

# Xiru Fan

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## Education

### Shanghai Jiao Tong University

M. E. in Mechanical Engineering

GPA: 3.6 / 4.3

Shanghai

Sep. 2021 - Mar. 2024

### Shanghai Jiao Tong University

B. E. in Nuclear Engineering and Technology

GPA: 3.7 / 4.3 (top 20%)

Shanghai

Sep. 2017 - Jun. 2021

## 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;

Sep. 2021 - May 2023

Steven J. Mentzer, Professor at Harvard Medical School

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

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<b>Programming</b>	Matlab, Python
<b>Professional Softwares</b>	Origin, Abaqus, Solidworks, Rhino, Mathematica, Simulink, ParaView, Lammmps
<b>Drawing &amp; Typesetting</b>	Office, Illustrator, Premiere Pro, Photoshop, L <sup>A</sup> T <sub>E</sub> X, Markdown
<b>Languages</b>	English (TOEFL: 105; GRE: 320 + 3.5)

## Awards and Honors

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

## Volunteer Services

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### 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