Vishnu Vardhan Chetlur Ravi

Senior Engineer
Qualcomm Technologies Inc.
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Contact Information

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Education

Ph.D. Electrical Engineering, *Virginia Tech*, USA Jun 2020

- Dissertation: Stochastic Geometry for Vehicular Networks
- Advisor: Dr. Harpreet S. Dhillon
- GPA: 3.94/4.0

B.E. (Hons.) Electronics and Communication Engineering, *BITS-Pilani*, India Jun 2013

- Final Term Project: Implementation of MIMO-OFDM Transceiver System in MATLAB
- Advisor: Dr. Yoganandam Yeleswarapu
- GPA: 9.82/10 Department Rank: 1 University Rank: 2

Research Interests

Wireless Communication, Stochastic Geometry, Wifi, LTE, 5G Networks, Vehicular Ad hoc Networks (VANETs), Cellular Vehicle-to-Everything (C-V2X) Communication, Unmanned Aerial Vehicle (UAV) Networks, Smart cities, Digital Signal Processing.

Ph.D. Research Work

- **Stochastic Geometry for Vehicular Networks** Jan 2017 – Jun 2020
  - Modeled the locations of vehicular nodes in the network using a doubly stochastic spatial model, and analyzed the coverage of vehicular users.
  - Characterized the performance of a VANET and derived the optimal channel access probabilities for maximizing the area spectral efficiency.
  - Load modeling, coverage and data-rate analysis of a C-V2X network.
- **Modeling and Analysis of UAV Networks** Oct 2015 – Dec 2016
  - Proposed a model for a finite 3D network of UAVs, analyzed the coverage of ground users and presented design insights to maximize the network spectral efficiency.
  - Handover analysis for a network of mobile UAVs serving ground UEs.

Professional Experience

- **Qualcomm Technologies Inc.**, San Diego, USA Aug 17, 2020 – *Present*
  Senior Engineer
  Project: Cellular Vehicle-to-everything (C-V2X) Communications and Unmanned Aerial Vehicle (UAV) networks
  - Performance evaluation of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication under various scenarios using system-level simulations.
  - Characterization of the system-level performance of UAV networks and contributions to the development of standards.
  - Participation in all the design stages as part of a team, identifying problems and design targets, developing solutions, and carrying out performance analysis.
  - Technical contributions to various industry organizations based on Qualcomm designs, and delivering high quality presentations to internal discussions.
  - Attendance to 3GPP RAN1, 5GAA, SAE or other industry groups in the near future.

- **Nokia Bell Labs**, Murray Hill, NJ, USA Jun 04, 2018 – Aug 10, 2018
  Summer Intern
  Project: Diversity Techniques for Ultra Reliable Low Latency Communications (URLLC)
  - Analyzed the performance of cyclic delay diversity for distributed cooperative transmission.
- **Qualcomm Technologies Inc.**, San Diego, USA May 16, 2016 – Aug 12, 2016
  Summer Intern
  Project: Performance evaluation of 802.11ax Up-link MU-MIMO prototype
  - Analyzed the performance of up-link multi-user communication with time and frequency impairments.
  - Developed python scripts to automate the test procedure.
- **Redpine Signals Inc.**, Hyderabad, India Jul 01, 2013 – May 05, 2015
  Design Engineer
  Project: Baseband design for GPS and Wifi chips
  - Developed a model for position calculation in Navigation systems (GPS and GLONASS).
  - Worked on a filter design to meet spectral mask specifications for WLAN 802.11p in MATLAB.

Book

[B1] H. S. Dhillon and **V. V. Chetlur**, "Poisson line Cox process: Foundations and Applications to Vehicular Networks", Morgan and Claypool publishers, 2020.

Book Chapter

[BC1] M. Banagar, **V. V. Chetlur**, and H. S. Dhillon, "Stochastic Geometry-based Performance Analysis of Drone Cellular Networks", in *UAV Communications for 5G and Beyond*. Y. Zeng, I. Guvenc, R. Zhang, G. Geraci, and D. W. Matolak, eds. Wiley, 2020.

Dissertation

[D1] **V. V. Chetlur**, "Stochastic Geometry for Vehicular Networks", PhD diss., Virginia Tech, 2020.

Journal Publications

[J8] **V. V. Chetlur** and H. S. Dhillon, "Spatial Models for Networks on Roads: Bridging the Gap Between Industry and Academia", *IEEE Network Magazine*, vol. 36, no. 1, pp. 26-31, Jan. 2022.

[J7] **V. V. Chetlur** and H. S. Dhillon, "On the Load Distribution of Vehicular Users Modeled by a Poisson Line Cox Process", *IEEE Wireless Communications Letters*, vol. 9, no. 12, pp. 2121-2125, Dec. 2020.

[J6] **V. V. Chetlur**, H. S. Dhillon, C. P. Dettmann, "Shortest Path Distance in Manhattan Poisson Line Cox Process", *Journal of Statistical Physics*, vol. 181, no. 6, pp. 2109-2130, Dec. 2020.

[J5] M. Banagar, **V. V. Chetlur**, and H. S. Dhillon, "Handover Probability in Drone Cellular Networks", *IEEE Wireless Communications Letters*, vol. 9, no. 7, pp. 933-937, Jul. 2020.

[J4] **V. V. Chetlur** and H. S. Dhillon, "Coverage and Rate Analysis of Downlink Cellular Vehicle-to-Everything (C-V2X) Communication", *IEEE Transactions on Wireless Communications*, vol. 19, no. 3, pp. 1738-1753, Mar. 2020.

[J3] **V. V. Chetlur**, and H. S. Dhillon, "Success Probability and Area Spectral Efficiency of a VANET Modeled as a Cox Process", *IEEE Wireless Communications Letters*, vol. 7, no. 5, pp. 856-859, Oct. 2018.

[J2] **V. V. Chetlur**, and H. S. Dhillon, "Coverage Analysis of a Vehicular Network Modeled as Cox Process Driven by Poisson Line Process", *IEEE Transactions on Wireless Communications*, vol. 17, no. 7, pp. 4401-4416, Jul. 2018.

[J1] **V. V. Chetlur**, and H. S. Dhillon, "Downlink Coverage Analysis for a Finite 3D Wireless Network of Unmanned Aerial Vehicles", *IEEE Transactions on Communications*, vol. 65, no. 10, pp. 4543-4558, Oct. 2017.

Conference Publications

[C4] **V. V. Chetlur**, and H. S. Dhillon, "Poisson Line Cox Process: Asymptotic Characterization and Performance Analysis of Vehicular Networks", in *Proc. IEEE Globecom*, Waikoloa, HI, December 2019.

[C3] **V. V. Chetlur**, S. Guha, and H. S. Dhillon, "Characterization of V2V Coverage in a Network of Roads Modeled as Poisson Line Process", in *Proc. IEEE ICC*, Kansas City, MO, May 2018.

[C2] **V. V. Chetlur**, and H. S. Dhillon, "Downlink Coverage Probability in a Finite Network of Unmanned Aerial Vehicle (UAV) Base Stations", in *Proc. IEEE SPAWC*, Edinburgh, UK, July 2016.

[C1] V. V. Makkapati, **V. V. Chetlur**, "Computation of Tortuosity of Two Dimensional Vessels", in *Proc. IEEE ICAPR*, Kolkata, India, January 2015.

Patent Applications

Included in the inventors list of 4 patent applications at Qualcomm Technologies Inc.

Awards

* Pratt Scholarship from Virginia Tech for a strong academic record throughout the graduate program, 2019.
* Exemplary Reviewer award from IEEE Transactions on Wireless Communication, 2018.
* Silver Medal for Academic Excellence by BITS-Pilani University in June 2013.
* BITS Merit Scholarship for the academic years 2011-12 and 2012-13.

Review Work

Journals & Magazines

- IEEE Transactions on Wireless Communications
- IEEE Transactions on Communications
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Intelligent Transportation Systems
- IEEE Wireless Communications Letters
- IEEE Communication Letters
- IEEE Vehicular Technology Magazine

Conferences

- IEEE Global Communication Conference (GLOBECOM)
- IEEE International Conference on Communications (ICC)
- IEEE/CIC International Conference on Communications in China (ICCC)
- IEEE Wireless Communications and Networking Conference (WCNC)
- International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)
- Spatial Stochastic Models for Wireless Networks (SpaSWiN) workshop
- National Conference on Communications (NCC)

Graduate Level Projects

- **Software Implementation of Error Control Codes** Spring 2017
  - Implemented the encoder and decoder modules for BCH codes, Convolutional codes, and LDPC codes in C++ and analyzed their BER performance.
- **Design and Analysis of OFDM Transceiver System** Spring 2016
  - Implemented a complete OFDM transceiver with LDPC coding scheme and analyzed the BER in AWGN and fading channels in MATLAB.
- **Comparative Analysis of Non-Orthogonal Waveforms for 5G Networks** Fall 2015
  - Compared the BER and bandwidth efficiency of Filter Bank Multi-Carrier (FBMC) and Universal Filtered Multi-Carrier (UFMC) waveforms with that of OFDM.

Graduate Coursework

- ◇ Digital Communications
- ◇ Stochastic Signals and Systems
- ◇ Multi-Channel Communication
- ◇ Advanced Digital Communications
- ◇ Information Theory
- ◇ Error Control Coding
- ◇ Measure and Probability
- ◇ Graph Theory
- ◇ Millimeter wave Communications and Networks
- ◇ MIMO Communication

Undergrad Research Experience

- **Philips Research**, Bangalore, India Jan 2013 – Jun 2013
  Intern
  Project: Image Processing algorithms to detect stage of Retinopathy of Prematurity (ROP) disease
  - Developed an algorithm to extract the information from the retinal images to identify the stage of the disease.
  - Implemented the algorithm using C++ and open source libraries.
- **Uurmi Systems Inc.**, Hyderabad, India May 2012 – Jul 2012
  Summer Intern
  Project: Channel Estimation and Equalization of Direct Sequence Spread Spectrum (DSSS) systems
  - Implemented LS and MMSE techniques for channel estimation, and channel matched filter and decision feedback equalizer for DSSS system in MATLAB.
- **BITS-Pilani**, Hyderabad Campus, India Aug 2011 – Dec 2011
  Undergrad Researcher
  Project: Application of Fuzzy Logic in Control Systems
  - Simulated the operation of fuzzy logic in the speed control of a DC shunt motor in Simulink.
- **Central Electronics Engineering Research Institute**, Chennai, India May 2011 – Jul 2011
  Summer Intern
  Project: Image Processing algorithm for vehicle detection and classification
  - Developed an algorithm to detect and classify vehicles in traffic images.
  - Worked on removal of shadows from the images in MATLAB.

Skills

- Wireless communication protocols: 5G-NR, LTE/LTE-A, CDMA, WiFi - IEEE 802.11
- Programming Languages: C, C++, MATLAB, Mathematica, Python

Reference

Harpreet S. Dhillon Associate Professor, Virginia Tech hdhillon@vt.edu