Chiranjib Saha

Graduate Research Assistant
Wireless@Virginia Tech
Department of Electrical and Computer Engineering
Virginia Tech, Blacksburg, USA

Objective

Seeking internship position for Summer 2018 in 4G/5G wireless system engineering team.

Contact Information

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Research Interests

Wireless communications; 5G networks; Heterogeneous cellular networks (HetNEts); LTE/LTE-A, WiFi; Internet of Things (IoT); Device-to-device (D2D) communications; Integrated access and backhaul design; Spectrum sharing; Machine learning; Signal processing; Stochastic geometry.

Education

Virginia Tech, USA. Third year Ph.D. in Electrical and Computer Engineering **2015-Present**

- Advisor: Dr. Harpreet S. Dhillon
- Current Research Project: Joint Backhaul and Radio Access Design for Heterogeneous Wireless Networks
- Current GPA: 3.85

Jadavpur University, India B.E. in Electronics and Telecommunication Engineering. **2011-2015**

- Final year Project Topic: Gesture driven control of an Arduino based robot using Kinect
- Advisor: Dr. Amit Konar
- CGPA: 9.22

PhD Research Experience

- **Integrated access and backhaul (IAB): design challenges and insights May 2017-Present**
  - Proposed new stochastic geometry-based model for mmWave IAB-enabled HetNet
  - Load modeling, coverage and data-rate analysis, studying resource partition strategies in IAB.
- **3GPP-inspired stochastic geometry models for HetNets Sep. 2015-May 2017**
  - Proposed new stochastic geometry-based models closely resembling 3GPP HetNet models, coverage analysis and model comparisons.
- **Performance analysis of D2D-enabled cellular networks Jan. 2016-May 2016**
  - Proposed new spatial models for D2D communication in user hotspots, analyzed downlink coverage and rate trends.

Graduate Level Projects

- **Fitting Point Processes to Cellular Network Topology Fall 2016**
  - Fitted point processes from Gibbs process family to analyze the location patterns of base stations in different urban regions of UK for four major telecom operators.
- **Software implementation of error control encoders and decoders Spring 2017**
  - C++ implementation of BCH encoders and Berlekamp-Massey algorithm, convolutional encoders and Viterbi decoder, LDPC codes.
- **Software Design of Digital Transmitter and Receiver Spring 2016**
  - MATLAB implementation of fundamental building blocks of a digital trans-receiver, e.g. modulation-coding schemes, pulse-shaping, OFDM and BER analysis for AWGN and fading channels.
- **Comparative Study and Analysis of MIMO Techniques Fall 2015**
  - Coded SU-MIMO receivers based on Pre-coding, Zero-Forcing (ZF), Successive Interference Cancellation (SIC) algorithms to compare performance of multiplexing schemes.
  - Analyzed antenna diversity techniques and DOA algorithms such as MUSIC, ESPRIT.
- **OFDM Channel Estimation and Receiver Algorithms Fall 2015**
  - Performed OFDM channel estimation using LS and MMSE approaches and implemented receiver algorithms including ZF, MMSE and SIC.
  - Simulated OFDM in frequency selective channels to capture performance.

Undergraduate Research Experience

- **Summer Intern** **May 2014-Jul. 2014**
  National University of Singapore
  Project: Multi-objective optimization algorithms for application in day-ahead thermal scheduling
- **Intern** **Dec. 2013-Jan. 2014**
  Indian Institute of Technology, Delhi
  Project: Application of evolutionary computation and perceptron networks in biometric systems
- **Undergraduate Research** **Dec. 2012-May 2014**
  Indian Statistical Institute, Kolkata
  Project: Designing dynamic constraint optimization algorithms

Journal Publications

[J6] **C. Saha**, M. Afshang, H. S. Dhillon, "3GPP-inspired HetNet Model using Poisson Cluster Process: Sum-product Functionals and Downlink Coverage", submitted, May. 2017, available online: arxiv.org/abs/1705.01699.

[J5] M. Afshang, **C. Saha**, and H. S. Dhillon, "Nearest-Neighbor and Contact Distance Distributions for Matérn Cluster Process", in *IEEE Commun. Letters*, to appear.

[J4] M. Afshang, **C. Saha**, H. S. Dhillon, "Nearest-Neighbor and Contact Distance Distributions for Thomas Cluster Process", in *IEEE Wireless Commun. Letters*, Dec. 2016.

[J3] **C. Saha**, M. Afshang, and H. S. Dhillon, "Enriched K-Tier HetNet Model to Enable the Analysis of User-Centric Small Cell Deployments", in *IEEE Trans. Wireless Commun.*, Mar. 2016.

[J2] **C. Saha**, K. Pal, S. Mukherjee, S. Das, "A Fuzzy Rule Based Penalty Function Approach For solving Constrained Optimization", in *IEEE Trans. Cybern*, Dec. 2016.

[J1] A. Trivedi, D. Srinivasan, K. Pal, **C. Saha** and T. Reindl, "Enhanced Multiobjective Evolutionary Algorithm Based on Decomposition for Solving the Unit Commitment Problem," in *IEEE Trans. Ind. Informat*, Dec. 2015.

Selected Conference Publications

[C6] **C. Saha**, M. Afshang, and H. S. Dhillon, "Integrated mmWave Access and Backhaul in 5G: Bandwidth Partitioning and Downlink Analysis," submitted, October 2017, available online: arxiv.org/abs/1710.06255.

[C5] **C. Saha**, M. Afshang, and H. S. Dhillon, "Poisson cluster process: Bridging the gap between PPP and 3GPP hetnet models," in Proc., ITA, 2017, available online: arXiv.org/abs/1702.05706.

[C4] **C. Saha** and H. S. Dhillon, "D2D underlaid cellular networks with user clusters: Load balancing and downlink rate analysis," in Proc., IEEE WCNC, San Francisco, CA, 2017.

[C3] **C. Saha** and H. S. Dhillon, "Downlink coverage probability of K-tier HetNets with general non-uniform user distributions," in Proc. IEEE ICC, Kuala Lumpur, 2016.

[C2] **C. Saha**, D. Goswami, S. Saha, A. Konar, A. Lekova and A. K. Nagar, "A novel gesture driven fuzzy interface system for car racing game," in Proc. FUZZ-IEEE, Istanbul, 2015.

[C1] K. Pal, **C. Saha**, S. Das, C. A. Coello Coello, "Dynamic Constrained Optimization with offspring repair based Gravitational Search Algorithm", in Proc. IEEE CEC, Cancún, 2013.

Graduate Courses Undertaken

Multichannel communications, Stochastic signals and systems, Information theory, Advanced Digital Communication, Measure and Probability, Spatial Statistics Error Control Coding

Awards

Wireless@VT Fellowship, 2015.

Computer Skills

- **Programming Languages:** C, C++, R, MATLAB, Mathematica
- **Scripting Languages:** HTML5, LaTeX

Teaching Experience

Course Instructor of Electronic Circuits Laboratory in Viginia Tech **Fall 2015-Spring 2016**.

Reference

Harpreet S. Dhillon Assistant Professor Virginia Tech E-mail: hdhillon@vt.edu