Fan Fei

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SUMMARY

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

- **9 years of CAD design and drawing, Finite Element Analysis (FEA) and Computer Fluid Dynamics (CFD).**
  (Proficient in using commercial software like Solidworks, Creo, AutoCAD, Keyshot, Propel, Aligni, ABAQUS and ANSYS, and open-source computing platforms such as FEniCS and FiPy based on Python.)
- **6 years of R&D/prototyping experience in additive manufacturing process and printer design.**
  (Involved in multiple 3D printing processes including binder jetting [BJ], power bed fusion [PBF], stereolithography [SLA], fused filament fabrication [FFF], direct ink writing [DIW]; familiar with multiaxial systems with CNC programs based on C++; 1 US patent, 9 journal papers and 8 conference proceedings.)
- **6 years of hands-on work experience in manufacturing facility.**
  (Strong skills in DFMA and GD&T; good at lathing, milling, drilling, CNC programming and machining, injection molding, casting, PCB design and semiconductor device fabrication, such as oxidation, photolithography, wet/dry etching, etc.)
- **6 years of material testing experience.**
  (Mechanical tests such as tensile, compression, fatigue, toughness tests, and material tests such as SEM, EDS, XRD, rheology tests, etc.)

EDUCATION

08/17-08/22	**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

05/22-Present **Research Associate (Post-doc)** *HP Labs, Palo Alto, CA*

- Development of 3D printed electronics based on Multi Jet Fusion (MJF)
  - Optimized the process parameters and improved the electric conductivity by 100% and mechanical strength by 25%.
  - Printing quality control using CT and structured-light scanning methods.
  - Designed and fabricated multiple 3D-structured sensors and actuators for demonstration for multiple industrial customers and universities.
  - Characterization of material properties using SEM, EDS, XRD, DSC, etc.
  - Drafted and submitted multiple IP/patents, proposals, and conference proceedings.

08/17-08/22 **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 high green density (>90%) and strength.
  - Applications in energy devices (batteries), RF devices (antennas) and piezoelectric sensors (sonar).
- Developed an extrusion-based 3D printing method to fabricate self-morphing wearable biomimetic smart skin.
  - Capable of printing stretchable and low-resistance electrodes directly in silicone elastomer.
  - Programmable and quick-response surface graphic deformation under low voltage.
  - Applications in wearable electronics, braille displays for blind people and deformable aircraft/submarine.
- Developed a stereolithography (SLA/DLP)-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 shape memory alloy's temperature and 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.

SKILLS

- **CAD/CAE Software:** Solidworks, AutoCAD, Creo, Abaqus, ANSYS, FreeFEM, LIGGGHTS, FEniCS (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), Differential Scanning Calorimetry (DSC), Ultraviolet–visible spectroscopy (UV-Vis), LCR tests, tensile, compressive, torsional, creep, fatigue, toughness and hardness testing.
- **Other Software:** MATLAB, C/C++, Arduino, QT Creator, Minitab, JMP, FLIR, OrCAD, PLC programming, NI Multisim, LabView.
- **Language:** Mandarin (Fluent), English (Fluent), Cantonese (Basic).

PUBLICATIONS

Selected Journals
- **Fei, Fan**, Levi Kirby, Alexander Gralczyk, and Xuan Song. "Binder-free Additive Manufacturing of Ceramics using Hydrothermal-assisted Jet Fusion." Journal of the European Ceramic Society (2023).
- **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 (2020): 1307-1313.
- 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.
- 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 β-tricalcium phosphate incorporating microRNA-200c." ACS biomaterials science & engineering 7, no. 9 (2021): 4521-4534.

Selected Conference Proceedings
- **Fei, Fan**, Levi Kirby, and Xuan Song. "Process Optimization for Hydrothermal-Assisted Jet Fusion Additive Manufacturing of Ceramics." In International Manufacturing Science and Engineering Conference, vol. 85802, p. V001T01A037. American Society of Mechanical Engineers, 2022.
- Wittkopf, Jarrid A., Sanil Jhaveri, **Fan Fei**, Manjarik Mrinal, Eric Luna-Ramirez, Dylan Richmond, Dayue Jiang et al. "3D Printed Electronics with Multi Jet Fusion for Flexible Hybrid Electronics." In 2023 IEEE 73rd Electronic Components and Technology Conference (ECTC), pp. 1463-1470. IEEE, 2023.