Rashad Eletreby

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EDUCATION

Aug 2015 to PhD Candidate in the Electrical and Computer Engineering Department,

Aug 2019 Carnegie Mellon University, USA —Adviser: Prof. Osman Yağan

GPA: 4.0/4.0

SEP 2012 to Master of Science in Electrical Engineering, Cairo University, Egypt

July 2014 Thesis: "Optimal Spectrum Assignment and Clustering for Cognitive Radio Sensor

Networks" — Advisers: Prof. Mohamed Khairy and Dr. Hany Elsayed

GPA: 4.0/4.0

SEP 2007 to Bachelor of Science in Electrical Engineering, Cairo University, Egypt

July 2012 Graduation Project: "Roaming Capture Analysis" — Industry Partner: Vodafone Egypt

— Adviser: Prof. Mohamed Khairy

PERCENTAGE: 88.36% —RANK: 9/310 (Top 3%)

RESEARCH EXPERIENCE

Aug 2015 to Research Assistant at Carnegie Mellon University, USA

Aug 2019 — Supervisor: Prof. Osman Yağan

- Fake news detection (ongoing): Developing machine learning techniques and methodologies that augment social information with news content to detect fake news on encrypted social platforms. **Dataset:** FakeNewsNet (The Data Mining and Machine Learning Lab Arizona State University). **Skills:** Machine Learning, Python, Pandas, and Probability Theory.
- Discovering social circles: Proposing methods for automatic community detection on social network subgraphs under the "Social Circle Analysis" category. Combining structural information (graph connectivity) and content information (traits pertaining to each node in the network) to determine communities within social network graphs. Dataset: ego-Facebook (Stanford Network Analysis Project). Skills: Machine Learning, Auto Encoders, Node Embedding, Clustering, Modularity Maximization.
- Network science: Investigating the *evolution* and spread of information and infectious diseases in complex networks. Building and analyzing mathematical and simulation models to characterize the role of evolutionary adaptations in facilitating the spread of information and infectious diseases. Skills: Graph Theory, Stochastic Models, Probability Theory, C++, and Python.
- Internet of Things: Working on the design, evaluation, and implementation of novel techniques that aim to i) disentangle and decode large numbers of interfering LP-WAN transmissions at a simple, single-antenna LP-WAN base station, and ii) extend the communication range of the current LP-WAN sensors. Skills: Ettus USRPs, LoRa Radio, MATLAB, C++, and UNIX.
- Random graph theory: Establishing zero-one laws for the k-connectivity of the composite graphs formed by the intersection of inhomogeneous random key graphs with Erdős-Rényi graphs. Proposing and investigating the connectivity of inhomogeneous random K-out graphs. Applications: Designing secure, large-scale, heterogeneous wireless sensor networks. Providing anonymity guarantees for transactions over cryptocurrency networks. Modeling the formation of common-interest social networks. Skills: Probability theory, Combinatorics, Graph theory, and Python.

Aug 2014 to May 2015 Research Assistant at Center of Advanced Networking, University of Arizona, USA — Supervisor: Prof. Marwan Krunz

• Physical-layer security: Conducted research on physical layer security in multi-link wireless networks using artificial noise techniques.

Feb 2013 to **July 2014**

Research Assistant at Center of Wireless Studies (CWS), Cairo University, Egypt

-Supervisor: Prof. Mohamed Khairy

• Cognitive radio sensor networks: Conducted research on cognitive radio sensor networks with emphasis on topology management and optimal power/channel assignment.

PROFESSIONAL EXPERIENCE

MAY 2018 to Summer Intern at Robert Bosch LLC, Sunnyvale, CA, USA

Aug 2018

— Supervisor: Sushanta Rakshit

• Wireless indoor localization: Implemented and tested several wireless indoor localization algorithms. Developed machine learning solutions based on density estimation (through Gaussian Mixture Models) and maximum likelihood to enhance the performance of state-of-the-art wireless indoor localization algorithms. Dataset: Labeled data is collected manually through field measurements. Skills: Python, Machine Learning, Clustering, Density Estimation, Pandas, MATLAB, and C++.

GRADUATE COURSES

Carnegie

• Introduction to Machine Learning (PhD) (10701)

Mellon

• Game Theory (80705)

University

• Estimation and Detection (18752)

University of Arizona

• Computer System and Network Evaluation

• Theory of Graphs and Networks

• Advanced Topics in Computer Networks

• Applied Stochastic Processes (18751)

• Wireless Communications (18758)

CAIRO University • Optimization Methods

• Non-linear Control Systems

• Linear Stochastic Control

• Advanced Mathematics

• Linear Control Systems

• Computer Control Systems

PATENTS

- (P2) R.Eletreby, D.Zhang, S.Kumar and O.Yağan "Empowering Low-Power Wide Area Networks in Urban Settings" - patent pending.
- (P1) M.Krunz, B.Akgun, P.Siyari, H.Rahbari, R.Eletreby, and O.Koyluoglu "Systems and methods for securing wireless communications" - patent granted by USPTO.

PUBLICATIONS

Technical Reports

(T1) **R.Eletreby** and M.Blanco "Social Circle Analysis via Content and Structure Augmentation" - Source code and report are available at: https://github.com/reletreby/structureAug

Journal Papers

- (J4) R.Eletreby, Y.Zhuang, K.M.Carley and O.Yağan "On the Evolution of Spreading Processes in Complex Networks" - submitted to Nature Communications.
- (J3) R.Eletreby and O.Yağan "k-connectivity of Inhomogeneous Random Key Graphs with Unreliable Links" - published in IEEE Transactions on Information Theory.
- (J2) R.Eletreby and O.Yağan "Connectivity of Wireless Sensor Networks Secured by Heterogeneous Key Predistribution Under an On/Off Channel Model" - published in IEEE Transactions on Control of Network Systems.
- (J1) R.Eletreby, H.Elsayed and M.Khairy "Optimal Spectrum Assignment for Cognitive Radio Sensor Networks Under Coverage Constraint" - published in IET Communications Journal.

Conference Papers

(C12) R.Eletreby and O.Yağan "Connectivity of Inhomogeneous Random K-out Graphs" - submitted to IEEE ISIT 2019

- (C11) **R.Eletreby** and O.Yağan "Connectivity of Wireless Sensor Networks Secured by The Heterogeneous Random Pairwise Key Predistribution Scheme" IEEE CDC 2018
- (C10) **R.Eletreby**, Y.Zhuang and O.Yağan "Evolution of Spreading Processes on Complex Networks" Conference on Complex Systems 2018
- (C9) **R.Eletreby**, Y.Zhuang and O.Yağan "Evolution of Spreading Processes on Complex Networks" IEEE ITA 2018 Invited Abstract
- (C8) **R.Eletreby**, D.Zhang, S.Kumar and O.Yağan "Empowering Low-Power Wide Area Networks in Urban Settings" ACM SIGCOMM 2017
- (C7) R.Eletreby and O.Yağan "Secure and Reliable Connectivity in Heterogeneous Wireless Sensor Networks" IEEE ISIT 2017
- (C6) **R.Eletreby** and O.Yağan "Connectivity of Inhomogeneous Random Key Graphs Intersecting Inhomogeneous Erdős-Rényi Graphs" IEEE ISIT 2017
- (C5) R.Eletreby and O.Yağan "Reliability of Wireless Sensor Networks under a Heterogeneous Key Predistribution Scheme" - IEEE CDC 2016
- (C4) **R.Eletreby** and O.Yağan "Performance of the Heterogeneous Key Predistribution Scheme under a Heterogeneous ON-OFF Channel Model" Allerton 2016
- (C3) **R.Eletreby** and O.Yağan "Minimum Node Degree in Inhomogeneous Random Key Graphs With Unreliable Links" IEEE ISIT 2016
- (C2) **R.Eletreby**, H.Rahbari, M.Krunz "Supporting PHY-layer Security in Multi-link Wireless Networks Using Friendly Jamming" IEEE GLOBECOM 2015.
- (C1) **R.Eletreby**, H.Elsayed and M.Khairy "CogLEACH: A Spectrum-Aware Clustering Protocol for Cognitive Radio Sensor Networks" CROWNCOM 2014.

HONORS AND AWARDS

Aug 2017 to May 2018	Philip and Marsha Dowd Fellowship at CARNEGIE MELLON UNIVERSITY, USA.	
Aug 2017 to May 2018	CMU Presidential Fellowship at Carnegie Mellon University, USA.	
Aug 2015 to July 2016	William J. Happel Endowed Fellowship at CARNEGIE MELLON UNIVERSITY, USA.	
Aug 2015 to July 2016	Carnegie Institute of Technology Dean's Fellow at CARNEGIE MELLON UNIVERSITY, USA.	
Aug 2014 to May 2015	Full tuition Graduate Assistantship at University of Arizona, USA.	
Sep 2012 to July 2014	Full tuition Graduate Assistantship at Cairo University, Egypt.	
Sep 2007 to July 2012	Award of Excellence from Faculty of Engineering , Cairo University, Egypt	

TEACHING EXPERIENCE

Univ.

Carnegie Mellon Univ.	• Analytical Performance Modeling and Design of Computer Systems (F17)	• Applied Stochastic Processes (S18)
UNIVERSITY OF ARIZONA	\bullet Electronic Circuits Lab (S15 and F14)	
Cairo	• MATLAB (Spring 2014)	• Electronic Circuits I (F13 and F12)

• Linear Control Systems (S12)