Zhiyu He

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Research Interests

My research focuses on the theoretical foundations of closed-loop decision-making, with applications spanning energy, mobility, and sociotechnical systems. I develop adaptive, modular, and scalable decision-making pipelines for modern infrastructures characterized by complex dynamics, increasing scales, and coupling uncertainties. Key examples include online feedback optimization and decision-dependent stochastic optimization.

Education and Experience

Ph.D., Information Technology and Electrical Engineering *2022–present*
Max Planck ETH Center for Learning Systems & Automatic Control Laboratory, ETH Zürich
Advisor: Florian Dörfler; Co-advisor: Michael Mühlebach

M.S., Control Science and Engineering *2019–2022*
Department of Automation, Shanghai Jiao Tong University
Advisor: Xinping Guan; Co-advisor: Jianping He

Visiting Student *2021*
Automatic Control Laboratory, ETH Zürich

B.Eng., Automation *2015–2019*
Department of Automation & Zhiyuan College, Shanghai Jiao Tong University
Zhiyuan Honors Program of Engineering (Top 5%)

Selected Honors and Awards

Oral presentation, DynaFront@NeurIPS25	2025
Finalist for the IEEE CSS Swiss Chapter Young Author Best Journal Paper Award	2024
China National Scholarship	2020, 2018, 2016
Outstanding Graduate of Shanghai	2022, 2019
Zhiyuan Honor Degree of B.Eng. *(52/3500 recipients in class of 2019)*	2019
Zhiyuan Outstanding Student Scholarship *(30/3500 recipients in class of 2019)*	2019
Samsung Scholarship	2017
A-class Scholarship for Excellent Academic Performance *(Top 1% in SJTU)*	2017

Teaching Activities

Teaching assistant, ETH Zürich

Advanced Topics in Control (Prof. Lars Lindemann) Spring 2026
Exercises, tutorials, and projects.

Control Systems (Prof. Florian Dörfler) Fall 2023, 2025, 2026
Coding exercises, hands-on experiments, and exercise classes.

Large-Scale Convex Optimization (Dr. Michael Mühlebach) Spring 2023, 2024
Exercises, tutorials, and exams.

Selected Publications

[1] **Zhiyu He**, Saverio Bolognani, Florian Dörfler, Michael Muehlebach. Decision-Dependent Stochastic Optimization: The Role of Distribution Dynamics. *Journal of Machine Learning Research*, 2026. [arXiv] [code]

[2] Michael Muehlebach, **Zhiyu He**, Michael I. Jordan. The Sample Complexity of Online Reinforcement Learning: A Multi-Model Perspective. *International Conference on Learning Representations*, 2026. [pdf] [arXiv]

[3] **Zhiyu He**, Saverio Bolognani, Michael Muehlebach, Florian Dörfler. Gray-Box Nonlinear Feedback Optimization. *IEEE Transactions on Automatic Control*, 71(10), 2026. [pdf] [arXiv] [code]

[4] **Zhiyu He**, Saverio Bolognani, Jianping He, Florian Dörfler, and Xinping Guan. Model-Free Nonlinear Feedback Optimization. *IEEE Transactions on Automatic Control*, 69(7), 2024. [pdf] [arXiv] [code]

[5] Adrian Hauswirth, **Zhiyu He**, Saverio Bolognani, Gabriela Hug, and Florian Dörfler. Optimization algorithms as robust feedback controllers. *Annual Reviews in Control*, 57(100941), 2024. [pdf] [arXiv]

[6] Florian Dörfler, **Zhiyu He**, Giuseppe Belgioioso, Saverio Bolognani, John Lygeros, Michael Muehlebach. Towards a Systems Theory of Algorithms. *IEEE Control Systems Letters*, 8, 2024. [pdf] [arXiv]

[7] **Zhiyu He**, Jianping He, Cailian Chen, Xinping Guan. Distributed Nonconvex Optimization: Gradient-free Iterations and ϵ-Globally Optimal Solution. *IEEE Transactions on Control of Network Systems*, 11(4), 2024. [pdf] [arXiv]

[8] **Zhiyu He**, Jianping He, Cailian Chen, Xinping Guan. Private and Robust Distributed Nonconvex Optimization via Polynomial Approximation. *IEEE Transactions on Control of Network Systems*, 11(3), 2024. [pdf] [arXiv]

Invited Talks

"Learning Algorithms in Feedback Loops: Dynamics and Performance Optimization", Oct. 2026
University of Washington, USA.

"Decision-Dependent Stochastic Optimization: The Role of Distribution Dynamics", Oct. 2026
University of Southern California, University of California, Irvine, California Institute of Technology, and University of California, Los Angeles, USA.

"Feedback Optimization: Model-Free & Gray-Box Approaches", Online Seminar, Zhejiang University, China. Jan. 2026

"Decision-Dependent Stochastic Optimization: The Role of Distribution Dynamics", Dec. 2025
DynaFront@NeurIPS25, USA.

"Model-Free Nonlinear Feedback Optimization", 57th Annual Conference on Information Sciences and Systems, Baltimore, Maryland, USA. [video] — Mar. 2023

"Non-Convex Optimization Algorithms in Network Systems", The 1st Distributed Control, Optimization, and Security Zhizhen Academic Forum For Postgraduates (Online), Shanghai Jiao Tong University, China. [video (in Chinese)] — Dec. 2021

"Non-Convex Distributed Optimization: Novel Algorithmic Design and Arbitrary Precise Solution", Intelligent Control Forum (Online), Peking University, China. [slides] — July 2020

Joint Work and Supervision

Feedback Optimization

Wen Yi Chan — ETH, master's thesis 2024

Robustify Feedback Optimization via Regularization. *Co-supervised with Keith Moffat.*

[1] Wen Yi Chan*, **Zhiyu He***, Keith Moffat, Saverio Bolognani, Michael Muehlebach, and Florian Dörfler. Robust Feedback Optimization with Model Uncertainty: A Regularization Approach. *64th IEEE Conference on Decision and Control*, 2025. [arXiv]

Wenbin Wang — ETH, master's thesis 2023

Feedback Optimization over Networks: Decentralized and Distributed Approaches. *Co-supervised with Saverio Bolognani.*

[2] Wenbin Wang, **Zhiyu He**, Giuseppe Belgioioso, Saverio Bolognani, and Florian Dörfler. Decentralized Feedback Optimization via Sensitivity Decoupling: Stability and Sub-optimality. *European Control Conference*, 2024. [pdf] [arXiv]

[3] Wenbin Wang, **Zhiyu He**, Giuseppe Belgioioso, Saverio Bolognani, and Florian Dörfler. Online Feedback Optimization over Networks: A Distributed Model-Free Approach. *63rd IEEE Conference on Decision and Control*, 2024. [pdf] [arXiv]

Christian Hartnik — ETH, master's thesis 2022

Online Bayesian Optimization: A Closed-Loop Approach. *Co-supervised with Marta Zagorowska and Alisa Rupenyan.*

Decision Dependence

Yuchen Cai — ETH, semester project and master's thesis 2026

Stochastic Optimization with Network Distribution Dynamics (semester project); Optimization and On-Demand Sampling under Network Distribution Shifts (master's thesis).

[4] Yuchen Cai, **Zhiyu He**, Michael Muehlebach, and Florian Dörfler. Stochastic Optimization with Network Distribution Dynamics via Local Jacobian Approximation. Submitted to *IEEE Control Systems Letters*, 2026.

Lorenzo Calda — ETH, semester project 2026

Preference Dynamics of Users at the Confluence of Performative Recommender Systems. *Co-supervised with Stefania Ionescu.*

Generative Modeling

Thierry Schwaller — ETH, semester project 2026
Online Generative Modeling for Data-Driven Decision-Making. *Co-supervised with Taiki Nakano.*

Jason Mino — Polimi & ETH, master's thesis 2026
Optimal Curation of Self-Consuming Data Loops: A Gaussian Analysis. *Co-supervised with Lucia Pezzetti.*

Applications in Mobility and Energy Systems

Andrin Joos — ETH, bachelor's thesis 2026
Dynamic Pricing for Ride-Hailing Platforms. *Co-supervised with Xiaoyan Wang.*

Jan Ghadamian — ETH, master's thesis 2025
Hierarchical Decision-Making in Layered Urban Mobility Systems. *Co-supervised with Mingjia He.*

[5] Mingjia He, **Zhiyu He**, Jan Ghadamian, Florian Dörfler, Emilio Frazzoli, and Gioele Zardini. Hierarchical Strategic Decision-Making in Layered Mobility Systems. *European Control Conference*, 2026. [arXiv]

[6] Mingjia He, **Zhiyu He**, Jan Ghadamian, Florian Dörfler, Emilio Frazzoli, and Gioele Zardini. Hierarchical Interactions in Mobility Networks: A Model-Free Feedback Approach. Submitted to *IEEE Transactions on Control of Network Systems*, 2026.

Jiarui Yu — EPFL & Empa, master's thesis 2025
Online Dynamic Pricing for Electrical Distribution Systems. *Co-supervised with Hanmin Cai and Wenbin Wang.*

[7] Jiarui Yu, **Zhiyu He**, Wenbin Wang, Colin N. Jones, Florian Dörfler, and Hanmin Cai. Load Management of Distribution Systems via Online Dynamic Pricing. arXiv:2605.26901 [eess.SY], 2026. [arXiv]

Vinzenz Tütsch — ETH, master's thesis 2023
Towards Autonomous and Distributed Traffic Signal Control. *Co-supervised with Kenan Zhang.*

[8] Vinzenz Tütsch, **Zhiyu He**, Florian Dörfler, and Kenan Zhang. Distributed Traffic Signal Control via Coordinated Maximum Pressure-Plus-Penalty. *IEEE International Conference on Intelligent Transportation Systems*, 2024. [pdf] [arXiv]

Distributed Optimization and Network Systems

All three projects co-supervised with Jianping He.

Jisheng Xu — SJTU 2022
Inference Attack in Distributed Optimization.

[9] Jisheng Xu, **Zhiyu He**, Chongrong Fang, Jianping He, and Yunfeng Peng. Inference Attack in Distributed Optimization via Interpolation and Manipulation. *61st IEEE Conference on Decision and Control*, 2022. [pdf] [full text]

Yilin Zhang — SJTU 2021
Resilient Approximation-based Distributed Optimization.

[10] Yilin Zhang, **Zhiyu He**, and Jianping He. Resilient Approximation-Based Distributed Nonconvex Optimization. *American Control Conference*, 2022. [pdf] [full text]

Wenzhe Zheng — SJTU 2021
Accurate Resilient Average Consensus.

[11] Wenzhe Zheng, **Zhiyu He**, Jianping He, and Chengcheng Zhao. Accurate Resilient Average Consensus via Detection and Compensation. *60th IEEE Conference on Decision and Control*, 2021. [pdf]