

Rashad Eletreby

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EDUCATION

Carnegie Mellon University

Doctor of Philosophy in Electrical and Computer Engineering

Thesis: New Models for the Structure and Dynamical Processes of Complex Networks

Adviser: Prof. Osman Yağan

GPA: 4.0/4.0

Pittsburgh, PA, USA

08/2015 – 07/2019

Cairo University

Master of Science in Electrical and Computer Engineering

GPA: 4.0/4.0

Cairo, Egypt

09/2012 – 07/2014

Cairo University

Bachelor of Science in Electrical and Computer Engineering

Percentage: 88.36% - Rank: 9/310

Cairo, Egypt

09/2007 – 07/2012

Summary

Research Areas

Machine Learning, Random Graph Theory, Network Science, Probability Theory, Stochastic Population Models, Wireless Communications.

Software

Python, Pandas, C++, MATLAB, scikit-learn, NumPy, SciPy, igraph, NetworkX.

PROFESSIONAL EXPERIENCE

Robert Bosch LLC (Summer Intern)

Machine Learning Models for Wireless Localization

- Designed and implemented machine learning models (based on density estimation and maximum likelihood principle) that enhanced the accuracy of the state-of-the-art wireless indoor localization algorithms by 23%.

Sunnyvale, CA, USA

05/2018 – 08/2018

RESEARCH EXPERIENCE

Carnegie Mellon University

Discovering Social Circles

- Designed and implemented innovative machine learning methods that combine structural information and content information to determine communities within social network graphs

Pittsburgh, PA, USA

08/2015 – 07/2019

Network Science

- Proposed and analyzed novel stochastic epidemic models to characterize the role of evolutionary adaptations in facilitating the spread of information/diseases in real-world social networks.

Random Graph Theory

- Established zero-one laws for the k-connectivity property of inhomogeneous random key graphs intersecting Erdős–Rényi graphs.
- Proposed and investigated the connectivity of inhomogeneous random K-out graphs.

Internet of Things

- Designed novel algorithms that significantly improved the performance of Low Power Wide Area Networks (LP-WANs) in urban setting (6.84x throughput gain as compared to the state-of-the-art).
- The proposed algorithms disentangle and decode large numbers of interfering LP-WAN transmissions at a simple, single-antenna LP-WAN base station.

University of Arizona

Physical Layer Security

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

Tucson, AZ, USA

08/2014 – 05/2015

Cairo University

Cognitive Radio Sensor Networks

- Conducted research on cognitive radio sensor networks with emphasis on topology management and optimal power/channel assignment

Cairo, Egypt

02/2013 – 07/2014

GRADUATE COURSES

Carnegie Mellon University

- Introduction to Machine Learning (PhD) (10701)
- Estimation and Detection (18752)
- Wireless Communications (18758)
- Applied Stochastic Processes (18751)
- Game Theory (80705)

Cairo University

- Optimization Methods
- Advanced Mathematics
- Linear Control Systems
- Linear Stochastic Control
- Nonlinear Control Systems

University of Arizona

- Computer Systems and Network Evaluation
- Theory of Graphs and Networks
- Advanced Topics in Computer Networks

HONORS AND AWARDS

Carnegie Mellon University

- Philip and Marsha Dowd Fellowship
- CMU Presidential Fellowship
- William J. Happel Endowed Fellowship
- Carnegie Institute of Technology Fellowship

Pittsburgh, PA, USA

08/2015 – 07/2019

University of Arizona

- Full tuition Graduate Assistantship

Tucson, AZ, USA

08/2014 – 05/2015

Cairo University

- Full tuition Graduate Assistantship
- Award of Excellence

Cairo, Egypt

09/2007 – 07/2014

PUBLICATIONS

Patents

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

Technical Reports

1. **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

1. **R. Eletreby**, Y. Zhuang, K. M. Carley and O. Yağan “*On the Evolution of Spreading Processes in Complex Networks*” - submitted to Nature Communications.
2. **R. Eletreby** and O. Yağan “*k-connectivity of Inhomogeneous Random Key Graphs with Unreliable Links*” - IEEE Transactions on Information Theory (published).

3. **R. Eletreby** and O. Yağan "*Connectivity of Wireless Sensor Networks Secured by Heterogeneous Key Predistribution Under an On/Off Channel Model*" - IEEE Transactions on Control of Network Systems (published).
4. **R. Eletreby**, H. Elsayed and M. Khairy "*Optimal Spectrum Assignment for Cognitive Radio Sensor Networks Under Coverage Constraint*" - IET Communications (published).

Conference Papers

1. **R. Eletreby** and O. Yağan "*Connectivity of Inhomogeneous Random K-out Graphs*" - IEEE ISIT 2019
2. **R. Eletreby** and O. Yağan "*Connectivity of Wireless Sensor Networks Secured by The Heterogeneous Random Pairwise Key Predistribution Scheme*" - IEEE CDC 2018
3. **R. Eletreby**, Y. Zhuang and O. Yağan "*Evolution of Spreading Processes on Complex Networks*" - Conference on Complex Systems 2018
4. **R. Eletreby**, Y. Zhuang and O. Yağan "*Evolution of Spreading Processes on Complex Networks*" - IEEE ITA 2018 - Invited Abstract
5. **R. Eletreby**, D. Zhang, S. Kumar and O. Yağan "*Empowering Low-Power Wide Area Networks in Urban Settings*" - ACM SIGCOMM 2017
6. **R. Eletreby** and O. Yağan "*Secure and Reliable Connectivity in Heterogeneous Wireless Sensor Networks*" - IEEE ISIT 2017
7. **R. Eletreby** and O. Yağan "*Connectivity of Inhomogeneous Random Key Graphs Intersecting Inhomogeneous Erdős–Rényi Graphs*" - IEEE ISIT 2017
8. **R. Eletreby** and O. Yağan "*Reliability of Wireless Sensor Networks under a Heterogeneous Key Predistribution Scheme*" - IEEE CDC 2016
9. **R. Eletreby** and O. Yağan "*Performance of the Heterogeneous Key Predistribution Scheme under a Heterogeneous ON-OFF Channel Model*" - Allerton 2016
10. **R. Eletreby** and O. Yağan "*Minimum Node Degree in Inhomogeneous Random Key Graphs With Unreliable Links*" - IEEE ISIT 2016
11. **R. Eletreby**, H. Rahbari, M. Krunz "*Supporting PHY-layer Security in Multi-link Wireless Networks Using Friendly Jamming*" - IEEE GLOBECOM 2015.
12. **R. Eletreby**, H. Elsayed and M. Khairy "*CogLEACH: A Spectrum-Aware Clustering Protocol for Cognitive Radio Sensor Networks*" - CROWNCOM 2014.