Haozhe Zhang

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EDUCATION

Ph.D. candidate in **Mechanical Engineering**
University of Virginia (GPA: 3.62)
08/2018 – Present (expected graduation: 04/2023)
B.S. in **Theoretical and Applied Mechanics**
University of Science and Technology of China
09/2014 – 06/2018

WORK EXPERIENCES

Packaging Engineer Intern, *Western Digital, Milpitas, CA* 05/2022 – 08/2022

- Developed a new failure criterion for SSD drop test by correlating test performance and simulation via machine learning. This criterion will cut the test cost on the drop test by ~ 90%.
- Conducted FEA with ANSYS for the reliability of NAND packages and proved guidelines for the design team to address customs' feedback. Developed experiments (DoE) based on the FEA results.
- Developed an acoustic detection method for locating in-situ crack initiation in packages, NANDs, and PCBs during three/four-point bending tests.

Research Assistant, *University of Virginia, Charlottesville, VA* 08/2018 – Present

- Designed multiple mechanical-driven engineering structures and devices, including healthcare devices, acoustic structures, and optical structures, with superior physical functionalities.
- Developed multiple theoretical models for solving physical problems and PDEs, which were further validated via experimental and computational studies with high precision.
- Conducted multiphysics FEA simulations, and comprehensive experiments, including 3D printing and mechanical testing, to test the mechanical properties and analyze the reliability of our designs.
- Published 4 (+2 under review) papers as first/co-first author and 4 journal papers as co-author in high-impact journals.

Research Assistant Intern, *University of Colorado, Boulder, Boulder, CO* 06/2017 – 09/2017

- Conducted crack propagation experiments of VHB gels and hydrogels with Instron and attached 1500+ glitters at the crack tip for the strain field tracing and analysis of the fracture mechanics of soft materials.
- Developed a dynamic tracing program for glitters with Hough transform achieved < 3% error.

RESEARCH EXPERIENCES

Mechanical Janus Structure (Featured as the inside cover of ***Advanced Materials***)

- Designed and prototyped a new engineering structure named *mechanical Janus structure* for composing superstructures with mechanically programmable organization for the first time.
- Designed a controllable acoustic wave filter with *mechanical Janus structure* unit.
- Developed a structural mechanical model to analyze its mechanism and to quantitatively predict its mechanical and physical properties with high accuracy.
- Conducted FEA (Abaqus, COMSOL) and 3D printing experiments for mechanical and acoustic analysis.
- Trained CNNs via PyTorch on FEA data for structural stability analysis with 88% accuracy.

Optical Devices (Stretchable Metasurface)

- Developed a theoretical mechanics model with conformal mapping methods for stretchable metasurfaces, for analyzing the rotation effect on optical properties.
- Conducted FEA simulations for the stress field and rotation angle validation analysis.
- Conducted mechanical testing to test the mechanical properties of the composited material.

Soft Robotics

- Designed and prototyped a robot design strategy with thermal and pneumatic actuators to achieve controllable locomotion patterns controlled by simple signals.
- Validated the model prediction in stress fields and locomotion trajectories with FEA computational studies conducted via Abaqus.

Printed Corneal Sensor

- Designed and prototyped a smart contact lens for painless assessment of ocular health for the first time.
- Analyzed its reliability under various loading conditions via FEA simulation with Abaqus.

Wearable Skin Sensor

- Designed an ultra-thin thermal skin sensor with a sensitivity 22 times higher than the existing mental sensor for body disease diagnosis**.**
- Conducted FEA with Abaqus to analyze the fracture risk and reliability in actual situations.

SKILLS

Coding and Data analysis: MATLAB, Python (Pytorch/panda/sqlite3), C, R, MySQL, Git, Fortran
Simulation: Abaqus, COMSOL, ANSYS, LS-Dyna, LAMMPS (molecular dynamics simulation)
3D Modeling: Solidworks, AutoCAD, SpaceClaim

SELECTED PUBLICATION

1. **Haozhe Zhang,** Weizhu Yang, Qingchang Liu, Yuan Gao, Zhufeng Yue, Baoxing Xu. Mechanical Janus Structures by Soft-Hard Material Integration. ***Advanced Materials***.
2. **Haozhe Zhang,** Baoxing Xu. Soft-hard material integration enabled programmable robotic locomotion. ***Applied Physics Letters*** 121(2022)214104
3. Kyunghun Kim#, Ho Joong Kim#, **Haozhe Zhang#,** Woohyun Park, Dawn Meyer, Min Ku Kim, Bongjoong Kim, Heun Park, Baoxing Xu**,** Pete Kollbaum, Bryan W Boudouris, Chi Hwan Lee. All-printed stretchable corneal sensor on soft contact lenses for noninvasive and painless ocular electrodiagnosis. ***Nature Communications*** 12 (2021) 1544 (# Equal contribution)
4. **Haozhe Zhang**, Weizhu Yang, Baoxing Xu. Rotation Mechanics of Optical Scatters in Stretchable Metasurfaces. ***International Journal of Solids and Structures***. 191-192(2020)566-576
5. Mingyu Sang, Kyowon Kang, Yue Zhang, **Haozhe Zhang**, Kiho Kim, Myeongki Cho, Jongwoon Shin, Jung-Hoon Hong, Taemin Kim, Shin Kyu Lee, Woon-Hong Yeo, Jung Woo Lee, Taeyoon Lee, Baoxing Xu and Ki Jun Yu. Ultra-high Sensitive Au-doped Silicon Nanomembrane Based Wearable Sensor Arrays for Continuous Skin Temperature Monitoring with High Precision. ***Advanced Materials***. 34(2022)2105865
6. Yuan Gao, Mingzhe Li, **Haozhe Zhang**, Yue Zhang, Weiyi Lu, Baoxing Xu. Anomalous solid-like necking of confined water outflow in hydrophobic nanopores. ***Matter***. 5(2022)266-280