HAIMIN HU

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EDUCATION

University of Pennsylvania | M.S.E. Candidate in Electrical Engineering (GPA: 4.0/4.0) Aug 2018 – Present

ShanghaiTech University | B.E. in Electronic and Information Engineering (GPA: 3.69/4.0) Sept 2014 – June 2018

University of California, Berkeley | Visiting Student in EECS (GPA: 3.955/4.0) Aug 2017 – May 2018

Research Interests: Model Predictive Control, Cyber-Physical Systems, Optimization, Robotics

PUBLICATIONS

1. **Haimin Hu**, Xuhui Feng, Rien Quirynen, Mario E. Villanueva, Boris Houska: Real-Time Tube MPC Applied to a 10-State Quadrotor Model, *American Control Conference*, 2018. (Accepted)
2. **Haimin Hu**, Ye Pu, Mo Chen, Claire J. Tomlin: Plug and Play Distributed Model Predictive Control for Heavy Duty Vehicle Platooning and Interaction with Passenger Vehicles, *57th IEEE Conference on Decision and Control*, 2018. (Accepted)
3. Xuhui Feng, **Haimin Hu**, Mario E. Villanueva and Boris Houska, "Min-max Differential Inequalities for Polytopic Tube MPC." *American Control Conference*, 2019. (Accepted)
4. Mo Chen, Sylvia L. Herbert, **Haimin Hu**, Ye Pu, Jaime F. Fisac, Somil Bansal, SooJean Han, Claire J. Tomlin, "FaSTrack: a Modular Framework for Real-Time Motion Planning and Guaranteed Safe Tracking." *IEEE Transactions on Automatic Control*, 2018. (Under review)

RESEARCH EXPERIENCE

Latency-Aware Control and Optimization | University of Pennsylvania Sep 2018 – Present

Supervisors: Prof. George J. Pappas and Prof. Manfred Morari

- Developing latency-aware MPC algorithms based on distributed optimization, with application to wirelessly connected distributed systems like vehicle platoons or smart buildings.
- Conducting research on platooning control based on low-latency vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) communications.

FaSTrack Project, Plug and Play Distributed MPC | University of California, Berkeley Oct 2017 – May 2018

Supervisor: Prof. Claire J. Tomlin

- Developed a NMPC-based trajectory planner for FaSTrack, a toolbox that is used in conjunction with any model-based motion planner to provide safety guarantees while planning and executing trajectories in real time. Paper submitted to IEEE Transactions on Automatic Control and is currently under review.
- Applied plug and play distributed MPC to heavy duty vehicle platooning. Paper accepted by CDC' 2018 as the first author.

Robust MPC via Min-Max Differential Inequalities | ShanghaiTech University Jun 2017 – Sep 2018

Supervisor: Prof. Boris Houska

- Utilized the min-max differential inequalities approach to design tube-based robust MPC controllers.
- Implemented the controller using ACADO Toolkit, to achieve real-time robust control of a 10-state quadrotor system.
- The average performance of the proposed controller for the 10-state system was 81.6 ms per real-time iteration with a lower level feedback loop with only 20 μs sampling time. Paper accepted by ACC' 2018 as the first author.

Software Development for Nano-Satellites | Istituto Nazionale di Fisica Nucleare (INFN) Padova, Italy Jun 2017 – Sep 2017

Supervisor: Prof. Denis Bastieri

- Refactored and maintained the code for the Flare Advocate project: a "quick-look" analysis that detects peculiar behaviors of gamma-ray sources and broadcasts this information to a wider scientific community. Collaborated with scientists from INFN (Padova, Italy) and SLAC Laboratory (Stanford University, USA).
- Conducted research on Support Vector Machine (SVM)-based classification method for astroparticle analysis.

Machine Perception and Computing Group | Chinese Academy of Science, Shanghai Oct 2015 – Jun 2017

Supervisor: Dr. Jun Huang

- Designed software tools for an Ackermann-steering autonomous driving car using Robot Operating System (ROS).
- Implemented control and mapping algorithms for the vehicle, including Linear Quadratic Gaussian (LQG) Control, corridor navigation via Extended Kalman Filter (EKF), and Particle Filter SLAM (GMapping).

PEER REVIEWER

Optimal Control, Applications and Methods

American Control Conference

AWARDS

GAPSA Professional Travel Grant, University of Pennsylvania, 2018

Outstanding Graduate (Top 10 among 200 graduates), City of Shanghai, 2018

Merit Student for Excellence in Research, ShanghaiTech University, 2017

President's Scholarship for Academic Excellence (Top 2% annual GPA), ShanghaiTech University, 2017

SELECTED COURSEWORK

Graduate Courses at UC Berkeley: EE 221A Linear System Theory (A), EE 291E Hybrid Systems and Intelligent Control (A), EE 220B Experiential Advanced Control Design I (A), EE 220C Experiential Advanced Control Design II (A).

Graduate Courses at Penn: ESE 504 Introduction to Optimization Theory (A+), ESE 530 Elements in Probability Theory (A), MEAM 517 Control and Optimization with Application to Robotics (A).

Ongoing Courses at Penn: CIS 520 Machine Learning, ESE 605 Convex Optimization, ESE 619 Model Predictive Control.

Undergraduate: Optimization and Machine Learning (A+), Digital Integrated Circuits (A+), Communication Systems (A), Introduction to Control (A), Feedback Control Systems (A, UC Berkeley).

TECHNICAL SKILLS

Programming Languages: C/C++ (4-year experience), MATLAB (4-year experience), Python (4-year experience)

Research Software: ACADO, YALMIP, CVX, Simulink, ROS, NI Multisim, Cadence

STANDARDIZED TESTS

TOEFL Total 105 (Reading 26, Listening 29, Speaking 23, Writing 27)

GRE Verbal 155 + Quantitative 170 + AW 4.0