SPCRC : Signal Processing and Communications

INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

R&D Showcase 2022

SPCRC : Summary

60+ *students*

9 *faculty members*

- *2 adjunct faculty members*

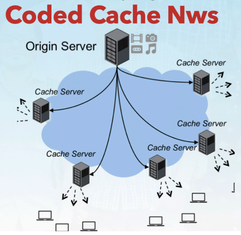
- Research Areas
  - Signal Processing
  - Communication theory
  - Coding Theory & Information Theory
  - IoT
- Funded projects
- Collaborations
- Publications

Funded Projects

Compressive Sensing

Distributed Storage

Coded Cache Nws



Smart Cities

IoT

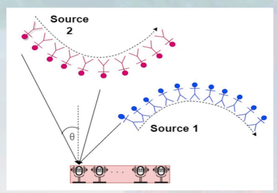
Collaborations

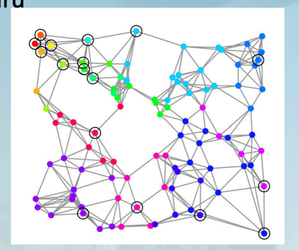
Faculty Profiles

Dr. Santosh Nannuru

Signal processing

- Locating position of sources & microphones from audio recordings
- Algorithms based on sparse representation & neural networks
- Methods for tracking multiple sources over time
- Learning signal dictionaries for sparse signal representation





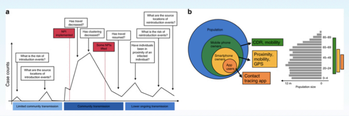
Graph signal processing

- Graph learning - finding connections in data
- Graph Signal Reconstruction
- GSP for Pandemic Data

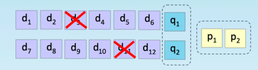
Dr. Praful Mankar, Dr. Sachin Chaudhari

- Cellular Internet-of-things Networks
- SP and ML for IoT
  - Data-transmission Reduction
  - Occupancy Detection

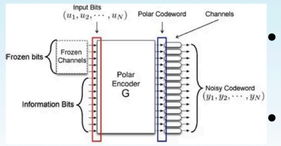
- Analysis of Age of Information for Time Sensitive Applications
- Smart City Applications
  - Air Pollution Monitoring
    - https://spcrc.iiit.ac.in/air
  - Water Flow and Level monitoring



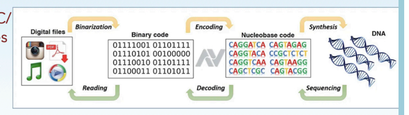
Dr. Prasad Krishnan, Dr. V Lalitha, Dr Arti Yardi



- Codes for distributed storage:
  - Maximally recoverable codes for various topologies and repairing Reed-Solomon Codes
- Decoding algorithms:
  - Polar/Reed-Muller/LDPC/ Spatially Coupled Codes
- Designing low latency codes based on ML techniques

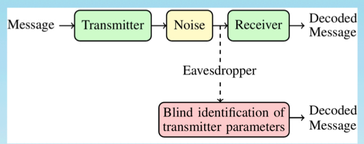


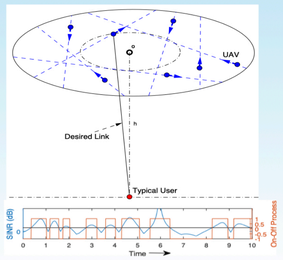
- Codes for distributed computing:
  - Mitigating the effect of stragglers in distributed gradient computation
  - Codes for DC from Combinatorial Designs and other Combinatorial Structures
- Codes for Content Delivery
  - Coded Transmissions schemes for Broadcast News with Caches
  - Private Information Retrieval
- Codes for DNA Data Storage



Dr. Ubaidulla, Dr. Praful Mankar, Dr. Arti Yardi, Dr. Sachin Chaudhari

- Wireless : Cellular and Beyond
  - Wireless Information and Energy Transfer
  - Non-orthogonal Multiple Access
  - Modeling and Analysis of Modern Cellular Networks using Stochastic Geometry
  - UAV & RIS enabled Cellular Comm





- Cognitive Radio Communications
  - Spectrum sensing for new PHY waveforms
  - Cooperative Detection using Heterogeneous Sensors
  - Cognitive Beamforming
- Reverse engineering of communication systems
- Covert communication

Select Publications

Signal Processing

- R. Pandey and S. Nannuru, "Parametric models for DOA trajectory localization", IEEE ICASSP 2022
- R. Pandey, S. Nannuru, and A. Siripuram, "Sparse Bayesian learning for acoustic source localization", IEEE ICASSP 2021

Coding Theory and Information Theory

- S. Sarmasarkar, V. Lalitha and N. Karamchandani, "On Gradient Coding with Partial Recovery," IEEE Int. Symp. Inf. Theory (ISIT) 2021.
- D. Shivakrishna, Aaditya M. Nair and V. Lalitha, "A Field Size Bound and Constructions of Maximally Recoverable Codes with Hierarchical Locality," IEEE Int. Symp. Inf. Theory (ISIT) 2021.
- [Journal] H. H. S. Chittoor, P. Krishnan, K. V. S. Sree and B. Mamillapalli, "Subexponential and Linear Subpacketization Coded Caching via Projective Geometry," in IEEE Transactions on Information Theory.
- K. V. Sushena Sree and P. Krishnan, "Coded Data Rebalancing for Decentralized Distributed Databases," 2020 IEEE Information Theory Workshop (ITW).

Communications and IoT

- [Journal] P. D. Mankar, M. A. Abd-Elmagid and H. S. Dhillon, "Spatial Distribution of the Mean Peak Age of Information in Wireless Networks," in IEEE Transactions on Wireless Communications, vol. 20, no. 7, pp. 4465-4479, July 2021
- [Journal] K. A. Shruthi, Robert Stewart, David Crawford, and S. Chaudhari , " Techno-economic Study of 5G Network Slicing to Improve Rural Connectivity in India, " in IEEE Open Journal of the Communications Society , Nov. 2021
- [Journal] Arti Yardi and Tejas Bodas, "A covert queueing problem with busy period statistic", IEEE Communication letters, Vol. 25, no. 3, pp. 726–729, March 2021.
- S. Duggireddy, P. Stanam, P. D. Mankar, and Harpreet S. Dhillon, "On the Properties of Time-Varying SNR Process in Cellular-Enabled UAV Networks", in IEEE International Conference on Communication (ICC), 2022 [to be presented]
- C. Rajashekar, S. De, S. Chaudhari, "Maximum Frequency Based Adaptive Sensing for Particulate Matter Nodes in IoT Network," in IEEE WF-IoT, New Orleans, USA, Jun. 2021