Pavan Kumar Reddy Manne

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Contact Information

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Education

Ph.D. in Electrical Engineering [Dual Degree]
Indian Institute of Technology Hyderabad 2014-2021
Dissertation:"System-Level Modelling and Performance Enhancements for 4G/5G Systems"
Received IEEE GraTE7 2022 Best Ph.D. Thesis Award

M.Tech. in Electrical Engineering [Dual Degree]
Indian Institute of Technology Hyderabad 2014-2021

B.Tech. in Electronics and Communications Engineering 2014
ACE Engineering College (affiliated to JNTU Hyderabad)

Research Areas

Wireless communications: massive MIMO systems, physical-layer procedures, protocol stack, scheduler designs, and systems building; **Emerging technologies:** reconfigurable intelligent surfaces, next-generation multiple access schemes, and AI/ML for wireless communications.

Professional Experience

Assistant Professor, *Indian Institute of Technology Mandi* Aug. 2025–present

- Leading a research project on intelligent resource management for next-generation massive MIMO networks.

Principal Architect, *WiSig Networks* Apr. 2024–Aug. 2025

- Led a layer-2 R&D team building standard compliant 5G base station *"Bharath-RAN"*.
  - As the lead architect, designed cutting-edge algorithms for scheduling, link and rank adaptation, and power control for a 5G base station, and guided the team in the implementation and outdoor validation of these designs.

Lead Engineer, *WiSig Networks* Aug. 2020–Mar. 2024

- Researched and co-developed a new concept called structural MIMO that maximizes the cellular capacity and ensures ubiquitous coverage.
  - A part of our work was submitted to ITU as a potential technology for IMT 2030 or 6G standard. [Link]
- Patented various algorithms for coverage enhancement, power control, scheduling users, and resource allocation in 4G/5G systems.
- Developed user pairing and beamforming algorithms for technologies like non-orthogonal multiple access schemes and reconfigurable intelligent surfaces, and published our findings in premier IEEE journals.

Research Engineer, *WiSig Networks* Jan. 2018–Jul. 2020

- Developed a MATLAB based 4G and 5G standard-compliant commercial system-level simulator from scratch.
- Patented beamforming algorithms that maximize 4G massive MIMO capacity.
  - With minimal software changes, our idea introduces 5G like beamforming feature to legacy 4G systems.
  - Received Best Paper Award Honorable Mention at COMSNETS 2020 for the work.
- Developed and evaluated a scheduler design that handles hundreds of users supporting single user MIMO (SU-MIMO) and multi-user MIMO (MU-MIMO).
- Implemented physical layer downlink control channel for various cellular technologies: 5G-NR, 4G-LTE, NB-IoT, and LTE-M1.

Academic Activities

Thesis Co-Advisor for M. Tech Students

- Kusuma Priya Pulavarty, *IIT Hyderabad, 2022*
- Swaraj Srivatsava, *IIT Hyderabad, 2024*
- Shivalika Tripathi, *IIT Hyderabad, 2024*

Teaching Assistant
Indian Institute of Technology Hyderabad, India

- Assisted in teaching of Signals and Systems [under-graduate level]
- Assisted in teaching of Digital Signal Processing [under-graduate level]
- Assisted in teaching of Advanced Cellular Communications [post-graduate level]

Awards

IEEE GraTE7 Best Ph.D. Thesis Award, *IEEE*	2022
Best Paper Award Honourable Mention, *COMSNETS*	2020
Best Poster Award, *COMSNETS*	2023
Excellence in Research Award, *IIT Hyderabad*	2020
Excellence in Research Award, *IIT Hyderabad*	2018

Service

Reviewer for: IEEE IoT-J, IEEE WCL, IEEE COMMLETT, IEEE TVT, IEEE ICC, IEEE Globecomm, IEEE WCNC.

Patent Applications

Granted Patents

4. Method and System for Identifying Non-orthogonal Multiple Access (NOMA) User Devices. [Link].
3. Method for Allocating Resources to a Plurality of Users by a Base Station [Link].
2. Method for Wireless Communication Using Beamformed PDCCH [Link].
1. Method and System for Scheduling a Pool of Resources to a Plurality of User Equipments [Link].

Provisional Filed, Under Examination

8. A Single Radio Unit, A Single Baseband and Stack to Serve Multiple Sectors.
7. A Method to Transmit One or More Waveforms to One or More Users.
6. High Capacity Wireless Backhaul and Methods Thereof.
5. Enhanced Rank Adaptation Methodology for Multiple-Input-Multiple-Output (MIMO) Systems.
4. Graph Neural Networks for User-Pairing in Wireless Communication Systems.
3. Method of communication with relay nodes and/or users and communication systems thereof [Link].
2. Structural Massive MIMO and Methods Thereof [Link].
1. Methods for Improving Coverage of a Cellular Network and thereof [Link].

Research Publications

Journals

10. Pavan Reddy M., "Enhanced Resource Management for RIS-assisted NOMA Networks: A Fractional Programming Framework", *IEEE Commun. Lett.*, *2025*, [Link].
9. S Mourya, Pavan Reddy M., SD Amuru, K. Kuchi, "Spectral Temporal Graph Neural Network for massive MIMO CSI Prediction", *IEEE Wireless Commun. Lett.*, *2024*, [Link].
8. Pavan Reddy M. SaiDhiraj, and K Kuchi "Optimizing the Placement and Beamforming of RIS in Cellular Networks: A System-Level Modeling Perspective", *IEEE Commun. Lett.*, 2023, [Link].
7. Pavan Reddy M. and Abhinav Kumar "User Pairing and Power Allocation for IRS-Assisted NOMA Systems with Imperfect Phase Compensation", *IEEE Wireless Commun. Lett.*, 2022, [Link].
6. Spandan, Muralimohan, Harish, Pavan Reddy M., K. Kuchi, "Outdoor Massive MIMO Testbed With Directional Beams: Design, Implementation, and Validation", *IEEE Access*, 2024, [Link].
5. Spandan, Muralimohan, Harish, Pavan Reddy M., SaiDhiraj, K. Kuchi, "Massive MIMO with Circular Antenna Array: Design, Implementation, and Validation", *IEEE Access*, 2024, [Link].
4. Pavan Reddy M., Koteswara Rao G., Harish Kumar D., Subhash K., S. Amuru, and K. Kuchi, "Uplink Coverage Enhancements for Extremely Large Cell Sites", *EURASIP Journal*, 2022, [Link].
3. Pavan Reddy M., A. Kumar, and K. Kuchi,"Design and Performance Analysis of Joint Control and Shared Channel Scheduler for DL in 3GPP Narrowband-IoT", *Ad Hoc Networks Journal*, vol. 114, 102440, 2021. [Link].
2. Pavan Reddy M., Harish Kumar D., S. Amuru, and K. Kuchi,"Design and Implementation of Beamformed PDCCH for 4G Massive MIMO Systems", *Ad Hoc Networks Journal*, vol. 111, 102358, 2021. [Link].
1. Pavan Reddy M., G. Santosh, A. Kumar, and K. Kuchi, "Scheduling and Decoding of Downlink Control Channel in 3GPP Narrowband-IoT," in *IEEE Access*, vol. 8, pp. 175612-175624, 2020. [Link].

Book Chapters/White Papers

3. Pavan Reddy M. and Abhinav Kumar, "Resource management and cloud-RAN implementation for narrowband-IoT systems", Managing Internet of Things Applications across Edge and Cloud Data Centres. *IET Book Chapter*, 2024. [Link].
2. Spandan et. al., "Meeting IMT2030 Performance Targets: The Potential of OTFDM Waveform and Structural MIMO Technologies". *Bharath 6G Alliance*, 2024. [Link].
1. Pavan Reddy M., Santosh G., Kumar A., and Kuchi K. "Improved Physical Downlink Control Channel for 3GPP Massive Machine Type Communications", *In: Lecture Notes in Computer Science*, vol 11227. Springer, Cham. [Link].

Conferences

15. Swaraj S., Ritesh K., Pavan Reddy M., and Abhinav Kumar, "RIS-Assisted Hybrid NOMA-OMA System with Imperfections in SIC and Phase Compensation", *IEEE VTC spring*, 2025. [Link].
14. Sharan Mourya, Pavan Reddy M., SaiDhiraj Amuru, Kiran Kuchi, "DBSCAN Clustering for User Pairing in Wireless Networks ", *COMSNETS* 2025. [Link].
13. Spandan, et. al., "Meeting IMT-2030 Performance Targets: The Potential of OTFDM Waveform and Structural MIMO Technologies", *ITU Kaleidoscope* 2025. [Link].
12. N. Mouni, Pavan Reddy M., Abhinav Kumar, P. Upadhyay, Maurizio M., "Adaptive Multi-User Clustering and Power Allocation for Hybrid OMA-NOMA System with Imperfect SIC", *COMSNETS* 2024. [Link].
11. N. Mouni, Pavan Reddy M., Abhinav Kumar, P. Upadhyay, "Enhanced User Pairing and Power Allocation Strategies for DL NOMA Systems with Imperfections in SIC", *COMSNETS* 2023. [Best Poster Award]. [Link].
10. N. Mouni, Pavan Reddy M., Abhinav Kumar, and P. Upadhyay, "α-Fairness based User Pairing for Downlink NOMA Systems with Imperfect SIC", *IEEE Globecomm*, 2022. [Link].
9. Priya K., Pavan Reddy M., and Abhinav Kumar "Spectral and Energy Efficient User Pairing for RIS-assisted Uplink NOMA Systems with Imperfect Phase Compensation," *IEEE VTC spring*, 2022. [Link].
8. N. Mouni, Pavan Reddy M., Abhinav Kumar, P. Upadhyay, "DNN based Adaptive User Pairing and Power Allocation to achieve α-Fairness in NOMA Systems with Imperfections in SIC", ACM AI-ML Systems 2022. [Link].
7. Prashanth L., Pavan Reddy M., Saidhiraj Amuru, and K. Kuchi, "Energy and Delay Efficient Intelligent Release Assistant Indication Scheme for NB-IoT," *COMSNETS*, 2022. [Link].
6. Pavan Reddy M., A. Kumar, and K. Kuchi, "Joint Link Adaptation and Resource Allocation for Uplink in 3GPP Machine Type Communications," *COMSNETS*, 2022. [Link].
5. Pavan Reddy M., Mounika R., Abhinav Kumar, and K. Kuchi, "Downlink Resource Allocation for 5G-NR Massive MIMO Systems," *NCC 2022* [Link].
4. Pavan Reddy M., Harish Kumar D., S. Amuru, and K. Kuchi, "Removing the PDCCH Bottleneck and Enhancing the Capacity of 4G Massive MIMO Systems," *COMSNETS*, Bengaluru, India, 2020, pp. 237-244. [Best Paper-Honourable Mention]. [Link].
3. Pavan Reddy M., A. Kumar, and K. Kuchi, "Joint Control and Shared Channel Scheduling for Downlink in 3GPP Narrowband-IoT," *COMSNETS*, Bengaluru, India, 2020, pp. 476-483. [Link].
2. Pavan Reddy M., G. Santosh, A. Kumar, and K. Kuchi, "Downlink Control Channel Scheduling for 3GPP Narrowband-IoT," *IEEE PIMRC*, Bologna, 2018, pp. 1-7. [Link].
1. Pavan Reddy M., G. Santosh, A. Kumar, and K. Kuchi, "Novel rate matching scheme for downlink control channel in 3GPP massive machine type communications," *COMSNETS*, Bengaluru, 2018, pp. 183-190. [Link].

References

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