Ya-Chen **Tsai**

(+1) 5108162720 | justinetsai0228@gmail.com | https://www.linkedin.com/in/justinetsai2503/

Education

University of California, Berkeley — *Berkeley, CA*

PhD in Electrical Engineering and Computer Science — *Aug. 2023 - Present*

- **GPA**: 4.0/4.0
- **Research Interest**: Integrated circuit system design for bio-sensing platforms.

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

eChem FET — *Berkeley, CA*

PhD work, Project Lead | Prof. Jun-Chau Chien's Lab, UC Berkeley — *Nov. 2023 - Present*

- Designed an S/H sensing circuit achieving femtoampere (fA) sensitivity for aptamer sensors; taped-out in T65 process.
- Evaluated eight bio-sensing arrays with different design parameters for performance comparison.
- Optimized performance with low leakege switches with different voltage control configurations.

DUST Bio-analyzer — *Berkeley, CA*

PhD Work | Prof. Jun-Chau Chien's Lab, UC Berkeley — *Mar. 2023 - Present*

- Developed a multimodal implantable IC device for pH, temperature, and molecule sensing with aptamer or antibody biosensors; taped-out in T18 process
- Designed power management components, including low dropout regulators (LDO) and RF power transmission modules.
- Validated chip functionality using an HRP/TMP ELISA kit and published this work in ISSCC 2025.
- Led system respin and top level integration.

Aptamer signal extraction with Periodic Wavelet Decomposition — *Berkeley, CA*

PhD Work, Project Lead | Prof. Jun-Chau Chien's Lab, UC Berkeley — *Oct. 2024 - Present*

- Developed a wavelet transform based mathematical method for aptamer signal extraction to achieve better de-noising and baseline cancellation.
- Preparing for submission to ACS Sensors.

Dual Aptamer for Protein and Small Molecule Sensing — *Berkeley, CA*

PhD Work, Project Lead | Prof. Jun-Chau Chien's Lab, UC Berkeley — *Oct. 2022 - Present*

- Developed a novel aptamer immobilization method to enable detection of proteins and neurotransmitters, expanding the range of detectable targets.

Dual-Aptamer Drift Cancellation for Aptamer Signal Improvement — *Taipei, Taiwan*

Undergraduate Work, Project Lead | Prof. Jun-Chau Chien's Lab, National Taiwan University — *Jun. 2021 - Oct. 2022*

- Proposed engineering solutions for creating differential aptamer pairs, reducing aptasensing drift by 370%.
- Published in ACS Sensors.

BioFET — *Taipei, Taiwan*

Undergraduate Work, Project Lead | Prof. Jun-Chau Chien's Lab, National Taiwan University — *Jan. 2022 - Mar. 2022*

- Designed a biosensing chip with eight arrays for pH, aptamer, and antibody sensing, in collaboration with Taiwan Semiconductor Manufacturing Corporation (TSMC); taped-out in D35 process.
- Conducted sensing cell design, system floorplanning, simulations, and layout.

Publication

A 0.7pArms Electrochemical Readout IC for Continuous Monitoring of Antibody Biologics in Upstream Biomanufacturing — *Under Review*

Hung-Yu Hou*, **Ya-Chen Tsai**, Wei Foo, Yan-Ting Hsiao, Jun-Chau Chien — *Nov 2024*

2025 IEEE Custom Integrated Circuits Conference (CICC)

An RFID-inspired One-step Packaged Multi-mode Bio- analyzer with Vacuum Microfluidics for Point-of-Care Diagnostics

Yan-Ting Hsiao, **Ya-Chen Tsai**(Presenter), Wei Foo, Hung-Yu Hou, Yun-Chun Su, Yueting Lily Li, Jun-Chau Chien — *Sep 2024*

2025 IEEE International Solid-State Circuits Conference (ISSCC)

Subtractive Microfluidics in CMOS

Wei-Yang Weng*, Alexander Di*, Xiang Zhang*, **Ya-Chen Tsai***, Yan-Ting Hsiao, Jun-Chau Chien — *Jul 2024*

2024 International Electron Devices Meeting (IEDM)

Differential Drift Cancelling Techniques to Improve Performance of Real-Time Structure-Switching Aptasensors

Ya-Chen Tsai, Wei-Yang Weng, Yu-Tong Yeh, Wei-Liang Hsu, Jun-Chau Chien — *Sep 2023*

ACS Sensors

A CMOS/Microfluidics Point-of-Care SoC employing Square-Wave Voltcoulometry for Biosensing with Aptamers and CRISPR-Cas12a Enzymes

Yan-Ting Hsiao, Shu-Yan Chuang, Hung-Yu Hou, Yun-Chun Su, Hsiu-Cheng Yeh, Hsin-Tzu Song, Yun-Jui Chang, Wei-Yang Weng, **Ya-Chen Tsai**, Pin-Yu Lin, Sih-Ying Chen, Yen-Ju Lin, Mei-Wei Lin, Jun-Chau Chien — *Jun 2023*

2023 IEEE Symposium on VLSI Technology and Circuits (VLSI Technology and Circuits)

Skills

Software	Cadence Virtuoso / Spectre, Altium, Quartus, Vivado, LTSpice
Programming	Verilog, System Verilog, Matlab, C++, Python, Asembly