

# KANGZE ZHENG

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## 🎓 EDUCATION

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**Sun Yat-sen University**, Guangzhou, China

Sept. 2021 -- Present

**Master student in Computer Science and Technology**; GPA: 3.9/4.0 (4.1/5.0)

Advisor: Prof. Yunong Zhang

**Sun Yat-sen University**, Guangzhou, China

Sept. 2017 -- Jun. 2021

**Bachelor of Engineering in Computer Science and Technology**; GPA: 3.8/4.0 (3.9/5.0)

Thesis: Preliminary Investigation on ZTD Formulas and GMDS-ZNN Models

Advisor: Prof. Yunong Zhang

## 🔬 RESEARCH EXPERIENCE AND PUBLICATIONS

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**Robust Model for Dynamic Convex Optimization**

Dec. 2022 -- Jun. 2023

- Presented a model based on the augmented Lagrange method for dynamic convex optimization, which incorporated an integral term and nonlinear technique for better robustness.
- Proved that the presented model is able to completely adapt to an important kind of noises called error-related noise in this work.
- Proposed a model-free framework based on the presented model for a surgical manipulator (a UR5 manipulator equipped with a trocar as its end-effector) with the remote-center-of-motion constraint.
- Compared the presented model with other existing ones.

“Nonlinear Integral-Augmented Model for Dynamic Convex Optimization with Perturbance Considered” by **K. Zheng** and Y. Zhang, submitted to *IEEE Transactions on Cybernetics*.

**Improvement on Existing Models for Solving Dynamic Nonlinear Equation Systems** Mar. 2022 -- Nov. 2022

- Reduced computational complexity from  $O(mn^2)$  to  $O(mn)$ , where  $m$  and  $n$  denote the numbers of equations and variables respectively.
- Accelerated the convergence rate of the proposed model by introducing nonlinear technique, leading to finite-time convergence.
- Derived a pseudoinverse-free controller from the proposed model for a UR5 manipulator to online solve the inverse kinematics problem.

“Low-Computational-Complexity Zeroing Neural Network Model for Solving Systems of Dynamic Nonlinear Equations” by **K. Zheng**, S. Li, and Y. Zhang, conditionally accepted by *IEEE Transactions on Automatic Control* as regular paper.

**Design of Control Input for Multiple-Integrator System with or without Perturbance**

Sept. 2021 -- Jan. 2022

- Designed control input for the triple-integrator system and generalized it for the multiple-integrator system.
- Verified that the control input is consistent with the design procedure.
- Proved that the control input could force the output of the noise-free integrator system to converge towards a reference trajectory globally and exponentially, and force the tracking error to converge within an error bound, under bounded-noise interference.

“Disturbed Zhang Dynamics Control for Triple-Integrator to Multiple-Integrator Systems: Design Formula Collection, Error Dynamics Equivalence, and Theoretical Analyses” by **K. Zheng**, C. Hu, Y. Zhang, and X. Kang, published in Proceedings of *Chinese Control Conference*.

**Online Solution to Dynamic Matrix Inversion**

Jan. 2021 -- Jun. 2021

- Used the zeroing dynamics to easily acquire the Getz-Marsden dynamic system whose derivation had been relatively complicated initially.

- Derived two other effective continuous-time model for dynamic matrix inversion, through the combination of the zeroing dynamics and conventional gradient-based method.

“Three Different Continuous-Time GMDS-ZNN Models and Multiple-Instant Discrete-Time Ones for Time-Varying Matrix Inversion with Comparisons” by **K. Zheng** and Y. Zhang, published in Proceedings of *China Automation Congress*, 2021.

### Exploration of Time Discretization Formulas with Higher Precision Jul. 2019 -- Mar. 2020

- Transformed a general 8-instant discretization formula by Taylor expansion and specified its convergent conditions.
- Proved the highest precision of the general formula by both the Routh-Hurwitz stability criterion and Jury stability criterion.

“No 8-Instant ZTD (Zhang Time Discretization) Formula with Quintic Precision or Higher as Proved” by Y. Zhang, **K. Zheng**, and J. Guo, published in Proceedings of *China Automation Congress*, 2021.

### ★ SCHOLARSHIP

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| • First-Prize Postgraduate Scholarship, Sun Yat-sen University   | 2022        |
| • Second-Prize undergraduate Scholarship, Sun Yat-sen University | 2020 & 2019 |
| • Third-Prize Undergraduate Scholarship, Sun Yat-sen University  | 2018        |

### 👉 HONORS AND AWARDS

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|---|------|
| • Outstanding Graduate of Sun Yat-sen University      | 2021 |
| • Second Prize of SYSU Collegiate Programming Contest | 2018 |

### ♡ ACADEMIC SERVICE

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|---|------|
| • Reviewer for International Conference on Information Science and Technology | 2023 |
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### ⚙️ SKILLS

- Programming Languages: C, C++, Python, MATLAB, Java
- Platforms: Linux, Windows
- Tools: L<sup>A</sup>T<sub>E</sub>X, CMake, Git

### 📄 TEST OF ENGLISH

- |   |           |
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| • IELTS: 7.0/9.0  | Aug. 2023 |
| • English Test I of Graduate Entrance Examination (GEE): 73/100 | Dec. 2020 |
| • College English Test Band 6 (CET6): 552/710                   | Dec. 2018 |
| • College English Test Band 4 (CET4): 524/710                   | Jun. 2018 |