Tianyu ZHANG
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Education

University of Manchester (UoM) — Manchester, UK
Research Associate for Computational Fabrication — *Apr. 2024 - Present*

University of Manchester (UoM) — Manchester, UK
PhD of Mechanical Engineering — *Jan. 2021 - Mar. 2024*

The Chinese University of Hong Kong (CUHK) — Hong Kong, CN
PhD student of Mechanical Engineering — *Aug. 2019 - Dec. 2020*

Xi'an Jiaotong University (XJTU) — Xi'an, CN
Master of Engineering in Mechanical Manufacturing & Automation — *Sep. 2015 - Jul. 2018*

University of Electronic Science and Technology of China (UESTC) — Chengdu, CN
Bachelor of Engineering in Mechanical Design, Manufacturing and Automation — *Sep. 2011 - Jul. 2015*

Research Interests

Multi-axis 3D printing, **Computational Geometry**, **Composites Manufacturing**, **Robotics**, **CNC**

Awards and Honors

- **Best Paper Award** - ASME 43rd Computers and Information in Engineering Conference (CIE), 2023.
- **Best Paper Award** - Technical Papers, ACM SIGGRAPH Asia, 2022.
- **Finalist of Best Student Paper Award** - IEEE International Conference on Automation Science and Engineering, 2021.
- **Postgraduate Awards** - 2nd Class of National Scholarship, 2016 & 2015; Professional Master Scholarship, 2015; Outstanding Member of XJTU Graduate Student Union, 2017.
- **Undergraduate Awards** - 1st Class of People's Scholarship, 2014 & 2012; 2nd Class of People's Scholarship, 2013; Advanced Individual of Study, 2014, Recommended to XJTU Graduate School with the exemption of entrance exam, 2015.

Publications

[1] Tianyu Zhang*, Tao Liu*, Neelotpal Dutta, Yongxue Chen, Renbo Su, Zhizhou Zhang, Weiming Wang, and Charlie C.L. Wang, "Toolpath generation for high density spatial fiber printing guided by principal stresses", Composites Part B: Engineering, 2024, Accepted. [**Q1, IF: 12.7**]

[2] Tianyu Zhang, Yuming Huang, Piotr Kukulski, Neelotpal Dutta, Guoxin Fang, and Charlie C.L. Wang, "Support Generation for Robot-Assisted 3D Printing with Curved Layers", IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, May 29 - June 2, 2023. [**CCF-A**]

[3] Tianyu Zhang*, Guoxin Fang*, Yuming Huang, Neelotpal Dutta, Sylvain Lefebvre, Zekai Murat Kilic, and Charlie C.L. Wang, "$S^3 - Slicer$: A general slicing framework for multi-axis 3D printing", ACM Transactions on Graphics (SIGGRAPH Asia 2022), vol.41, no.6, (15 pages), December 2022. (**Best Paper Award - Technical Papers**; 4/97 with a ratio of 0.98% in terms of 407 submissions) [**Q1, IF: 7.8**]

[4] Tianyu Zhang, Xiangjia Chen, Guoxin Fang, Yingjun Tian, and Charlie C.L. Wang, "Singularity-aware motion planning for multi-axis additive manufacturing", IEEE Robotics and Automation Letters (RAL), Presented at IEEE International Conference on Automation Science and Engineering (CASE 2021), Lyon, France, August 23-27, 2021, vol.6, no.4, pp.6172-6179, October 2021. (**Finalist of Best Student Paper Award**) [**Q2, IF:4.6**]

[5] Tao Liu*, Tianyu Zhang*, Yongxue Chen, Yuming Huang, and Charlie C.L. Wang, "Neural slicer for multi-axis 3D printing", ACM Transactions on Graphics (SIGGRAPH 2024), vol.43, no.4, (15 pages), July 2024. **[Q1, IF: 7.8, Co-first author]**

[6] Dutta Neelotpal*, Tianyu Zhang*, Guoxin Fang, Ismail E. Yigit, and Charlie C.L. Wang, "Vector Field Based Volume Peeling for Multi-Axis Machining", ASME Journal of Computing and Information Science in Engineering (JCISE), Presented at ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023), Boston, USA, August 20-23, 2023, vol.24, no.5, 051001 (12 pages), May 2024. (**Best Paper Award**) **[Q4, IF: 2.6, Co-first author]**

[7] Yongxue Chen, Tianyu Zhang, Yuming Huang, Tao Liu, and Charlie C.L. Wang, "Co-optimization of tool orientations, kinematic redundancy, and waypoint timing for robot-assisted manufacturing", IEEE Transactions on Automation Science and Engineering (TASE), Conditionally Accepted, December 2024. **[Q2, IF: 5.9]**

[8] Guoxin Fang, Tianyu Zhang, Yuming Huang, Zhizhou Zhang, Kunal Masania, and Charlie C.L. Wang, "Exceptional mechanical performance by spatial printing with continuous fiber: curved slicing, toolpath generation, and physical verification", Additive Manufacturing (ADDMA), vol.82, 104048 (16 pages), February 2024. **[Q1, IF: 10.3]**

[9] Guoxin Fang, Tianyu Zhang, Sikai Zhong, Xiangjia Chen, Zichun Zhong, and Charlie C.L. Wang, "Reinforced FDM: Multi-axis filament alignment with controlled anisotropic strength", ACM Transactions on Graphics (SIGGRAPH Asia 2020), vol.39, no.6, (15 pages), November 2020. **[Q1, IF: 7.8]**

[10] Yuming Huang, Guoxin Fang, Tianyu Zhang, and Charlie C.L. Wang, "Turning-angle optimized printing path of continuous carbon fiber for cellular structures", Additive Manufacturing (ADDMA), vol.68, 103501 (16 pages), April 2023. **[Q1, IF: 10.3]**

Research&Work Experiences

Nonplanar Continuous Fibre AM (CFAM) design tool evaluation Manchester, UK
Developer & Project Manager *Jun 2024 - Present*

- Joint project with **National Composites Centre** (UK)
- Contents: Took the design space and loading criteria and performed the design and manufacture of CCF components (Topoloy optimization, Curved slicing, Toolpath generation, Trajectory planning)
- Under the condition of identical fiber usage, the part strength achieved a 36.0% improvement compared to the industrial standard for fiber-reinforced printing.

Vector-field guided tool-path planning for 3D printing with CCF Manchester, UK
Developer & Project Manager *Oct 2023 - Mar 2024*

- Joint project with **Broetje-Automation GmbH** (German)
- UKRI Impact Acceleration Account (IAA) Fund
- Contents: Determined optimal fiber placement following stress field and fabrication constraints; Filled the model material into the carbon fiber gaps caused by fabrication constraints; Combined toolpath commands of fiber and model material and the fabrication auxiliary information.

Toolpath algorithms for 5XCAM hybrid manufacturing Manchester, UK
Main Developer *Aug 2021 - Jan 2023*

- Joint project with **5AXISWORKS Co., Ltd.** (UK)
- Innovate UK Smart Grants
- Contents: Developed a new CAM software program called "5XCAM" that supports the toolpath generation for machining and curved-layer 3D printing. Website: https://5axismaker.co.uk/5xcam?rq=5XCAM

- An extension of the curved slicing kernel and a fruitful academic-industry collaboration.

Development of application software for electric vehicles Suzhou, CN
Software Developer *Jul 2018 - Jun 2019*

- Technical staff in **Shenzhen Inovance Technology Co., Ltd.**
- Responsible for coding and testing based on customer requirements for electric vehicle applications.

Specification for Long Transmission Chain Mechanical Spindle Xi'an, CN
Developer & Project Manager *Oct 2016 - May 2018*

- Advisor: Chang-Jiang (Cheung Kong) Scholar Professor Wanhua Zhao
- A sub-project of National Funding Project-2015ZX04001002
- Contents: Eliminated the vibration of spindle structure by a designed model filter and instruction shaping; Built rapid control prototyping platform based on dSPACE and did experimental verification.

Design of 3-RPS Parallel Robot Control Algorithm Chengdu, CN
Software Developer & Project Manager *Oct 2014 - Jun 2015*

- Contents: Conducted parallel robot's structure and inverse kinematics analysis, and built parallel robot SimMechanics model to simulate the actual parallel robot; Used adaptive inverse controller to realize the control of the parallel robot; Used xPC Target toolkit to build a rapid control prototyping platform.