

Ghaith Hattab

UCLA Electrical Engineering, 54-130B Engineering IV – 90095 – Los Angeles, CA
☎ +1 (323) 350 5219 • ✉ ghattab@ucla.edu • 🌐 www.ghaithhattab.com

Research Interests

Algorithm development, optimization, and signal processing for wireless communication systems, including 5G coexistence with incumbents (sub-6GHz and mmWave), providing connectivity to massive IoT, network densification and massive MIMO for 5G networks, and dynamic spectrum access.

Education

University of California, Los Angeles (UCLA)

PhD, Electrical Engineering, 4.0/4.0

Advisor: Prof. Danijela Cabric

Los Angeles, CA, United States

Sept. 2014–present

Queen's University

M.Sc., Electrical and Computer Engineering, 4.23/4.30

Advisor: Prof. Mohamed Ibnkahla

Thesis topic: Pilot Tone-Aided Detection for Cognitive Radio Applications

Kingston, ON, Canada

Sept. 2012–April 2014

American University of Sharjah (AUS)

B.Sc., Electrical Engineering (summa cum laude), 4.0/4.0

Advisors: Prof. Mohamed El-Tarhuni and Prof. Naser Qaddoumi

Thesis topic: Design of Underwater Wireless Sensor Network (UWSN)

Sharjah, UAE

Aug. 2008–June 2012

Experience

Industry.....

Nokia Bell Labs

Research Intern, Access Research Lab

Arlington Heights, IL

Summer 2017

Supervised by: Amitava Ghosh. Primary collaborators: Eugene Visotsky, Mark Cudak, and Prakash Moorut

- Developed a detailed interference framework and simulator for the 5G (mmWave and sub-6 GHz) coexistence with existing incumbent services (fixed service and satellite earth stations)
- Developed practical interference management techniques for 5G coexistence with existing systems
- Presented 5G coexistence work to chief officers in FCC and filed comments in response to different FCC's Notice of Inquiry

Research.....

EE Department, UCLA

Research Assistant, Cognitive Reconfigurable Embedded Systems Lab

Los Angeles, CA

Sept. 2014–present

- Developing a PHY/MAC cross-layer design for shared spectrum access between massive IoT and cellular UEs (current)
- Developing a spectrum sharing paradigm for massive IoT over the unlicensed spectrum (current)
- Optimized and proposed joint user-centric cell association and spectrum allocation strategies that maximize coverage and rate for IoT devices and cellular users, respectively
- Developed and optimized load-aware user association algorithms to balance the load between massive MIMO macro BSs and ultra-dense small-cell BSs
- Developed a linear program to mitigate interference between macro BSs and ultra-dense small-cell BSs
- Developed a fuzzy Q-learning-based sleep/wake-up protocols for energy-efficient ultra-dense cellular networks (collaborative work)
- Investigated several detection algorithms for instantaneous collision and interference detection using in-band full duplex radios (collaborative work)

ECE Department, Queen's University

Research Assistant, Wireless Communications and Signal Processing Lab

Kingston

Sept. 2012–Aug. 2014

- Proposed and designed cooperative wideband spectrum sensing algorithms for dynamic spectrum access
- Optimized a pilot tone-aided detector for cognitive radio applications

ELE Department, AUS

Research Assistant, Microwave Imaging and Nondestructive Evaluation Lab

Sharjah

Aug. 2011–May 2012

- Developed a realistic channel model to predict the path loss underwater
- Designed and prototyped an underwater wireless sensor network, where electromagnetic waves are used as a mean of communication

Teaching.....

EE Department, UCLA

Teaching Assistant for Signals and Systems (EE 102)

Los Angeles, CA

Winter 2018

EE Department, UCLA

Teaching Assistant for Logic Design of Digital Systems (EE M16)

Los Angeles, CA

Fall 2015, 2016, and 2017

ECE Department, Queens

Teaching Assistant for Digital Communications (ELEC 461)

Kingston

Winter 2014

Publications and Talks

Submitted Papers

- S.1 **G. Hattab**, E. Visotsky, M. Cudak, and A. Ghosh, "Interference Mitigation Techniques for Coexistence of 5G mmWave Users with Incumbents at 70 and 80 GHz", *submitted to IEEE Trans on Wireless Communications*.
- S.2 **G. Hattab** and D. Cabric, "Coverage and Rate Maximization via User Association in Multi-antenna HetNets", *submitted to IEEE Trans on Wireless Communications*.
- S.3 F. Panahi, F. Panahi, **G. Hattab**, T. Ohtsuki, D. Cabric, "Green Heterogeneous Networks via an Intelligent Sleep/Wake-up Mechanism and D2D Communications", *submitted IEEE Trans. on Green Commun. and Networking*.
- S.4 **G. Hattab** and D. Cabric, "Long-term Rate-based User-centric Association for Downlink Multi-antenna HetNets", *submitted to IEEE ICC'18*.
- S.5 **G. Hattab**, P. Moorut, E. Visotsky, M. Cudak, and A. Ghosh, "Interference Analysis of the Coexistence of 5G Cellular Networks with Satellite Earth Stations in 3.7-4.2GHz", *submitted to IEEE ICC'18*.

Journal Publications.....

- J.1 **G. Hattab** and D. Cabric, "5G Unlicensed Spectrum Access for Massive Machine Type Communications Enabled by Distributed Wideband Spectrum Sensing", *IEEE TCCN Newsletter*, Nov. 2017.
- J.2 **G. Hattab** and D. Cabric, "Rate-based Cell Range Expansion for Downlink Massive MIMO Heterogeneous Networks", *IEEE Wireless Commun. Letters*, Nov. 2017.
- J.3 W. Ejaz, **G. Hattab**, T. Attia, M. Ibnkahla, F. Abdelkefi, and M. Siala, "Joint Quantization and Confidence-based Generalized Combining Scheme for Cooperative Spectrum Sensing," *IEEE Systems Journal*, Oct. 2016.
- J.4 W. Ejaz, **G. Hattab**, N. Cherif, M. Ibnkahla, F. Abdelkefi, and M. Siala "Cooperative Spectrum Sensing with Heterogeneous Devices: Hard Combining versus Soft Combining," *IEEE Systems Journal*, July. 2016.
- J.5 A. El-Mougy, M. Ibnkahla, **G. Hattab** and W. Ejaz, "Reconfigurable Wireless Networks," *Proceedings of the IEEE*, vol.103, no.7, pp.1125-1158, July 2015.
- J.6 **G. Hattab** and M. Ibnkahla, "Multiband Spectrum Access: Great Promises for Future Cognitive Radio Networks," *Proceedings of the IEEE* vol.102, no.3, pp.282-306, Mar. 2014. **(The No. 8th most popular paper on IEEEExplore in Mar. 2014)**.

- J.7 **G. Hattab**, M. El-Tarhuni, M. Al-Ali, T. Joudeh, and N. Qaddoumi, "Underwater Wireless Sensor Network with Realistic Radio Frequency Path Loss Model," *International Journal of Distributed Sensor Networks*, vol. 2013, 9 pages, Jan. 2013.

Conference Publications.....

- C.1 **G. Hattab**, E. Visotsky, M. Cudak, and A. Ghosh, "Coexistence of 5G mmWave Users with Incumbent Fixed Stations over 70 and 80 GHz", *IEEE GLOBECOM'17*, Dec. 2017.
- C.2 **G. Hattab** and D. Cabric, "Energy-Efficient Massive Cellular IoT Shared Spectrum Access via Mobile Data Aggregators", *IEEE WiMob'17*, Oct. 2017.
- C.3 F. Panahi, F. Panahi, **G. Hattab**, T. Ohtsuki, D. Cabric, "Green Heterogeneous Networks via an Intelligent Power Control Strategy and D2D Communications", *IEEE PIMRC'17*, Oct. 2017.
- C.4 T. Vermeulen, M. Laghate, **G. Hattab**, D. Cabric, and S. Pollin, "Towards Instantaneous Collision and Interference Detection using In-Band Full Duplex", *IEEE INFOCOM*, May 2017.
- C.5 T. Vermeulen, M. Laghate, **G. Hattab**, D. Cabric, and S. Pollin, " Nearly Instantaneous Collision and Interference Detection using In-Band Full Duplex", *IEEE DySPAN*, Mar. 2017.
- C.6 **G. Hattab** and D. Cabric, "Joint Resource Allocation and User Association in Multi-Antenna Heterogeneous Networks", *IEEE Globecom*, Dec. 2016.
- C.7 **G. Hattab** and D. Cabric, "Inter-tier Interference Mitigation in Multi-Antenna HetNets: A Resource Blanking Approach", *IEEE Globecom*, Dec. 2016.
- C.8 **G. Hattab** and M. Ibnkahla, "Multiband Spectrum Sensing: Challenges and Limitations," *Proc. WiSense Workshop*, Ottawa, August 2014.
- C.9 **G. Hattab** and M. Ibnkahla, "Enhanced Pilot-Based Spectrum Sensing Algorithm," *Proc. IEEE Biennial Symp. on Commun. (QBSC'14)*, pp.57-60, June 2014.

Book.....

- B.1 **G. Hattab**, "Fundamentals of Signal Detection and Estimation," 2nd Edition, 2014.

Book Chapters.....

- B.2 **G. Hattab** and D. Cabric, "Spectrum Sensing, Measurement, and Modeling", in Wei Zhang, editor, *Handbook of Cognitive Radio - Springer*, May 2017.
- B.3 Mohamed Ibnkahla and **Ghaith Hattab**, "Spectrum Sensing" in M. Ibnkahla, *Cooperative Cognitive Radio Networks: The Complete Spectrum Cycle*, pp. 11-38, CRC Press, 2014.
- B.4 Mohamed Ibnkahla, Ala Abu Alkheir, and **Ghaith Hattab**, "Cooperative Spectrum Acquisition" in M. Ibnkahla, *Cooperative Cognitive Radio Networks: The Complete Spectrum Cycle*, pp. 39-70, CRC Press, 2014.
- B.5 Mohamed Ibnkahla and **Ghaith Hattab**, "Spectrum Sensing: Performance Measures and Design Trade-Offs" in M. Ibnkahla, *Cooperative Cognitive Radio Networks: The Complete Spectrum Cycle*, pp. 95-120, CRC Press, 2014.

Talks, Presentations, and Posters.....

- T.1 **Ghaith Hattab**, "Massive Cellular IoT Communications via Mobile Data Aggregators", UCLA Annual Research Review (ARR 2017), Apr. 2017.
- T.2 **Ghaith Hattab**, "Rate-biased User Association for Downlink Multi-antenna Heterogeneous Networks", UCLA Annual Research Review (ARR 2016), Feb. 2016.
- T.3 **Ghaith Hattab**, "Multiband Cognitive Radio Networks: Promises and Challenges", University of British Columbia, Feb. 2014.

Relevant Computer Skills

MATLAB and Simulink; Network Simulator 3 (NS3); LabVIEW; Mathematica; Maple; C++

Awards and Distinctions

UCLA Electrical Engineering Departmental Fellowship	Sept. 2014
1st Place in IEEE Kingston Section M.Sc. Research Excellence Award	May 2013
Queen's University Graduate Award	2012-2014
The 3rd prize in Sharjah Islamic Bank (SIB) Design Competition	Feb. 2013
Recipient of the Presidential Cup award (Awarded by his Highness Sheikh Dr. Sultan Bin Mohammad Al Qassimi, Supreme Council Member, Ruler of Sharjah and President of AUS)	June 2012
The 2nd Best Senior Design Project Award in the College of Engineering	May 2012
The Best Departmental Senior Design Project Award	May 2012
Recipient of the Chancellor Award for academic excellence (4 times)	2008-2012
Ideal Student Award	May 2011
Recipient of the Dean's Award for academic excellence (8 times)	2008-2012
Recipient of Ministry of Presidential Affairs (MOPA) Fellowship	Sept. 2008
The 5th place (~/35,000 Students) in high school across the UAE	June 2008

Professional Affiliations

IEEE Student Membership and IEEE Communications Society Membership

Professional Service

Reviewer	
Journals: Proceedings of the IEEE, IEEE Trans. on Cognitive Commun. and Networking, IEEE Trans. on Commun., IEEE Trans. on Signal Processing, and IEEE Commun. Letters	
Conferences: IEEE PIMRC'17, ICC'17, GLOBECOM'17, and others	
Supervisor	
Meriem Mekki, Nesrine Cherif, and Takwa Attia	March–Aug.2014
Saulo De Sousa	Summer 2013
Student	
President of the IEEE AUS Student Chapter	2011-2012
Team Leader in AUS Leadership Program	2011-2012
Media Coordinator of the IEEE AUS Student Chapter	2010-2011
Member of AUS Community Service	2010-2011