Curriculum Vitae

Dr. Himanshu Bhusan Mishra

Associate Professor
Electronics Engineering Department IIT (ISM) Dhanbad
(from 12th July 2024 to present)

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Educational Qualification

- **PhD (2012-16):** Electrical Engineering Department (Signal Processing and Communication) **Indian Institute of Technology Kanpur**, India
- **M. Tech (2010-12):** Electronics and Communication (Communication and Signal Processing) **National Institute of Technology Rourkela, India**
- **B.Tech (2005-2009):,** Electronics and Telecommunication, **B.P.U.T. Odisha, India**

Post PhD Research Experience

- From 2nd June 2017 to 11th July 2024, I have worked as Assistant Prof. in ECE department of IIT (ISM) Dhanbad.
- From NOV 2016 to APR 2017, I have worked as project associate in multimedia wireless network group in EE department of IIT Kanpur, under Prof. Aditya K Jagannatham.

Industry Experience

- Interim Engineering Intern in Modem system team at QUALCOMM India Private Limited, Hyderabad (from 6th June 2016 to 29th Aug 2016).

Research Interest

My current research interest is specially focused on the following areas

- Development of robust signal processing algorithms for advanced wireless communication (4G, 5G, beyond 5G).
- Development of channel estimation and data detection schemes for OFDM/Filter Bank Multi-carrier (FBMC)/ Orthogonal time frequency space (OTFS) based MIMO/massive MIMO/ multi-user MIMO systems.
- Application of Machine Learning techniques for wireless communication systems.
- Implementation of real time wireless communications using software defined radio (SDR).

Research Projects under me

SL No.	Title	Cost in Rs.	Duration (in Years)	Role as PI/Co-PI	Funding Agency	Status
1.	Development of an Efficient Transceiver for MIMO-OFDM System using Novel Channel Estimation Algorithms	10 Lakhs	3	PI	FRS of IIT (ISM) Dhanbad	Completed
2.	Development of Signal Processing Framework for Uplink/Downlink of Multi-cell, Multi-User Massive MIMO-FBMC-OQAM based 5G communication system	13 Lakhs	2	PI	DST (SERB) Start-up Research Grant	Completed
3.	Multi-Carrier Waveforms for Intelligent Reflecting Surface (IRS) assisted Next-Generation Wireless Communication Systems	39.08 Lakhs	3	PI	DST(SERB) CRG Grant	Ongoing
4.	Development of spectrally efficient low complexity fast sparse channel estimation algorithms for orthogonal time frequency space (OTFS) modulation scheme.	6.6 Lakhs	3	PI	DST (SERB) MATRICS Grant	Ongoing
5.	FIST-2019 Project	Rs.	5	Co-PI	DST Govt.	Ongoing

	of Department of Electronics Engineering	1,90,00,000/-			India	
6.	CORROSION POTENTIAL OF INDUSTRIAL WASTE AS A GEOMATERIAL USING INVERSE DIELECTRIC SPECTROSCOPY	Rs.3271400/-	3	Co-PI	DST(CRG) Govt. India	Ongoing
7.	Development of Channel Estimation and Phase Optimization Algorithms for Implementation of Intelligent Reflecting surface (IRS) Assisted Wireless Systems in Underground Mines	9.5 Lakhs	1	PI	TEXMiN Foundation IIT ISM Dhanbad	Ongoing

Publications in Journals

1. S. Soujanya, P. Singh and **H. B. Mishra**, *"OFDM/OQAM-IRS System with Imperfect CSI," in IEEE Communications Letters, doi: 10.1109/LCOMM.2024.3444902.*
2. Kumar, Chandan, Debjani Mitra, and **Himanshu B. Mishra**. *"Low complexity stationary iteration based approximate inversion for signal detection in OTFS system." Physical Communication, Vol. 66, 2024. 102469.*
3. Rakesh Yadav, **Himanshu B. Mishra**, Samrat Mukhopadhyay and Rahul Mishra, "IRS-OTFS Systems: Design of Reflection Coefficients for Low-Complexity ZF Equalizer", Accepted in IEEE Transactions on Vehicular Technology. *(With my PhD Scholar Rakesh Yadav)*

4. Mukhopadhyay, Samrat, and **Himanshu B. Mishra**. "Multiple Choice Hard Thresholding Pursuit (MCHTP) for simultaneous sparse recovery and sparsity order estimation." *Signal Processing (2024)*

5. R. Ranjan, A. Bhattacharya, S. Mukhopadhyay and **H. B. Mishra**, "A Gradient Ascent Based Low Complexity Rate Maximization Algorithm for Intelligent Reflecting Surface-Aided OFDM Systems," in *IEEE Communications Letters*, vol. 27, no. 8, pp. 2083-2087, Aug. 2023. *(With my PhD Scholar Rakesh Ranjan)*

6. S. Kumari, M. K. Dikkala, S. Mukhopadhyay and **H. B. Mishra**, "Two Choice Hard Thresholding Pursuit (TCHTP) for Delay-Doppler Channel Estimation in OTFS," in *IEEE Wireless Communications Letters*, vol. 12, no. 6, pp. 1032-1036, June 2023,, doi: 10.1109/LWC.2023.3257998. *(With my PhD Scholar Sweta Kumari)*

7. Dora, S.K., **Mishra, H.B**. & **Sahoo, M.** Low Complexity Implementation of OTFS Transmitter using Fully Parallel and Pipelined Hardware Architecture. *Journal of Signal Processing Systems* (2023). https://doi.org/10.1007/s11265-023-01847-x *(With my PhD Scholar Sai Kumar Dora)*

8. P. Singh, K. Yadav, **H. B. Mishra** and R. Budhiraja, " BER Analysis For OTFS Zero Forcing Receivers," *IEEE Transactions on Communications*, vol. 70, no. 4, pp. 2281-2297, 2022.

9. P. Singh, A. Gupta, **H. B. Mishra** and R. Budhiraja, "Low-Complexity ZF/MMSE MIMO-OTFS Receivers For High-Speed Vehicular Communication," *IEEE Open Journal of the Communications Society*, vol. 3, pp. 209-227, 2022.

10. **Himanshu B. Mishra,** Singh, P., Prasad, A.K. and Budhiraja, R. "OTFS Channel Estimation And Data Detection Designs With Superimposed Pilots", *IEEE Transactions on Wireless Communications*, vol. 21, no. 4, pp. 2258-2274, April 2022

11. P. Singh, **H. B. Mishra**, A. K. Jagannatham, K. Vasudevan, and L. Hanzo, "Uplink sum-rate and power scaling laws for multi-user massive MIMO-FBMC systems," ***IEEE Transactions on Communications*** vol. 68, no. 1, pp. 161-176, 2020

12. Singh, Prem, **Himanshu B. Mishra**, Aditya K. Jagannatham, and K. Vasudevan. "Semi-Blind, Training, and Data-Aided Channel Estimation Schemes for MIMO-FBMC-OQAM Systems." ***IEEE Transactions on Signal Processing***, vol. 67, no. 18, pp. 4668-4682, 2019

13. E. Sharma, **Himanshu B. Mishra**, K. Vasudevan, R. Budhiraja " PAPR analysis of superimposed training based SISO/MIMO-OFDM systems with orthogonal affine precoder" ***Physical Communication***, *25*, pp.239-248, 2017

14. Himanshu B.Mishra, K.Vasudevan "Design of superimposed training sequence for spatially correlated multiple-input-multiple-output channels under interference-limited environments" *IET communication*, vol. 9, no. 10, pp. 1259-1268, 2015

Publications in International and National Conferences

- Sai Dora, Kapil Yadav, Manodipan Sahoo and **Himanshu B. Mishra**, "Hardware implementation of OTFS Modulation Using CORDIC Algorithm", Accepted in IEEE SPCOM, (to be presented at IISC Bangalore in July 2024) (with PhD Student Sai Kumar Dora).
- S. Kumari, **H. B. Mishra** and S. Mukhopadhyay, "Greedy Sparse Channel Estimation Framework for Multi-User OTFS Systems," *2024 National Conference on Communications (NCC)*, Chennai, India, 2024, pp. 1-6, doi: 10.1109/NCC60321.2024.10485909. (with PhD Student S. Kumari)

- R. Ranjan, A. Bhattacharya, **H. B. Mishra** and S. Mukhopadhyay, "A Low-Complexity Phase Shift Optimization to Achieve Security in IRS-Assisted MISO Systems," 2024 National Conference on Communications (NCC), Chennai, India, 2024, pp. 1-6, doi: 10.1109/NCC60321.2024.10485931. (With PhD student R. Ranjan)

- S. Soujanya, **H. B. Mishra** and P. Singh, "IRS Assisted FBMC Waveform: Channel Estimation and Reflecting Coefficients Optimization," *TENCON 2023 - 2023 IEEE Region 10 Conference (TENCON)*, Chiang Mai, Thailand, 2023, pp. 1-6, doi: 10.1109/TENCON58879.2023.10322538.

- S. Kumari, **H. B. Mishra** and S. Mukhopadhyay, "Peak-To-Average Power Ratio Analysis For Embedded Pilot And Superimposed Pilot Aided OTFS Waveform," *2023 IEEE Guwahati Subsection Conference (GCON)*, Guwahati, India, 2023, pp. 1-6, doi: 10.1109/GCON58516.2023.10183560. (With PhD Student S. Kumari)

- S. K. Dora, R. K. Yadav, **M. Sahoo** and **H. B. Mishra**, "VLSI Architecture for Low Complexity Zero Forcing Equalizer in OTFS Modulation," *2023 International Conference on Electrical, Electronics, Communication and Computers (ELEXCOM)*, Roorkee, India, 2023, pp. 1-6, doi: 10.1109/ELEXCOM58812.2023.10370165. (With PhD Student S. K. Dora)

- **H. B. Mishra**, P. Singh, A. K. Prasad and R. Budhiraja, "Iterative Channel Estimation And Data Detection in OTFS Using Superimposed Pilots," 2021 IEEE International Conference on Communications Workshops (ICC Workshops), 2021, pp. 1-6. (With my MTech student A K Prasad)

- P. Singh, **H. B. Mishra** and R. Budhiraja, "Low-Complexity Linear MIMO-OTFS Receivers," 2021 IEEE International Conference on Communications Workshops (ICC Workshops), 2021, pp. 1-6.

- Patra, Radhashyam, ArunanshuMahapatro, **Himanshu B. Mishra**, Prem Singh, and Sonali Panda. "PAPR and CCDF Analysis of Superimposed Training Sequence-based MIMO-FBMC OQAM Systems." In *TENCON 2019-2019 IEEE Region 10 Conference (TENCON)*, pp. 1489-1493. IEEE, 2019.

- Prem Singh, BagadiUsha Rani, **Himanshu B. Mishra**, K. Vasudevan "Neighbourhood Detection-based ZF-V-BLAST Architecture for MIMO-FBMC-OQAM Systems", IEEE Globecom, 2018, Abu Dhabi, UAE

- Naveen K D Venkategowda, **Himanshu B Mishra** "Optimal Energy Transmission for Decentralized Detection in Wireless Powered Sensor Networks", IEEE Vehicular Technology Conference, Fall, 2018 , Chicago, IL, USA

- **Himanshu B Mishra,** Naveen K D Venkategowda, Aditya K Jagannatham "Affine-Precoding based Superimposed Training for Semi-Blind Channel Estimation in OSTBC MIMO-OFDM Systems ", in Fifty-First AsilomarIEEE Conference on Signals, Systems and Computers, Pacific Groove, CA, USA, Oct. 2017.

- E Sharma, **Himanshu B Mishra**, K Vasudevan "Training Sequence Optimization for Estimating the channel in the Presence of Colored Interference for MIMO-OFDM Systems" *Region 10 Conference (**TENCON**), 2016 IEEE*. IEEE, 2016.

- E Sharma, **Himanshu B Mishra**, K Vasudevan"PAPR Analysis of Superimposed Training Based MIMO-OFDM Systems using an Orthogonal Affine Precoder " *India Conference (**INDICON**), 2016 IEEE Annual*. IEEE, 2016.

  Mishra, HimanshuBhusan; Mishra, Madhusmita; Patra, Sarat Kumar. "Selected mapping based PAPR reduction in WiMAX without sending the side information," ***IEEE. Conf. RAIT*. 2012**. , pp. 182-184

Courses taken at IIT (ISM) Dhanbad

- ECC11101- Electronics Engineering, (UG Course)
- ECC18102- Wireless Communication (UG Course)
- ECC 302- Digital Signal Processing (UG Course)
- ECC 306- Digital Communication (UG Course)
- ECE 52109- Multicarrier communication (PG Course)
- ECC51102- Probability Theory and Linear Algebra (PG Course)
- ECC52102- Estimation and Detection Theory (PG Course)

Number of PhD students under my Guidance

- **Number of PhD students awarded** - 1
- **Number of Full-time PhD students** - 4

Scholastic Achievements

- Achieved **Departmental Best M.Tech. Award** and honoured with **institute silver medal** at NIT Rourkela.

- Received International Travel Grant (ITS) from SERB, DST, Govt. of India to present paper in IEEE 88th VTC Fall 2018 at Chicago, USA.
- The following research paper is nominated for Best paper Award in, IEEE SPCOM, which will be presented on 3rd July 2024 at IISC Bangalore.
    - Sai Dora, **Himanshu B. Mishra,** Manodipan Sahoo and Kapil Yadav, "Hardware implementation of OTFS Modulation Using CORDIC Algorithm", Accepted in IEEE SPCOM, (to be presented at IISC Bangalore in July 2024)

- Two of my journal papers [R1] and [R2] have recently been listed as **best reading articles** in IEEE Communication Society under the topics "Delay-Doppler Channel Estimation" and "Multiple Antenna and Multiple Access for OTFS", respectively. The details can be found in the following link.

  https://www.comsoc.org/publications/best-readings/orthogonal-time-frequency-space-otfs-and-delay-doppler-signal-processing

  [R1] **H. B. Mishra**, P. Singh, A. K. Prasad and R. Budhiraja, "OTFS Channel Estimation and Data Detection Designs With Superimposed Pilots," *IEEE Transactions on Wireless Communications*, vol. 21, no. 4, pp. 2258-2274, April 2022, doi: 10.1109/TWC.2021.3110659.

  [R2] P. Singh, A. Gupta, **H. B. Mishra** and R. Budhiraja, "Low-Complexity ZF/MMSE MIMO-OTFS Receivers for High-Speed Vehicular Communication," *IEEE Open Journal of the Communications Society*, vol. 3, pp. 209-227, 2022, doi: 10.1109/OJCOMS.2022.3147569.

Short Courses Conducted

- Under the SSR activity of my SRG project, delivered lecture on the topic **"Development of Signal Processing Schemes for OTFS based 5G systems**" , on 7th June 2021.
- A short training on "FPGA based SDR" was conducted on 19th July 2019.

Invited Talks Delivered

- Delivered a lecture for one day workshop on "Brief description of 5G and application of Electronics in Medical Field" at the Institution of Engineers (India), Jamshedpur Local Centre on 14th Sept. 2019**.**
- Expert speaker for TEQIP-III Sponsored short term course on "Modern Wireless Communication: Towards 5G" at NIT Rourkela, India, from 25th Sept. to 29th Sept. 2019.
- Delivered guest lecture on the topic "*Channel estimation and data detection for OTFS based 6G wireless systems*", at NIT Rourkela on 30th July 2022, during "Karyasala Workshop" which is sponsored by DST (SERB) Govt. of India.
- Delivered guest lecture on the topic " *Research Challenges for intelligent reflecting surface (IRS) assisted orthogonal time frequency space (OTFS) based next generation wireless systems* " at NIT Trichy on 8th July 2023, during "Karyasala Workshop" which is sponsored by DST (SERB) Govt. of India.
- Delivered Invited talk in the topic: "OTFS Waveform for next Generation Wireless Systems" on 10th April 2024, during Faculty Development Program (FDP) on 5G Technology, organized by Department of Telecommunications (DoT) Govt. of India.

Administrative Work at IIT (ISM) Dhanbad

- MTech Coordinator (GATE), PG Admission Cell
- Vice Chairperson PG Admission
- Warden of Jasper Hostel
- DPGC Member, DUGC Member

Papers Reviewed

- IEEE Trans. On Wireless Communications
- IEEE Trans. On Communications
- IEEE Transactions on Vehicular Technology
- IEEE Wireless Comm Letter
- IEEE Communication Letters
- IEEE Communication Magazine
- IEEE GLOBECOM
- IEEE NCC

PERSONAL INFORMATION

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