Xu Cuiwentong

Visiting Ph.D Student with CSC Scholarship
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Education

Xi'an Jiaotong University (XJTU), *Ph.D Candidate in Mechanical Engineering* 2021.09 - date

- **Research Focus**: Non-stationary signal processing; Time-Frequency Analysis; Machine Learning; Predictive Maintenance;

China Agricultural University(CAU), *B.Eng. in Mechanical Engineering* 2017.09 - 2021.06

China Agricultural University(CAU), *B.Sc. in Data Science* 2017.09 - 2021.06

- **GPA**: 3.55/4 (Top 10% student);

Publications

[1] **C. Xu** and Y. Liao, Weight extracting transform for instantaneous frequency estimation and signal reconstruction, Mechanical Systems and Signal Processing, vol. 216, 2024, doi: 10.1016/j.ymssp.2024.111475.

[2] L.Yang, **C.Xu**, R.Duan and Y.Liao, Stack Denoising Autoencoder and State-Space Model Based Bearing RUL Prediction Method, presented at the 2022 International Conference on Sensing, Measurement & Data Analytics in the era of Artificial Intelligence (ICSMD), 2022.

[3] **C.Xu** and Y.Liao, Nonlinear Chirp Mode Extraction: A New Efficient Method to Decompose Nonstationary Signals. (under review in *Signal Processing*)

[4] **C.Xu** and Y.Liao, Short-time Weighted Ridge Separation: A Novel Ridge Detector with Separation of Overlapped Non-Stationary Signals. (under review in *IEEE Transactions on Signal Processing*)

[5] **C.Xu** and Y.Liao, Local Adaptive Time-frequency Bidirectional Synchrosqueezing Transform. (submitted to *ICASSP 2025*)

[6] J.Xue, **C.Xu**, et al, An Automatic Tooth Segmentation Method of Three-dimensional STL Dental Models, Patent: 202311325894.7 (first inventor excluding supervisors)

[7] C.Yin, **C.Xu**, Impact Factors to Design Iteration in NPDP Software, Software Patent: 2021SRBJ0027 (first inventor excluding supervisor)

[8] C.Yin, **C.Xu**, NetLogo-Based MPDP Simulation Software, Software Patent: 2020SRBJ0198 (first inventor excluding supervisor)

[9] C.Yin, **C.Xu**, Multi-Product Development Process Simulation Software, Software Patent: 2018SRBJ1150 (first inventor excluding supervisor)

Research & Experience

R & D of Intelligent Fault Diagnosis for Large Industrial Equipment 2023.12 - date

- I developed data analysis algorithms and integrated them with the development platform, further development is ongoing.
- Dynamic Balance; Cross-domain Transfer; RUL Prediction

Health Management and Intelligent Diagnosis System for Petroleum Refining Units 2022.06 - 2023.09

- I implemented the existing vibration signal analysis algorithms and integrated them into the backend of the system.
- Rolling Bearing; Sliding Bearing; Vibration Data Analysis; RUL Prediction

Automatic Tooth Segmentation of Three-dimensional Dental Models 2022.06 - 2023.09

- I researched the segmentation methods for 3D STL data, proposed a technical roadmap, and created a dataset.
- STL Model; Region Growing; MeshSegNet;

Structural Health Monitoring in Complex Marine Environments 2022.06 - 2023.06

- I modeled the marine environment and analyzed the impact of wave stress on offshore equipment
- Wave Energy Power Generator; Slamming Loads; Springing Responses;

Underground Equipment Group Health Monitoring and Predictive Maintenance System 2021.09 - 2022.06

- I developed a sensor monitoring plan for the equipment network and a corresponding Bayesian fault tree model.
- Sensor Placement; Bayesian Network; Fault Tree Analysis (FTA);

Early Warning System for Urban Waterlogging Based on Narrowband Internet of Things (NB-IoT) 2020.09 - 2021.06

- This is my undergraduate thesis, in which I completed the entire R& D process of IoT manhole cover products.
- NB-IoT; Flexible Sensor; Edge Computing; IoT Communication;

Correlation Analysis of Precipitation and Waterlogging in Beijing 2020.09 - 2021.06

- This is another undergraduate thesis, in which I conducted various analyses on meteorological precipitation data.
- Data Mining; Precipitation Data;

Precise Feeding Platform for Breeding Rabbits 2019.09 - 2020.06

- I designed control algorithms for the robotic arm and visual positioning for the tracked vehicle
- Robot Arm; Visual Localization;

Awards

China Undergraduate Mathematical Contest in Modelling(CUMCM), First Prize

- Dynamic Modelling; Concentric Drum; Collaborative Strategy;

Huawei Cup Mathematical Contest in Modelling, First Prize

- Aerospace Model; “Wandering Earth” Problem;

China Undergraduate Mathematical Contest in Modelling(CUMCM), Second Prize

- Heat Transfer Model; Optimal Design;

China Undergraduate Contest in Mechanical Design, Second Prize

- Combined Mechanism Design; Cams. Gears and Sliding Links;

Scholarships & Honors

- First Prize Scholarship of CAU; Merit Student of CAU (3/50); Outstanding Graduate of CAU (100/5000);
- First Prize Scholarship of XJTU;

Skills & Other Informations

Research Tools

- Programming: MATLAB, Python, NetLogo, LabVIEW;
- Structural Analysis: AutoCAD, SolidWorks, Creo, Ansys, COMSOL;
- Machine Learning Frameworks: PyTorch;

Language Proficiency

- Chinese (Native); English (Fluent);