Mahdi Zaman

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Summary

Multi-agent perception and machine intelligence enthusiast, experienced in algorithm development for connected autonomous vehicles.

Research Experience

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

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

Education

University of Central Florida | PhD, Computer Engineering 08/2024

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 speed-accuracy trade off on semantic segmentation
- exploring applicability of proposed model in classification and object detection

Automated Vehicle Marshaling System (ongoing)

- generated synthetic scenarios to assess communication QoS in warehouse/parking environment
- developed system architecture to support remote driving under Vehicle-to-Infrastructure coverage
- enhancing medium access layer to enable high-speed transmission for tele-operated driving

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

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

Cooperative Steering Control for Autonomous Driving

- implemented a look-ahead mechanism for V2X-equipped transport
- developed end-to-end learning with LSTM-based deep network

Infrastructure-assisted Tolling

- prototyped a V2I-based tolling service for tele-operated driving support
- developed multi-priority aperiodic packet handling feature in medium access layer of LTE D2D

Scalability in Cellular-V2X

- enhanced transmission rate control algorithm for increased adaptability in congested traffic
- generated traffic scenarios with synthetic mobility traces to test scalability on I-405 highway
- 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

- Python, C, C++
- PyTorch, Scikit-learn, OpenCV
- NS3, MATLAB
- Bash Scripting, Linux, Git

References

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