

# Dr. Hussein Al-Zubaidy

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## Work experience

Since 2013      School of Electrical Engineering (EE), KTH      Stockholm, Sweden  
**Research Associate**

- Wireless networks performance analysis and power optimization for industrial networks.
- Networked energy-aware visual analysis (GreenEyes, EU FP7 FET project).
- Wireless sensor networks analysis and optimization.
- Delay analysis of secure channel communication.
- Teaching: PhD advanced course on Network Calculus.
- Graduate students' supervision.

2011- 2013      ECE, University of Toronto      Toronto, Canada  
**NSERC Post-Doctoral Fellow**

- Developing a novel (min, x) network calculus for multi-hop wireless networks analysis.
- Information-theory based approach to multi-hop wireless networks analysis.
- Stochastic network calculus theory and applications.
- Optimal stochastic control of queuing systems.
- Cooperative communications and wireless relay networks analysis and optimization.
- Security in wireless ad-hoc networks.

Summer 2009      HSNG, National Chung Cheng University (CCU)      Chiya-Yi, Taiwan  
**Research Associate**

- Distributed public key generation in wireless ad-hoc networks.
- Giving seminars in several universities and research labs in Taiwan, e.g., National Taiwan University (NTU), Institute of Information Science, Academia Sinica, National Cheng Kung University (NCKU), and National Sun Yat-Sen University (NSYSU).

2004–2010      Broadband Networks Lab, Carleton University      Ottawa, Canada  
**Research Assistant**

- 1) Conducting research:
  - Applied stochastic processes and probability.
  - Stochastic optimization of queuing systems: coupling method and stochastic dominance.
  - Modeling, analysis and optimization of packet scheduling in wireless networks using queuing theory, dynamic programming and stochastic optimization.
  - Security in wireless ad-hoc networks.
  - Third and fourth Generation (3G/4G) mobile networks LTE, HSPA, WCDMA, UMTS.
  - Building a system level simulator for the HSDPA system using OPNET modeler.
- 2) Supervising and mentoring junior graduate students.
- 3) Preparing, publishing and presenting papers and technical reports to disseminate research results.
- 4) Chairing technical sessions in international conferences and contributing in the reviewing and selection process of the accepted papers.
- 5) Writing proposals for the sake of securing research funding, e.g., NSERC, Nortel and Defence Research and Development of Canada (DRDC).

2004–2010      System and Computer Eng., Carleton University      Ottawa, Canada

#### Teaching Assistant

- Supervised labs and presented tutorial sessions in OPNET, NS-2, assembly programming and distributed systems programming.
- Assisted in many courses including: Computer Networks, Distributed Systems, Networks Programming, Microprocessor Systems, Digital Communications, Communication systems lab, and Communication Systems Analysis and Design.
- Mentoring, Counseling and supervising undergraduate students.

2006–2007      Carleton University Foundry Program      Ottawa, Canada

#### Consultant (Innovation management)

- Provide consultation to faculty members and students of Carleton University regarding the commercialization of their innovative ideas and inventions.
- Evaluate the potential of these projects and recommend funding options if deemed promising (The foundry grants funds to innovative ideas and spin-off companies).
- Provide the required professional advice and exposure by utilizing the Foundry resources and network of professionals from the surrounding community

### Education

2005-2010      Carleton University      Ottawa, Canada

#### Ph.D. Systems and Computer Engineering.

- Thesis: “Optimal Packet Scheduling in Emerging Wireless Networks.”
- Supervisor: Prof. Ioannis Lambadaris.

2004-2005      Carleton University      Ottawa, Canada

#### M.A.Sc. Systems and Computer Engineering. *(Upgraded to the PhD program in the summer of 2005)*

- Thesis: “Quality of Service Provision in Third Generation HSDPA system.”
- Supervisor: Prof. Ioannis Lambadaris.

1992-1994      University of Technology      Baghdad, Iraq

#### M.Sc. Communication Engineering.

- Thesis: “Search Strategies for Serial Search DS-Spread Spectrum Acquisition Schemes.”
- Supervisor: Prof. Waseem W. Jibrail.

1987-1991      University of Technology      Baghdad, Iraq

#### B.Sc. Electronic and Communication Engineering.

Rank: 2 out of 73

### Interests

#### Research areas of interest:

- Stochastic network calculus: theory and application to multi-hop wireless network.
- Scheduling and resource allocation in multi-hop wireless networks over fading channels.
- Networks performance analysis and optimization using stochastic network calculus, queuing theory, stochastic modeling, coupling arguments and stochastic dominance.
- Wireless visual sensor networks analysis and optimization.
- Fundamental research in networking and network information theory.
- Mesh and sensor networks analysis, planning and optimization.

#### Personal interests:

Sports, travel, music, writing poetry and reading.

**Skills****Research skills:**

I have developed many research skills from my past research experience such as:

- The ability for critical thinking and analysis
- The ability to identify research problems, provide intuition for the expected outcome of tackling such problems and communicate the findings effectively
- Knowledge of basic and advanced research protocols and procedures
- Drafting and completing research papers and technical reports and meeting deadlines
- Writing research proposals and securing research funding.
- Presenting research findings at scholarly and professional society meetings
- Teamwork and collaboration with research team members both in academia and industry.

I also acquired many interesting analytic techniques such as:

- Dynamic programming: Markov decision process (MDP) and POMDP.
- Stochastic modeling, stochastic dominance, dynamic coupling and sample path arguments.
- Fluid based analysis (FBA) approximations for queuing systems
- Queuing theory
- Stochastic network calculus, MGF calculus; *I developed (min, x) wireless network calculus.*

**Simulation tools and programming languages:**

I mastered several simulations and modeling software and programming languages such as: OPNET, NS-2, MathCAD, MATLAB, C/C++, VB, MPI and OpenMP parallel programming, Assembly programming (SDK86, Motorola 68020).

**Honors and awards**

- **Marie-Curie fellowship program (FP7)** - ERCIM Alain Bensoussan FP (2013-2014).
- **NSERC Post-Doctoral Fellowship (PDF) for 2 years**, Canada, 2010.
- **NSERC Visiting Fellowship in Canadian Government Laboratories**, Canada, 2009.
- **NSERC Summer program in Taiwan**, held at CCU, Chiya Yi, Taiwan, 2009
- **Ontario Graduate Scholarship (OGS)**, held at Carleton University, 2008-2009.
- **Ontario Graduate Scholarship for Science and Technology (OGSST) twice**, held at Carleton University, Ottawa, Canada, 2004-2006.
- **Dr. Roger Kaye Memorial Award for Ontario Students**, 2007 and 2008, Carleton University, Ottawa, Canada.
- **The Minister of Higher Education prize**, for ranking the 2nd of 73 graduates in a 4 years B.Sc. program, University of Technology, Baghdad, 1991.
- **Graduate scholarship – SCE**, Carleton University, for 5 years (2005 -2009).
- **Dean of Graduate Studies Academic Excellence Scholarship**, Carleton University, for 4 years (2006 -2009).
- **Best industry oriented project award**, Almansour College University, Baghdad, 1996.

## List of Publications:

### a) Articles published or accepted in refereed journals

1. **Al-Zubaidy, H.**, Liebeherr, J., Burchard, A., Network-Layer Performance Analysis of Multi-Hop Fading Channels. To appear in *IEEE/ACM Transaction on Networking (ToN)*.
2. **Al-Zubaidy, H.**, Huang C.C., Yan J., Dynamic Packet Scheduler Optimization in Wireless Relay Networks. *IEEE Journal on Selected Areas in Communications (JSAC)*. Vol. 30, Issue. 9, Pages 1746 – 1753, October 2012.
3. **Al-Zubaidy, H.**, Lambadaris, I., Viniotis, I., Optimal Scheduling in A Multi-Server Queues With Random Connectivity and Retransmissions. *Elsevier Computer Communications*, Vol. 35, Issue 13, Pages 1626–1638, July 2012.
4. **Al-Zubaidy, H.**, Lambadaris, I., and Talim, J., Optimal Scheduling in High Speed Downlink Packet Access Networks. *ACM Transaction on Modeling and Computer Simulation (TOMACS)*, Vol. 21 Issue 1, Pages 3:1 – 3:27 (+ 12 pages online appendix), December 2010.
5. Jibrail, W., **Al-Zubaidy, H.**, Search Strategies for Acquisition of DS Spread Spectrum Signals. *International Journal of Electronics*, Vol. 84, No. 2, Pages 83-104, 1998.

### b) Journal articles submitted/under preparation:

1. **Al-Zubaidy, H.**, Liebeherr, J., Service Characterizations for Multi-Hop Multiaccess Wireless Networks.
2. **Al-Zubaidy, H.**, Lambadaris, I., Viniotis, I., Optimal Scheduling Policies in a Multi-server Homogeneous Queuing System with Random Connectivity.
3. **Al-Zubaidy, H.**, Lambadaris, I., Viniotis, I., Optimal Key Generation Policies for Threshold Security Scheme in Mobile Ad-Hoc Networks.

### c) Other refereed contributions (conferences)

1. Schiessl, S., Gross, J., **Al-Zubaidy, H.**, (2015) Delay Analysis for Wireless Fading Channels with Finite Blocklength Channel Coding. MSWiM'15, Cancun, Mexico.
2. **Al-Zubaidy, H.**, Dan, G., Fodor, V., (2015) Performance of In-Network Processing for Visual Analysis in Wireless Sensor Networks. IFIP Networking'15, Toulouse, France.
3. Petreska, N., **Al-Zubaidy, H.**, Knorr, R., Gross, J., (2014) On the Recursive Nature of End-to-End Delay Bound for Heterogeneous Wireless Networks. IEEE ICC'15, London, UK.
4. Petreska, N., **Al-Zubaidy, H.**, Gross, J., (2014) Power Minimization for Industrial Wireless Networks under Statistical Delay Constraints. 26th International Teletraffic Congress (ITC 2014), Karlskrona, Sweden.
5. **Al-Zubaidy, H.**, Liebeherr, J., (2014) Service Characterizations for Multi-Hop Multiaccess Wireless Networks. IEEE INFOCOM Workshop on Network Science for Communication Networks, Toronto, Canada.

6. **Al-Zubaidy, H.**, Liebeherr, J., Burchard, A., (2013) A (min, x) Network Calculus for Multi-Hop Fading Channels. IEEE INFOCOM'13, Turin, Italy.
7. **Al-Zubaidy, H.**, Huang C.C., Yan J., (2011) Most Balancing Algorithms for Optimal Packet Scheduling in Multi-Server Wireless Systems. IEEE WCNC'2011, Mexico.
8. **Al-Zubaidy, H.**, I. Lambadaris, I. Viniotis, C. C. Huang, R. H. Hwang, (2010) Optimal Key Generation Policies for MANET Security. Globecom'10, Miami, USA.
9. **Al-Zubaidy, H.**, Lambadaris, I., Viniotis, I., Yu, R. (2010) Optimal Multi-server Allocation to parallel queues with random connectivity and retransmissions. ICC'10, South Africa.
10. **Al-Zubaidy, H.**, Lambadaris, I., Viniotis, I. (2009) Optimal Resource Scheduling in Wireless Multi-service Systems with Random Channel Connectivity. IEEE Globecom'09, USA.
11. **Al-Zubaidy, H.**, Lambadaris, I., and Talim, J. (2008) Code Allocation Policy Optimization in HSDPA Networks Using FSMC Channel Model. IEEE WCNC'08, USA.
12. **Al-Zubaidy, H.**, Lambadaris, I., and Talim, J. (2008) Analytic Evaluation of Achievable Downlink Service Rate and Server Sharing in 3G Wireless Networks. ICTTA'08, Syria.
13. Abou El Saoud, M., **Al-Zubaidy, H.**, and Mahmoud, S. (2008) Connectivity Model for Wireless Mesh Networks. ICC'08, Beijing, China.
14. Abou El Saoud, M., Mahmoud, S., **Al-Zubaidy, H.** (2008) Effect of Inter-Link Dependencies on the Connectivity of Wireless Mesh Networks. IEEE WCNC'08, USA.
15. **Al-Zubaidy, H.**, Talim, J., and Lambadaris, I. (2007) Dynamic Scheduling in High Speed Downlink Packet Access Networks: Heuristic Approach. MILCOM07, USA.
16. **Al-Zubaidy, H.**, Lambadaris, I., Talim, J. (2007) Determination of Optimal Policy for Code Allocation in High Speed Downlink Packet Access with Multi-State Channel Model. ACM/IEEE MSWiM'07, Greece.
17. **Al-Zubaidy, H.** (2007) Downlink Scheduler Optimization in HSDPA Networks. Communication, 2nd Canadian Summer School on Comm. and Info. Theory, Banff, Canada.
18. **Al-Zubaidy, H.**, Lambadaris, I., Talim, J. (2007) Service Rate Determination for Group of Users with Random Connectivity Sharing a Single Wireless Link. IASTED WOC 2007 Montreal.
19. **Al-Zubaidy, H.**, Talim, J., Lambadaris, I. (2007) Optimal Scheduling Policy Determination for High Speed Downlink Packet Access. IEEE ICC'07, Scotland.
20. **Al-Zubaidy, H.**, Lambadaris, I., Talim, J. (2007) Downlink Scheduler Optimization in High-Speed Downlink Packet Access Networks. 26th IEEE INFOCOM'07, USA.
21. **Al-Zubaidy, H.**, Talim, J., Lambadaris, I. (2007) Heuristic Approach of Optimal Code Allocation in High Speed Downlink Packet Access Networks. ICN'07, French Caribbean.
22. **Al-Zubaidy, H.**, and Omari, T. (2006) RED Performance Evaluation Using Stochastic Modeling and Fluid-Based Analysis. CCECE06, Canada.
23. Omari, T., and **Al-Zubaidy, H.** (2005) Call Center Performance Evaluation. CCECE05, Canada.

**d) Technical reports (TR):**

1. **Al-Zubaidy, H.**, Liebeherr, J., Burchard, A., A Network Calculus Approach for the Analysis of Multi-Hop Fading Channels, <http://arxiv.org/abs/1207.6630>, July 2012.
2. **Al-Zubaidy, H.**, Huang, C.C., Yan, J. Dynamic Packet Scheduler Optimization in Wireless Relay Networks, <http://arxiv.org/abs/1104.3165>, April 2011.
3. **Al-Zubaidy, H.**, Lambadaris I., Viniotis I. Optimal Multi-Server Allocation to Parallel Queues With Independent Random Queue-Server Connectivity, <http://arxiv.org/abs/1103.1448>, Mar. 2011.
4. **Al-Zubaidy, H.** (2009) Optimal Node Selection for Distributed Security Management in Wireless Systems. TR # SCE-09-12, SCE, Carleton University.
5. **Al-Zubaidy, H.** (2009) Optimal Control of Parallel Queues Served by Two Homogeneous Randomly Connected Servers with Retransmission. TR # SCE-09-11, SCE, Carleton University.
6. **Al-Zubaidy, H.** (2009) Optimal Channel Resource Allocation in Emerging Wireless Networks. TR# SCE-09-02, SCE, Carleton University.
7. **Al-Zubaidy, H.**, Talim, J., and Lambadaris, I. (2006) Optimal Scheduling in High Speed Downlink Packet Access Systems. TR # SCE-06-16, SCE, Carleton University.
8. **Al-Zubaidy, H.** (2006) Dynamic Frequency Hopping (DFH) in Mobile Communication. TR # SCE-06-17, SCE, Carleton University.
9. **Al-Zubaidy, H.** (1994) Search Strategies for Serial Search Direct-Sequence Spread Spectrum Acquisition Schemes. M.Sc. Thesis, University of Technology.

**e) Conference presentations:**

1. IFIP Networking'15, Toulouse, France. Mar. 2015.
2. IEEE INFOCOM'14 workshop, Toronto, Canada. May. 2014.
3. IEEE INFOCOM'13, Torino, Italy. Apr. 2013.
4. IEEE Globecom'10, Miami, FL, USA. Dec. 2010.
5. IEEE Globecom'09, Honolulu, HI, USA. Dec. 2009.
6. IEEE International Wireless Comm. and Networking Conference WCNC, USA. Mar. 2008.
7. IEEE International Conference on Information & Comm. Technologies ICTTA, Syria 2008.
8. Two presentations. International Military Comm. Conference MILCOM, Orlando, USA. Oct 2007.
9. Three presentations. IEEE International Conference on Communications ICC, Scotland. June 2007.
10. International IASTED Wireless and Optical Communications. Montreal, Canada, May 2007.
11. Canadian CCECE'06, Ottawa, May 2006, Canada.
12. CCECE'05, Saskatchewan, May 2005, Canada.

**f) Invited talks:**

1. Invited speaker: Dagstuhl Seminar on Network Calculus, Dagstuhl, Germany, Mar. 2015.
2. Invited speaker: the 2nd Workshop on Network Calculus (WoNeCa-2), Bamberg, Germany, Mar. 2014.
3. Invited talk at SICS, Kista, Sweden, Jan. 2014.
4. Seminar at KTH, Stockholm, Sweden, Dec. 2013.
5. Invited talk at EPFL, Lausanne, Switzerland, May 2013.
6. IEEE Computer Communication Workshop (CCW), Sedona, AZ, USA. Nov. 2012.
7. BCWS Seminar Series, Systems and Computer Engineering, Carleton University, April 2013.
8. IEEE Computer Communication Workshop (CCW), Sedona, AZ, USA. Nov. 2012.
9. MITACS research workshop on estimation, fusion and detection in networked systems, Bellairs Research Institute, Barbados, Mar. 2011.
10. Fields-MITACS Workshop on Probabilistic Methods in Wireless Nets, Ottawa, Canada, Aug. 2011.
11. Toronto Networking Seminar Series, University of Toronto, Dec. 2010.
12. BCWS Seminar Series, Systems and Computer Engineering, Carleton University, July 2009.
13. Invited talks at National Taiwan Univ. and at Institute of Information Science, Taipei, Taiwan 2009.
14. Invited talk at National Cheng Kung University (NCKU) in Kaohsiung, Taiwan. July 2009.
15. Invited talk at National Sun Yat-Sen University (NSYSU) in Tainan, Taiwan. July 2009.
16. Canadian Summer School on Communications and Information Theory, Banff, August 2007.



## References:

### 1) Ioannis Lambadaris, Ph.D (Professor)

(PhD Thesis supervisor)

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