Yahya Hussain Essa (Ezzeldin)

CONTACT INFORMATION

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RESEARCH INTERESTS

Machine Learning, Distributed Computing, Wireless Communications, Information Theory

EDUCATION

University of California, Los Angeles (UCLA) (October 2014 – December 2020)
Ph.D. candidate in Electrical and Computer Engineering (GPA: 3.94)
Advisor: Prof. Christina Fragouli

Alexandria University, Egypt (October 2011 – August 2014)
M.Sc. in Electrical Engineering (GPA: 4.00)
Advisor: Prof. Karim G. Seddik
Thesis: Lattices in wireless communications: interference alignment and lattice-based LDPC codes

Alexandria University, Egypt (September 2006 – July 2011)
B.Sc. in Electrical Engineering (Grade: 91.92/100)
Graduation Project: Baseband Implementation of LTE Advanced Uplink Physical Layer

HONORS

- Ranked $\mathbf{2^{nd}}$ over Electrical Engineering Class of 2011, Alexandria University.
- Awarded Certificate of Merit, First Class Honors, for being one of the top ten students in Electrical Engineering during my undergraduate studies (2006-2011).
- Ranked $\mathbf{1^{st}}$ over IGCSE students in Alexandria and $\mathbf{12^{th}}$ over Egypt in 2006.

AWARDS AND FELLOWSHIPS

- Distinguished Ph.D. Dissertation Award from UCLA ECE Department in 2021
- Dissertation Year Fellowship 2019-2020
- Samueli Fellowship in 2016 for EE 102 honors course development.
- Graduate Division Award in 2014-2015 academic year.

RESEARCH PROJECTS

Communication for Distributed Machine Learning

- Developing quantization schemes for feature compression in distributed learning & inference.
- Deriving trade-offs between storage, computation and communication in a Map-Reduce distributed computation setting.

Physical layer technologies in emerging wireless networks

- Investigate the capacity guarantees for network simplification in Full-Duplex and Half-Duplex Gaussian relay networks operating with physical layer cooperation. The best subnetwork is chosen to operate instead of the full network, to reduce power utilization, coordination overhead and give potential for resource sharing between different data transmission sources.
- Deriving closed-form expression for the approximate capacity of Gaussian Half-Duplex Line networks and develop polynomial-time algorithms to construct an operating schedule that achieve the approximate capacity.
- Investigate the capacity of relay networks that employ directed antennas to model mmWave communication and derive min-cut bounds as well as achievable strategies for approximating the capacity in terms of the route capacities in the network.

Reconstruction from hippocampal neural measurements

- Studying the impact of multiple feature extraction basis on the performance of position reconstruction from spiking patterns in a rat hippocampus.

Hybrid power-line communication and Wi-Fi links

- Investigated the performance of Hybrid Power-line communication and Wi-Fi links.
- Implemented blocks using Click Modular Router to estimate the link performance over Wi-Fi and Power-line communication in the EPFL testbed and route accordingly.

A Location-aided Framework for Cognitive Radio Networks

- Implementing of radio receivers using GNURadio/USRP testbed. Development of a testbed that utilizes Click Modular Router with GNURadio for evaluation of location-aided routing protocols for cognitive radio networks.

Internships

Machine Learning Platform Engineer (*Intel Corporation*) *(June 2018 – August 2018)*
Development of tracing tools to model machine learning workloads such as convolutional and recurrent neural networks on the next generation Vision Processing Unit, which help drive decisions for next generation IPs. (Deep Learning Frameworks: Caffe, PyTorch, Onnx)

Journal Papers and Pre-prints

Xiaoshen Song, **Yahya H. Ezzeldin**, Giuseppe Caire, Christina Fragouli, "Efficient Beam Scheduling for Half-Duplex mmWave Relay Networks", *IEEE Transactions on Communications, June. 2021 (accepted to appear).*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Giuseppe Caire, "Gaussian 1-2-1 Networks: Capacity Results for mmWave Communications", *IEEE Transactions on Information Theory, Nov. 2020.*

Yahya H. Ezzeldin, Ayan Sengupta, Christina Fragouli, "Wireless Network Simplification: The Performance of Routing", *IEEE Transactions on Information Theory, July 2020.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Daniela Tuninetti, "The Approximate Capacity of Half-Duplex Line Networks", *IEEE Transactions on Information Theory, May 2020.*

Osama A. Hanna, **Yahya H. Ezzeldin**, Tara Sadjadpour, Christina Fragouli, Suhas Diggavi, "On Distributed Quantization for Classification", *IEEE Journal on Selected Areas in Information Theory, May 2020.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Daniela Tuninetti, "Network Simplification in Half-Duplex: Building on Submodularity", *IEEE Transactions on Information Theory, Oct. 2019.*

Yahya H. Ezzeldin, Karim G. Seddik, "Pseudo-Lattice Treatment for Subspace Aligned Interference Signals", *IEEE Transactions on Vehicular Technology, Nov. 2014.*

Osama A. Hanna, **Yahya H. Ezzeldin**, Christina Fragouli, Suhas Diggavi, "Quantizing data for distributed learning", *arXiv Dec 2020.*

Conference Papers

Juan C. Rebanal, **Yahya H. Ezzeldin**, Christina Fragouli, Paulo Tabuada, "A coding approach to localization using landmarks," *accepted at 2020 IEEE Global Communications Conference (GLOBECOM), Taipei City, Taiwan, Dec. 2020.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Giuseppe Caire, "Gaussian 1-2-1 Networks with Imperfect Beamforming", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Los Angeles, CA, USA, Jul. 2020.*

Yahya H. Ezzeldin, Christina Fragouli, Suhas Diggavi, "Quantizing Signals for Linear Classification", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Paris, France, Jul. 2019.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Giuseppe Caire, "Polynomial-time Capacity Calculation and Scheduling for Half-Duplex 1-2-1 Networks", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Paris, France, Jul. 2019.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Giuseppe Caire, "On the Multicast Capacity of Full-Duplex 1-2-1 Networks", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Paris, France, Jul. 2019.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Giuseppe Caire, "Gaussian 1-2-1 Networks: Capacity Results for mmWave Communications", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Vail, CO, USA, Jun. 2018.*

Gaurav Kumar Agarwal, **Yahya H. Ezzeldin**, Martina Cardone, Christina Fragouli, "Secure Communication over 1-2-1 Networks", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Vail, CO, USA, Jun. 2018.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Daniela Tuninetti, "Half-Duplex Routing is NP-hard", in Proc. of *55th Annual Allerton Conference, Monticello, IL USA, Oct, 2017.*

Yahya H. Ezzeldin, Mohammed Karmoose, Christina Fragouli, "Communication vs Distributed Computation: an alternative trade-off curve", in Proc. of *Information Theory Workshop (ITW), Kaohsiung, Taiwan, Nov. 2017.*

Yahya H. Ezzeldin, Martina Cardone, Christina Fragouli, Daniela Tuninetti, "Efficiently Finding Simple Schedules in Gaussian Half-Duplex Relay Line Networks", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Aachen, Gernmany, Jun. 2017.*

Yahya H. Ezzeldin, Ayan Sengupta, Christina Fragouli, "Wireless Network Simplification: Beyond Diamond Networks", in Proc. of *IEEE International Symposium on Information Theory (ISIT), Barcelona, Spain, Jul. 2016.*

Yahya H. Ezzeldin, Mustafa Nainay, "PNCR: A Physical Network Coding Framework for Routing in Wireless Ad-hoc Networks", in Proc. of *IEEE Wireless Communications and Networking Conference (WCNC), Istanbul, Turkey, Apr. 2014.*

Yahya H. Ezzeldin, Ahmed Sultan, Moustafa Youssef, "Best Relay Selection for Underlay Cognitive Radio Systems with Collision Probability Minimization", in Proc. of *IEEE International Conference on Computing, Networking and communications (ICNC), Honolulu, HI, USA, Feb. 2014.*

Yahya H. Ezzeldin, Radwa A. Sultan, Karim G. Seddik, "Sparse Reconstruction-Based Detection of Spatial Dimension Holes in Cognitive Radio Networks", in Proc. of *IEEE International Symposium on Personal Indoor and Mobile Radio Communications, London, UK, Sep. 2013.*

Talks and Posters

All accepted conference papers have resulted in conference presentation and one poster (WCNC 2014). Below some selected instances delivered by Yahya H. Ezzeldin are shown.

[Presentation] **Yahya H. Ezzeldin***, Martina Cardone, Christina Fragouli, Giuseppe Caire, "Gaussian 1-2-1 Networks: Capacity Results for mmWave Communications",
IEEE ISIT, Vail, CO, USA, Jun. 2018 [**TPC Choice Session**].

[Presentation] **Yahya H. Ezzeldin***, Martina Cardone, Christina Fragouli, Daniela Tuninetti, "Efficiently Finding Simple Schedules in Gaussian Half-Duplex Relay Line Networks",
IEEE ISIT, Aachen, Gernmany, Jun. 2017.

[Presentation] **Yahya H. Ezzeldin***, Ayan Sengupta, Christina Fragouli, "Wireless Network Simplification: Beyond Diamond Networks",
IEEE ISIT, Barcelona, Spain, Jul. 2016.

[Presentation] **Yahya H. Ezzeldin***, Ahmed Sultan, Moustafa Youssef, "Best Relay Selection for Underlay Cognitive Radio Systems with Collision Probability Minimization",
IEEE ICNC, Honolulu, HI, USA, Feb. 2014.

[Poster] **Yahya H. Ezzeldin***, Mustafa Nainay, "PNCR: A Physical Network Coding Framework for Routing in Wireless Ad-hoc Networks",
IEEE WCNC, Istanbul, Turkey, Apr. 2014.

Teaching Experience

University of California, Los Angeles, California, USA
[Teaching Assistant] *(Fall 2016 and Fall 2017)*

- Linear Programming
- Systems and Signals
- Systems and Signals Seminar (Honors)

Alexandria University, Alexandria, Egypt
[Teaching Assistant] *(Fall 2011 – Spring 2014)*

- Digital Communications
- Communication Systems
- Advanced Communications
- Introduction to Antenna Theory

Technical Services

- Reviewer (Journals)
  - IEEE Transactions on Information Theory
  - IEEE Transactions on Communications
  - IEEE Transactions on Wireless Communications
- Reviewer (Conferences)
  - IEEE International Symposium on Information Theory (ISIT)
  - IEEE Global Telecommunications Conference (GLOBECOM)
  - IEEE Wireless Communications and Networking Conference (WCNC)
- Mentor
  - Summer Undergraduate Scholars Program at UCLA HSSEAS
  - High School Summer Research Program at UCLA HSSEAS

Technical Courses

Selected Courses at UCLA

- Probability Theory (MATH 275A, B, C)
- Combinatorial Theory (MATH 206A)
- Deep Learning (EE239AS)
- Convex Optimization (EE236B)
- Information Theory (EE231A)
- Adaptation and Learning (EE210A)
- Network Information Theory (EE239AS)
- Real Analysis (MATH 131BH)
- Linear Programming (EE236A)
- Network Coding (EE234A)

Skills & Background

Programming Languages: *Matlab, Python, C/C++, Linux shell scripting*
Frameworks: *GNURadio, Click Modular Router, WARPLab, TensorFlow, Caffe, PyTorch*

References

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Prof. Suhas Diggavi
Professor
University of California, Los Angeles
Email: suhasdiggavi@ucla.edu

Prof. Giuseppe Caire
Professor
Technical University of Berlin
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