

# DELIN ZHAO

Address: No.28, West Xianning Road, Xi'an, Shaanxi, 710049, P.R.China

Phone: +86-15037783987 ◊ Email: zhaodl3120@stu.xjtu.edu.cn

## EDUCATION

### Xi'an Jiaotong University (985)

Xi'an, China

*M.E. of Electrical Engineering*

*Sept. 2020 - Present*

Average score: **90.75/100**

GPA: **3.69/4.0**

Ranking: **2/42**

Main courses: Electrical Network Theory (100), Computational Method A (92), Academic English II (93), Design of Power Electronic Equipment (Excellence), Principles and Application of DSP controller (Excellence), Skills Training for Power Electronic Technology (Excellence)

### Jilin University (985)

Changchun, China

*B.E. of Electrical Engineering and its Automation*

*Sept. 2016 - June 2020*

*B.A. of English Literature (double bachelor's degree)*

*Sept. 2018 - June 2020*

Average score: **89.07/100**

GPA: **3.58/4.0**

Ranking: **4/101**

Main courses: Probability and Statistics B (97), Computing Method B (96), Practice: Programmable Logic System Design (94), Signal and Systems A(*bilingual*, 95), Power Electronics Technology (95), Continuous and Discrete Control Systems (92), Microcomputer Principle and Interface Technology A(*bilingual*, 94), Power System Analysis (93), Test Methods and Apparatus of Electrical Engineering (97), Electrical Technology of Clean Energy Resource (97)

## RESEARCH EXPERIENCES

### Development of 22kW 800V Bidirectional On-board Charger

*Nov. 2021 - Present*

*University-Industry Collaboration Project*

- The on-board charger (OBC) is compatible with 6.6kW for single-phase and 22kW for three-phase, requiring bidirectional power flow to meet the needs of different scenarios.
- In previous work, the advantages and disadvantages of different topologies were investigated and analyzed. The key point is to achieve wide voltage gain, and to reduce the DC bus capacitance in consideration of improving the overall power density and efficiency of OBC by means of active power decoupling, sinusoidal charging, etc.

### Modeling and Stability Analysis of Wireless Power Transfer (WPT) System

*Sep. 2020 - Nov. 2021*

- Modeling: In previous work, various models of LCC-S type wireless power transfer system have been established, including GSSA, EDF, discrete-time modeling, and harmonic state space (HSS).
- Stability analysis: In the discrete iterative model, the eigenroots of the Jacobian matrix at the fixed point are used to analyze the system stability. Converting the GSSA and EDF closed-loop transfer functions to the  $z$  domain, we can explore the influence of different controller parameters ( $K_p$ ,  $K_i$ ), delay parameters (hardware delay, controller delay), and hardware parameters (mutual inductance, load) on system stability in comparison with discrete iterative model. In HSS model, the system stability can be analyzed by eigenvalues. In addition, the oscillation frequency can be predicted when the WPT system is unstable.
- Periodic energy control (PEC): The periodic energy control takes the energy input to the resonant network in each period as the control target, which has the advantages of fast dynamic response and suppression of system overshoot.

### Design of DC Ice-melting Device for Overhead Grid Line

*Nov. 2021 - Present*

- A 6-pulse container ice-melting device is adopted, with an output DC current of 1000A, DC voltage of 12kV, and capacity of 9.6 MW.
- The ice-melting source programming includes system protection, communication with master computer etc., with the control goal of ice-melting current required by grid lines.
- One DSP and dual FPGAs framework: In this project, DSP is the main control chip while dual FPGAs are responsible for processing AD sampling data and controlling trigger signal of thyristors respectively.

## RESEARCH PUBLICATION

[1] T. Ma, Y. Wang, X. Hu, **D. Zhao**, Y. Jiang and C. Jiang, "Periodic Energy Control for Wireless Power Transfer System," in IEEE Transactions on Power Electronics, vol. 37, no. 4, pp. 3775-3780, April 2022, doi: 10.1109/TPEL.2021.3129501.

[2] Hu Xiufang, Wang Yue, Lv Shuangqing, **Zhao Delin**, Ma Tianlu. Modeling and Stability Analysis of Wireless Power Transfer System Based on Harmonic State Space [J/OL]. Automation of Electric Power Systems: 1-17, 2022.3.

[3] Hu Xiufang, Wang Yue, Lv Shuangqing, **Zhao Delin**, Ma Tianlu. Modeling and stability analysis of LCC-S wireless power transfer system based on activation function [J/OL]. Transactions of China Electrotechnical Society: 1-11, 2022.3.

## HONORS AND SCHOLARSHIPS

### Honors:

- Xi'an Jiaotong University **Excellent Postgraduate Cadre** during the academic year of 2020-2021 Dec. 2021
- **Excellent Postgraduate** of Power Electronics and Renewable Energy Center(PEREC) during the year of 2021 Nov. 2021
- Outstanding Volunteer of Xi'an Jiaotong University Power Electronics Academic Annual Conference June 2021
- Jilin University **Excellent Graduation Thesis (Design)** June 2020
- **Excellent League Member** of Jilin University May 2019
- Jilin University **Excellent Student** during the academic year of 2018-2019 (*Ranking:3/101*) Nov. 2019
- Jilin University **Excellent Student** during the academic year of 2017-2018 (*Ranking:3/101*) Nov. 2018

### Scholarships:

- **Special Scholarship** of Xi'an Jiaotong University during the academic year of 2020-2021 Nov. 2021
- **Delta Scholarship** during the year of 2021 (only **6 people** in the whole school) Nov. 2021
- Jilin University **Graduate Scholarship** June 2020
- **National Encouragement scholarship** during the academic year of 2018-2019 Nov. 2019
- Jilin University **Xinwang First Prize Scholarship** (only **3 people** in the whole school) (*Ranking:1/101*) Dec. 2018
- Jilin University **Academic Achievement Scholarship** for Disciplinary Competition (**3 times**) May 2018- Nov. 2018
- **National Encouragement scholarship** during the academic year of 2017-2018 Nov. 2018

## COMPETITION EXPERIENCES

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|--|--------------------|-----------|
| • National Undergraduate Electronic Design Contest in Jilin Division             | Second Prize       | Dec. 2019 |
| • 10 <sup>th</sup> Electronic Design Competition of Jilin University             | <b>First Prize</b> | May 2019  |
| • Jilin Province Undergraduate Electronic Design Competition                     | <b>First Prize</b> | Oct. 2018 |
| • National Robot Competition   | Second Prize       | Aug. 2018 |
| • 3 <sup>rd</sup> Jilin Province Robot Competition                               | <b>First Prize</b> | Sep. 2018 |
| • Infineon National University UAV Innovative Design and Application Competition | Top 15             | July 2018 |
| • 9 <sup>th</sup> Electronic Design Competition of Jilin University              | <b>First Prize</b> | May 2018  |
| • 2 <sup>nd</sup> Jilin Province Robot Competition                               | <b>First Prize</b> | Nov. 2017 |
| • National College Students Mathematics Competition in Jilin Division            | Third Prize        | June 2017 |

## EXTRA-CIRRUCULAR

### Student working experience:

- S0048 party branch disciplinary member, School of Electrical Engineering Sep. 2020 - Present
- Director of news media center of School of Electrical Engineering, Xi'an Jiaotong University Sep. 2021 - July 2022
- Commissary in charge of organization, College of Instrumentation and Electrical Engineering Sep. 2017 - July 2020

### Voluntary service:

- Volunteer of the anti-epidemic vanguard team, School of Electrical Engineering Dec. 2021 - Feb. 2022
- Filming of the unveiling ceremony of China Electric Power Technology Innovation Alliance Sep. 2020

## COMPETENCES AND SAKILLS

- Languages: IELTS:6.5, GRE: 322 (V152 Q170) AW3.0
- Computer Skills: Proficient in MATLAB, Altium Designer, Code Composer Studio (CCS), Quartus II, Keil and other science softwares