

Longlong Li

Curriculum Vitae | PhD Student, Department of Mechanical Engineering, Chonnam National University

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Research focus: MEMS, micro/nano sensors, and 3D bioelectronic sensing platforms for multimodal electromechanical analysis of engineered cardiac tissue.

Education

- 2022-Present | PhD in Mechanical Engineering, Chonnam National University, Gwangju, South Korea
- 2018-2022 | B.S. in Mechanical Engineering, Wenzhou University, Wenzhou, China

Research Experience

- Developing MEMS-enabled and flexible multimodal sensors for electromechanical monitoring of engineered cardiac tissue.
- Building 3D bioelectronic platforms for tissue maturation, cardiotoxicity screening, and in vitro cardiac disease modeling.
- Integrating strain, electrical, and structural readouts for real-time characterization of cardiac electromechanical behavior.

Research Interests

- BioMEMS sensing platforms
- Engineered cardiac tissue monitoring
- Multimodal electromechanical recording
- Drug cardiotoxicity evaluation

Projects

- 2026.03-Present | Biomimetic Cardiac Hypoxia Model and Electromechanical Evaluation Platform, MNLT
- 2024.03-2026.03 | High-Throughput Drug Toxicity Screening Platform Based on 3D Cardiac Tissue, MNLT
- 2022.09-2024.03 | Regulatory Mechanisms of Graphene Conductive Microenvironments in Cardiomyocyte Electrophysiological Communication and Maturation, MNLT
- 2022.01-2022.08 | Smart Trash Bin Development, Cixi Zhuoshang Electric Appliance Co., Ltd.
- 2021.01-2021.12 | Desktop Customized Food 3D Printer, Wenzhou University
- 2020.01-2020.12 | Toy Storage Robot Based on Visual Recognition and Navigation, Wenzhou University

Publications

- 2024 | Graphene SU-8 platform for enhanced cardiomyocyte maturation and intercellular communication in cardiac drug screening. *ACS Nano* 18(49): 33293-33309.
- 2025 | Harnessing native blueprints for designing bioinks to bioprint functional cardiac tissue. *iScience* 28(3).
- 2025 | Development of multifunctional PAA-alginate-carboxymethyl cellulose hydrogel-loaded fiber-reinforced biomimetic scaffolds for controlled release of curcumin. *International Journal of Biological Macromolecules* 301: 140449.

- 2025 | Dual-sensitized hollow SnO₂ nanospheres with rGO and Pd for highly sensitive detection of acetone in exhaled breath. *Applied Surface Science* 696: 162959.
- 2025 | Hydrogel-Integrated Biomimetic Hydroxyapatite Scaffolds with Tunable Porosity for Enhanced Curcumin Delivery. *Journal of Drug Delivery Science and Technology*, 107572.
- 2025 | Enhancing cardiomyocyte maturation through PEDOT:PSS-coated surfaces and mechanical stimulation with strain sensors. *Journal of Micromechanics and Microengineering* 35(4): 045002.
- 2025 | InGaN-GaN-MQW-ZnO based e-nose sensors for nitrogen dioxide detection using advanced machine learning approaches. *Sensors and Actuators B: Chemical*, 138650.
- 2026 | Air-Breakdown Triboelectric Nanogenerator Inspired by Transistor Architecture for Low-Force Human-Machine Interfaces. *Nano-Micro Letters* 18(1): 251.
- 2026 | Tilted-angle acoustofluidic separation of live and dead neonatal rat ventricular myocytes using hypotonic cell swelling. *Sensors and Actuators B: Chemical*.

Conferences

- 2023 | The hybrid cantilever of conductive graphene and su-8 for improving the maturity and electrical coupling of cardiomyocytes. *MicroTAS 2023*, Katowice, Poland.
- 2024 | Enhancing Cardiomyocyte Maturation via Mechanical Stimulation of 3D Printed Cardiac Tissue Using a Origami-based 3D Sensor and Magnetic Fields. *IEEE NANOMED 2024*, Hawaii, USA.
- 2024 | Polymer Cantilever Integrated with a Full-Bridge Sensor for Continuous Wireless Measurement of Cardiomyocyte Contractility. *MicroTAS 2024*, Montreal, Canada.
- 2024 | MONITORING OF DRUG-IMFACTED CARDIOMYOCYTES CONTRACTILITY USING PI MICROCANTILEVER STRUCTURES WITH NANO-SILICON STRAIN SENSOR. *MicroTAS 2024*, Montreal, Canada.
- 2025 | A Dual-Detection Approach for Cardiotoxicity Screening: Utilizing Nano Silicon Strain Sensor and Mea to Monitor Contractility and Field Potential in Cardiomyocytes. *IEEE MEMS 2025*, Kaohsiung, Taiwan.
- 2025 | Origami-Inspired 3D Sensor Platform for Real-Time Electromechanical Coupling Analysis in Engineered Heart Tissues. *IEEE SENSORS 2025*, Vancouver, Canada.
- 2025 | Integrated Bioelectronic Platform Utilizing PEDOT:PSS Strain Sensors for Real-Time Mechanostimulation and Sensing. *IEEE SENSORS 2025*, Vancouver, Canada.
- 2025 | Development of a Multi-Channel Wireless Monitoring Platform for Long-Term Cardiomyocyte Contraction Assessment Using a Polymer Cantilever with integrated Sensor. *MicroTAS 2025*, Adelaide, Australia.
- 2025 | Enhancement of cardiomyocyte microenvironment and functional assessment using through-hole structures with integrated polymer cantilevers. *MicroTAS 2025*, Adelaide, Australia.
- 2026 | Multimodal Microelectrode-Microcantilever Array for Electromechanical Analysis of Cardiomyocyte Tissue in Drug Testing. *IEEE MEMS 2026*, Salzburg, Austria.

Patents

- Intelligent dispatch and retrieval management device for UAV swarms, CN216269980U.
- Automatic potato harvester, CN216415123U.
- Potato digging device, CN216313996U.
- Automatic rolling and pressing device for footpoint and acupoint stimulation, CN214278088U.
- Kitchen waste collection cart, CN113369827A / CN113369827B.
- Ditching and ridging integrated machine, CN112023495A / CN112023495B.

- Clothes-folding machine based on longitudinal folding, CN113186699A / CN113186699B.

Awards

- 2025 | BK21 Fellowship Scholarship
- 2025 | RLRC Outstanding Graduate Student
- 2021 | China National Scholarship
- 2019 | Zhejiang Provincial Government Scholarship

Technical Skills

- Micro/Nanofabrication and Device Development: Proficient in MEMS and flexible sensor micro/nanofabrication processes, device development, and sensor performance characterization.
- Tissue Engineering and Cell Culture: Experienced in NRVM and hiPSC-CMs cardiomyocyte culture, 3D engineered heart tissue (EHT) construction, and bioink formulation based on collagen and dECM systems.
- Test Systems and Hardware Integration: Capable of independently developing experimental prototypes and building synchronized measurement systems integrating closed-loop control, strain sensors, and microelectrode array (MEA) detection.
- Multimodal Signal Processing: Skilled in Python and MATLAB for processing cardiac electromechanical multimodal signals and extracting key electrophysiological and mechanobiological features.