Meng-Chi Chen

EECS Ph.D. candidate where machine learning meets semiconductor manufacturing and circuits: DRAM process integration at Micron, circuit-graph learning at Synopsys, and fab SPC tooling at FabuBlox; builds integrated hardware-to-cloud systems.

Expected Ph.D. Jan 2028 | Authorized to work in the US for internships; no employer sponsorship required

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Education

Degree	Institution & Details	Period
Ph.D. in EECS	• Massachusetts Institute of Technology (MIT), Cambridge, USA • Nanomaterial and Electronics Group, Advisor: Dr. Jing Kong • Selected courses: Integrated Microelectronic Devices, CMOS Analog and Circuit Design, Power Electronics, Deep Learning, Computer Vision.	Sep 2022 - Jan 2028 (expected)
M.S. in Chemistry	• National Taiwan University (NTU), Taipei, Taiwan • Dean's Award of College of Science. • Overall GPA = 4.01/4.30 (A = 4.0).	Feb 2018 - Feb 2020
B.S. in Chemistry	• National Tsing Hua University (NTHU), Hsinchu, Taiwan	Sep 2012 - Jun 2016

Work Experience

Machine Learning Research Scientist Intern at FabuBlox, Inc. (fabublox.com), Boston, MA

MIT-born nanofabrication process-design platform

Jul 2026 – Aug 2026

- Prototyped an interactive Statistical Process Control (SPC) analysis suite for the Fab Run Tracker in JavaScript and HTML, computing the full control-chart family live over designed wafer-fabrication scenarios: I-MR charts, Western Electric, Nelson, and Westgard rules, process capability (Cp and Cpk), EWMA and CUSUM, dispersion, and a Radial Slope metric, with 2D and 3D wafer-profile drill-down and Markdown and PDF export.
- Led a fab-engineer customer-discovery program, conducting and synthesizing interviews with process-integration, IT, and process engineers from TSMC and Micron through a transcript-to-keynote pipeline to ground product feature prioritization.
- Authored competitive analyses (PDF Solutions, XperiDesk, FlowDoodle) and MES (Manufacturing Execution System) landscape research, distilled into Fab Run feature proposals (control-chart review, excursion and drift alerting, yield prediction, virtual metrology, and commonality analysis for root cause).
- Delivered internal Fab Experience Sharing presentations translating semiconductor-fab domain knowledge (naming conventions, data pipelines, SPC) for the software engineering team.
- Reviewed ML-for-fab-yield literature and proposed a virtual-fab simulation approach that generates labeled excursion events to train root-cause and commonality-analysis models.

Full-Stack Developer (Part-time) at Stage Intelligence (stage-intelligence.com), Cambridge, MA

Early-stage AI startup for stage-lighting and venue-operations automation

May 2026 – present

- Architected and shipped a serverless full-stack SaaS on Cloudflare Pages and Pages Functions (TypeScript), Supabase (Postgres, Auth, Row-Level Security), and LLM APIs (Claude and OpenAI) for an AI venue-intake product.
- Built and deployed the company website (stage-intelligence.com): a static, SEO-optimized homepage (Open Graph, JSON-LD) with a shared-includes prerender and sitemap pipeline and a Stories blog, auto-deploying from GitHub to Cloudflare Pages; restructured a heavy React and Vite single-page app into a separate route.
- Scaffolded the product app end to end: Supabase schema and seed data, REST API endpoints verified locally, plus domain and DNS setup on Cloudflare and a GitHub organization for the team.
- Built Python data pipelines, including a PDF tech-pack to structured-document extraction pipeline (deterministic image cropping plus LLM labeling with a two-tier automated fact-check) and a coverage-matching analysis tool.

Machine Learning and Circuit Design Intern at Synopsys Inc (synopsys.com)

May 2025 – Aug 2025

- Developed a Circuit Foundation Model (CFM) for VLSI circuits using Recurrent Hypergraph Neural Networks (RHGN), representing circuits as hypergraphs to generate embeddings for devices, wires, and terminals based on their connectivity.
- Designed and implemented advanced message-passing ("hopping") algorithms to recursively capture and aggregate connection information across circuit components, enabling robust circuit representation learning.
- Built modular utilities—including a TrainingRecorder for loss tracking, ConfigManager for centralized hyperparameter management, and ResourceManager for real-time memory/CPU monitoring—to streamline and maintain complex training workflows.

- Automated the visualization of neural network weights and biases at each training epoch, producing interpretable heatmaps and GIFs to understand model attention, enhance model transparency (explainable AI) and facilitate diagnostics.
- Engineered custom loss functions and evaluation metrics (including confusion matrices, precision, recall, and F1-score) to effectively address severe class imbalance and improve model performance assessment.
- Developed scalable data ingestion and preprocessing pipelines capable of handling large-scale circuit datasets, supporting flexible batch training and efficient experimentation.

Teaching Assistant, Massachusetts Institute of Technology, Cambridge, MA: *6.2500 Nanoelectronics and Computing Systems* and *6.2000 Electrical Circuits*
Jan 2025 – May 2026

- Coded Python simulations of band diagrams and semiconductor properties and guided final device-design projects in Synopsys Sentaurus TCAD (6.2500); ran hands-on circuit and microcontroller labs, debugging student circuits and contributing homework solutions and exam questions (6.2000).

Process Integration Engineer at Micron Technology, Inc. (micron.com), Taoyuan, Taiwan
E2: Jun 2021 – Oct 2021; E1: Sep 2020 – Jun 2021

- Coordinated manufacturing areas for production line problem solving, process margin enlargement, and yield enhancement, increasing revenue and reducing cost.
- Resolved word line broken issue of DRAM at FEOL caused by defect-induced block etching, using N_2 purge loading port to prevent defects from outgas condensation of the previous process.
- Used 6-month specification-to-yield graph to identify and solve contacts short issue of DRAM at MOL which arose from narrow overlay window.
- Created data visualization with SQL and Tableau to automatically highlight inline control chart deviations across thousands of charts, saving the department roughly six hours per engineer per week.
- Constructed hourly-update control table allowing every production area to input impacted product and risk level during a major fab event, providing live loss estimation and yield loss projection.
- Developed a conversion plan management system that monitors every engineer's experiment on the production line to provide daily update emails on status, in-line metrology data, and expected final probe test date.
- Wrote 8D reports and provided CAPA (corrective action and preventive action) for root-cause analysis on production issues; participated in cross-department 8D discussions on RMA (returned merchandise administration).

Founder, Chemistry Chi Chi — Private Test Prep Institute for Master Entrance Exam, Taiwan
Sep 2020 – Sep 2021

- Founded and operated a private test prep institute focused on chemistry entrance exams for master's programs.
- Conducted market research to select a location within budget; oversaw renovation and interior design of the classroom space.
- Developed and delivered comprehensive curriculum covering undergraduate-level organic, inorganic, physical, and analytical chemistry, along with test-taking strategies.
- Applied evidence-based learning frameworks (Ebbinghaus forgetting curve, Dunning-Kruger effect, Eisenhower Matrix, Pareto principle) to optimize educational outcomes.
- Led marketing and outreach by connecting with alumni networks and establishing an official website to attract and retain students.
- Invited guest lecturers from top graduate programs to present on research topics and offer insights into graduate study and academic careers.
- Provided personalized academic and career consultations in chemistry-related fields.
- Managed all aspects of the business: curriculum planning, instruction, marketing, and administration.

Teaching Assistant, National Taiwan University, Taipei, Taiwan: *General Chemistry*, *Organic Chemistry* I/II, and *Analytical Chemistry* laboratory
Feb 2018 – Jan 2019

- Led review sessions and laboratory instruction for classes of about 30 to 150 students; wrote and graded exams, quizzes, and lab reports.

Research Experience

Position & Description	Period
PhD program research in Prof. Jing Kong's Group, Massachusetts Institute of Technology, MA • Developed an AI-empowered automated system for 2D material image sampling and scoring to enhance CVD process control and characterization in semiconductor research. • Engineered a comprehensive automation solution from software, firmware, to hardware leveraging python, microcontroller, and linear motion system. • Implemented machine learning techniques for the optimization of 2D material synthesis, including recipe optimization and analysis of Raman and photoluminescence spectra. • Developed computer vision technique to precisely determine rotational angles (0.1°–5°) for 2D material heterostructure fabrication without expensive hardware modifications.	Dec 2022 - Present
Master program research in Prof. Pi-Tai Chou's Group in Physical Chemistry, Material, and Chemical Biology, National Taiwan University, Taiwan (degree Feb 2020; research continued to Aug 2020) • Thesis title: Rudimentary photophysical property of selected 3-substituted phenothiazines. • Explored the photophysical property of 3-substituted phenothiazine and fluorescent nitro compound with steady-state and time-resolved spectroscopy. • Used a computational approach with time-dependent density functional theory for molecular geometry, oscillation strength, and transition wavelength. • PbS quantum dot synthesis using hot-injection method, fluorescent quantum yield measurement, and morphology characterization for infrared fluorescent applications.	Feb 2018 - Aug 2020
Summer exchange researcher in Prof. Jan Kleissl's Solar Resource Assessment and Forecasting Lab, University of California, San Diego, CA • Research topic: Cloud Shadow Speed Sensor – The Future of Solar Forecast Technology. • Analyzed weather data from fisheye all sky camera. • Utilized Microcontroller programming, fail safe bypass system design and wiring for Cloud shadow speed sensor aimed for desert operation. • Designed and constructed Arduino weather monitoring systems for solar forecasting.	Jul 2014 - Aug 2014
Undergraduate research in Prof. Jer-Shing Huang's Group in Nanooptics, Plasmonics, Microscopy, and Applied Spectroscopy, National Tsing Hua University, Taiwan • Thesis title: Sorting Self-assembled Single-crystalline Gold Microplates by Eddy Current. • Sorted eddy currents of self-assembled single-crystalline gold microplates with time-variant magnetic field created by magnets rotor assembly. • Synthesized gold nanoparticles and gold microplates by controlled reduction of hydrogen tetrachloroaurate precursor. • Designed and fabricated electric circuits for DC motor speed control system for the magnetic rotor assembly.	Apr 2013 - Aug 2016

Publications

- Ang-Yu Lu, Richard A. Chen, Aijia Yao, Meng-Chi Chen, Ji-Hoon Park, Tianyi Zhang, Xudong Zheng, Nannan Mao, Jiangtao Wang, Zhien Wang, Tomás Palacios, Jing Kong. Text Mining of CVD Synthesis Recipes for 2D Materials. *Advanced Materials*, 2026, e09132. DOI: 10.1002/adma.202509132
- Zhien Wang, Haozhe Wang, Roman Caudillo, Jiangtao Wang, Zhenjing Liu, Alexandre Foucher, Ji-Hoon Park, Meng-Chi Chen, Ang-yu Lu, Peng Wu, Jiadi Zhu, Xudong Zheng, Tymofii S. Pieshkov, Steven A. Vitale, Yimo Han, Frances M. Ross, Iwnetim I. Abate, Jing Kong. Interfacial Oxidation of Metals on Graphene. ACS Applied Nano Materials, 2024, 7(21), 24537-24546. DOI: 10.1021/acsanm.4c04283
- Meng-Chi Chen, Deng-Gao Chen, Pi-Tai Chou. Fluorescent Chromophores Containing the Nitro Group: Relatively Unexplored Emissive Properties. ChemPlusChem, 2021, 86, 11-27. DOI: 10.1002/cplu.202000592
- Meng-Chi Chen, Yao-Lin Lee, Zhi-Xuan Huang, Deng-Gao Chen, Pi-Tai Chou. Tuning Electron-withdrawing Strength on Phenothiazine Derivatives: Achieving 100% Photoluminescence Quantum Yield by $-NO_2$ substitution. Chemistry - A European Journal, 2020, 26(31) 7124-7130. DOI: 10.1002/chem.202000754
- Deng-Gao Chen, Yi Chen, Cheng-Ham Wu, Yi-An Chen, Meng-Chi Chen, Jia-An Lin, Chun-Ying Huang, Jianhua Su, He Tian, Pi-Tai Chou. Phenothiazine Scope: Steric Strain Induced Planarization and Excimer Formation. Angewandte Chemie, 2019, 131(38), 13431–13435. DOI: 10.1002/anie.201906083
- Yi Chen, Deng-Gao Chen, Yi-An Chen, Cheng-Ham Wu, Kai-Hsin Chang, Fan-Yi Meng, Meng-Chi Chen, Jia-An Lin, Chun-Ying Huang, Jianhua Su, He Tian, Prof. Pi-Tai Chou. Mono-Heteroatom Harnessing Excited-state Structural

Planarization for Dihydrodibenzo[a,c] phenazines. Chemistry - A European Journal, 2019, 25(72), 16755-16764. DOI: 10.1002/chem.201904900

- Paramaguru Ganesan, Deng-Gao Chen, Wen-Cheng Chen, Premkumar Gnanasekaran, Jia-An Lin, Chun-Ying Huang, Meng-Chi Chen, Chun-Sing Lee, Pi-Tai Chou, and Yun Chi. Methoxy substituents activated carbazole-based boron dimesityl TADF emitters. Journal of Materials Chemistry C, 2020, 8, 4780-4788. DOI: 10.1039/C9TC07020F
- Gave talk titled "Sorting Self-Assembled Single-crystalline Gold Microplates by Eddy Current" at the 9th International Conference on Nanophotonics (ICNP 2016) held at Academia Sinica, Taiwan, Mar 23, 2016.

Preprints

- Tsung-Yu Yang, Meng-Chi Chen. ESGLens: An LLM-Based RAG Framework for Interactive ESG Report Analysis and Score Prediction. arXiv preprint arXiv:2604.19779 (2026). DOI: 10.48550/arXiv.2604.19779
- Meng-Chi Chen. The Three Axes of Success: A Three-Dimensional Framework for Career Decision-Making. arXiv preprint arXiv:2601.17023 (2026). DOI: 10.48550/arXiv.2601.17023

Skills

Category	Details
Language	Mandarin Chinese and Taiwanese: Native; English: Fluent
Instrument	TEM (JEM1230 and T12). NMR (Bruker 400). Fluorescence and single photon counting (FLS980 and FS920). UV-Vis (U3310). Cleanroom techniques, photolithography, PVD and CVD.
Programming	• Strongest: Python and PyTorch – building efficient, maintainable ML pipelines and model training workflows. • Automation & Microcontrollers: VBA, Visual Basic, Arduino (C/C++). • Embedded & Instrumentation: ESP32, RS-485, RS-232, Modbus RTU, serial protocol decoding, serial device servers, power and current metering. • Systems & Dev: Linux, SSH, Bash/Shell scripting for automation and remote development. • Simulation: Synopsys Sentaurus TCAD, Mathematica, MATLAB. Database & Visualization: SQL, Tableau. • 3D Modeling & Printing: Blender, AutoCAD, UltiMaker Cura. • Academic Writing: LaTeX, EndNote, Microsoft Office. • Web & App: HTML, CSS, JavaScript, TypeScript, React, Vite. (Personal Website: edchen1240.com) • Cloud & Backend: Cloudflare (Pages, Functions, Workers, D1, R2, Zero Trust Access, DNS), Supabase (Postgres, Auth, RLS), REST APIs, Git and GitHub, LLM API integration (Claude, OpenAI).

Projects

Personal projects, each conceived, architected, and project-managed by me; software implemented by AI coding agents under my direction.

Home Energy and Monitoring System, self-built, Worcester, MA (smarthome.edchenlab.com)
Used solar panels, a hybrid inverter, a $LiFePO_4$ bank, and a human-powered generator integrated into one system with sensor-to-cloud monitoring
Jul 2026 – present

- Integrated a 2.04 kW array of used panels, a 6 kW hybrid inverter, a 10.24 kWh $LiFePO_4$ bank, and a human-powered generator (48 V BLDC motor, 19.48:1 two-stage chain drive, characterized by open-circuit and loaded fits) into a working home system; the water heater runs on stored solar power, and a current-sensing relay on the inverter's remote-switch logic wakes it only on demand, cutting standby loss from an estimated 1.7–2.4 kWh to a measured 0.04–0.06 kWh per day.
- Architected a sensor-to-cloud telemetry chain and monitoring app: an ESP32-S3 and Ethernet serial servers poll the battery over RS-485 and a temperature sensor over Modbus RTU every minute into Cloudflare Workers and D1, served through Pages and Zero Trust Access with HMAC-signed expiring guest passes; cross-validated the battery-protocol decoder in Python and JavaScript on live hardware (0 failures in 513 frames) and qualified five serial device servers by loopback and CRC tests.
- Validated every instrument against physics before trusting its data: caught a tenfold scale misprint in a meter manual through $P = VI\cos\phi$, matched two current meters to 0.9% over 20 points, and traced a non-charging PV string to three stacked causes (a shading-collapsed knee at $V_{mp}/V_{oc} = 0.60$, output below the inverter's own standby draw, and an unconnected input terminal), rewiring and re-fusing it the same day.

Human Karaoke, karaoke songbook and live request platform (karaoke.edchenlab.com)
Sep 2026 – present

- Conceived and launched a gated songbook of 426 songs in 8 languages with a song graph that links each song to 8 related songs (934-song map, 3,600 edges), an idea carried over from circuit-graph representation learning; used for live request queueing at a community gathering of about 50 people.
- Directed multiple AI coding agents across 24 Python data-pipeline scripts and a Cloudflare Pages Functions and D1 backend (about 4,450 lines of site code, 94 changelog entries in six weeks), with each product decision recorded and verified by about 140 automated checks.

Personal Websites: edchen1240.com (bilingual knowledge site), edchenlab.com (deployed apps), and mit.edu/~edchen93 (MIT online CV)
Jan 2024 – present

- Turned first-hand experience of navigating US systems as an international student (banking, visas, cross-border marriage, thesis writing) into 29 searchable articles that reach people when they need them: 1,430 Google search clicks and 38,400 impressions in the three months to Oct 2026 (average position 6.9); readers have reached out for career consultation. Representative pieces: US school district quality (13 peer-reviewed sources and primary public records) and opening a US bank account without an SSN (the site's most-clicked article).
- Build and run my own sites in place of social media, and measure them: Google Search Console and visitor analytics kept as a long-term record, with article revisions evaluated by pre- and post-tests against control articles.

Achievements

Award & Description	**Period**
Excellent Poster Award and Popular Poster Award titled "Rudimentary photophysical property of selected 3-substituted phenothiazines" in 2020 Graduate Student Poster Exhibition of Department of Chemistry, National Taiwan University.	Jun 2020
Dean's Award of College of Science, for outstanding master research in National Taiwan University, titled "Rudimentary photophysical property of selected 3-substituted phenothiazines".	May 2020
First Place Award over 17 competitors (2^{nd} stage) in College Student Thesis Competition of the $\mathbf{1}^{st}$ SPINTECH Technology Thesis Award titled "Sorting Self-assembled Single-crystalline Gold Microplates by Eddy Current", held at Sun Moon Lake, Nantou County, Taiwan, Nov 28, 2015, with an award of US$700.	Nov 2015
Special Prize of Industry Application in 2015 NCCU × NTUST Hackathon, presented concept for team of four of a circular economy business model based on secondhand cloth selling, dressing discussion social platform along with accessory selling and advertising. National Chengchi University, Taipei, May 15–17, 2015.	May 2015
Outstanding Presenter Award titled "Cloud Shadow Speed Sensor – The Future of Solar Forecast Technology" in 2014 UCSD Summer Research Conference held at UC San Diego, Aug 14, 2014.	Aug 2014