

Shi-Xi Kong | Curriculum Vitae

RESEARCH INTEREST

My research interest lies in nanoelectronic devices, with a particular focus on translating scientific insights into practical device technologies for memory, logic, emerging computing paradigms, and beyond.

EDUCATION

Stanford University

Ph.D. in Electrical Engineering

California, United States

Sep 2026 – Present

National Yang Ming Chiao Tung University (NYCU)

B.S. in Electronics and Electrical Engineering

Hsinchu, Taiwan

Sep 2021 – Jan 2026

GPA: 4.20/4.30 (Top 6.90%)

PUBLICATIONS

- **S.-X. Kong** and T.-H. Hou, Modeling Trap-Assisted Tunneling Current in Ferroelectric Tunneling Junction for Improved Current Density and On-Off Ratio, in *29th International Electron Devices and Materials Symposium (IEDMS)*, 2024.
- **S.-X. Kong** and T.-H. Hou, Theoretical Investigation of Performance-Improved Ferroelectric Tunnel Junction Based on Trap-Assisted Tunneling, *Applied Physics Letters* 127 (26), 262902, 2025.

RESEARCH EXPERIENCE

Department of Electronics and Electrical Engineering, NYCU

Research Assistant

Hsinchu, Taiwan

Jul 2023 – Present

- **Trap-Assisted Tunneling in Ferroelectric Tunnel Junctions for Enhanced Device Performance**

Supervisor: Prof. Tuo-Hung Hou (NYCU)

- Developed a comprehensive FTJ model integrating ferroelectric switching, direct tunneling, Fowler–Nordheim tunneling, and trap-assisted tunneling mechanisms.
- Revealed how the TAT mechanism under different trap conditions and device structures impacts FTJ performance, providing theoretical explanations for previously observed experimental data.
- Proposed the TAT-based FTJs concept and provided optimization guidelines, theoretically demonstrating ultra-high performance that significantly outperforms the conventional FTJ, effectively addressing the performance bottlenecks of FTJs in memory applications such as in memory computing.

- **Spiking Dynamics in STT-MRAM for Crossmodal Temperature and Magnetic Field Sensing**

Supervisor: Prof. Tuo-Hung Hou (NYCU)

- Conducted characterization and analysis of STT-MRAM spiking data under varying magnetic field and temperature conditions.
- Proposed bias- and dimension-dependent spiking responses to embed separable features into spike trains.
- Applied neural network models to spiking data within an in-sensor computing framework, demonstrating the first spiking-based STT-MRAM crossmodal magnetic field and temperature sensing without requiring calibration circuitry or analog-to-digital conversion.

- **Thermodynamics of Nonlinear Circuits**

Supervisor: Prof. Edwin C. Kan (Cornell University)

- Explored thermodynamically consistent frameworks for modeling nonlinear electronic circuits, addressing the Brillouin paradox in low-voltage simulations.

- Investigated sharp-switching limits of diodes and related devices to assess fundamental performance boundaries.

HONORS AND AWARDS

- Stanford Graduate Fellowship, Stanford University, 2026–2029
- Research Assistantship, TSMC-NYCU Joint Research Center, 2023–2024
- Academic Achievement Award (Top 5%), NYCU, awarded three times (2021, 2022, 2025)

SKILLS

Software MATLAB, Origin, Python, SPICE, C/C++

Language Mandarin (native), English (fluent)

EXTRACURRICULAR ACTIVITIES

Freshman Orientation Camp

Chief Organizer

Aug 2022 – Aug 2023

Led the cross-department organization of the annual freshman orientation camp. Responsible for overall planning, program design, team coordination, and on-site execution, demonstrating leadership and organizational skills.

NYCU Open House Career Fair

Planning Team Member

Aug 2022 – Aug 2023

Participated in event flow planning as a member of the planning team and led volunteers on-site to ensure smooth execution of the largest regional university career fair in the Taoyuan–Hsinchu–Miaoli area.