Ya-Chen **Tsai**

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Education

University of California, Berkeley — *Berkeley, CA*

PH.D IN ELECTRICAL ENGINEERING — *Aug. 2023 - Present*

- **Coursework**: Digital Design and Integrated Circuits, Advanced ICs for Communications

National Taiwan University — *Taipei, Taiwan*

B.S. IN ELECTRICAL ENGINEERING — *Sep. 2019 - Jun. 2023*

- **GPA**: Overall: 4.17 / 4.3, IC-related: 4.24 / 4.3, Last 60: 4.24 / 4.3
- **Coursework**: Bioelectronics Circuit, Analog Integrated Circuit, Electronic Circuit Design, Digital Circuit Lab, Integrated Circuit Design
- **Honors**: Dean's Award 2020, Dean's Award 2023

Research Projects

Tapeout - eChem FET — *Berkeley, CA*

PHD RESEARCHER, PROJECT LEAD | PROF. JUN-CHAU CHIEN'S LAB, UC BERKELEY — *Nov. 2023 - Dec. 2023*

- Designed novel sensing circuit to reach fA sensitivity for aptamer sensors.
- Innovated eight different bio-sensing arrays for testing and comparison.

Tapeout - Biosystem chip, Powering — *Berkeley, CA*

PHD RESEARCHER | PROF. JUN-CHAU CHIEN'S LAB, UC BERKELEY — *Mar. 2023 - Present*

- Developed an implantable IC device with multiple sensing capabilities for aptamers and other biosensors.
- Designed the essential components of powering, including LDO circuit design, RF power transmission, and power management.

Aptamer Testing - Dual Aptamer — *Taipei, Taiwan*

PHD RESEARCHER | PROF. JUN-CHAU CHIEN'S LAB, UC BERKELEY — *Oct. 2022 - Present*

- Proposed a novel immobilization scheme for aptamer sensing, expanding target molecules to proteins and neurotransmitters.

FPGA implementation - Object Tracking — *Taipei, Taiwan*

UNDERGRADUATE RESEARCHER | ELECTRICAL ENGINEERING LAB (DIGITAL CIRCUIT) — *Dec. 2022 - Jan. 2023*

- Programmed Altera DE2-115 FPGA with camera OV7670 to capture live images and detect the target object.
- Implemented memory I/O in SRAM and SDRAM on FPGA with System Verilog.

Aptamer Testing - Drift Cancellation — *Taipei, Taiwan*

UNDERGRADUATE RESEARCHER | PROF. JUN-CHAU CHIEN'S LAB, NATIONAL TAIWAN UNIVERSITY — *Jun. 2021 - Oct. 2022*

- Proposed engineering methods to create differential aptamer pairs and implemented sensing with Xilinx XEM7001 FPGA, achieving 370% reduction in drift of aptasensing.
- Published a journal paper in ACS Sensors.

Tapeout - BioFET — *Taipei, Taiwan*

RESEARCH PROJECT LEAD | PROF. JUN-CHAU CHIEN'S LAB, NATIONAL TAIWAN UNIVERSITY — *Jan. 2022 - Mar. 2022*

- Designed a biosensing chip with 8 different sensing arrays for pH sensing, aptasensing, and antibody sensing, collobrating with Taiwan Semiconductor Manufacturing Corporation (TSMC).
- Conducted core array design, system floorplan, simulation, and layout.

Publication

Differential Drift Cancelling Techniques to Improve Performance of Real-Time Structure-Switching Aptasensors — *1st Author*

YA-CHEN TSAI, WEI-YANG WENG, YU-TONG YEH, WEI-LIANG HSU, JUN-CHAU CHIEN — *Accepted*

ACS Sensors

Comparison of BioFET structures for pH Sensing, Aptasensing, and Antibody Sensing — *1st Author*

YA-CHEN TSAI, JUI-FU YAN, JUN-CHAU CHIEN — *Under Preparation*

Biosensors and Bioelectronics

Skills

Analog Circuit Design	Cadence Virtuoso / Spectre, Altium, LTSpice
Digital Circuit Design	Verilog, System Verilog, FPGA design and implementation (Altera DE2-115 and Xilinx XEM7001)
Software Programming	Matlab, C++, Python, Asembly
Cleanroom fabrication	RIE training, Basic training