

Ranjitha Prasad

Communications Research Laboratory,
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Education

- **Ph.D., Electrical Communication Engineering** 2010 - 2015
Indian Institute of Science, CGPA: 6/8 Bangalore, India
- **M.S., Electrical Engineering** 2006 - 2009
Indian Institute of Technology Madras, CGPA: 9/10 Chennai, India
- **B.E., Electronics and Communication Engineering** 2000 - 2004
National Institute of Engineering, Percentage: 81.58% Mysore, India

Research Interests

Bayesian Learning, Estimation Theory, Probabilistic Graphical Models, Compressed Sensing, Data Analytics

Research Experience

- **Ph.D., Thesis Title : Sparse Bayesian Learning for Joint Channel Estimation and Data Detection in OFDM Systems**

Advisor: Prof. Chandra R. Murthy, Dept. of Electrical Communication Engineering, IISc

Abstract: In this thesis, novel, efficient and low-complexity SBL-based algorithms that exploit structured sparsity in the presence of fully/partially known measurement matrices was proposed. The proposed algorithms are applied to the problem of channel estimation and data detection in Orthogonal Frequency Division Multiplexing (OFDM) systems. Cramér Rao type lower Bounds (CRB) for the single and multiple measurement vector SBL problem of estimating compressible vectors are derived.

- **M.S., Thesis Title: Robust Channel Estimation Algorithms for MIMO OFDM Systems.**

Advisor: Prof. K. Giridhar, Dept. of Electrical Engineering, IIT Madras

Abstract: In this thesis, channel estimation for MIMO OFDM systems, employing decision directed channel tracking (DDCT) for high fade rates and long frame duration was studied. Channel estimation in the presence of error propagation in DDCT was modeled as an outlier contaminated Gaussian linear regression problem. A novel EM algorithm combined with the robust Huber's M estimator was proposed for channel estimation.

Work Experience

- **Communications Research Laboratory, EEE, NTU** Singapore
Research Associate Apr. 2015 - present
 - Project: Predictive analytics based offline clustering and route optimization for efficient package delivery. Project implemented at Courex Pte Ltd.
- **ECE dept., University of California, San Diego** Jan. 2013 - March. 2013
Intern (Prof. B. D. Rao) San Diego, USA
 - Project: Sparse Bayesian learning for block sparse vectors.
- **SDT lab, ECSE dept., Monash University** Sept. 2012 - Dec. 2012
Intern (Prof. Emanuele Viterbo) Melbourne, Australia
 - Project: Compressed sensing and secret sharing
- **Signal Processing for Communications Lab, ECE, IISc** Bangalore, India
Project Associate (Prof. Chandra R. Murthy) 2009 - 2010
 - Project: Channel tracking algorithms for communication
- **Tata Elxsi** Bangalore, India
Senior Design Engineer 2004 - 2006
 - Hardware and Software for set top boxes: Multiple projects developing drivers for Modem, Tuner and ASC modules and OpenTV testing.

Awards and Honors

- Secured 14th in the tenth standard Karnataka state board examination.
- Won the Best paper award at IEEE National Conference on Communications, 2014 in the communications track.

Grants

- PhD Research Fellowship from Ministry of Human Resource Development, Govt. of India
- ICASSP Travel Grant, May 2011 (Prague, Czech Republic)
- Indo-NSF grant for the internship at UC, San Diego (Jan-Mar, 2013)
- TCS Research Fellowship, Aug 2013
- TCS Travel grant: NCC 2014 (Kanpur, India), ICASSP 2014 (Florence, Italy)

Relevant courses

Probability theory and Random process, Probabilistic graphical models, Machine learning, Convex optimization, Estimation theory, Matrix theory, Adaptive signal processing, Wireless communications.

Skills

Languages: C, C++, Javascript, MATLAB, R

Publications

Journals

1. R. Prasad, C. R. Murthy, and B. D. Rao, "Joint Channel Estimation and Data Detection in MIMO-OFDM Systems: A Sparse Bayesian Learning Approach", *In press at IEEE Trans. on Sig. Proc.* June 2014
2. R. Prasad, C. R. Murthy, and B. D. Rao, "Joint Approximately Sparse Channel Estimation and Data Detection in OFDM Systems using Sparse Bayesian Learning", *IEEE Trans. on Sig. Proc.* July 2014
3. R. Prasad and C. R. Murthy, "Cramer Rao-Type Bounds for Sparse Bayesian Learning", *IEEE Trans. on Sig. Proc.*, Jan. 2013.

Conferences

1. G. Joseph, C. R. Murthy, R. Prasad, and B. D. Rao, "Online Recovery of Temporally Correlated Sparse Signals Using Multiple Measurement Vectors", *Proc. IEEE Globecom, San Diego, CA, USA, Dec. 2015.*
2. V. Vinuthna, R. Prasad, and C. R. Murthy, "Sparse signal recovery in the presence of colored noise and rank-deficient noise covariance matrix: an SBL approach", *Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), Brisbane, Australia, April 2015.*
3. R. Prasad, C. R. Murthy, and B. D. Rao, "Nested Sparse Bayesian Learning for Block-Sparse Signals with Intra-Block Correlation", *IEEE International Conference on Speech, Acoustics and Signal Processing (ICASSP), Florence, Italy, May 2014.*
4. R. Prasad, and C. R. Murthy, "Joint Channel Estimation and Data Detection in MIMO-OFDM Systems Using Sparse Bayesian Learning", *National Conference on Communications (NCC), Kanpur, India, Feb. 2014. (Best paper award in the Communications track)*
5. R. Prasad, B. N. Bharath, and C. R. Murthy, "Joint Data Detection and Dominant Singular Mode Estimation in Time Varying Reciprocal MIMO Systems", *IEEE International Conference on Speech, Acoustics and Signal Processing (ICASSP), Prague, Czech Republic, May 2011.*
6. R. Prasad, C. R. Murthy, "Bayesian Learning for Joint Sparse OFDM Channel Estimation and Data Detection", *IEEE Global Telecommunication Conference (Globecom), Dec 2010.*

7. R. Prasad, K. Giridhar, "DDCT for Fast Fading Spatially Multiplexed OFDM system", *National Conference on Communications (NCC)*, Jan 2009
8. R. Prasad, K. Giridhar, "Robust Channel Tracking in Fast Fading MIMO channels", *IEEE Global Telecommunication Conference (Globecom)*, Dec 2008.

References

- Prof. Chandra R. Murthy, Dept. of ECE, IISc
Email: cmurthy@ece.iisc.ernet.in
- Prof. B. D. Rao, Dept. of ECE, UCSD
Email: brao@ece.ucsd.edu
- Prof. Justin Dauwels, School of EEE, NTU
Email: jdauwels@ntu.edu.sg