Hang Zhang   zh000426zju@163.com   +8619858125881

Educational Background

09/2022-Present   College of Energy Engineering, **Zhejiang University**
❖   Master of Engineering, Energy and Power Engineering   GPA: 3.98/4.0
09/2018-06/2022   College of Energy Engineering, **Zhejiang University**
❖   Bachelor of Engineering, New Energy Science and Engineering   GPA: 3.94/4.0
11/2023-12/2023   **Xi'an Jiaotong University** (Academic Exchange Program)
❖   Learned advanced image processing methods in the field of medical image processing; Applied techniques to segment the images in energy; Learned unsupervised semantic segmentation algorithms

Publications

Hang, Z., Yu, W., Lei, W., Zhentao, P., Letian, Z., Chunfeng, L., Yingchun, W., Xuecheng, W. **"***B-U-net: Holographic Image Segmentation of Multi-scale Dense Particle Field with Noisy Training Dataset***"**. Advanced Powder Technology. 2023, 34(11): 104201.

Hang, Z., Yu, W., Lei, W., Zhentao, P., Letian, Z., Chunfeng, L., Yingchun, W., Xuecheng, W. "*B-U-net-based Band Noise Recognition Study of Hologram Images of Atomized Droplet Field*". The 13th National Annual Conference on Multiphase Flow Testing, Hangzhou, China, 2023. (Oral, excellent conference paper)

Hang, Z., Boyi, W., Letian, Z., Yue, Z., Yu, W., Yingchun, W., Xuecheng, W. "*Adaptive detection and segmentation with mechanism-guided machine learning in 3D holographic particle field*". Proceedings of the 9th World Congress on Momentum, Heat and Mass Transfer (MHMT 2024), London, United Kingdom. (Oral)

Lei, W., Tianxiong, L., Yue, Z., **Hang, Z.** Yingchun, W., Ge, S., Tao, L., Xuecheng, W. "*65 kHz Picosecond Digital Off-axis Holographic Imaging of 3D Droplet Trajectory in a Kerosene Swirl Spray Flame*". Optics and Lasers in Engineering. 2023, 160: 107236.

Zhentao, P., **Hang, Z.**, Yu, W., Letian, Z., Yingchun, W., Xuecheng, W. "*Recognition of Multiscale Dense Gel Filament-Droplet Field in Digital Holography with Mo-U-Net*". Frontiers in Physics. 2021, 9: 742296.

Yu, W., **Hang, Z.**, Zhu, Z., Bin, S., Shixi, W., Wen, A., Dongping, C., Yingchun, W., Xuecheng, W. "*Aluminum Droplet, Oxide Cap and Flame Segmentation in Burning Al/AP Propellant by Combining YOLOv7 and Two-stage Cluster*". Measurement. 2024, 114264. (co-first author).

Yue, Z., Lei, W., **Hang, Z.**, Yu, W., Xuecheng, W., Gaofeng, W., Ge, S., Tao, L., Tingjie, Z. "Dual-camera Off-axis Holographic Particle Tracking Velocimetry: Development and Application to Air-blast Swirl Spray Measurement". Optics and Lasers in Engineering 178 (2024): 108237.

Hang, Z., Boyi, W., Letian, Z., Yue, Z., Yu, W., Jianhan, F., Wei, X., Gaofeng, W., Yingchun, W., Xuecheng, W. "*Adaptive in-focus Particle Detection and Segmentation in Holographic 3D Image with Mechanism-guided Machine Learning*". Optics and Laser in Engineering. (Under review).

Research Experience

10/2023-Present   **Spatial-temporal Detection of Water Droplet Breakup Dynamic Process in Icing Wind Tunnel-**Leader
Supervisor: Researcher Yingchun Wu, National Key Laboratory of Clean Energy Utilization, China
❖   Detected individual frames in the video stream using YOLOv8, and extracted droplet and filament skeletons by binarization of the images in the detection frame
❖   Modeled the graph skeleton consisting of droplets and liquid filaments using GCN to replenish feature extraction of the CNN classification network
❖   Built an end-to-end detection network for video to further undergo a 3DCNN before entering YOLOv8 and adjust the loss function

11/2022-10/2023   **Structural Segmentation Study of Metal Particle Burning Images-**Leader
Supervisor: Researcher Yingchun Wu, National Key Laboratory of Clean Energy Utilization, China
❖   Produced a target detection dataset of metal particle combustion images and implemented data enhancement including randomized image pruning using Opencv-python
❖   Deployed the YOLOv7 model with the torch framework; utilized Kmeans which targets at the generated special feature map containing geometrical information and grayscale to complete the four-class segmentation of metal particle combustion images

09/2022-08/2023   **Study on the Dynamic Process of Droplet Atomization by image segmentation-**Leader
Supervisor: Researcher Yingchun Wu, National Key Laboratory of Clean Energy Utilization, China
❖   Responsible for the construction of the holographic optical imaging system, the oil and gas supply system, and the data acquisition system; completed the off-axis holographic recording
❖   Performed the digital reconstruction of off-axis holograms; wrote code for dataset reading, model construction, training process, inference process; constructed the B-U-net, designed the loss function in the form of the KL divergence and finetuned the inference procedure to replace the argmax function

- Completed writing, typesetting, and responding to review comments on the original draft of the paper; used matplotlib, Origin, Tecplot and Adobe Illustrate for plotting graphs and method plots

12/2021-06/2022 **Artificial Intelligence Tracking Measurement of Holographic Images of Swirl Spray Atomization Field-**Leader

Supervisor: Researcher Yingchun Wu, National Key Laboratory of Clean Energy Utilization, China

- Built a droplet atomization experimental platform coupled with oil and gas supply and data acquisition systems and a corresponding pulsed laser off-axis holographic optical measurement system
- Established a tracking method based on Kalman filter and Hungarian algorithm; compared the results of droplet tracking velocimetry based on filtering algorithm and cross-correlation algorithm in terms of two parameters: velocity magnitude and velocity direction

03/2021-05/2022 **Study of the Dynamic Process of Gel Atomization-**Core Member

Supervisor: Researcher Yingchun Wu, National Key Laboratory of Clean Energy Utilization, China

- Constructed the dataset using the inline reconstructed holographic images and Matlab adaptive thresholding method to obtain their segmentation results
- Performed data enhancement of the original dataset with Opencv-python and skimage; implemented the dataset reading, model building (Mo-U-net, replaced encoding process with Mobilenetv2), training process, and inference process code writing based on the tensorflow framework
- Used Opencv-python to write a labeling tool for image segmentation to obtain truthful labels by optimizing the prediction results of the network model; constructed three metrics, PIOU, ASSD, and particle distribution to verify the performance of Mo-U-net

10/2020-08/2021 **Intelligent Detection of Volatile Organic Compounds (VOC) Gases Based on Sensor Arrays and Movable Platforms-**Core Member

Supervisor: Academician Xiang Gao, National Key Laboratory of Clean Energy Utilization, China

- Designed an experiment scheme, and recorded the values of the response of different sensors at different times based on the designed sensor array; used pandas, numpy, matplotlib and seaborn to read, analyze, process and visualize experimental data
- Built a deep learning regression model using the torch framework, extracted the temporal changing tendency of responding signals instead of the stable responding value of the sensor using one-dimensional convolution layers combined with fully connected layers, and realized the regression of pollutant species using MSEloss as the loss function and Adam as the optimizer
- Patents: Apparatus and Method for Dynamic Online Monitoring of VOCS by Self-Calibrating Gas Sensor Array, ZL202110241591.3; A Method for Detecting Odor in Industrial Parks, ZL202110896701.8; A Multipurpose Odor Detection Device for Industrial Parks, ZL202121818534.7

10/2019-07/2020 **Bio-deodorization Product Design-**Vice Captain

Supervisor: Prof. Linghong Chen, National Key Laboratory of Clean Energy Utilization, China

- Investigated the equivalence ratios of different pollutants in the air, as well as their level of risk to human health and the effectiveness and cost of strains with the capacity to absorb and convert such pollutants
- Sketched a simplified version of the product model in SolidWorks and constructed a schematic model with an acrylic sheet

Internships

08/2022-06/2023 **Huzhou Research Institute of Zhejiang University-**Algorithm Engineer

- Collaborated on the Python version of the Shake-The-Box algorithm for laminar PTV based on the particle tracking velocimetry literature
- Segmented the metal particle in the single-frame double-exposure inline holographic image
- Designed the special convolution kernel to get the in-focus plane through cross-correlation and performed four-class segmentation by clustering and completed the extraction of particle size information

Awards & Honors

11/2023   Suzhou Yucai Scholarship, Zhejiang University
11/2023   Outstanding Postgraduate Student, Zhejiang University
06/2022   Outstanding Undergraduate Graduate, Zhejiang University
06/2022   Outstanding Undergraduate Graduate, Zhejiang Province
12/2021   Cen Kefa First Class Scholarship, Zhejiang University
12/2021   Second Class Scholarship, Zhejiang University
08/2021   First Prize, the 14th National Energy Conservation, Emission Reduction and Innovation Entrepreneurship Competition
06/2021   First Prize, the 14th Energy Conservation, Emission Reduction and Innovation and Entrepreneurship Competition of Zhejiang University
12/2020   Second Class Scholarship, Zhejiang University
12/2020   Zhejiang Provincial Government Scholarship, Zhejiang Province

06/2020   Second Prize, the 13th Energy Saving, Emission Reduction and Innovation Entrepreneurship Competition of Zhejiang University

01/2020   Second Prize, Physical Theory Innovation Competition for College Students in Zhejiang Province

12/2019   Second Class Scholarship, Zhejiang University