Xiru Fan

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Education

Shanghai Jiao Tong University *Shanghai*

M. E. in Mechanical Engineering Sep. 2021 - Mar. 2024

GPA: 3.6 / 4.0

Shanghai Jiao Tong University *Shanghai*

B. E. in Nuclear Engineering and Technology Sep. 2017 - Jun. 2021

GPA: 3.7 / 4.3 (top 20%)

Publications

[1] **X. Fan**, C. Valenzuela, W. Zhao, Z. Chen*, D. Wang*, S. J. Mentzer*. "Stochastic simulations of self-organized elastogenesis in the developing lung", *PLOS Computational Biology*, 19(6): p. e1011219, 2023. [Link]

[2] **X. Fan**, M. Zhang, K. Zhou, D. Wang*. "Multiphysics modeling and spatio-temporal optimization of grayscale digital light processing 3D printed structures with high resolution". (*Advanced Materials* in revision).

[3] M. Zhang, **X. Fan**, D. Wang*. "Voxel design of grayscale DLP 3D printed soft robots". (*Advanced Science* in revision).

[4] D. Wang, **X. Fan**, M. Zhang. "Six-degree-of-freedom photocuring 3D printing device and 3D printing method", *CN Patent*, CN115503232A, filed Sep 28, 2022, and filed Dec 23, 2022. (pending) [Link]

[5] D. Wang, M. Zhang, **X. Fan**. "Multi-material photocuring 3D printing device and method with super air knife assisting in cleaning", *CN Patent*, CN115625893A, filed Oct 31, 2022, and filed Jan 20, 2023. (pending) [Link]

Research Projects

Research on digital light processing (DLP) 3D printing *Shanghai*

Master Thesis | Advisor: Dong Wang, *Associate Professor of School of Mechanical Engineering, SJTU* Sep. 2022 - Now

Aim to develop a holistic computational tool which enables the high-resolution fabrication of soft robots with desired performance

– System set up

- build a free-form 6-DOF DLP 3D printing system using 6-axis robot arm
- build a multi-materials DLP 3D printing system

– Multi-physics modeling

- model the DLP 3D printing process considering Gaussian beam propagation, light divergence, and the photobleaching effect of the resin
- calibrate the light field parameters of the digital light engine and the photopolymerization parameters of different resin
- establish a "grayscale value - degree of conversion - mechanical properties" relationship

– Design for DLP 3D printing

- visualize the objective structure based on the planned path and projected images
- develop a spatio-temporal optimization algorithm for high-resolution grayscale DLP 3D printing
- inversely design and fabricate high-resolution structures, such as micro-fluidic devices, lattice metamaterials, and pneumatic actuators

Research on origami-inspired pneumatic soft actuator (PSA) *Shanghai*

Chung-Tsung Program | Advisor: Hesheng Wang, *Professor of Department of Automation, SJTU* Jun. 2019 - Jun. 2021

Aim to design and fabricate origami-inspired variable-stiffness PSAs with programmable performance

- design variable-stiffness skeleton inspired by origami for PSA
- simulate the transformation of the origami-inspired skeleton
- design and fabricate PSAs with programmable performance

Research on stochastic simulations of self-organized elastogenesis *Shanghai*

Collaborative Research | Advisor: Dong Wang, *Associate Professor of School of Mechanical Engineering, SJTU*; Steven J. Mentzer, *Professor at Harvard Medical School* Sep. 2021 - May 2023

Aim to simulate the process of extracellular assembly and exploring the impact of different factors on this process using cellular automata

- model the self-organization of tropoelastin in the developing lung using cellular automata based on experimental results
- analysis the impacts of different factors on the process of tropoelastin extracellular assembly

Research on reconstruction and evaluation of 3D flow field *Shanghai*

Graduation Program | Advisor: Li Yang, *Associate Professor of School of Mechanical Engineering, SJTU* Nov. 2020 - Jun. 2021

Aim to reconstruct and evaluate the 3D flow field of a ship using cross-sections generated by neural network GAN

- reconstruct flow field of a whole ship based on cross-sections after data registration and combination
- evaluate the results of 3D reconstruction using statistical and fluid mechanics indicators
- put forward a workflow of the 3D flow field reconstruction of ships based on cross-sections

Technical Skills

Programming	Matlab, Python
Professional Softwares	Origin, Abaqus, Solidworks, Rhino, Mathematica, Simulink, ParaView, Lammps
Drawing & Typesetting	Office, Illustrator, Premiere Pro, Photoshop, LaTeX, Markdown
Languages	English (TOEFL: 105; GRE: 320 + 3.5)

Awards and Honors

Dec. 2022	**Honorary Title**: "The Chung-Tsung Scholar" (0.1%)	*Shanghai*
Jun. 2021	**Honorary Title**: "Outstanding Graduate of Shanghai Jiao Tong University" (1%)	*Shanghai*
Oct. 2019	**Honorary Title**: "The Merit Student of Shanghai Jiao Tong University" (1%)	*Shanghai*
Jun. 2019	**Award**: Excellent Paper Presenter of "The 5th Annual International Conference for Students"	*Shanghai*
Dec. 2017	**Award**: First Prize in "Engineering Design Showcase, 2017 Fall"	*Shanghai*
Oct. 2019-2022	**Scholarship**: " 'Rongchang' Inovation Scholarship " (30000 RMB per year)	*Shanghai*
Oct. 2018-2019	**Scholarship**: Second Prize of the " NPIC Scholarship " (6000 RMB)	*Shanghai*
Jun. 2020	**Contest**: First Prize in "The Ninth Shanghai Mechanical Engineering Innovation Competition"	*Shanghai*
Nov. 2018	**Contest**: First Prize in "The "Zhixing Cup" Shanghai Student Social Practice Project Competition "	*Shanghai*
May 2018	**Contest**: Champion of the " 10th SJTU Mechanical Innovation Competition for Freshman "	*Shanghai*

Volunteer Services

International Academic Conferences

Presentation / Attendance

- 16th International Conference on Intelligent Robotics and Applications (ICIRA 2023), Hangzhou, July 2023
- 9th International Conference on Mechanical Engineering and Automation Science (ICMEAS 2023), Xi'an, Oct. 2023

International Events *Shanghai*

Volunteer

- 3rd China International Import Expo, Oct. 2020
- Shanghai Marathon 2019, Nov. 2019
- 40th Odyssey of the Mind World Final, Mar. 2019

SK Sunny Student Volunteer Organization *Shanghai*

Volunteer Sep. 2017 - Jun. 2019

- Creative Innovation Class, Minhang Central Elementary School

References

- Prof. Dong Wang
  Ph. D, Associate Professor, at School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai, China
  ✉ wang_dong@sjtu.edu.cn
- Prof. Steven J. Mentzer
  Ph. D, Professor, at Harvard Medical School, Boston, U. S.
  ✉ smentzer@bwh.harvard.edu
- Prof. Hesheng Wang
  Ph. D, Professor, at Department of Automation, Shanghai Jiao Tong University, Shanghai, China
  ✉ wanghesheng@sjtu.edu.cn