Fan Fei

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SUMMARY

I am currently seeking full-time Engineering position about R&D, product design, characterization of material properties, prototyping, 3D printing, etc. Brief introduction about myself:

- **5 years of R&D/prototyping experience in Additive Manufacturing process and printer design.**
  (4 new 3D printers, 1 multiaxial system with CNC programs based on C++, 1 US patent, 6 journal papers and 2 conference proceedings)
- **6 years of hands-on work experience in manufacturing facility.**
  (Proficient in lathing, milling, drilling, CNC programming and semiconductor device fabrication, such as oxidation, photolithography, wet/dry etching, etc.)
- **8 years of CAD design, Finite Element Analysis (FEA) and Computer Fluid Dynamics (CFD).**
  (Proficient in using commercial software like Solidworks, Creo, AutoCAD, ABAQUS and ANSYS, and open-source computing platforms such as FEniCS and FiPy based on Python programming)
- **5 years of material testing experience.**
  (Mechanical tests such as tensile, compression, fatigue, toughness tests, and material tests such as SEM, EDS, XRD)

EDUCATION

08/17-05/22 **Industrial Engineering (Ph.D.)**, University of Iowa, Iowa City, IA — GPA: 3.99/4.0
- *Research area*: Additive manufacturing (AM)/3D printing prototyping /Analysis of physical mechanism/FEA modeling.
- *Thesis*: Hydrothermal-Assisted Jet Fusion: A Binder-Free Additive Manufacturing Approach for Ceramics

08/14-05/16 **Mechanical Engineering (M.S.)**, University of Florida, Gainesville, FL — GPA: 3.96/4.0

08/10-07/14 **Aerospace Engineering (B.S.)**, Harbin Institute of Technology, Harbin, China — GPA: 3.50/4.0

WORK & RESEARCH EXPERIENCES

08/17-Present **Research Assistant** *University of Iowa, Iowa City, IA*

- Developed a binder-free jetting-based ceramic printing process and printer.
  - Able to print complex ceramic structures with large density and strength.
  - Applications in energy devices (batteries), RF devices (antennas) and piezoelectric sensors (sonar).
- Developed an embedded liquid metal printing process.
  - Capable of printing stretchable and low-resistance electrodes directly in silicone elastomer for underwater vehicles.
- Developed a biomimetic self-morphing smart skin.
  - Programmable surface graphic deformation under low voltage.
  - Applications in Braille displays for blind people.
- Developed a stereolithography-based printing process and printer for ceramics and polymer materials.
  - Application of microRNA-200c incorporated 3D-Printed bio-scaffolds enhance bone/teeth regeneration.
  - Capable of working together with deep learning algorithm for high-accuracy printing (10 μm).
- Developed a CFD model to simulate the liquid penetration behavior in powder bed under different packing density.
  - Utilized FEA and volume of fluid (VOF) methods in ANSYS Fluid.

09/19-12/19 **Teaching Assistant** *University of Iowa, Iowa City, IA*

- Course: Engineering Problem Solving-I (ENGR 1100)
- Provided students with the opportunity to develop and demonstrate specific problem-solving skills such as using Creo for product design and FDM 3D printers for the fabrication, etc.

06/14-04/17 **Research Assistant** *University of Florida, Gainesville, FL*

- Simulation research for Woven Composite Materials via FEA method
  - Found the tensile strength of the WCM material unit by software of Virtual Textile Morphology Suite and Abaqus.
- Developed a 2-DOF planar end effector with passive force control.
  - Tested the displacement and contact force of the end effector with encoders and made comparisons with the simulation results via MATLAB Simulink.

08/13-05/14 **Research Internship** *Texas A&M University, College Station, TX*

- Design and simulation research for Mars rover's self-folding landing structure via FEA method.
  - It is an origami structure able to fold to target shape with certain strength and unfold into flat shape for storage.
  - Simulated the folding and unfolding process of the structure by tuning the SMA's temperature and alloy phases via Abaqus.
  - Optimized the structure with the objective to have lowest mass together with enough bending stiffness and buckling strength via OpenDAO.

COMMUNITY ACTIVITIES

12/2021 **STEM Event for Blind Students** *University of Iowa, Iowa City, IA*

- Helped students from Iowa Blind School to learn about 3D design and printing.

PATENTS

- Song, Xuan, **Fan Fei**, and Levi J. Kirby. "Hydrothermal-assisted transient jet fusion additive manufacturing." U.S. Patent Application 17/103,430, filed May 27, 2021.

SKILLS

- **CAD/CAE Software:** Solidworks, AutoCAD, Creo, Abaqus, ANSYS, FreeFEM, LIGGGHTS, FEniCS (python based), FiPy (python based).
- **Materials characterization:** Scanning Electron Microscopy (SEM), element analysis based on energy-dispersive X-ray (EDS), X-ray diffraction analysis (XRD), Thermogravimetric Analysis (TGA), LCR tests, tensile, compressive, torsional, creep, fatigue, toughness and hardness testing.
- **Other Software:** MATLAB, C/C++, Arduino, QT Creator, OrCAD, PLC programming, NI Multisim.
- **Language:** Mandarin (Fluent), English (Fluent), Cantonese (Basic).

PUBLICATIONS

Journals

- **Fei, Fan**, Parth Kotak, Li He, Xiaofeng Li, Cyan Vanderhoef, Caterina Lamuta, and Xuan Song. "Cephalopod-Inspired Stretchable Self-Morphing Skin Via Embedded Printing and Twisted Spiral Artificial Muscles." *Advanced Functional Materials* (2021): 2105528.
- **Fei, Fan**, Li He, Levi Kirby, and Xuan Song. "Study of Droplet Diffusion in Hydrothermal-Assisted Transient Jet Fusion of Ceramics." *Journal of Manufacturing Science and Engineering* 143, no. 5 (2021): 051001.
- **Fei, Fan**, Li He, Baizhuang Zhou, Ziyang Xu, and Xuan Song. "Hydrothermal-Assisted Transient Binder Jetting of Ceramics for Achieving High Green Density." *JOM* 72, no. 3 (2020): 1307-1313.
- Remy, Matthew T., Adil Akkouch, Li He, Steven Eliason, Mason E. Sweat, Tadkamol Krongbaramee, **Fan Fei**, *et al.* "Rat Calvarial Bone Regeneration by 3d-Printed B-Tricalcium Phosphate Incorporating Microrna-200c." *ACS Biomaterials Science & Engineering* 7, no. 9 (2021/09/13 2021): 4521-34.
- He, Li, **Fan Fei**, Wenbo Wang, and Xuan Song. "Support-free ceramic stereolithography of complex overhanging structures based on an elasto-viscoplastic suspension feedstock." *ACS applied materials & interfaces* 11, no. 20 (2019): 18849-18857.

Conference Proceedings

- Kirby, Levi, **Fan Fei**, Chao Wang, and Xuan Song. "Hydrothermal Assisted Transient Jet Fusion of Ceramics: A Test Case Using Bentonite Clay." *Procedia Manufacturing* 48 (2020): 797-806.
- He, Li, **Fan Fei**, Wenbo Wang, and Xuan Song. "Layerless Additive Manufacturing of Metal Alloy Lattices Using Immiscible-Interface Assisted Direct Metal Drawing." *Procedia Manufacturing* 34 (2019): 647-654.
- He, Yusen, **Fan Fei**, Wenbo Wang, Xuan Song, Zhiyu Sun, and Stephen Baek. "Predicting manufactured shapes of a projection micro-stereolithography process via convolutional encoder-decoder networks." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 51739, p. V01BT02A033. American Society of Mechanical Engineers, 2018.

PRENSENTATIONS

- "Binder-free Additive Manufacturing of Ceramics Using Hydrothermal-assisted Transient Jet Fusion", 32nd Annual International Solid Freeform Fabrication Symposium (virtual), Austin, Texas, Aug. 2-4, 2021.

HONORS

2021	NSF Student Travel Award for SFF 2021 Symposium
2019	NSF Student Travel Award for SFF 2019 Symposium
2018	Graduate Poster Award, University of Iowa, Iowa City, Iowa
2017	Dean's Fellowship, University of Iowa, Iowa City, Iowa
2014	Outstanding Final-year-thesis Award, Harbin Institute of Technology, Harbin, China
2013	First Prize of People's Scholarship, Harbin Institute of Technology, Harbin, China (Top 5% of all major)