Mahdi Zaman

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Summary

6 years of research experience on cooperative perception, autonomous driving, multiagent systems and machine vision

Research Experience

University of Central Florida | Research Assistant — 08/2018 – present

Ford Motor Company | Research Intern — 06/2020 – 08/2020

Education

University of Central Florida | PhD, Computer Engineering — 12/2024

University of Central Florida | MS, Computer Engineering — 04/2022

Bangladesh University of Engineering and Technology | BS, Electrical and Electronic Engineering — 02/2017

Projects

Multiscale Region Attention for Dense Vision Tasks (ongoing)

- formulated novel attention mechanism to facilitate simultaneous-multiscale feature extraction
- achieved superior FLOP-accuracy trade off in classification
- exploring general applicability of proposed model, currently testing segmentation

Automated Vehicle Marshaling System (ongoing)

- generated synthetic scenarios to assess communication QoS in warehouse/parking environment
- designed and wrote system architecture to support remote driving under Vehicle-to-Infrastructure coverage
- incorporating protocol parameters to enable high-speed communication for tele-operated driving

Memory-efficient Multi-agent Vision Transformer for Assisted Scene Understanding (ongoing)

- formulating memory-efficient transformer optimized for bandwidth to leverage Vehicle-to-Everything (V2X)

Cooperative Steering Control for Autonomous Driving

- introduced one of the earliest CNN-LSTM network for end-to-end AV control
- simulated look-ahead at ego vehicle in data-loader to emulate V2X-equipped behavior

Infrastructure-assisted Tolling

- prototyped a V2I-based tolling service for tele-operated driving support
- enhanced LTE D2D medium access layer with multi-priority aperiodic packet handling

Scalability in Cellular-V2X

- enhanced transmission rate control that reduces latency by upto 25% in congested traffic
- generated synthetic traffic scenarios on I-405 highway for scalability research
- co-authored a congestion control algorithm for advanced safety services
- applied for patent and proposed for 3GPP standardization

Dynamic-Object-Map-based Architecture for Cooperative Vehicle Safety Systems

- enabled centralized in-vehicle map to enhance autonomous navigation
- laid out platform to build advanced vehicular safety protocols

Point-to-Point Driver Messenger System

- enabled arbitration in critical driving maneuver via local object map sharing
- defined a scenario detection and target recognition module to notify driver intent

Publications

- Predictive Model-based and Control-aware Communication Strategies for Cooperative Adaptive Cruise Control; *IEEE OJ-ITS 2023*

- On Batching Acknowledgements in C-V2X Services; *IEEE VTC 2023*
- Addressing Rare Outages in CV2X with Time-controlled One-shot Resource Scheduling; *TechRxiv 2023*
- Performance Analysis of V2I Zone Activation and Scalability for C-V2X Transactional Services; *IEEE VTC 2022*
- Performance Analysis of Cellular-V2X with Adaptive and Selective Power Control; *IEEE CAVS 2020*
- Controlling Steering Angle for Cooperative Self-driving Vehicles utilizing CNN and LSTM; *IEEE IV Symposium 2019*
- Connected and Autonomous Vehicles in the Deep Learning Era:; *IEEE IV Symposium 2019*
- Dynamic Object Map based Architecture for Robust CVS Systems; *SAE Technical Paper*
- Finite State Markov Modeling of C-V2X Erasure Links for Stability Analysis of Platooning Applications, *IEEE Syscon 2022*
- A Maneuver-based Urban Driving Dataset and Model for Cooperative Vehicle Applications; *IEEE CAVS 2020, Canada*
- Connected Autonomous Vehicles in the Deep Learning Era: A case study on Computer-guided Steering; *Handbook of Pattern Recognition and Computer Vision, 6th ed. p365-384; 2020*

Patents

- One-shot transmission for v2x messaging

Teaching Experience

Algorithms for Machine Learning | Instructor, UCF
- lectured core-to-advanced ML topics to ~250 students
- mentored in ideation and development of self-directed projects
- designed course curriculum and evaluation strategies

Digital Systems and Computer Organization | Graduate Teaching Assistant, UCF
- instructed courses and projects on FPGA using Verilog and low-level assembly language

Skills

- Programming: Python, C, C++
- Frameworks: PyTorch, Scikit-learn, OpenCV, NS3
- Computation: MATLAB, Simulink
- Dev: Bash Scripting, Linux, Git