



Shengjun(Daniel) Zhang

RESEARCH ASSISTANT · CONTROL · OPTIMIZATION · STATISTICAL LEARNING

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"There is nothing more practical than a good theory."

Education

UNT (University of North Texas)

PH.D. MAJOR IN ELECTRICAL ENGINEERING

- Minor in Business Management

Denton, Texas, U.S.A

Jan. 2018 - present

NYU (New York University)

M.S. IN ELECTRICAL ENGINEERING

- Robotic Control

New York, New York, U.S.A

Jan. 2015 - Jan. 2017

CAU (China Agricultural University)

B.S. IN AUTOMATION OF HONORS PROGRAM WITH *Cum Laude*

- Control Theory

Beijing, China

Sep. 2010 - Jul. 2014

Research Interests

Artificial Intelligence

Statistical Learning, Machine Learning, Reinforcement Learning

Optimization

Convex Optimization, Non-convex Optimization, Distributed Optimization

Power System

DERs with Transactive Approaches

Professional Experience

University of North Texas.

RESEARCH/TEACHING ASSISTANT

- Cyber-Physical Energy System Laboratory, Department of Electrical Engineering.
- Supervisor: Dr. Colleen Bailey & Dr. Tao Yang.

Denton, Texas, U.S.A

Jan. 2018 - present

Huazhong University of Science and Technology.

VISITING RESEARCHER

- Key Laboratory of Image Processing and Intelligent Control of Education Ministry, School of Artificial Intelligence and Automation.
- Supervisor: Dr. Ye Yuan.

Wuhan, China

May 2018 - Jul. 2018

Zhejiang University.

VISITING RESEARCHER

- Group of Networked Sensing and Control, College of Control Science and Engineering.
- Supervisor: Dr. Junfeng Wu.

Hangzhou, China

Jul. 2018 - Jul. 2018

New York University.

RESEARCH ASSISTANT

- Control/Robotics Research Laboratory, Tandon School of Engineering.
- Supervisor: Dr. Farshad Khorrami.

New York, New York, U.S.A

Jan. 2016 - Jul. 2016

Research & Projects

Sparse PCA via Zeroth-order Optimization Approach

RESEARCH DISSERTATION

UNT

Sep. 2019 - Present

- Applying zeroth-order optimization techniques to Sparse PCA problem.
- Develop new zeroth-order optimization algorithm to solve Sparse PCA problem.
- Compare proposed zeroth-order algorithm with existing zeroth-order algorithms and first-order algorithms.
- Develop stochastic zeroth-order algorithm for Sparse PCA problem.

Obstacle Avoidance and Navigation Utilizing Proximal Policy Optimization

RESEARCH PROJECT

UNT

Oct. 2019 - Apr. 2020

- Utilizing PPO, a reinforcement learning approach, to guide a TurtleBot to avoid obstacles.
- Compared PPO approach with DDPG and DQN in simulation on ROS platform.
- This work has been accepted by 2020 SPIE Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications II.

Robust Optimization with Event Triggered Communication.

RESEARCH PROJECT

UNT

Feb. 2019

- Minimize a global cost function formed by a sum of local convex cost functions in a distributed way.
- Develop a robust algorithm over an undirected and connected network.
- The proposed algorithm is arbitrarily initialized unlike the existing algorithms.

Analyzing Distributed Optimization Algorithms via IQC.

RESEARCH PROJECT

UNT

Nov. 2018

- Investigate the convergence rate of distributed push-pull based optimization algorithms in directed graph networks.
- Present a unified framework based on integral quadratic constraints (IQCs) from robust control theory.
- Formulate convergence analysis problems into a semidefinite program (SDP).
- This work has been accepted by the 15th IEEE International Conference, and is in **Best Student Paper Shorten List**.

Nonlinear System Identification via Sparse Bayesian Learning.

COURSE PROJECT

UNT

Oct. 2018 - Dec. 2018

- Reimplement *Sparse Bayesian Learning Algorithm*, proposed in *A Sparse Bayesian Approach to The Identification of Nonlinear State-space Systems*.
- Apply such an algorithm to identify a pendulum model.

Applying Q-Learning to a 4×4 Tic-Tac-Toe.

COURSE PROJECT

UNT

Mar. 2018 - May 2018

- Implement *Q*-learning algorithm to a 4×4 Tic-Tac-Toe game.

UGV Integrated Mobile Platform.

RESEARCH PROJECT

NYU

Jan. 2016 - Jul. 2016

- Model the UGV integrated mobile platform and simulated it via V-rep.
- Implement SLAM and control algorithms on the integrated mobile platform.

Honors & Awards

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| 2020 | Third Place Graduate Student Poster Competition , IEEE North Tech SAS | Denton, Texas, U.S.A |
| 2019 | IEEE Outstanding Graduate Student , IEEE local event | Denton, Texas, U.S.A |
| 2019 | College of Engineering Dean Tuition Scholarship , UNT | Denton, Texas, U.S.A |
| 2019 | Toulouse Graduate School Scholarship , UNT | Denton, Texas, U.S.A |
| 2018 | College of Engineering Dean Tuition Scholarship , UNT | Denton, Texas, U.S.A |
| 2018 | Toulouse Graduate School Scholarship , UNT | Denton, Texas, U.S.A |
| 2012 | 2nd prize , Physics Experiment Competition of colleges | Beijing, China |

Certifications

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| 2016 | Machine Learning , Instructor: Andrew Ng, license: NNBCAXYFA2HK. | Stanford University on Coursera |
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Mentoring

- Project on load shedding in Smart Grid.
- First placement: engineer, Oncor Electric Delivery.

Teaching Experiences

Spring '19 **EENG 2620 Signals and Systems**, Teaching Assistant

UNT

Fall '18 **EENG 2620 Signals and Systems**, Teaching Assistant

UNT

Fall '18 **EENG 5940 Control and Optimization for Power Systems**, Teaching Assistant

UNT

Professional Activities

Member IEEE HKN, IEEE Studnet Member, IEEE Young Professionals

Journal Reviewer IET Control Theory and Applications

Neurocomputing

Automatica

International Journal of Robust and Nonlinear Control

Conference Reviewer Advances in Neural Information Processing Systems (NeurIPS)

IEEE Conference on Decision and Control (CDC)

American Control Conference (ACC)

IEEE International Conference on Control and Automation (ICCA)

Chinese Control Conference (CCC)

Publications

JOURNAL ARTICLES [3]

Linear Convergence of First- and Zeroth-Order Primal-Dual Algorithms for Distributed Nonconvex Optimization

Xinlei Yi, Shengjun Zhang, Tao Yang, Tianyou Chai, Karl H Johansson

IEEE Transactions on Automatic Control (In Submission). IEEE

In Submission

Linear Convergence of the Alternating Direction Method of Multipliers for Distributed Nonconvex Optimization

Xinlei Yi, Shengjun Zhang, Tao Yang, Tianyou Chai, Karl H Johansson

IEEE Transactions on Signal Processing (In Submission). IEEE

In Submission

A Magnetic Nanoparticle Based Nucleic Acid Isolation And Purification Instrument for DNA Extraction of Escherichia coli O157: H7

Yahui Chen, Jianhan Lin, Qin Jiang, Qi Chen, Shengjun Zhang, Li Li

Journal of nanoscience and nanotechnology 16.3 (2016) pp. 2296–2300. American Scientific Publishers

2016

CONFERENCE PROCEEDINGS [8]

A Primal-Dual SGD Algorithm for Distributed Nonconvex Optimization

Xinlei Yi, Shengjun Zhang, Tao Yang, Tianyou Chai, Karl H Johansson

Advances in Neural Information Processing Systems (NeurIPS)

Vancouver, Canada

Under Review

Zeroth-order Algorithms for Distributed Stochastic Nonconvex Optimization

Xinlei Yi, Shengjun Zhang, Tao Yang, Tianyou Chai, Karl H Johansson

TBD

TBD

In Submission

Exponential Convergence for Distributed Smooth Optimization Under the Restricted Secant Inequality Condition

Xinlei Yi, Shengjun Zhang, Tao Yang, Tianyou Chai, Karl H Johansson

21st IFAC World Congress

Berlin, Germany

2020

Linear Convergence for Distributed Optimization Without Strong Convexity

Xinlei Yi, Shengjun Zhang, Tao Yang, Tianyou Chai, Karl H Johansson

59th IEEE Conference on Decision and Control (CDC)

Jeju Island, Republic of Korea

2020

Obstacle Avoidance and Navigation Utilizing Proximal Policy Optimization

Daniel Zhang, Colleen P. Bailey

SPIE Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications II

California, United States

2020

Optimal Control Under Communication Constraints for Multi-agent Unmanned Vehicles

Daniel Zhang, Colleen P. Bailey

SPIE Optical Science Technologies for Advanced Security and Defence Systems

Edinburgh, United Kingdom

2020

Event-Triggered Control for Consensus of Multi-Agent Systems with Nonlinear Output and Directed Topologies

Xinlei Yi, Shengjun Zhang, Tao Yang, Junfeng Wu, Karl Henrik Johansson

38th Chinese Control Conference (CCC)

Guangzhou, China

2019

Computational Convergence Analysis of Distributed Optimization Algorithms for Directed Graphs

Shengjun Zhang, Xinlei Yi, Jemin George, Tao Yang

15th IEEE International Conference on Control and Automation (ICCA)

Edinburgh, Scotland

2019

PREPRINT [2]

Distributed Proportional-Integral Optimization Algorithms with Event-triggered Communication

Wen Du, Xinlei Yi, Shengjun Zhang, Jemin George, Tao Yang

2019

Distributed Economic Dispatch over Networks with Markovian Communication Losses

Junfeng Wu, Shengjun Zhang, Tao Yang, Ling Shi, Hong Wang

2018