI/ML-based adaptive link scheduling for wireless networks

MENTORING

- Supervised 6 B.Tech. final-year projects (IIT ISM Dhanbad)
- Supervising 2 M.Tech. scholars (ongoing)
- Co-supervised 1 M.S. (Research) student at IIT Delhi

JOURNAL PUBLICATIONS

1. **U. Singh**, M. R. Bhatnagar, and T. A. Tsiftsis, "Feedback-Based SSK modulation: constellation design and performance results," *IEEE Trans. Commun.*, vol. 68, no. 11, pp. 6902–6917, Nov. 2020.
2. **U. Singh**, M. R. Bhatnagar, and T. A. Tsiftsis, "Secrecy analysis of SSK modulation: adaptive antenna mapping and performance results," *IEEE Trans. Wireless Commun.*, vol. 20, no. 7, pp. 4614–4630, Jul. 2021.
3. **U. Singh** and M. R. Bhatnagar, "Secrecy analysis for spatial modulation: transmission scheme and performance evaluation," *IEEE Commun. Lett.*, vol. 26, no. 1, pp. 35–39, Jan. 2022.
4. **U. Singh**, M. R. Bhatnagar, and J. Nebhen, "Quadrature spatial modulation-assisted full-duplex communication," *IEEE Wireless Commun. Lett.*, vol. 10, no. 12, pp. 2629–2633, Dec. 2021.
5. **U. Singh**, M. R. Bhatnagar, and A. Bansal, "RIS-assisted SSK modulation: reflection phase modulation and performance analysis," *IEEE Commun. Lett.*, vol. 26, no. 5, pp. 1012–1016, May. 2022.
6. **U. Singh**, H.A.-Tous, O. Tirkkonen, and M. R. Bhatnagar, "Performance analysis of the STAR-RIS-assisted downlink NOMA communication system," *IEEE Commun. Lett.*, May. 2023.
7. **U. Singh** and O. Tirkkonen, "Robust link adaptation in multiantenna URLLC systems with flashligh interference," published in *IEEE Commun. Lett.*, August 2024.
8. **U. Singh**, S. R. Khosravirad, and O. Tirkkonen, "Survival mode transmission strategy for URLLC services over time-correlated rayleigh fading channel," *in IEEE Transactions on Communications* (minor revision submitted).

CONFERENCE PUBLICATIONS

1. A. Srinivasan, **U. Singh** and O. Tirkkonen, "Multi-agent reinforcement learning approach scheduling for in-X subnetworks," in *Proc. IEEE VTC (Fall)*, Washington DC, USA, Oct. 2024.
2. **U. Singh** and O. Tirkkonen, "Link adaptation for downlink MIMO URLLC transmission," in *Proc. IEEE WCNC*, April 2024, pp. 1–6.
3. H. Raj, **U. Singh**, and B. R. Manoj, "On the Performance of IRS-Assisted SSK and RPM over Rician Fading Channels,"in *Proc. IEEE VTC-Spring*, Singapore, Jun 2024, pp. 1–5.
4. **U. Singh** and M. R. Bhatnagar, "Partially informed transmitter-based space shift keying," in *Proc. IEEE Annu. Int. Symp. Pers. Ind. Mobile Radio Commun. (PIMRC)*, Istanbul, Turkey, Aug 2019, pp. 1–7.
5. **U. Singh** and M. R. Bhatnagar, "Secrecy performance analysis of adaptive SSK transmission," in *Proc. IEEE Annu. Int. Symp. Pers. Ind. Mobile Radio Commun. (PIMRC)*, London, U.K (Virtual Conference), Aug. 2020, pp. 1-7.
6. **U. Singh** and M. R. Bhatnagar, "An information transmission scheme for RIS-aided wireless communication network," published in *Proc. IEEE Int. Conf. on Sig. Proc. and Commun. (SPCom)*, Bangalore, India, July 2022.
7. D. S. Gurjar, **U. Singh**, and P. K. Upadhyay, "Energy harvesting in hybrid two-way relaying with direct link under Nakagami-m fading," in *Proc. IEEE Wirel. Commun. Net. Conf. (WCNC)*, Barcelona, Spain, April. 2018, pp. 1-6.
8. **U. Singh**, S. Solanki, D. S. Gurjar, P. K. Upadhyay, and D. B. da Costa, "Wireless power transfer in two-way AF relaying with maximal-ratio combining under Nakagami-m fading," in *Proc. IEEE Int. Wirel. Commun. Mob. Comp. Conf. (IWCMC)*, Cyprus, Jun. 2018, pp. 169–173.
9. S. K. Baranwal, **U. Singh**, and M. R. Bhatnagar, "Robust URLLC link adaptation via statistical modeling of time-varying SINR deviations," in *accepted in IEEE International Conference on Signal Processing and Communications (SPCOM)*, Bangalore, India, July 2026.

AWARDS AND HONOURS

- India–Finland Research Fellowship (Aalto University exchange)
- GATE MHRD Fellowship (PhD and M.Tech)
- IIT Delhi International Travel Grant (IEEE PIMRC 2019)
- GATE AIR 1056 (99.3 percentile)

PROFESSIONAL SERVICE

- Technical Program Committee: IEEE WCNC 2024, ICC 2024, VTC 2025
- Reviewer: IEEE TCOM, TWC, TVT, IoT Journal, CL, WCL, GLOBECOM
- IEEE Member (Communications Society, Young Professionals)

REFERENCES

- Dr. Manav R. Bhatnagar (Ph.D. Supervisor)
  Professor, Department of Electrical Engineering
  Indian Institute of Technology Delhi
  Address: Hauz Khas, IN-110016 New Delhi, India
  Phone: +91-11-26597251
  Email: manav@ee.iitd.ac.in

- Dr. Olav Tirkkonen (Postdoc Supervisor)
  Professor, Department of Communication and Networking
  Aalto University Helsinki, Finland
  Phone: +358505122491
  Email: olav.tirkkonen@aalto.fi
- Dr. Prabhat Kumar Upadhyay (M.Tech Supervision)
  Professor, Department of Electrical Engineering
  Indian Institute of Technology Indore, India
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I, hereby, declare that all the above given information is correctly entertained up to my knowledge.

Ugrasen Singh