Shilong Sun

Contact Information

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Current Position

Assistant Professor — Mar 2020 – Present

- School of Mechanical Engineering and Automation
- Harbin Institute of Technology, Shenzhen

Research Interests

- Techniques: Humanoid Robots, Artificial intelligence, Deep Learning, Fault diagnosis and prognosis, Vibration energy harvesting.
- Applications: Robot design, Industrial data application, Smart cities design, Decision-making with AI

Work Experience

Postdoctoral Fellow — Feb 2019 – Feb 2020

- Recipient of Postdoctoral Hub for Innovation & Technology Fund (ITF) Project, Hong Kong
- Depart. of Systems Engineering and Engineering Management
- City University of Hong Kong
- Supervisor: Dr. Peter W. TSE

Research Associate — May 2015 – Aug 2015

- City University of Hong Kong
- A Novel Prognostic System for Predicting the Remaining Useful Life of Slurry Pumps that Exhibit High Fluctuation in Operational Parameters and Unobvious Degradation Trends

Research Associate — Jan 2014 – Apr 2015

- City University of Hong Kong
- Sustainable conversion of food waste and agricultural residues to gamma-valerolactone and ammonium sulfate

Education

City University of Hong Kong — Sep 2015 – Nov 2018

- Ph.D in Depart. of Systems Engineering and Engineering Management
- Supervisor: Dr. Peter W. TSE

Jilin University, School of Automotive Engineering — Sep 2011 – Jul 2014

- M.Phil in Power Engineering (Internal Combustion Engine)
- Supervisor: Prof. Wanchen SUN

Shenyang Aerospace University — Sep 2007 – Jul 2011

- B.Sci. in Mechanical Engineering

Research Project

- Project: Guangdong Provincial Natural Science Foundation Project - Research on Group Fault diagnosis Method of Rotating Machinery Bearings based on Decentralized Group Learning
- Project: Guangdong Provincial Natural Science Foundation Youth Project - Research on Intelligent Fault Diagnosis Framework and Condition Monitoring of Mechanical Systems Based on Group Distributed Learning
- Project: Shenzhen University Stable Support Surface project - Research on on-orbit Fault Mechanism and Diagnosis Method of Continuous Flexible Space Machinery
- Project: National Key Laboratory of Robotics Technology and Systems, Harbin Institute of Technology - Research on Bipedal Gait Planning and Motion Stability Control of Highly Dynamic Response Humanoid Robots
- Project: National Key Laboratory of Intelligent Manufacturing Equipment and Technology, Huazhong University of Science and Technology - Research on Cutting Vibration Suppression and Condition Monitoring of Aerospace Weakly Rigid Components Based on Self-supplying energy

Research Experience

City University of Hong Kong Sep 2015 – Aug 2018

- Vibration energy harvester system, Smart structure and materials, Modeling and simulation with energy harvester.
- Fault diagnosis and prognosis of bearing, gearbox and pumps through mathematical models,Data mining and signal processing of industrial data .

City University of Hong Kong May 2015 – Aug 2015

- Fault diagnosis and prognosis of bearing, gearbox and pumps through mathematical models.

City University of Hong Kong Jan 2014 – Apr 2015

- Effects of fossil fuels and alternative fuels (especially bio-fuels) on gasoline, diesel and hybrid vehicles, emissions control, combustion optimization.
- Combustion and vibration analysis for a hybrid vehicle by using various additions ratio of sustainable bio-fuels with normal gasoline.

Jilin University Jul 2012 – Jan 2014

- Adjusted a 4-cylinder diesel's fuel injection and inlet parameters to improve in-cylinder combustion effects, controlled the activated and heated in-cylinder combustion atmosphere, and studied the particle size distribution characteristics under diesel fuels emission.
- Optimized air intake and fuel injection parameters to set up the combustion boundary conditions of blended fuel with the help of the engine calibration tool, studied the particle size distribution of fuel with different physicochemical properties.
- Controlled engine combustion boundary conditions and fuel chemical kinetics process together, accomplished the controllable design of the premixed compression ignition combustion.

Publications

1. S. Sun*, T. Peng, Y. Zhou, X. Zhang, and D. Wang. Contrastive learning and dynamics embedding neural network for label-free interpretable machine fault diagnosis. ISA Transactions, pp. 1-1, 2023. IF: 7.3. JCR Q1.
2. S. Sun*, T. Peng, and H. Huang. Machinery Prognostics and High-Dimensional Data Feature Extraction Based on a Transformer Self-Attention Transfer Network. Sensors, vol. 23, no. 22, 2023 IF: 3.9. JCR Q2.
3. S. Sun*, T. Peng, H. Huang, Y. Wang, X. Zhang*, and Y. Zhou. IoT Motion Tracking System for Workout Performance Evaluation: A Case Study on Dumbbell. IEEE Transactions on Consumer Electronics, pp. 1-1, 2023. IF: 4.3. JCR Q2.
4. S. Sun*, H. Huang, T. Peng and D. Wang. An Improved Data Privacy Protection Diagnosis Framework for Multiple Machinery Components Based on a Swarm Learning Algorithm. IEEE Transactions on Instrumentation and Measurement, pp. 1-1, 2023. IF: 5.6. JCR Q1.
5. S. Sun, H. Huang, T. Peng, C. Shen*, and D. Wang. A Data Privacy Protection Diagnosis Framework for Multiple Machines Vibration Signals Based on a Swarm Learning Algorithm. IEEE Transactions on Instrumentation and Measurement, pp. 1-1, 2023. IF: 5.6. JCR Q1.
6. S. Sun and P. W. Tse, Modeling of a horizontal asymmetric U-shaped vibration-based piezoelectric energy harvester (U-VPEH). Mechanical Systems and Signal Processing, vol. 114, pp. 467-485, Jan. 2019. IF: 8.4. JCR Q1.
7. S. Sun and P. W. Tse, Design and performance of a multimodal vibration-based energy harvester model for machine rotational frequencies. Applied Physics Letters, vol. 110, no. 24, p. 243902, Jun. 2017. IF: 4.0. JCR Q1.
8. T. Peng, C. Shen, S. Sun* and D. Wang, Fault Feature Extractor based on Bootstrap Your Own Latent and Data Augmentation Algorithm for Unlabeled Vibration Signals. IEEE Transactions on Industrial Electronics, vol. 69, no. 9, pp. 9547-9555 2022. IF: 7.7. Top, JCR Q1.
9. Y. Zheng and S. Sun* , Global optimization of excitation directions for scavenging energy based on a cross-jointed L-shape multidirectional piezoelectric energy harvester. Sensors and Actuators A: Physical, vol. 342, p. 113651, Aug. 2022. IF: 4.6. JCR Q1.
10. X. Zhang, X. Xiang, S. Lu, Y. Zhou, and S. Sun*. Evolutionary Optimization of Drone-Swarm Deployment for Wireless Coverage. Drones, vol. 7, no. 1, p. 8,2023. IF: 4.8. JCR Q2.
11. S. Sun, Y. Zheng, Y. Wang, and X. Zhang*. Investigation of internal resonance on widening the bandwidth of energy harvester based on a cantilevered double pendulum structure. AIP Advances, vol. 12, no. 9, p. 095108, 2022. IF: 1.6. JCR Q4.
12. T. Yan, D. Wang*, S. Sun , C. Shen, and Z. Peng. Investigations on the sensitivity of sparsity measures to the sparsity of impulsive signals. Mechanical Systems and Signal Processing, vol. 179, p. 109372, Nov. 2022. IF: 8.4. JCR Q1.

13. D. Wang*, J. Liu, S. Sun et al.Investigations on the sensitivity of sparsity measures to the sparsity of impulsive signals. Mechanical Systems and Signal Processing, vol. 178, p. 109315, Oct. 2022. IF: 8.4. JCR Q1.
14. D. Wang,S. Sun, and P. W. Tse*, A general sequential Monte Carlo method based optimal wavelet filter: A Bayesian approach for extracting bearing fault features. Mechanical Systems and Signal Processing, vol.52-53, pp.293-308, Feb. 2015. IF: 8.4. JCR Q1.
15. S. Sun, X. Zhang,Theoretical and Experimental Study of Nonlinear and Electro-Magneto-Mechanical-Based Piezoelectric Vibration Energy Harvester. Shock and Vibration,vol. 2019. IF: 1.6. JCR Q3.
16. S. Sun, P. W. Tse, and Y. L. Tse, An Enhanced Factor Analysis of Performance Degradation Assessment on Slurry Pump Impellers. Shock and Vibration,vol. 2017, pp. 1-13, 2017. IF: 1.6. JCR Q3.
17. P. W. Tse and S. Sun, The design and performance of a novel vibration-based energy harvester adopted various machine rotational frequencies. 12th World Congress on Engineering Asset Management & 13th International Conference on Vibration Engineering and Technology of Machinery, Brisbane, Australia, August 2^{nd}-4^{th}, 2017.
18. P. W. Tse and S. Sun, A novel design of a multi-model and vibration-based piezoelectric energy harvester. Academicsera 19th International Conference on Science, Technology, Engineering and Management, Taipei, May 26^{th}-27^{th}, 2018.

Projects

- Smart and sustainable campus (City University of Hong Kong)
- The establishment of strategic alliance on advanced open systems for smart cities (City University of Hong Kong)
- Sustainable conversion of food waste and agricultural residues to gamma-valerolactone and ammonium sulfate (City University of Hong Kong)
- A Novel Prognostic System for Predicting the Remaining Useful Life of Slurry Pumps that Exhibit High Fluctuation in Operational Parameters and Unobvious Degradation Trends (City University of Hong Kong)
- Effects of fuel properties and combustion boundary conditions on PM physico-chemical properties and particle size distribution of the new generation diesel-NSFC(National Natural Science Foundation of China)
- Study on achieving clean and high efficiency combustion for compression-ignition internal combustion engine with wide-distillation fuel and cylinder thermo-atmosphere cooperative control-NSFC

Honors and Awards

- Academicsera Excellent Paper Award — May 2018
- Outstanding Academic Performance Award in CityU of Hong Kong — 2016-2017
- Research Tuition Scholarship in CityU of Hong Kong — 2016-2017
- UGC-funded Studentship in CityU of Hong Kong — 2015-2018
- Hall 8 & JCH Active Residence Award in CityU of Hong Kong — 2016-2017
- Outstanding Graduate Scholarship in Jilin University — 2011-2013
- Excellent Graduate 2nd Class Scholarship in Jilin University — 2013

- JLU-Male Corporate Social Scholarship in Jilin University 2013
- Bosch Innovation Thinking Ahead contest in Jilin University 2013
- Prize of Mechanical Design And Innovation competition in Shenyang Aerospace University 2010
- Honorable Mention of MCM (Mathematical Contest In Modeling) of North America in Shenyang Aerospace University 2010
- Outstanding Achievement Award of Social Practice in Shenyang Aerospace University 2008-2009
- National Encouragement Scholarship for Excellent Student (Top 1%) in Shenyang Aerospace University 2008-2009
- First Class of Scholarship for Excellent Student (Top 3%) in Shenyang Aerospace University 2008-2009
- Second Class of Scholarship for Excellent Student (Top 8%) in Shenyang Aerospace University 2007-2008
- Champion of 4*400 metres relay in Shenyang Aerospace University 2009
- Outstanding Athletes in Shenyang Aerospace University 2009

Teaching Experience

- Teaching Assistant: The use of advanced condition monitoring methods to determine bearing localized faults via the Smart Asset Maintenance System (SAMS)– SEEM6014
- Teaching Assistant: The investigation and the comparison in the ability of several commonly used Nondestructive Test(NDT) methods for flaw detection– SEEM6014
- Teaching Assistant: Introduction to Support Vector Machine (SVM) and its learning algorithms - I– SEEM6102

Language Ability

- Chinese: Native
- English: Fluent
- Cantonese: Beginner

Hobbies

- Soccer,Basketball, Hiking, Music,Movie, Sports,Poem etc.