Jiachen Li

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EDUCATION BACKGROUND

The University of Texas at Austin   2023.9 - 2028.6(Expected)
- Mechanical Engineering, Dynamic Systems and Control area, PhD student
- Advised by Prof. Maggie Chen

University of California, San Diego   2022.9 - 2023.7
- Academic Exchange Student

Harbin Institute of Technology   2019.9 - 2023.7
- Control Engineering, *Bachelor Degree*
- GPA: 3.7/4 , 88/100
- Institute of Intelligent Control and Systems, supervised by Prof. Jianbin Qiu and Prof. Tong Wang

Nanyang Technological University Summer School   2021.7 - 2021.8
- Robotics, Automation and IoT Programme
- Distinction, supervised by Prof. Ming Xie

Harbin Institute of Technology International Summer School   2021.8 - 2021.9
- Artificial Intelligence
- Lecture-based, supervised by Prof. Jianwei Ma

REASERCH INTERESTS

Optimization, control, game theory, decision-making and planning, reinforcement learning

PUBLICATIONS

1. Hao Zhang, **Jiachen Li**, Tong Wang, Tong Wang, Qingshuang Zeng, and Huaicheng Yan. PDE-based event-triggered containment control of multi-agent systems with input delay under spatial boundary communication. International Journal of Robust and Nonlinear Control.

2. Runsheng Guo, **Jiachen Li**, Kangkang Sun, Tong Wang, and Jianbin Qiu. Output-Feedback Boundary Adaptive Fault-Tolerant Control for Scalar Hyperbolic PDE Systems with Actuator Faults. International Journal of Adaptive Control and Signal Processing.

3. Hao Zhang, **Jiachen Li**, Tong Wang, Jianbin Qiu. Control of Nonlinear Coupled Burgers' PDE-ODE Systems with Sensor Nonlinearities: A Mixed Control Approach.

4. Zichen Yao, Zhanwen Yang, Yongqiang Fu, **Jiachen Li**. Asymptotical stability for fractional-order Hopfield neural networks with multiple time delays. Mathematical Methods in the Applied Sciences.

RESEARCH EXPERIENCES

Optimizing the Performance of Autonomous Mobile Robots (AMRs)   2024.1 - Present
- Developed a control-oriented optimization platform for AMRs to extend battery life while ensuring task completion
- Addressed the bilinear optimization problem through (1)McCormick envelop techniques (2)Koopman Operator (3)Polytopic Linear Differential Inclusions (PLDIs) for linearization and proposing a novel planning algorithm with relaxed constraints for robust handling of parameter uncertainties

Optimal Strategy for Stable Grasping with Three Fingers   2023.8 - 2023.12
- Built a Plato-based pybullet simulation platform
- Designed optimal strategy for stable grasping with a three-finger Plato hand: Controlled the Plato to grasp the object and at randomized target grasping positions and the movement

Improved Denoising Convolutional Neural Network (DnCNN) for seismic data denoising   2023.2 - 2023.6
- Introduced the attention mechanism to DnCNN and made the network more targeted extraction of noise components in the removal of random noise from seismic data random noise in earthquake data

PDE-Based Event-Triggered Containment Control of Multi-Agent Systems   2021.9 - 2022.7
- Described the collective dynamics of multi-agent systems as PDEs
- Proposed the optimal protocols by minimizing the 2-norm of the designed control gain matrix

Autonomous vehicles decision-making algorithm research　　　　　　　　2022.1 - 2022.7
- Applied reinforcement learning to make specific behavioral decisions combined with the perception module
- Designed Fuzzy Petri nets to validate and propose more specific metrics for our algorithm

Intelligent Micromanipulation Robots　　　　　　　　2021.7 - 2021.9
- Used zebrafish as a model to test the realization of different functions of the system
- Processed the image of zebrafish based on OpenCV

Output-Feedback Boundary Adaptive Fault-Tolerant Control for Scalar Hyperbolic PDE Systems with Actuator Faults　　　　　　　　2021.4 - 2021.9
- Developed parameter updating laws of gradient type to compensate actuator faults along with parameter uncertainties, based on which the adaptive FTC problem for scalar hyperbolic PDE system was effectively addressed

Control of Nonlinear Coupled Burgers' PDE-ODE Systems with Sensor Nonlinearities　　　2021.4 - 2021.9
- Proposed a mixed control approach to produce a fuzzy-model-based controller tackling the time dimensional nonlinearity and a boundary controller eliminating the space dimensional nonlinearity
- Applied the proposed mixed control approach to a nonlinear hypersonic rocket car to testify its validity

Asymptotical stability for fractional-order Hopfield neural networks　　　　　　　2020.9 - 2021.4
- Gave a boundary of the stability region for linear fractional-order differential equations with delay, which is an open problem for six years
- Established framework for stability analysis of fractional-order Hopfiled neural networks with multiple time delays and obtained a necessary and sufficient condition in a coefficient-type criterion, which is delay-independent

COMPETITION EXPERIENCES

National College Competition on Internet of Things　　　　　　　　2022.1 - 2022.4

Disorderly gripping of robotic arms
- Used 3D point clouds to identified object types and locations
- Designed a robotic arm to gripping control by hand-eye calibration

National Undergraduate Electronics Design Contest　　　　　　　　2021.10 - 2021.11

Appliance analysis and identification device
- Designed a device that determined the type and operating status of an electrical appliance
- Used converter, filter circuits and LSTM for signal processing

National University Student Engineering Training Comprehensive Ability Competition　　2020.12 - 2021.4

Intelligent Delivery Robot
- Designed a robot that can identify objects and automatically deliver

COURSE PROJECTS

Introduction to Optimization　　　　　　　　2023.8 - 2023.12
- Reproduced the work: Optimizing Solution-Samplers for Combinatorial Problems: The Landscape of Policy-Gradient Methods.

Stochastic Process/Dynamic Systems II　　　　　　　　2022.9 - 2022.12
- Object tracking via kalman filter, with radar data
- Advised by Prof. David D. Sworder

Automatic Control Practice II　　　　　　　　2022.4 - 2022.5
- Used matlab and simulink to identificate the parameter of servo system in Webots virtual environment
- Adopted the double closed-loop PID controller and the disturbance observer to control the pitch axis and yaw axis of aircraft

Automatic Control Practice I　　　　　　　　2021.11 - 2021.12
- Designed a specific motor control circuit with adjustable-speed drives, user-friendly operations, and a low cost , and then completed the soldering
- Analyzed the relationship between input/output quantities by regulating the input signal and measuring the corresponding output

SKILLS AND QUALIFICATIONS

- **Proficient**：Python, PyTorch, Matlab, Simulink, Latex, HTML
- **Familiar**：C/C++, TensorFlow, Keras, Verilog, etc.
- **TOEFL**: 108 (Reading: 30, Listening: 30, Speaking: 21, Writing: 27)
- **GRE**: 334/340+5/6.0 (Verbal: 165, Quantitative: 169, Analytical Writing: 5)

Others / Summary

- Passionate about technology, love programming, solid foundation, good programming habits
- Lively and polite personality, strong communication and collaboration as well as social skills, organizational leadership
- Love writing, travel, good at organizing and summarizing