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.

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, Oct. 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 Fransisco, CA, Mar. 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, Mexico, Jun., 2013.

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.

UNDERGRAD 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

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