

Gao Wenhao

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Educational Background

Tsinghua University Electrical Engineering	2024-Present
Degree: Doctor's Degree	
Major Courses: Advanced Power Network Analysis, Offshore Wind Power Optimization	
Tsinghua University Electrical Engineering	2023-2024
Position: Research Assistant	
Research Field: Optimal Planning of Offshore Wind Farm Electrical Collector System	
National University of Singapore Electrical Engineering	2022-2023
Degree: Master's Degree	
Major Courses: Industrial Drives、Power Electronic Systems （GPA: 3.8）	
Master's Thesis and Presentation Grade: A （5.0）	
National University of Singapore (Suzhou)Research Institute Electrical and Computer Engineering	2021-2022
Degree: Bachelor's Degree	
Major Courses: Renewable Generation and Smart Grid （Average: 89.13）	
Chongqing University Electrical Engineering and Its Automation	2018-2022
Degree: Bachelor's Degree	
Major Courses: Power System Analysis、Electric Drive、Electrical Machinery （Average: 84.72）	

Research Experience

Study of Electric Vehicle Driving Routes and Charging Infrastructure Planning in Northern China	2022-Present
<ul style="list-style-type: none">Research Content: Simulation of electric vehicle driving routes in northern cities of China and study of charging infrastructure layout optimizationResearch Methodology: This study combines web crawling, intelligent optimization algorithms, Baidu Maps' real-time heat maps, and population density data to model electric vehicle routes, optimal charging infrastructure numbers and locations, and charging queue times in Northern China's cities in the predicted situation in 2030. The study seeks to balance the tradeoff between operating costs and user costs to optimize charging infrastructure layout for enhanced coverage and usage. It considers factors such as reduced battery efficiency and lower electric driving range during Northern winters. Data analysis and visualization are facilitated by ArcGIS.Tentative Conclusion: Under the forecasted market conditions, the optimized charging facility site selection planning, achieved through the improved particle swarm optimization algorithm, meets the market's saturation demand. The number and layout of charging stations tend to stabilize, demonstrating robustness.	
Cost of Charging Electric Vehicles in a City	2021-2022
<ul style="list-style-type: none">Research Content: Simulation of vehicles driving routes in a city, analysis of electric vehicle operating costsResearch Methodology: A questionnaire survey was distributed to 200 households to classify different driving patterns by combining different household compositions and actual conditions, and the shortest route planning was obtained to simulate real driving routes using the Gaode Open Platform route planning API. The parameters such as	

daily driving mileage and average speed of each section of road under different driving patterns were counted, and the charging algorithm was optimized based on different types of charging piles and electricity calculation rules such as peak and valley tariffs and step tariffs. The lowest annual and monthly operating costs of electric vehicles were studied and compared with traditional gasoline vehicles.

- **Main Conclusion:** Different charging habits have a greater impact on the operating costs of electric vehicles, whose average operating costs are lower than those of gasoline vehicles, but the overall costs also need to take into account depreciation prices and other comprehensive factors.

Research on electromagnetic analysis and control strategy based on novel permanent magnet miniature linear motor 2020-2021

- Study of a miniaturized position detection system for a new permanent magnet miniature linear motor: reveal various losses in the motor and perform high precision detection of motor rotor position based on different TMR sensor layouts.
- Propose a novel permanent magnet miniature linear motor optimized closed-loop control strategy with high dynamic performance: A MEMS (microelectromechanical system) linear motor maximum thrust current ratio control system with friction observer is designed and the control system is simulated using MATLAB Simulink to demonstrate the effectiveness of the proposed algorithm.

Numerical simulation study of high-voltage high-power electronic devices 2019-2020

- A new structure of high-voltage SBD device with buried buffer doping layer is proposed: By re-optimizing the shape of the longitudinal electric field distribution in the drift region, the reverse leakage current and forward turn-on voltage drop is significantly reduced while keeping the reverse breakdown point in Schottky barrier region.
- A Novel Trench MOS TMBS Contact SBR is proposed: its meta-package sequence part can obtain better electrical performance and thermal stability. The top channel can obtain better forward surge reliability and reduce on-resistance.

Research Results

1. One journal paper submitted as first author to Applied Energy:
W. H. Gao and J. C. -H. Peng, "Study of Electric Vehicle Charging Infrastructure Planning in Northern China, "Applied Energy. (Submitted)
2. One conference paper accepted by IEEE-ISGT (11th International Conference on Innovative Smart Grid Technologies (Asia)) as first author and corresponding author:
W. H. GAO* and H. X. Li, "Cost of Charging Electric Vehicles in a City," 2022 IEEE ISGT (Asia).
3. One journal paper published as the first author:
W. H. GAO, Q. M. SUN, et al., "A New High Voltage SBD with Improved Buried Buffer Doped Structure," Microelectronics, vol.51, no.1, pp.116-120, Feb. 2021.
4. Apply for a national invention patent as the fourth inventor:
"A Novel Trench MOS TMBS Contact SBR," CN111668314A, Sep. 2020.

Awards

Individual Awards:

Outstanding Graduate Cadre of National University of Singapore (Suzhou) Research Institute	05/2022
Outstanding Graduate Cadre of Chongqing University	12/2021
Outstanding Communist Youth League Cadre of Chongqing University	04/2021
Philip K.H. Wong Scholarship of Chongqing University	12/2020
Second Prize of National College Student Mathematics Competition	11/2020

Comprehensive Scholarship of Chongqing University
Comprehensive Scholarship of Chongqing University

09/2020
03/2019

Collective Awards:

During the tenure of monitor and league branch secretary, led the class to win the awards of Top Ten May Fourth Red Flag League Branch of Chongqing University, Outstanding League Day Activity of Chongqing University, Benchmarking League Branch of Chongqing University, Nomination of Advanced Class Striving for Excellence of Chongqing University.

Internship Experience

Jiangsu Zhongneng Silicon Industry Technology Development Co., Ltd.:

08/2021

Intern at the Transformer Substation: Responsible for power equipment monitoring and line inspection.

Campus Promotion Ambassador of HKUST:

2020-2021

Promotional copywriting, poster production, contacting the heads of domestic universities, etc.

Skills

English Skills: *IELTS 6.5 (W: 6.5, R: 7.5, L: 6.5, S: 6.0), CET-6: 567*

Computer Skills: *National Computer Rank Examination Certificate of Level 2 with a Good Grade* (MS Office Advanced Application and Design) . Proficiency in Office software, ability to use programming languages (*Python, C++, MATLAB*)