

## BIOGRAPHICAL SKETCH

Born in Iran

B.S. 2006, Islamic Azad University, Isfahan, Iran

M.S. 2011, Islamic Azad University, Tehran, Iran

Ph.D. 2017, Florida Atlantic University, Boca Raton, Florida

### CONCERNING PERIOD OF PREPARATION & QUALIFYING EXAMINATION

**Time in Preparation:** 2014—2017

**Qualifying Examination Passed:** Spring 2014

#### **Published Papers:**

- E. Limouchi, I. Mahgoub, and A. Alwakeel, "Fuzzy Logic-based Broadcast in Vehicular Ad hoc Networks," 2016 IEEE 84th Vehicular Technology Conference (VTC-Fall), pp. 1-5.
- E. Limouchi and I. Mahgoub, "BEFLAB: bandwidth efficient fuzzy logic-assisted broadcast for VANET," 2016 IEEE Symposium Series on Computational Intelligence (SSCI), pp.1-8.
- E. Limouchi and I. Mahgoub, "Intelligent hybrid adaptive broadcast for VANET," in 2016 IEEE 7th Annual Ubiquitous Computing, Electronics and Communication Conference (UEMCON), pp. 1-7.
- E. Limouchi, A. Zilouchian, and I. Mahgoub, "OFDMA-based WiMAX Connection Admission Control based on Fuzzy Logic Controller," 2016 IEEE International Wireless Communications and Mobile Computing Conference (IWCMC), pp. 1129-1134.
- E. Limouchi and I. Mahgoub, "Cross-layer statistical broadcast with density adaptive contention window adjustment," in Elsevier Vehicular Communication Journal (Under review).
- E. Limouchi and I. Mahgoub, "Volunteer dilemma game inspired broadcast scheme for VANET," in IEEE Transactions on Computational Intelligence and AI in Games (Under review).
- E. Limouchi and I. Mahgoub, "Transmission range adaptive broadcast scheme for VANET," in IEEE Transactions on Intelligent Transportation Systems (Under review).



COLLEGE OF ENGINEERING  
& COMPUTER SCIENCE

Florida Atlantic University

FLORIDA ATLANTIC UNIVERSITY

COLLEGE OF ENGINEERING & COMPUTER SCIENCE

announces the

Ph.D. Dissertation Defense

of

***ELNAZ LIMOUCHI***

for the degree of

DOCTOR OF PHILOSOPHY (PH.D.)

July 5, 2017 at 10 a.m.

in

Engineering East, Room 405

777 Glades Road

Boca Raton, FL

## ABSTRACT OF DISSERTATION

DEPARTMENT: Computer & Electrical Engineering and  
Computer Science

DISSERTATION TITLE: “Smart Broadcast Protocol Design  
for Vehicular Ad hoc Networks”

CHAIR OF THE CANDIDATE’S PH.D. COMMITTEE:  
Imad Mahgoub, Ph.D.

PH.D. SUPERVISORY COMMITTEE:  
Mohammad Ilyas, Ph.D.  
Ali Zilouchian, Ph.D.  
Valentine Aalo, Ph.D.  
Ed Callaway, Ph.D.

Multi-hop broadcast is one of the main approaches to disseminate data in VANET. Therefore, it is important to design a reliable multi-hop broadcast protocol, which satisfies both reachability and bandwidth consumption requirements. In this work, considering the challenges related to the nature of VANET, we design a number of smart broadcast protocols and evaluate their performance in various network density scenarios. We use fuzzy logic technique to determine the qualification of vehicles to be forwarders, resulting in reachability enhancement. Then we design a bandwidth efficient fuzzy logic-assisted broadcast protocol, which aggressively suppresses the number of retransmissions. We also propose an intelligent hybrid protocol that adapts to local network density. In order to avoid packet collisions and enhance reachability, we design a cross layer statistical broadcast protocol, in which the contention window size is adjusted based on the local density information. We look into the multi-hop broadcast problem with an environment based on game theory. In this scenario, vehicles are players and their strategy is either to volunteer and rebroadcast the received message or defect and wait for others to rebroadcast. We introduce a volunteer dilemma game inspired broadcast scheme to estimate the probability of forwarding for the set of potential forwarding vehicles. In this scheme we also introduce a fuzzy logic-based contention window size adjustment system.

Finally, based on the estimated spatial distribution of vehicles, we design a transmission range adaptive scheme with a fuzzy logic-assisted contention window size system, in which a bloom filter method is used to mitigate overhead. Extensive experimental work is obtained using simulation tools to evaluate the performance of the proposed schemes in terms of reachability, number of rebroadcasts per covered vehicle, and bytes sent per vehicle.