Behrad Toghi

Contact Information

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Academic Training

- **Ph.D. University of Central Florida** **(2017-present)**
  - Major: Electrical Engineering, Cyber Physical Systems (**GPA:** 4.0 out of 4)
  - Advisor: Dr. Yaser P. Fallah
  - Connected & Autonomous Vehicles (CAVs) | V2X | Cooperative Perception/AI
- **B.Sc. Sharif University of Technology** **(2011-2016)**
  - Major: Electrical Engineering, Communications
  - Advisor: Dr. Arash Amini
  - Thesis: Hi-precision Multi-receiver Satellite Geo-location Systems

Work Experience

- **Ford Motor Company**, *Research Engineer* (2018)
  - Summer intern at Ford Research & Advanced Engineering (R&A)
  - Cellular Vehicle-to-Everything (V2X) project
- **Center for Research in Electric Autonomous Transport**, *Ph.D. Research Fellow* (2017)
  - Directed by Dr. Yaser P. Fallah, CREAT is mainly focused on research in Connected Automated Vehicles (CAVs) and Intelligent Transportation Systems (ITS).
- **Ericsson**, *Network Optimization Engineer* (2016)
  - Intern in the AOS Group (an Ericsson contractor) in 3G roll-out and modernization project.
- **Sharif U. of Tech. Startup Accelerator**, *Electric Vehicle Engineer* (2015)
  - "Long range Electric Vehicle" project under the supervision of Dr. F. Tahami in the Sharif Startup Accelerator to design and manufacture electric taxi in an industrial scale.

Selected Projects

- **Cooperative AI Applications in Distributed Multi-agent Systems** (*Funded by Toyota InfoTech*)
  - Cooperative and collective perception solutions for connected and automated ground and aerial vehicles.
  - Cooperative decision making algorithms for multi-agent systems.
- **Cellular Vehicle-to-Everything C-V2X Communication** (*Funded by Ford Motor Company*)
  - Link level simulation in ns-3 for PHY, MAC, and higher protocol stack layers.
  - Scalability, congestion control, and performance evaluation studies.
  - Theoretical analysis and analytical modeling
- **IEEE 802.11p (Dedicated Short Range Communication) Scalability** (*Funded by CAMP*)
  - Collision Avoidance Metrics Partnership (CAMP) is a consortium of USDOT, NHTSA, and OEMs (Ford, General Motors, Toyota, Nissan, etc.)
  - Study on the vehicle safety applications and collision avoidance based on the vehicular communication.
- **Small-scale Connected Automated Vehicle (SCAVE) Framework** (*Funded by UCF*)
  - A cooperative CAV test framework equipped with LiDAR, Camera Vision, Simultaneous Localization and Mapping (SLAM) algorithms, and V2X communication. I am supervising a team of 7 undergraduate and graduate students in this project.
- **Long Range Public Transport Electric Vehicle** (*Funded by IKCO Automotive Industries*)
  - A collaboration between Sharif University of Technology startup accelerator and IKCO Automotive Industries to design and manufacture long-range electric taxis in an industrial scale.

Publications

- B. Toghi *et. al.*, "Multiple Access in Cellular V2X: Performance Analysis in Highly Congested Vehicular Networks", *2018 IEEE Vehicular Networking Conference (VNC-2018)*, Taipei, Taiwan
- H. N. Mahjoub, B. Toghi, Y. P. Fallah, "A Stochastic Hybrid Framework for Driver Behavior Modeling Based on Hierarchical Dirichlet Process", *2018 IEEE Vehicular Technologies Conference (VTC-Fall2018)*, Chicago, IL
- H. N. Mahjoub, B. Toghi, Y. P. Fallah, "A Driver Behavior Modeling Structure Based on Non-parametric Bayesian Stochastic Hybrid Architecture", *IEEE Connected and Automated Vehicles Symposium (CAVS2018)*, Chicago, IL

- H. N. Mahjoub, B. Toghi, SM O. Gani "V2X System Architecture Utilizing Hybrid GP-based Model Structures", *IEEE Systems Conference (IEEE SysCon 2019)*, Orlando, FL
- B. Toghi, Y. P. Fallah, J. Rao, I. Vukovic "Technical Report: Performance Analysis of Cellular Vehicle-to-everything Transceiver Devices", *Ford Proprietary Technical Document*, Ford Motor Company Research Center Library, Dearborn, MI
- D. Grover, B. Toghi "MNIST Dataset Classification Utilizing k-NN Classifier with Modified Sliding Window Metric", *Computer Vision Conference (CVC 2019)*, Los Vegas, NV
- B. Toghi, D. Grover, Y. P. Fallah "Creating a Live Maneuver-based Driving Dataset and Model for Connected & Automated Vehicle Applications", *IEEE Intelligent Vehicles Symposium (IVS 2019)*, Paris, France [Submitted]
- B. Toghi *et. al.* "Distributed Congestion Control For Cellular Vehicle-to-everything Communication", *IEEE Vehicular Technology Conference (VTC-Fall2019)*, Honolulu, HI [Submitted]

Presentations

- Keynote speaker: *"A Survey on the Future of Autonomy in Mass Transportation & Fleet vehicles"*, Work Fleet Forum, Jacksonville, FL - 2017
- Invited talk: *"Small-scale Connected Automated Vehicle (SCAVE) Framework"*, Graduate Research Forum, University of Central Florida, Orlando, FL - 2018

Honors and Awards

- **ORC Doctoral Fellowship Recipient** (2017)
  - Fellowship for doctoral studies with 4-year full financial support from UCF is awarded to *one candidate* annually by ECE dep't, Orlando, FL
- 1^{st} **Place Award** (2012)
  - Sharif Cup Robotic League: Path-finder robots competition, Sharif University of Technology, Tehran, Iran
- 2^{nd} **Place & Silver Medalist** (2010)
  - A member of the Iran national science olympiad team participating in the International Olympiad on Astronomy and Astrophysics (IOAA) *among teams from 25 countries*, Beijing, China
- **Presidential Fellowship Award** (2010)
  - Merit-based 4-year Presidential Scholarship for undergraduate study at the Sharif University of Technology, Tehran, Iran
- **National Elites Foundation** (2009)
  - Membership in the Iranian National Elites Foundation a science Olympiad medalist.
- 1^{st} **Place & Gold Medalist** (2009)
  - Gold medal and absolute winner (best-result award) in the National Astrophysics Olympiad held by the Young Scholars Club (YSC) in a competition with *more than 10,000 students nation-wide*.

Skills

- **Programming:** Python, C++, MATLAB (+Simulink), Robotic OS (ROS), Intel 8085, 8051
- **Engineering Software:** NS−3, Actix Analyzer, TEMS Investigation, Orcad PSPICE, HSPICE, Quartus II, Altium, WinCUPL, GAMS, AutoCAD, LaTeX
- **Vehicular Systems:** Experienced in vehicle sub-systems, mechatronics systems, CAN-bus, LiDAR devices, computer vision methods, SLAM and path planning techniques. Strong hands-on skills in product design, prototyping, mass production, and test engineering.
- **Udacity Self-driving Car Engineer Nano-degree**: is a three semester online degree covering Computer Vision Algorithms, Deep Learning, Object Detection and Tracking, Path Planning, Control Algorithms, etc.

Graduate Courses

Computer Vision (A), Advanced A.I. (A), Machine Learning (A), Cyper Physical Sys. (A), Autonomous Robotics (A), Vehicle Electronic Sys. (A), Adaptive Control (A), Automotive Mechatorincs (A)

Activities

- Member of the Society of Automotive Engineers **(SAE)** International.
- Reviewer for the **IEEE** Transactions on Vehicular Technology **(TVT)** and **IEEE** Vehicular Technology Magazine **(VTM)**.
- Member of the Motorcycle and Automobile Federation of Iran **(MAFIRI)**; professional race driver (2010-2016), won 5 National championships and grand prizes
- ***Other Activities***: Mountaineering, Hiking, Snow-boarding, Wake-boarding, Photography

References

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