Menghua Zhang

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EDUCATION

Huazhong University of Science and Technology (HUST) Wuhan, China
M.E. in Power Engineering *09/2019-06/2021*
School of Energy and Power Engineering
Grade point:3.63/4.0

Tianjin University of Commerce (TJCU) Tianjin, China
B.E. in Energy and Power Engineering *09/2014-06/2018*
College of Mechanical Engineering
Grade point:3.86/4.0

PUBLICATIONS

- **Menghua Zhang**, Zhenxin Zhou, Huanxin Chen. Research on Compressor Liquid Floodback Fault Diagnosis of Variable Refrigerant Flow System Based on Deep Learning and Transfer Learning. Energy and Buildings, 2021(under review)
- **Menghua Zhang**, Zhenxin Zhou, Huanxin Chen. Research on compressor liquid floodback fault diagnosis based on deep neural network algorithm. Refrigeration Technology, 2020
- **Menghua Zhang**, Zhenxin Zhou, Nian Liu. The energy efficiency improvement strategy of chillers using artificial neural network algorithms. Refrigeration Technology, 2020
- Hengda Cheng, Huanxin Chen, **Menghua Zhang**. Research on Energy Efficiency of Office Buildings VRF System in China. Refrigeration Technology, 2020
- Huanxin Chen, Yuke Zeng, **Menghua Zhang**. The influence of different climatic regions on the energy efficiency standard index of VRF system. Journal of Refrigeration, 2020
- Zhenxin Zhou, Huanxin Chen, Gunan Li, Hanlu Zhong, **Menghua Zhang**, et al. Data-driven fault diagnosis for residential variable refrigerant flow system on imbalanced data environments. International Journal of Refrigeration, 2021, 125: 34-43.

PATENTS

Utility patent:

- Load forecasting control method and system of chiller based on side-cloud collaborative framework, 2021
- A CO_2 automotive air conditioning system based on waste heat and subcooling, 2017
- A CO_2 automobile air-conditioning system based on waste heat and pressure combined with auxiliary subcooling, 2017
- CO_2 marine refrigeration system with subcooling assisted by absorption and thermoelectric refrigeration, 2017
- A waste heat-driven absorption refrigeration auxiliary subcooled CO_2 automobile air conditioner, 2017

Utility model patents:

- A CO_2 automotive air conditioning system based on waste heat and supercooling, 2017
- A CO_2 automobile air-conditioning system based on waste heat and pressure combined with auxiliary subcooling, 2017
- CO_2 marine refrigeration system with subcooling assisted by absorption and thermoelectric refrigeration, 2017
- A waste heat-driven absorption refrigeration auxiliary subcooled CO_2 automobile air conditioner, 2017

RESEARCH EXPERIENCES

Key Research & Development Project : *Optimization project of cold and heat source control system of SAIC Volkswagen Energy Center based on deep learning*

Leader *09/2019- 09/2020*

Research Objective: Aims to improve the operating efficiency of chillers in the energy center, and adjust the operating parameters of the chillers through artificial neural networks to optimize the control of the chillers

- Use Python language for data cleaning and discretization, and use CART/RF, correlation coefficients and expert knowledge to select feature variables;
- Using the ANN algorithm to predict the return water temperature of the chiller cooling water of the air conditioning system for 5 minutes, the mean square error reaches 0.11, and the coefficient of determination reaches 0.99

Key Research & Development Project: *Energy consumption prediction of R&F Wanda Realm Hotel in State Grid based on deep learning algorithm*

Leader *05/2020- 12/2020*

Research Objective: Designed to improve the accuracy of predicting hotel energy consumption in the short term, and to optimize control over it

- Use DBN algorithm to predict hotel energy consumption, and cuckoo search algorithm to optimize.
- Finally, the average absolute error is 1.05, the mean square error is 1.36, and the coefficient of determination is 0.98.

General Program of National Natural Science Foundation of China:

- Research on the fault diagnosis method of refrigeration and air-conditioning based on pattern recognition and integrated learning under the framework of big data. (Project Number:No.51876070);
- Optimization analysis of training data for fault diagnosis of refrigeration system based on dynamic recognition and cluster analysis. (Project Number:No.51576074);
- State Key Laboratory of Compressor Technology (Anhui Province Laboratory of Compressor Technology) Open Fund (No.SKL-YSJ201801)

Leader *09/2019-04/2021*

Research Objective: Aim to enhance the explainability and accuracy of dealing with Fault Diagnosis of Air Conditioning System problems.

- The use of deep learning models can detect liquid return failures more efficiently, with an accuracy rate of 99.86%;
- Compared with the decision tree model with supervised algorithm, there is no need for correlation analysis and pruning process. Compared with the cluster analysis algorithm model of unsupervised algorithm, there is no need for correlation and principal component analysis process. The processing process is simple and easy to operate and efficient;
- Use Keras to build a deep neural network model;
- Compared with support vector machines, neural networks, and random forest algorithms, the process of building deep neural network models is simple and efficient;
- I have a wealth of experience in dealing with Fault Diagnosis of Air Conditioning System problems across domains.

Project of Tianjin University of Commerce: *Research on Air Distribution Law of Cold Storage*

Leader *04/2016- 04/2017*

- This project uses a combination of simulation and experiment to study the airflow field of the cold storage, mainly studying the airflow field between the fruit box and the fruit box after the fruit box is placed in the cold storage.
- This project establishes a three-dimensional physical model, uses Ansys Icem CFD software for structural meshing, uses Fluent software for solving calculations, and uses Tecplot software for post-processing, and finally obtains the simulation content.
- The simulation of this project mainly studies the distribution of the airflow field between the fruit bins when the apples are pre-cooled. The boundary conditions in the simulation are measured experimentally.

INTERNSHIP EXPERIENCES

Dalian Matsushita Refrigeration Co., Ltd. **Dalian, China**

Refrigeration Technology Development Intern *06/2017-07/2017*

- I mainly operate the compressor production line in the workshop for internship, including the production of hermetic compressors, semi-hermetic compressors and screw unit production lines.

- Design compressor drawings and unit installation drawings with CAD in the office.
- In practice in safety positions and production unit test workshops, I have mastered the methods of measuring the performance of parts and components.

EXTRACURRICULAR ACTIVITIES

China-UK workshop of Low-Carbon Heating and Cooling Technologies **Wuhan, China**
Volunteer *08/2019*

- Welcomed the conference attendees and helped to facilitate the registration process including direction guide, material preparation and technical support on the spot.
- Discussed and interacted with researchers on Low-carbon heating and cooling technology and answered the questions the attendees may have.

Huazhong University of Science and Technology Career Development Association **Wuhan, China**
Excellent camper *09/2019-09/2020*

- I am an outstanding member of the Career Development Association of Huazhong University of Science and Technology.
- I participated in the "Autumn Recruitment Have Something to Say" results conference and excellent job-seeking students sharing and exchange meeting, copywriting and writing training sessions.
- Compile 7 articles, one of which was reprinted by major public accounts in the school and was posted for a week.

School of Energy and Power Engineering, Huazhong University of Science & Technology **Wuhan, China**
Class President & Organizing Committee *09/2019-Present*

- Cooperate with class members to jointly manage the daily affairs of the class, including discipline, study, and mental health. Carry out activities to collect students' opinions and suggestions and give feedback to the counselor.
- Organize various activities: party branch life meeting, party branch supervision of check-in activities during the epidemic, party, babecue, live sniper games, karaoke.

The Red Cross of TJCU, Tianjin University of commerce **Tianjin, China**
Director of the Training Department of the Red Cross *2014-2016*

- Responsible for organizing activities to accompany the elderly in nursing homes and chatting with the elderly.
- Responsible for organizing activities to accompany mentally handicapped children and paying attention to their health.
- Organize the donation of books and old clothes, and donate to people in need for free.
- Organize AIDS publicity activities to popularize AIDS knowledge.

ACHIEVEMENTS/AWARDS

• 3rd class Scholarship for Knowing and Doing, awarded by HUST, School Level	09/2020
• Excellent Youth Communist, awarded by HUST, School Level	09/2020
• Third place in Ningde Times Battery Modeling Competition, awarded by HUST, School Level	06/2019
• 2nd class Scholarship for Academic Excellence, awarded by HUST, School Level	09/2020
• 2nd class Scholarship for Academic Excellence, awarded by HUST, School Level	09/2019
• The seventh place in the Team Tennis Tournament, awarded by HUST, School Level	11/2020
• Outstanding member of Career Development Association, awarded by HUST, School Level	12/2019
• The third prize of Tianjin University Student Physics Competition	03/2019
• The first prize of Tianjin Danvers Cup Refrigeration Competition	05/2017
• 3rd class Scholarship for Academic Excellence, awarded by TJCU, School Level	2014-2017
• The third prize of Tianjin University Student Physics Competition	05/2015
• National inspirational scholarship	2015-2017
• Excellent student, awarded by TJCU, School Level	08/2010
• Outstanding Graduate , awarded by TJCU, School Level	12/2017
• Advanced Individual in Social Practice , awarded by TJCU, School Level	09/2016
• More than 4 certificates for computer professional, awarded by xuetangX, Mooc of Chinese Unviersity	2020-2021

SKILLS/HOBBIES

- **Programming:** Python, C, etc
- **Mathematical Tools:** Mathematica, Matlab.
- **Web Front-end:** HTML
- **Machine Learning Framework:** Scikit-Learn, Pytorch, Keras, and TensorFlow.
- **Database:** MySQL
- **Engineering drawing software：** CAD,Proe,UG and SketchUp
- **Engineering modeling software：** ANASYS , Fluent, OpenStudio
- **Hobbies:** Running, Cycling, Tai Chi, Fitness, Jazz, Singing, Photography , Tennis, Basketball, etc.