Faezeh Hajiaghajani

PhD, NeEWS Lab, Michigan State University | hajiagh1@msu.edu | Work sponsorship: NOT needed

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Summary of Qualifications

Human Activity Recognition, Body Sensors, Artificial Intelligence, Machine Learning, RNNs, Deep Learning, Time series Prediction using RNNs, Familiar with TensorFlow and Keras, LSTMs, Data Mining, Signal Processing, Object Oriented Programming, Algorithms and Data Structure, Network Protocol Design, Social Wireless Networks, Delay Tolerant Networks, Device-to-Device Commercial Content Dissemination, Multicast Routing, MAC Protocols, Wireless Sensor Networks, Embedded Systems, IoTs, Energy Efficiency in WSNs, Cooperative Content Caching, Data Dissemination and Caching in Vehicular Networks, SQL, JAVA, C++, MATLAB, R, Ruby on Rails, Javascript, HTML, PHP

Education

PhD, Electrical and Computer Engineering, Michigan State University, East Lansing, MI, 2017
Thesis: "Economic Gain-aware Routing Protocols for Device-to-Device Content Dissemination" (GPA: 3.75)

M.S. Computer Engineering, Amirkabir University of Technology, Tehran, Iran 2011
Thesis: "Tracking Mobile Targets in Wireless Sensor Networks Applying Hybrid Clustering Methods" (GPA: 17.8/20)

B.S. Information Technology Engineering, Amirkabir University of Technology, Tehran, Iran 2009
Thesis: "Design and Implementation of a Patient Monitoring System in a Modern Hospital" (GPA:16/20)

Professional Experiences

2012-2017 **Research Assistant,** Network Embedded and Wireless Systems (NeEWS) Lab, Michigan State University

- Thesis project on "ECONOMIC GAIN-AWARE ROUTING PROTOCOLS FOR DEVICE-TO-DEVICE CONTENT DISSEMINATION".
- Developed a series of multicast routing protocols for Device-to-Device (D2D) content dissemination in Social Wireless Networks.
- Developed several D2D content dissemination frameworks for marketing applications such as coupon and advertisement dissemination, with the objective of maximizing a pre-defined economic gain for commercial content providers.
- Researched on developing routing frameworks using tools such as model based prediction, time series prediction (using Long Short Term Memory (LSTMs)), as well as learning based mechanisms including reinforcement learning (Q-learning) and evolutionary learning (evolving state machines).

2011-2012 **Software Developer**, Behpooyesh Co., Iran

- Ruby on Rails Software developer
- The job involved software design, programming, debugging, testing, and database management (SQL) for developing a web-based Automatic Vehicle Location system. The AVL software product monitors, controls and provides online services for city-wide GPS-enabled public transportation vehicles, such as buses and taxis and their passengers.

Fall 2011 **Instructor**, Operating Systems Lab course, AUT

- I taught the OS Lab with focus on Linux kernel with full responsibilities of an instructor including content preparation, teaching, assignment and exam preparation, etc.

Spring 2010 **Teacher assistant** for Operating Systems course and Distributed Networks course, Amirkabir University of Technology (AUT), Iran

- Responsibilities included holding problem-solving classes weekly, grading, etc.

2010-2011 **R+D**, Mobile Ad hoc & WSN Lab, AUT, Iran

- Worked on a project on target tracking in Wireless Sensor Networks with focus on target recovery, optimizing energy consumption and accurate tracking. Designed and evaluated (using OMNeT++/Castalia) an efficient multi-target tracking algorithm for Wireless Sensor Networks.

Summer 2009 **Software Developer**, Real-time Intelligent Systems Lab, AUT, Iran

- Designed and developed a Java based web application for patient monitoring. The application monitors patients' vital signals in a real-time manner. It also collects data for offline reviews.

Collaborative Projects

- Collaborative project on human activity analysis
    1. Developed an infant-caregiver sensor system for monitoring infant's spontaneous movements and interaction with caregiver, both are believed to be critical for the early diagnosis of Autism Spectrum Disorder.
        - Used and adapted R and MATLAB's toolboxes including neural network, classification, SVM, time series analysis and signal processing to demonstrate that using data from two sensors on both individuals can accurately detect infant-caregiver interactions. Used both time-based and frequency-based features for classification.
    2. Proposed a contact-less indoor activity analysis approach using first-reflection Echolocation. Using machine learning and signal processing techniques, we demonstrated that for the goal of isolating workplace sedentary behavior, the proposed approach can differentiate between sitting, standing, and walking (i.e., in-office pacing) with more than 80% accuracy.
- Collaborative project on developing a pulse based networking protocol for ultra-light-weight communication in sensor networks
    1. Contributed to developing a novel pulse switching framework (Pulse Positioned Coded PDU (PPCP)) for ultra-lightweight network applications. Demonstrated that this approach enables data transmission with significantly fewer pulses/logical bits, which reduces energy consumption. Addressed design and implementation challenges including associated with intra-PDU idle listening and error handling. The PPCP architecture developed on real sensor devices in NEeWS lab and currently collecting environmental data in a greenhouse (http://nasa-server.egr.msu.edu/yoshiPlotFor98/#/tab/dash), demonstrate the system's efficacy and ability to reduce energy consumption.
    2. Working on time-series prediction (especially using LSTMs) and developing algorithms for estimating changes in environmental parameters in greenhouse monitoring using the collected data by PPCP-enabled sensors.
    3. Designed different parts of the proposed PPCP architecture and handled implementation challenges on different layers (Physical, MAC, routing).
- Collaborative project on cooperative content caching in Social Wireless Networks (SWNs)
    1. Proposed caching mechanisms with a cooperative caching model that utilizes human interaction and interest locality in social wireless networks. The goal is to reduce content provisioning cost for the content provider by having devices share content using Device-to-Device (D2D) links.
    2. Proposed a request generation model which details two levels of users' content preference within a per-user heterogeneous request environment. We incorporate a rebate/incentive element in the system which enables users receive rebates or discounts for supplying cached content to other users.

Publications

Journal and Conference Papers

1. F. Hajiaghajani and S. Biswas, "*Towards Scalable and Privacy Preserving Commercial Content Dissemination in Social Wireless Networks*", IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2017), Montreal, Canada, Oct. 2017.

2. R. Wang, F. Hajiaghajani and S. Biswas, "*Incentive Based Cooperative Content Caching in Social Wireless Networks*", IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2017), Montreal, Canada, Oct. 2017.

3. P. Patel, M. Padmanabhan, F. Hajiaghajani, S. Biswas and M. Lee, "*Spontaneous Movements During Caregiver Contact as an Early Window into Autism Spectrum Disorder (ASD)"*, North American society for psychology of sport and physical activity (NASPSPA), Poster session, San Diego, June 2017

4. Henry Griffith, Faezeh Hajiaghajani, Subir Biswas, "*Office Activity Classification Using First-Reflection Ultrasonic Echolocation*", 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2017), Jeju Island, Korea, July 2017.

5. F. Hajiaghajani and S. Biswas, "*Learning based Gain-aware Content Dissemination in Delay Tolerant Networks* ", 9th International Conference on COMmunication Systems & NETworkS (COMSNETS), Bengaluru, India, Jan 2017.

6. R.Wang, F. Hajiaghajani and S. Biswas, "*Heterogeneous Content Caching in Wireless Networks*", 9th International Conference on COMmunication Systems & NETworkS (COMSNETS), Bengaluru, India, Jan 2017.

7. R. Wang, F. Hajiaghajani, S. Biswas, "*Distributed Caching in Mobile Networks with Heterogeneous Content Demand*", 14th IEEE Annual Consumer Communications & Networking Conference (CCNC), Las Vegas, US, Jan 2017.

8. F. Hajiaghajani and S. Biswas, "*Device-to-Device Commercial Content Dissemination in Social Wireless Networks*", 14th IEEE Annual Consumer Communications & Networking Conference (CCNC), Las Vegas, US, Jan 2017.

9. Dezhi, F. Hajiaghajani, S. Das and S. Biswas, "*Pulse Position Coded PDUs: A New Approach to Networking Energy Economy*", 14th IEEE Annual Consumer Communications & Networking Conference (CCNC), Las Vegas, US, Jan 2017.

10. F. Hajiaghajani and S. Biswas, *"Device-to-Device Coupon Distribution using Economic Routing Utilities*", 12th IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob) 2016, New York, US, Oct. 2016.

11. H. Griffith, F. Haiaghajani, A. Griffith, *"Enhancing Continuity Between Gender Diversity Interventions Using Hybrid Social Networks"*, IEEE Frontiers in Education Conference (FIE), Pensylvania, 2016.

12. S. Biswas, B. Harrington, F. Hajiaghajani, R. Wang, "*Contact-less Indoor Activity Analysis Using First-reflection Echolocation*", IEEE ICC 2016, Kuala Lumpur, Malaysia, May 2016.

13. F. Hajiaghajani, S. Biswas, "*Feasibility of Evolutionary Design for Multi-access MAC Protocols*", 2015 IEEE Global Communications Conference (GLOBECOM), pp. 1-7, San Diego, 2015.

14. F. Hjaiaghajani, S. Biswas, "*MAC Protocol Synthesis Using Evolvable State-Machines*", in Computer Communication and Networks (ICCCN), 2015 24th International Conference on , pp.1-6, Las Vegas, Aug. 2015.

15. F. Hajiaghajani, Y. Piolet Thulasidharan, M. Taghizadeh, and S. Biswas, "*Economy Driven Content Dissemination in Delay Tolerant Networks*,",Elsevier Journal of Ad hoc Networks, Vol. 20, pp. 132-149, Sep. 2014.

16. F. Hajiaghajani, Y. Piolet Thulasidharan, M. Taghizadeh, and S. Biswas, *"Characterization of gain-aware routing in delay tolerant networks*",Proc. SPIE 8758, Next-Generation Analyst, Baltimore, Maryland, May 2013.

17. F. Hajiaghajani, M. Naderan, H. Pedram, M. Dehghan, "*Merging and incentive-based techniques in hybrid clustering for multi-target tracking in Wireless Sensor Networks*", IEEE International Conference on Computer, Information and Telecommunication Systems *(CITS),*pp. 1-5, Greece, 2013.

18. F. Hajiaghajani, M. Naderan, H. Pedram, and M. Dehghan, "*HCMTT: Hybrid clustering for multi-target tracking in Wireless Sensor Networks*," IEEE International Conference on Pervasive Computing and Communications (PERCOM Workshops),pp.889-894, Lugano, Switzerland, March 2012.

Patents and Inventions

- S. Biswas, F. Dezhi, F. Hajiaghajani, S. Das, "Method for Transmitting Data using Inter-Pulse Interval Modulation Technique", Submitted US patent 15/377,195, Dec. 13th, 2016

Technical Skills

- Programming languages: Java, C++, Ruby (on Rails), SQL, MATLAB
- Data analysis using R and MATLAB (Statistics and Machine Learning Toolbox, Wavelet Toolbox, Neural Network Toolbox, Signal Processing)
- TensorFlow, Keras, specifically worked on time series prediction using LSTMs
- Network Simulators: OMNET++, Castalia (a platform on OMNeT++ for Wireless Sensor Networks and Body Area Networks), DTN simulator ONE, NS3

Awards and Activities

- N2Women Young Researcher Fellowship Award, N2Women, 2016
- Thesis Completion Fellowship, Michigan State University, 2016
- Travel grant for Computing Research Association Women (CRA-W) Graduate Cohort, 2015
- Graduate Excellence fellowship, Michigan State University, 2012
- Awarded M.Sc thesis grant from Iranian Education and Research Institute for ICT, Tehran, 2010.
- Accepted as an honored student to Computer Engineering M.Sc program in Amirkabir University of Technology bypassing the required entrance exam, 2009.
- Arranged and moderated a ComSoc N2Women meeting during WiMob 2016, New York
- Poster evaluator for 6th annual summer undergraduate research forum Mid-SURE (Mid-Michigan Symposium for Undergraduate Research Experiences), July 2016