Jiaqi Liu

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EDUCATION

Southern University of Science and Technology (SUSTech)   *Aug 2021 – Jul 2025*

Bachelor of Engineering in Materials Science and Engineering

- **Overall GPA:** 3.8/4.0 | **Rank:** Top 5 in the 2025 cohort
- **Scholarship:** NEWARE Scholarship (Industry-sponsored, *2024*); Second-class Scholarship (*2024*); Third-class Scholarship (*2022*); Excellent Freshman Scholarship (*2021*)
- **Honor:** Outstanding Graduation Project (*2025*)

RESEARCH INTEREST

Electronic skins (E-skins) for supporting observational learning in humanoid robots: I aim to address the **cross-domain knowledge transfer of tactile intelligence** from humans to machines. To this end, I seek to develop E-skins applicable to both humans and humanoid robots, and integrate learning algorithms to achieve the transfer learning of tactile experiences from humans to robots.

PUBLICATION & PATENT

- Z. Wu, **J. Liu**, Y. Tian, Y. Cheng, J. Ma, J. Feng. Ultra-sensitive Flexible Temperature Sensor Based on Polyionic Elastomer with a Wide Detection Range. ***Proceedings of the IEEE International Conference on Electronics, Circuits and Systems (ICEPT 2025)***. (Accepted)
- Z. Wu, Y. Cheng, Z. Yang, T. Wang, **J. Liu**, J. Feng, Y. Tian, C. Guo. Ultra-Sensitive and High-Resolution Flexible Iontronic Humidity Sensor for Detecting Subtle Moisture Differences. ***Advanced Functional Materials***. 2025, adfm.202517569. (Manuscript Under Review)
- R. Wang, Y. Cheng, Q. Zhang, H. Li, W. Wu, Y. Wang, **J. Liu**, R. Xing, J. Ma, T. Jiao. Near infrared light-based non-contact sensing system for robotics applications. ***Advanced Materials***. 2025, 30, e2414481.
- S. Xie, Y. Cheng, X. Chen, **J. Liu**. A polyionic elastomer with its preparation method and an ultra-sensitive iontronic flexible temperature sensor with its application based on polyionic elastomer. Patent No. 202410734790.X. (Granted)

MAJOR RESEARCH EXPERIENCE

Ultra-Flexible Electronics Laboratory, SUSTech   *Jan 2023 – Present*

Research Assistant (full-time), Advisor: Prof. Chuanfei Guo

Graduation Project: Highly Conformal and Bimodal Fingertip Electronic Skins   *Sep 2024 – Jun 2025*

- Developed four types of E-skins with ascending conformality to finger tips, addressing the data distortion issue caused by poor interface adhesion between E-skins and complex curved surfaces.
- Designed and integrated four modules of senor, adapter, signal acquisition and processing, manipulator and servo control for intelligent TCM diagnosis.
- Innovated a working mechanism, designed a characteristic data acquisition method, and constructed a deep learning algorithm via 1D CNN.
- Achieved high device sensitivity and long-term stability through rigorous performance characterization and iterative optimization of fabrication processes.

<u>Collaboration Project: Humidity-Enhanced Multimodal Iontronic Sensing System</u>   *Jun 2023 – Present*

- Developed a multimodal iontronic sensing platform integrating pressure, temperature, and humidity sensors for smart agricultural applications (e.g., fruit maturity detection).
- Synthesized and optimized the formula of ionic gels as the active materials of pressure and temperature sensors, and systematically characterized the electrical, thermal, and mechanical properties of materials.
- Debugged and characterized the sensor performances.
- Designed and fabricated multimodal tactile sensors arrays and intelligent electronic gloves.
- Constructed 3D virtual modeling and render simulation images for wearable device demonstration via 3D Studio Max.

SCIENTIFIC COMPETITION

College Students' Innovation and Entrepreneurship Training Program   *Apr 2023 – May 2025*

Project Leader

<u>National Project: Ultra-Sensitive Temperature Sensor Based on Polyionic Elastomer</u> | Smart Applications

- Introduced polyionic elastomers to overcome free-ion concentration limits in iontronic temperature sensors, achieving ultra-sensitive flexible sensing performance.
- Elucidated the temperature-sensing mechanism through theoretical analysis; validated hypotheses via numerical simulations and experimental results.
- Optimized material composition, synthesis routes, and processing parameters, successfully fabricating polyionic elastomer-based sensors with high temperature responsiveness.
- Designed and fabricated integrated circuits for flexible sensors, confirming the utility of temperature sensors across multiple fields.
- Led a multidisciplinary team in research planning, earning recognition as a **National Innovation Project**.

The 17th "Challenge Cup" Technological Innovation Competition   *Jan 2023 – Nov 2023*

Core Team Member, Provincial Bronze Award

<u>Provincial Project: Displacement-Controlled Smart Hardness Recognition Sensor</u> | Deep Learning

- Proposed a convenient and low-cost self-examination medical device for glaucoma by integrating two flexible pressure sensors asymmetrically on a displacement-controlled rubber finger.
- Conducted literature review on flexible iontronic devices and hardness sensing.
- Optimized sensor material formulations and fabrication processes to improve sensitivity and stability.
- Applied deep learning algorithms to achieve 98.6% accuracy in classifying standard hardness blocks.
- Managed project declarations, academic posters design and defense presentations, securing **provincial grant funding** (No. pdjh2023b0462).

SKILL

- **Programming & Software:** Python, MATLAB, JAVA, SolidWorks, AutoCAD, 3D Studio Max, Adobe Photoshop, Jade 5.
- **Laboratory Technique & Instrument:** SEM, XRD, FTIR, TGA, DSC, RT, XRF, UV-VIS Spectrophotometer, Contact Angle Goniometer, High-Precision Laser Cutting Machine, Precision Ion Polishing System, Magnetron Sputtering Instrument.
- **Research & Experimental Skill:** Deep Learning, Virtual Model Modeling, 3D printing, Engineering Drawing, Web Design and Development.