Zhengrui TAO

Address: School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai, China
E-Mail: taozhengrui@sjtu.edu.com Tel: +86-18621808762
GitHub account: AnkaTao Personal Blog: ankatao.github.io

EDUCATION BACKGROUND

Shanghai Jiao Tong University, Shanghai, China Sep 2017---Mar 2020
M.S. in Mechanical Engineering **GPA: 88/100**

- **Core Courses**: *Data Mining; Machining Learning; Friction and lubrication theory; Matrix theory; Mechanical Dynamics.*
- **Advisor:** Prof. Qinglong An

Harbin Institute of Technology, **WEIHAI**, Weihai, China Sep 2013---Jun 2017
B.Eng. in Mechanical Engineering **GPA: 94/100**

- **Core Courses**: *Programming Fundamentals; Object-Oriented Programming (Java); Mechanical Design; Mechanical System Computer Control, Industrial Robot Technology.*
- **Advisor:** Prof. Jian Wu

SELECTED PUBLICATIONS & PRESENTATIONS

Journals

- **A Novel Method for Tool Condition Monitoring Based on Long Short-Term Memory and Hidden Markov Model Hybrid Framework in High-Speed Milling Ti-6Al-4V (Reviews Completed)**
  Zhengrui Tao, Qinglong An, Gongyu Liu, Ming Chen
  Submitted to the International Journal of Advanced Manufacturing Technology
- **Tool Remaining Useful Life Prediction Based on Convolutional Neural Network-Stacked Bidirectional and Unidirectional LSTM Network Hybrid Model (Under Review)**
  Qinglong An[&], **Zhengrui Tao**[&], Jie Chen, Meng Hu, Ming Chen ([&]*co-first authors*)
  Submitted to the Measurement
- **Experimental investigation on tool wear characteristics of PVD and CVD coatings during face milling of Ti-6242S and Ti-555 titanium alloys (Under Review)**
  Qinglong An, Jie Chen, **Zhengrui Tao**, Weiwei Ming, Ming Chen
  Submitted to the International Journal of Refractory Metals and Hard Materials
- **Eddy Current Distance Measurement Calibration Method for Curved Surface Parts Based on Support Vector Machine Regression (Reviews Completed)**
  Tao Zhengrui, Dang Jiaqiang, Xu Jingyang, An Qinglong, Chen Ming, Wang Li, Ren Fei
  Submitted to the Journal of Shanghai Jiaotong University
- **High-precision calibration method and application for coating thickness measurement of curved surface based on eddy current displacement sensor (Major Revision)**
  Tao Zhengrui, Dang Jiaqiang, Xu Jingyang, An Qinglong, Chen Ming, Ren Fei, Wang Li
  Submitted to the Journal of Zhejiang University (*Engineering Science*)

Conference Presentations

- **Cutting Performance Evaluation of Helical Milling Specialized Tool for CFRP/Titanium Alloy**
  Tao Zhengrui, An Qinglong, Chen Ming
  14th CJUMP Conference, Harbin, China, Sep 13-15, 2018
- **Hierarchical Dirichlet Process Hidden Semi-Markov Model-based Method for Tool Wear Estimation in High-Speed Milling Ti-6Al-4V**
  Tao Zhengrui, Liu Gongyu, An Qinglong, Chen Ming
  8th ICHSM Conference, Guangzhou, China, Nov 7-11, 2018

RESEARCH EXPERIENCE

Institute of Manufacturing Technology and Equipment Automation, Shanghai Jiao Tong University

Research Assistant Sep 2017-Present

- **Advisor:** Prof. Qinglong An
- **Tool Condition Monitoring, Prognostics, and Remaining Useful Life Prediction**
  Developed a novel method based on Long Short-Term Memory network and hidden Markov model (LSTM-HMM) hybrid framework to track the flank wear and predict the remaining useful life of cutting tool during high-speed milling Ti-6Al-4V.
  Proposed an integrated model that incorporates convolutional neural network (CNN) with stacked bidirectional and unidirectional LSTM (SBULSTM) network, named CNN-SBULSTM, to address sequence data produced in complex surface machining.
- **Chatter Stability Analysis and Parameter Optimization in the machining process of Impeller**
  Modeling of milling force based on the thin-walled workpiece is proposed, chatter stability models in the time domain and frequency domain based on the theory of machining dynamics are also established. Then milling parameters optimization is studied based on the targets of maximum material removal rate and smoothest surface quality.

Institute of Composite Materials and Structure, Harbin Institute of Technology, WEIHAI

Research Assistant Sep 2016-Jul 2017

- **Advisor:** Prof. Jian Wu
- **Analysis and Experimental Study on Contact Characteristics of Aviation Sealing Profile**
- Macro and micro contact characteristics of an aviation seal profile are investigated by theoretical analysis, numerical simulation and experimental testing.

Institute of Mechanical Manufacturing and Control Engineering, Harbin Institute of Technology, WEIHAI

Research Assistant Dec 2015-Jul 2016

- **Advisor:** Prof. Huiying Liu
- **Redundant Motor-Driven Four-bar Point Separation Device**
  Designed, manufactured, assembled and tested a new point separation device to make sure the two separated parts are reliably connected, and the connection between the two parts can be rapidly released after receiving separating signal.
- **Main Hub Angle Parameters Testing Platform**
  Developed a new testing platform to measure the angle parameters of the main hub of a certain type of helicopter and implemented the upper computer software based on C++.

SELECTED PROJECT EXPERIENCE

Course Project: Association Management System Aug 2017

- Familiarized with multiple useful development tools to complete a project that provided with fundamental functions, which were implemented based on MEAN stacks (Mongoose, Express, Angular, Node.JS), beautified by Bootstrap & controlled on GitHub; handled with high concurrent requests by using message queue & Redis as an in-memory database.
- Responsible for front-coding of UI implement and back-end coding of query function implement; received high score.

Upgrading Control Software of UNPA Sep 2015

- Improved the LabVIEW control software of Universal Nanoparticle Analyzer (UNPA); added new functions, such as particle diffusion loss correction; enhanced program user interface and debugged code errors.

HONORS & AWARDS

Sandvik Coromant Scholarship **(Top 3%)** 2018
The Best Poster Award of 8th International Conference of High-Speed Machining **(Top 2%)** 2018
The Best Paper Award of 14th China-Japan International Conference on Ultra-Precision Machining Process **(Top 2%)** 2018
1st Prize, the Graduate Course Competition of Complex Electromechanical Practice **(Top 1%)** 2018
Outstanding Graduates of Shandong Province **(Top 2%)** 2017
National Scholarship **(Top 2% Nationwide)** 2016
Merit Student of Harbin Institute of Technology **(Top 5%)** 2016
1st Prize, the 3rd New Concept Structure Design Competition (**Top 1%)** 2016
National Endeavor Scholarship (**Top 1%)** 2015

SKILLS

Computer Aid Design/Software

- Solidworks, UG
- Abaqus, CutPro, Thirdwave
- MATLAB, Minitab
- Python (Numpy, Tensorflow, Keras), C/C++
- Microsoft Office

Electronics/Mechanical

- Lathes, Mills, CNC Programing, Electron Microscopy (SEM, EDX)
- Instrumentation and Controls (LabVIEW, Simulink)
- Thermodynamics, Fluid Mechanics, Heat Transfer, Combustion Analysis

Personal

- Badminton, Running
- Cooking, Trying different types of food