Pavan Kumar Reddy Manne

As of June 2024

Contact Information

5-4-78/H/2, APHB Colony,
Bhongir, Telangana, India (IN)-508116.

https://pavanreddymanne.github.io
pavanreddymanne@gmail.com

Education

Ph.D. in Electrical Engineering (advisor: Prof. Kiran Kuchi) [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

Signal processing for wireless communications; scheduler designs for cellular networks; massive MIMO and beamforming; protocol design, system building, and evaluation; next-generation multiple access schemes; and reconfigurable intelligent surfaces.

Industrial Experience

Principal Architect, *WiSig Networks* 2023-present

- Leading the layer-2 R&D team that is building standard compliant 5G base station *"Bharath-RAN"*.
  - As a lead architect, I have designed a range of cutting-edge algorithms focused on scheduling, link & rank adaptation, and power control for a 5G base station. Subsequently, I have been guiding my team in the implementation and outdoor evaluation of these designs.

Lead Engineer, *WiSig Networks* 2020-2023

- 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* 2018-2020

- 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 Experience

Thesis Co-Advisor for Ph.D. Students

- Spandan Bisoyi, *IIT Hyderabad, Ongoing*

Thesis Co-Advisor for M. Tech Students

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

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 TVT, IEEE ICC, IEEE Globecomm, IEEE WCNC.

Patent Applications

Granted Patents

2. Method for Allocating Resources to a Plurality of Users by a Base Station [Link].
1. Method for Wireless Communication Using Beamformed PDCCH [Link].

Provisional Filed, Under Examination

9. Enhanced Rank Adaptation Methodology for Multiple-Input-Multiple-Output (MIMO) Systems.
8. Graph Neural Networks for User-Pairing in Wireless Communication Systems.
7. Structural Massive MIMO and Methods Thereof.
6. Method of communication with relay nodes and/or user equipment's and communication systems thereof.
5. A Method to Transmit One or More Waveforms to One or More Users.
4. High Capacity Wireless Backhaul and Methods Thereof.
3. A Method for Adaptive Multi-user Clustering in Non-orthogonal multiple access systems with Imperfect Successive Interference Cancellation.
2. Methods for Improving Coverage of a Cellular Network and thereof [Link].
1. Method and System for Scheduling a Pool of Resources to a Plurality of User Equipments [Link].

Research Publications

Journals

8. Spandan, Muralimohan, Harish, Pavan Reddy M., SaiDhiraj, K. Kuchi, "Massive MIMO with Circular Antenna Array: Design, Implementation, and Validation", *IEEE Access*, 2024, [Link].
7. 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].
6. 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].
5. 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].
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 Downlink 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 Physical Downlink Control Channel 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

2. 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].

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

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.
11. N. Mouni, Pavan Reddy M., Abhinav Kumar, P. Upadhyay, "Enhanced User Pairing and Power Allocation Strategies for Downlink NOMA Systems with Imperfections in SIC", *COMSNETS* 2023. [Best Poster Award]. [Link].
10. 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].
9. 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].
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

Prof. Kiran Kuchi,
Department of Electrical Engineering, IIT Hyderabad,
Founder of WiSig Networks Pvt. Ltd.
kkuchi@ee.iith.ac.in, kkuchi@wisig.com

Dr. Abhinav Kumar,
Associate Professor,
Department of Electrical Engineering, IIT Hyderabad,
abhinavkumar@ee.iith.ac.in

Dr. SaiDhiraj Amuru,
Staff Engineer,
Plume Design, Inc.
asaidhiraj@gmail.com