Mahdi Zaman

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Summary

2 years of research experience in developing machine learning models for medical applications, **4 years** at the intersection of autonomous driving and cooperative perception.

Research Experience

University of Central Florida | Research Assistant 05/2023 – present

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

University of Central Florida | Research Assistant 08/2018 – 05/2020

Education

University of Central Florida | PhD, Computer Engineering 07/2025

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

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

Projects

Multi-scale Vision Transformer for 3D Segmentation (ongoing, paper under review)

- developed a neuro-inspired transformer architecture for organ/tumor segmentation
- improved performance on multiple medical benchmarks at 1/7th compute cost
- ablation studies confirm the benefits of the proposed learning paradigm

AI in Prostate Cancer (ongoing, recently started)

- developing AI models for predicting post-operative outcomes from robotic prostatectomies

Automated Vehicle Marshaling System (ongoing, paper under review)

- generated synthetic warehouse scenarios as testing grounds to assess communication QoS
- proposed novel application and medium access protocol to support remote driving under V2X coverage
- incorporating protocol parameters to scale for high-throughput tele-operated driving in larger ground

Bandwidth-efficient Collaborative Vision Transformer (ongoing)

- developed channel-optimized feature generation from neighboring agents
- proposed novel feature sharing mechanism to boost overall perception under V2X coverage

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

- Scalable Cellular-V2X Solution: Large-Scale Deployment Challenges of Connected Vehicle Safety Networks; *Automotive Innovation; vol 7*
- Optimized Control-centric Communication in Cooperative Adaptive Cruise Control Systems, *IEEE VTC 2024*
- 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 (under review)

Teaching Experience

Collaborative Perception | Invited talk, UCF

- presented current state-of-the-art on collaborative perception

Algorithms for Machine Learning | Instructor, UCF

- designed course curriculum and evaluation strategies
- lectured core-to-advanced ML topics to ~250 students
- mentored in ideation and development of self-directed projects

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, MONAI, Scikit-learn, OpenCV, NS3
- Computation: MATLAB, Simulink
- DevOps: Kubernetes, Bash scripting, Linux, Git