Yi-Chun Liao

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EDUCATION

Duke University — **Durham, NC**
Ph.D. in Electrical and Computer Engineering — *Aug. 2026 – Present*
- Advisor: *Prof. Yiran Chen*

National Taiwan University (NTU) — **Taipei, Taiwan**
B.Sc. in Computer Science and Information Engineering (CSIE) — *Sep. 2021 – Jan. 2026*
- Overall GPA: 3.90/4.30, Last 60 GPA: 4.09/4.30

PUBLICATIONS

Yi-Chun Liao, Chieh-Lin Tsai, Yuan-Hao Chang, Camélia Slimani, Jalil Boukhobza, and Tei-Wei Kuo. "RETENTION: Resource-Efficient Tree-Based Ensemble Model Acceleration with Content-Addressable Memory." *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD 2026)*. Link.

Yi-Chun Liao, Chieh-Lin Tsai, Yuan-Hao Chang, Camélia Slimani, Jalil Boukhobza, and Tei-Wei Kuo. "Practicalizing Tree-Based Model Acceleration with CAM through Model Pruning and Data Placement Optimization." *ACM/IEEE International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS 2025)*. Link.

Hong-Wei Li, Ping-Ting Liu, Bo-Wei Lin, **Yi-Chun Liao**, and Yennun Huang. "IPMES: A Tool for Incremental TTP Detection Over the System Audit Event Stream." *IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2024)*. Link.

RESEARCH EXPERIENCE

Research Intern — **Indiana, United States**
University of Notre Dame, Advisor: Prof. X. Sharon Hu — *May 2025 – Present*
- Conduct independent research on realizing scalable in-memory retrieval with content-addressable memory (CAM), co-designing algorithm and hardware to prevent the massive data movement of retrieval phase.
- Conduct independent research on alleviating the capacity constraint of in-memory hyperdimensional computing, adapting the model for hardware constraints and introducing an algorithm for scalable CAM implementations.
- Contribute to the extension of the open-source CAM simulator CAMASim, enabling data mapping optimizations with SPC and ODR, algorithms proposed in RETENTION.

Research Assistant — **Taipei, Taiwan**
Academia Sinica, Advisors: Prof. Yuan-Hao Chang and Prof. Tei-Wei Kuo — *Apr. 2024 – Jun. 2026*
- Conducted independent research on minimizing resource consumption for tree-based ensemble model inference, introducing an end-to-end framework RETENTION to minimize the capacity requirement for CAM-based acceleration.
- Explored and quantified the relationship between capacity redundancy and processing overhead, enabling flexible tradeoffs between controllable accuracy loss, energy consumption, and capacity requirement.
- Reduced capacity requirement by 4.35× to 207.12× with less than 3% accuracy loss and no degradation on throughput and energy efficiency. The first-authored paper was published in TCAD.
- Collaborated on minimizing retrieved tokens for RAG acceleration, exploring the tradeoffs between accuracy, latency, and capacity requirement.

Research Assistant — **Taipei, Taiwan**
Academia Sinica, Advisor: Prof. Yennun Huang — *Jul. 2023 – Jun. 2024*
- Collaborated on developing a data analytics tool, IPMES, to detect structural anomalies and trace event patterns within system log streams. The co-authored paper was published in DSN 2024.
- Constructed an automated framework to simulate diverse system workloads and log operating system behavior inside virtual machines. The framework was subsequently used for dataset synthesis.

TEACHING EXPERIENCE

Teaching Assistant **Taipei, Taiwan**
Computer Architecture, Lecturer: Prof. Chia-Lin Yang *Sep. 2024 – Jan. 2025*
- Supported the instruction of the junior compulsory course Computer Architecture at NTU, enrolled by over 100 students.
- Led weekly discussion sessions, designed and/or graded assignments, quizzes, and exams.
- Provided voluntary office hours, exceeding 10 hours per week during exam periods.

Teaching Assistant **Taipei, Taiwan**
APCS Camp *Jul. 2022/23 – Aug. 2022/23*
- Provided TA hours for over 300 C++ beginners during two-week crash courses.
- Adapted teaching strategies including programming problem solving and customized course reviews to meet the diverse needs and skill levels of students.

HONORS

First Place of Bachelor Thesis Award **Taipei, Taiwan**
National Taiwan University *2025*
- Distinguished through a three-stage selection process and recognized as one of the top 2 in the CSIE Department, the best in the EECS College, and one of the top 6 university-wide.

Appier Enterprise Award **Taipei, Taiwan**
National Taiwan University *2025*
- Received the Most Potential Award from Appier in the departmental undergraduate research exhibition.

Dean's List Award **Taipei, Taiwan**
National Taiwan University *2025*
- Ranked 1/155 in the department for both Spring and Fall 2024 semesters.

Irving T. Ho Memorial Scholarship **Taipei, Taiwan**
Irving T. Ho Memorial Foundation *2024*
- Awarded to 3 students in the department for academic and research excellence.

First Place of AUO Enterprise Award **Taipei, Taiwan**
MakeNTU 2024 (Nationalwide Makerthon) *2024*
- Designed an interactive in-car RPG game for AUO smart windows to enhance travel experience, which was recognized as the best work for AUO Enterprise Award among 43 teams.

EXTRACURRICULAR ACTIVITIES

President **Taipei, Taiwan**
NTU CSIE Department Student Association *Aug. 2023 – Jul. 2024*
- Directed the student council of the CSIE department with over 50 members.
- Promoted student welfare and represented over 600 students in faculty meetings, contributing to departmental decisions.

Vice President **Taipei, Taiwan**
NTU EECS College Student Association *Aug. 2023 – Jul. 2024*
- Represented over 1500 students in college faculty meetings and helped shape student-related policies.

President **Taipei, Taiwan**
NTU Cancer Children Service Club *Feb. 2023 – Jul. 2023*
- Led a 50-member service club, managing budget allocation and arranging educational and recreational activities.
- Worked with Childhood Cancer Foundation of R.O.C., organizing voluntary services to reduce the burden of parents.

Vice Coordinator **Taipei, Taiwan**
NTU CSIE Camp *Feb. 2023 – Jul. 2023*
- Organized a 6-day camp for over 100 high school students with a 50-member staff team.
- Designed activities to introduce students to the CSIE department and provide insights into university life.