COLLEGE OF ENGINEERING AND COMPUTER SCIENCE
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

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for the degree of Doctor of Philosophy (Ph.D.)

"Decentralized Systems for Information Sharing in Dynamic Environment Using Localized Consensus"

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ABSTRACT OF DISSERTATION

Decentralized Systems for Information Sharing in Dynamic Environment Using Localized Consensus
Achieving a consensus among a large number of nodes has always been a challenge for any decentralized system. Consensus algorithms are the building blocks for any decentralized network that is susceptible to malicious activities from authorized and unauthorized nodes. Proof-of-Work is one of the first modern approaches to achieve at least a 51% consensus, and ever since many new consensus algorithms have been introduced with different approaches of consensus achievement. These decentralized systems, also called blockchain systems, have been implemented in many applications such as supply chains, medical industry, and authentication. However, it is mostly used as a cryptocurrency foundation for token exchange. For these systems to operate properly, they are required to be robust, scalable, and secure. This dissertation provides a different approach of using consensus algorithms for allowing information sharing among nodes in a secured fashion while maintaining the security and immutability of the consensus algorithm. The consensus algorithm proposed in this dissertation utilizes a trust parameter to enforce cooperation, i.e., a trust value is assigned to each node and it is monitored to prevent malicious activities over time. This dissertation also proposes a new solution, named localized consensus, as a method that allows nodes in small groups to achieve consensus on information that is only relevant to that small group of nodes, thus reducing the bandwidth of the system. The proposed models can be practical solutions for immense and highly dynamic environments with validation through trust and reputation values. Application for such localized consensus can be communication among autonomous vehicles where traffic data is relevant to only a small group of vehicles and not the entirety of the system.

BIOGRAPHICAL SKETCH
Born in 1989
B.S., Ben Gurion University, Beer-Sheva, Israel, 2014
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CONCERNING PERIOD OF PREPARATION
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Time in Preparation: 2020 - 2022

Qualifying Examination Passed: Fall 2020

Published Papers:

Zamir L. and Nojoumian M. Localized State-Change Consensus in Immense and Highly Dynamic Environments. Cryptography, Emerging Topics in Blockchain Security and Privacy, MDPI. vol. 6, issue 2, pp. 1-16, 2022. https://doi.org/10.3390/cryptography6020023

Zamir L. and Nojoumian M. Information Sharing in the Presence of Adversarial Nodes Using Raft. Future Technologies Conference (FTC), Springer LNNS 360, pp. 159-172, Vancouver, Canada, 2021. https://doi.org/10.1007/978-3-030-89912-7_13

Zamir L., Shaan A. and Nojoumian M. ISRaft Consensus Algorithm for Autonomous Units. IEEE 29th International Conference on Network Protocols (ICNP), pp. 1-6, Dallas, USA, 2021. https://doi.org/10.1109/ICNP52444.2021.9651979

Shaller A., Zamir L. and Nojoumian M. Roadmap of Post-Quantum Cryptography Standardization: Side-Channel Attacks and Countermeasures. Elsevier Information and Computation, 2022. (Submitted)