FANGJIAN LI

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SUMMARY

- PhD Candidate in Robotics and Control, Mechanical Engineering, Clemson University
- Highly capable in control algorithm development and system analysis (reinforcement learning (RL), imitation learning (IL), optimal control)
- Proven capability in programming language (Python, MATLAB, C++)
- Experienced in graphic user interface (GUI) design and human-in-the-loop (HITL) experiment design
- Familiar with Linux, high-performance computing (HPC), and robot operating system (ROS)

EDUCATION

Clemson University – SC, USA
Doctor of Philosophy in **Mechanical Engineering,** Summer 2022 (GPA 4.0)

- Machine Learning & Optimization
- Automated Vehicle System
- Modern Control Engineering
- Deep Learning
- Optimal Controls
- Analysis of Tracking System

Clemson University – SC, USA
Mater of Science in **Automotive Engineering,** Aug 2016 (GPA 3.7)

- Automotive Electronics
- Vehicle Diagnostics
- Automotive Stability and Safety System
- Vehicle Control System Design
- Vehicle Testing
- Systems Integration Method

Hefei University of Technology – China
Bachelor of Science in **Vehicle Engineering**, Jun 2014 (GPA 3.5)

- Automotive Dynamics
- Theory of Automotive Engine

SELECTED PROJECTS

- **Safe Inverse Reinforcement Learning (IRL) in Driving Scenario:** As a mentor, the human operator can teach autonomous systems how to drive safely. To reach this goal, a safety critic network is trained based on the guidance of the control barrier function (CBF). The trained safety critic is then integrated into the discriminator network in the IRL algorithm to inject safety awareness. A safety critic-based regulator is also applied to further enforce the importance of safety. The proposed algorithm is written with TensorFlow and tested in driving simulator highway-env. The training is on the HPC source at Clemson University.
- **Interactive Safety Critic Networks in Driving Scenario:** A novel safety critic network is proposed to evaluate the safety level of the subject car, considering its careless/aggressive neighbor cars. The car interaction is modeled as a zero-sum Markov game which is solved by a Q-like learning strategy. Specifically, the neighbors are modeled based on the seq2seq network. The safety critic network is first trained based on real human driving data. The simulation environment is built on top of CARLA.
- **Haptic Assistive Control with Learning-Based Driver Intent Recognition:** In semi-autonomous driving scenarios, the driver intention is first recognized by the AdaBoost.M2. A Nonlinear model-predicative controller (NMPC) is then used to track the updated trajectory based on the recognized driver intentions.
- **Human-Robot-Interaction (HRI) for the Vehicle Team under Cyber Attacks:** An HRI solution is developed to improve the vehicle team survivability under cyber attacks. The HRI is composed of an anomaly detection system, a Bayesian inference-based information management system, and a graphical user interface (GUI). Human-in-the-loop (HITL) experiment has been conducted with the proposed HRI.

- **Human-Centered Adaptive Cruise Control Design:** The driver psychological comfort is quantified based on the AP driver model. An optimal control problem has been formulated in improving the driver comfort with the satisfaction of multiple driving-related constraints. An MPC-like controller is built to Simulink and CarSim software were used to modeling the system and verify the design of this system.
- **Deep Learning Series Project:** As a first part, a typical video captioning task is fulfilled by the seq2seq model written by TensorFlow. The Bahdanau attention and schedule sampling features are also added to improve accuracy. As a second part, three different forms of GANS, i.e., DCGAN, WGAN, and ACGAN, are built to generate realistic images based on the image database.

SELECTED PUBLICATIONS

- Li, Fangjian, John R. Wagner, and Yue Wang**,** "**Safety-aware Adversarial Inverse Reinforcement Learning (S-AIRL) for Highway Autonomous Driving**", ASME Journal of Autonomous Vehicles and Systems. 2022.
- Wang, Chengshi, Fangjian Li, Yue Wang, and John R. Wagner. "**Haptic Assistive Control with Learning-Based Driver Intent Recognition for Semi-Autonomous Vehicles**." IEEE Transactions on Intelligent Vehicles. 2021.
- Li, Fangjian, Dariusz Mikulski, John R. Wagner, and Yue Wang. "**Trust-based Control and Scheduling for UGV Platoon under Cyber Attacks**", SAE Technical Paper. 2019.
- Li, Fangjian, and Yue Wang. "**Cooperative Adaptive Cruise Control for String Stable Mixed Traffic: Benchmark and Human-Centered Design**." IEEE Transactions on Intelligent Transportation Systems. 2017.

ACTIVITIES

Co-chair in the in the following conference session:

- The 2021 Modeling, Estimation and Control Conference (MECC), Austin, TX.

Paper reviewer in the following conferences:

- The 2021 International Conference on Intelligent Robots and Systems (IROS), Prague, Czech Republic
- The 2019 Conference on Advanced Intelligent Mechatronics (AIM), Hong Kong, China
- The 2018 American Control Conference (ACC), Milwaukee, WI

Poster/Paper presenter in the following conferences:

- 2019 SAE 2019 World Congress
- 23rd, 24th, 25th Annual Automotive Research Center Program Review, Ann Arbor, MI

Travel awardees in the following summer school:

- IEEE VTS Connected & Autonomous Vehicle Summer School, Worcester, MA

INTERNSHIP EXPERIENCE

BYTON automobile - Santa Clara, CA

Advanced Driver Assist System (ADAS) Engineer Co-op May-Aug 2018

- Develop ADAS simulation models with SIMULINK and Carmaker
- Benchmark testing of the ADAS features in the testbed
- Develop the novel driver monitoring system (DMS) and prepare the patent
- Software requirements specification (SRS) updates for the ADAS features
- ADAS homologations (ECE, ISO, GB) summary and review

China Automotive Engineering Research Institute (CAERI) - Chongqing, China Jun-Aug 2015

Advanced Driver Assist System (ADAS) Engineer Co-op

- Develop the testing and evaluation scenarios and procedures of the ADAS features.
- On-field testing of ADAS by using Racelogic-Vbox and RT-range.
- Process the testing data and generate reports