Tijue Wang

(+49) 152 0626 9895 | tijue.wang@gmail.com
Mosczinskystr. 12, 01069 Dresden, Germany

Education

Diplom in Lightweight Engineering, TU Dresden (Germany) 2018.10 – 2021.11

- German GPA **1.5/1.0**
- Diplom thesis: "High-resolution fiber bundle imaging using deep learning" (**1.0/1.0**)
- DAAD-STIBET Scholarship (2021)
- Young Talent Award of Gisela und Erwin Sick Foundation (2022)

Bachelor in Material Engineering, Wuhan University of Science and Technology (China) 2013.09 – 2017.06

- GPA **3.82/4.00**, rank **1/110**
- Bachelor thesis at *the State Key Laboratory of Refractories and Metallurgy* : "Study on preparation of silicon/titanium nitride-bound silicon carbide" (**4.00/4.00**, the outstanding bachelor thesis)
- **National Scholarship of China** (2016), the Special Scholarship (2014), the First Prize Scholarship (2015)
- National University Competition of Inorganic Non-metallic Materials (2016, Xi'an), **the First Prize**

Skills

- Programming: MATLAB, Python, 2-year project experience in **deep learning**
- Language: English (CET6, **working language**), German (DSH-2), Chinese (native)
- Others: LaTeX, AutoCAD, Siemens NX, Inkscape, 3D printing; SEM, XRD (material characterization)

Research Experiences

High-resolution fiber endoscopy using deep learning Diplom Thesis 2021.06 – 2021.11
Else Kröner Fresenius Center Project: BrainAce WHK, Research Associate 2022.02 – present
Laboratory of Measurement and Sensor System Technique, TUD

- **Motivation**: Multi-core fiber (MCF) endoscopy allows minimally invasive access to deep tissue and provides real-time image transfer for brain tumor diagnostics. However, ultra-thin MCF endoscopes (~300 µm) suffer from honeycomb artifacts and low resolution, leading to image degradation and hindering diagnosis.
- **Aim**: Developing image reconstruction and resolution enhancement algorithms for MCF imaging.
- **Method**: 1) MCF image reconstruction by a cascaded **neural network** of a U-Net (for artifact removal) and an EDSR network (for resolution enhancement) on a dataset of 5,000 images. 2) Learning on a **digital twin**: reference-based simulation and then transfer learning on collected tumor images.
- **Result**: 1) Peak signal-to-noise ratio and structural similarity increased from 20.6 dB and 0.73 to 34.8 dB and 0.99, separately, with video-rate computing. 2) Reconstruction for an arbitrary given MCF possible, only ~50 tumor images (**100× less data**) required for training → highly transferable in medical practice

Machine learning-assisted laser cladding process design of CoCrNi coatings 2023.04 – present
Cooperation with *South China University of Technology* & *Leibniz IFW Dresden*

- **Motivation**: CoCrNi medium entropy alloys have good high-temperature oxidation and wear resistance, and laser cladding provides an efficient way for coating processing. However, finding optimal process parameters remains a challenge, since coating performance highly depends on the parameters.
- **Aim**: Optimizing laser cladding process parameters of CoCrNi coatings using machine learning.
- **Method**: 1) Constructing a dataset including process parameters (inputs) and coating properties (targets) of prepared samples. 2) Regression by **multilayer perceptron (MLP)** neural network and evaluation. 3) Screening for desired properties, experimental validation, and characterization.
- **Result**: 1) Accurate prediction with a coefficient of determination $\mathbf{R^2}$ of up to **0.99** by MLP on the independent test sets. 2) The CoCrNi-TiC composite coating prepared with the optimized parameters can reach a microhardness of up to 430 $HV_{0.2}$ and a specific wear rate of 0.22×10^{-4} $mm^3/(N\cdot m)$.

Publications

- J. Wu, **Tijue Wang**, et al. "Learned end-to-end high-resolution lensless fiber imaging towards real-time cancer diagnosis." *Scientific Reports* (2022).
- **Tijue Wang**, et al. "Resolution enhanced multi-core fiber imaging learned on a digital twin for cancer diagnosis" (2023, in preparation).
- C. Pan*, **Tijue Wang***, et al. "Machine learning-assisted fabrication design of CoCrNi-TiCx composite coatings: process parameters, microstructure and properties" (2023, *co-first author, in preparation).

Conferences

- **Tijue Wang**, et al. "Learning-based lensless fiber bundle imaging with real-time resolution enhancement for biomedicine", SPIE Emerging Topics in Artificial Intelligence, San Diego, USA, Aug. 2023 (**invited talk**).
- **Tijue Wang**, et al. "High-resolution imaging with multi-core fibers and deep neural networks for cancer diagnostics", Complex Media NeuroPhotonics Workshop, Brno, Czech Republic, Oct. 2022 (poster).
- **Tijue Wang**, et al. "Single-shot high-resolution lensless fiber bundle imaging using deep learning for neurosurgery", the 25th Congress of the International Commission for Optics, Dresden, Germany, Sep. 2022 (oral presentation).

Others

- SECAI & CeTI International Summer School of AI + Medicine (2023, Dresden)
- Coursera Certificate in Machine Learning
- Member of SPIE and IEEE