

EXPERTISE

Autonomous Driving | Deep/Machine Learning | Reinforcement Learning | Computer Vision

WORKEXPERIENCE

- **Stanford University**, *Visiting Researcher* (May 20 - Present)
 - Hosted by **Dr. Dorsa Sadigh** at **Stanford Iliad Lab**, working on the **SymCoDrive** project.
- **Mercedes-Benz R&D North America**, *Research Intern* (May 19 - Jan 20)
 - Speech & Digital Assistants team: designed & proposed the "Semantic Analyzer Module" (patented).
 - Autonomous Driving dep't: worked in Behavior Planning team on Scene Understanding (patent filed).
- **Ford Motor Company R&D**, *Research Intern* (May 18 - Aug 18)
 - Outcomes of my research work on scalability studies of Cellular Vehicle-to-Everything (C-V2X) contributed to SAE J3161 standard. I performed performance analysis on Qualcomm C-V2X devices.
- **Sharif University of Technology**, *Automotive Engineer* (Feb 16 - Feb 17)
 - Contributed to concept design and prototyping of a *long-range electric urban taxi* pre mass production.
- **Ericsson**, *Engineering Intern* (Sep 15 - Dec 15)
 - Undergrad intern in an Ericsson contractor, worked in a nationwide 3G network optimization project.

SKILLS

- **Software:** Python (+TensorFlow, Keras, Torch, OpenCV, OpenAI Gym), C++, MATLAB, Git, ROS, NS3 Simulator, Agile Software Development (SCRUM), TDD (GoogleTest)
- **Vehicular:** Experienced in vehicle sub-systems, mechatronics, CAN bus, LiDAR and sensory devices. Strong hands-on skills in product management, prototyping, mass production, and test engineering.
- **Udacity Self-driving Car Engineer Nano-degree**

EDUCATION

- **Ph.D. Electrical Engineering** **2017-2021**
 - *University of Central Florida, Orlando, FL*
 - Advised by **Dr. Yaser P. Fallah** & closely collaborating with **Dr. Dorsa Sadigh** (Stanford) and **Dr. Ramtin Pedarsani** (UCSB).
 - Dissertation title: *Cooperative Autonomous Driving in Mixed-autonomy Environments*
- **B.Sc. Electrical Engineering** **2011-2016**
 - *Sharif University of Technology, Tehran, IR*

HONORS &AWARDS

- **Graduate Researcher of the Year** (2019)
 - Awarded as the *Graduate Research MVP (Most Valuable Player)* among ~9,000 graduate students, UCF College of Graduate Studies, Orlando, FL
- **ORC Doctoral Fellowship** (2017)
 - Fellowship for doctoral studies with 4-year full financial support UCF ECE department, Orlando, FL
- **1st Place Award - Sharif Cup Robotic League** (2012)
 - 2-wheel path-finder robots competition, Sharif University of Technology
- **Silver Medal - International Science Olympiad** (2010)
 - Member of the Iran national science olympiad team participating in the International Olympiad on Astrophysics (IOAA) *among teams from 25 countries*, Beijing, China
- **Gold Medal - National Science Olympiad** (2010)
 - 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*.
- **National Elites Foundation** (2009)
 - Membership in the Iranian National Elites Foundation as a science olympiad gold medalist.

PUBLICATIONS

- B. Toghi, R. Valiente, D. Sadigh, R. Pedarsani, Y. P. Fallah "Cooperative Autonomous Vehicles that Sympathize with Human Drivers", *2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021)*, Prague, Czech Republic
- B. Toghi, R. Valiente, D. Sadigh, R. Pedarsani, Y. P. Fallah "Altruistic Maneuver Planning for Cooperative Autonomous Vehicles Using Multi-agent Advantage Actor-Critic", *2021 ADP3 workshop at IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2021)*
- B. Toghi, R. Valiente, D. Sadigh, R. Pedarsani, Y. P. Fallah "Social Coordination and Altruism in Cooperative Autonomous Driving", *IEEE Transactions on Intelligent Transportation Systems (IEEE T-ITS)* [submitted]
- B. Toghi *et al.* "A Maneuver-based Urban Driving Dataset and Model for Cooperative Vehicle Applications", *IEEE CAVS 2020*, Victoria, B.C., Canada
- Md Saifuddin, M. Zaman, B. Toghi, Y. P. Fallah, J. Rao "Performance Analysis of Cellular-V2X with Adaptive and Selective Power Control", *IEEE CAVS 2020*, Victoria, B.C., Canada
- B. Toghi *et al.* "Analysis of Distributed Congestion Control in Cellular Vehicle-to-everything Networks", *IEEE Vehicular Technology Conference (VTC-Fall 2019)*, Honolulu, HI
- B. Toghi *et al.* "Spatio-temporal Dynamics of Cellular V2X Communication in Dense Vehicular Networks", *IEEE CAVS 2019*, Honolulu, HI
- G. Shah *et al.* "Real-Time Hardware-In-the-Loop Emulation Framework for DSRC-based Connected Vehicle Applications", *IEEE CAVS 2019*, Honolulu, HI
- H. N. Mahjoub, B. Toghi, SM O. Gani, Y. P. Fallah "V2X System Architecture Utilizing Hybrid Gaussian Process-based Model Structures", *IEEE Systems Conf. (SysCon 2019)*, Orlando, FL
- B. Toghi *et al.*, "Multiple Access in Cellular V2X: Performance Analysis in Highly Congested Vehicular Networks", *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", *IEEE Vehicular Technologies Conference (VTC-Fall 2018)*, Chicago, IL
- H. N. Mahjoub, B. Toghi, Y. P. Fallah, "A Driver Behavior Modeling Structure Based on Non-parametric Bayesian Stochastic Hybrid Architecture", *IEEE Vehicular Technologies Conference (VTC-Fall 2018)*, Chicago, IL
- D. Grover, B. Toghi "MNIST Dataset Classification Utilizing k-NN Classifier with Modified Sliding Window Metric", **Book chapter:** *Springer series "Advances in Computer Vision"*

PATENTS

- B. Toghi, S. Antol, D. Petrich, G. Hayrapetyan "Predicting the Behavior of a Vehicle using Agent-to-agent Relations to Control an Autonomous Vehicle", [Patent Application 2016157.6 filed by Daimler AG in Great Britain on Oct 12, 2020]
- B. Toghi, D. Chen "A Method for Generating at Least One Alternative Utterance to an Initial Utterance, as Well as a Semantic Analyzer Module", [Patent Application 2009185.6 filed by Daimler AG in Great Britain on Jun 17, 2020]

PRESENTATIONS

- **Keynote speaker:** "The Future of Autonomy in Mass Transportation & Fleet Vehicles", Work Fleet Forum, Jacksonville, FL - 2017
- **Invited talk:** "Small-scale Cooperative Vehicle Platform (SCVP)", Graduate Research Forum, University of Central Florida, Orlando, FL - 2018
- **Invited talk:** "Connected Cars and Cellular Vehicle-to-everything Communication", Annual Graduate Fellows Symposium, University of Central Florida, Orlando, FL - 2018

ACTIVITIES

- Professional rally racing driver (2010-2016), won 5 national championships and Grands Prix
- Mountaineering, Rock Climbing, Snowboarding, Wakeboarding, Astrophotography

REFERENCES

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