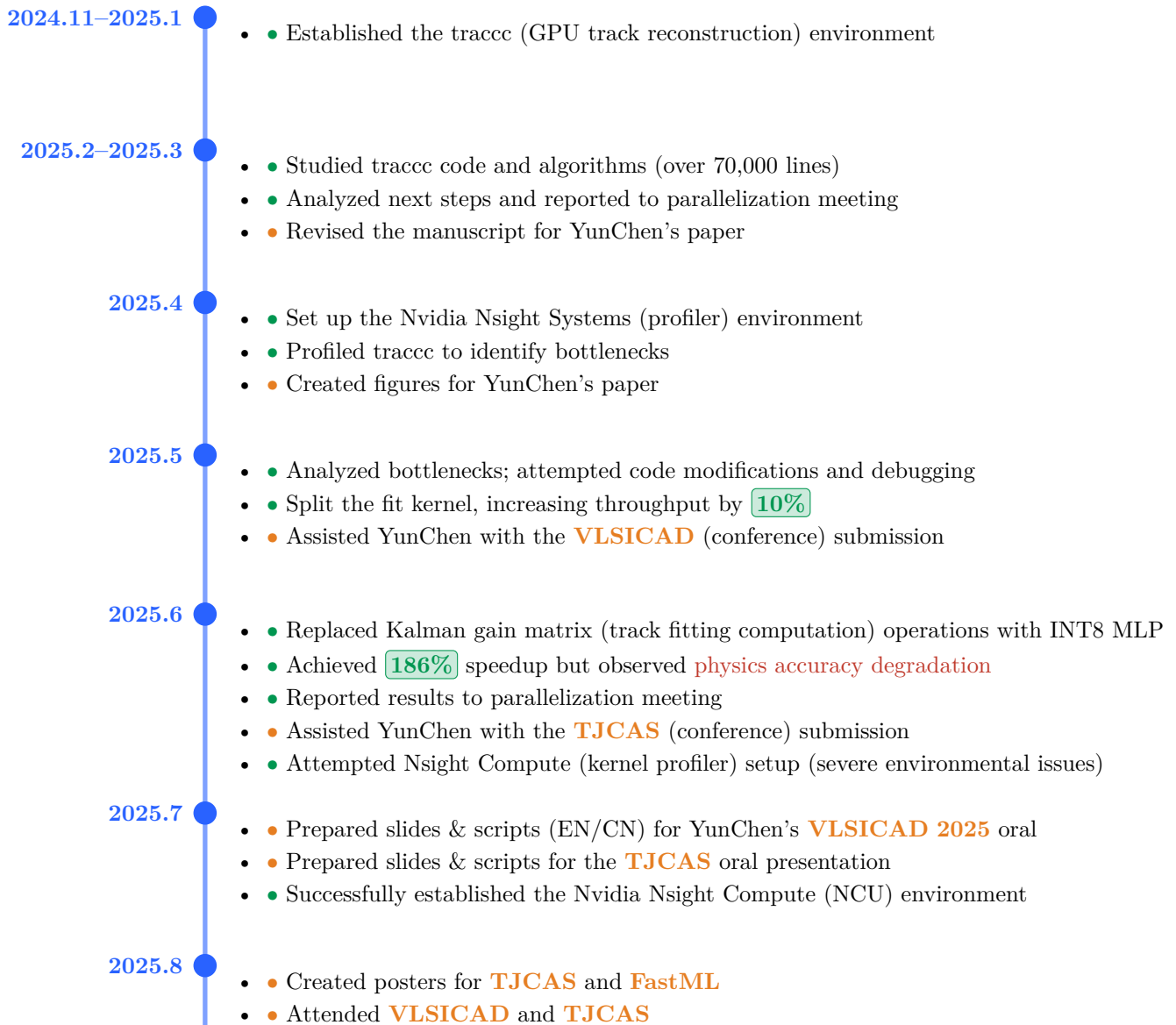


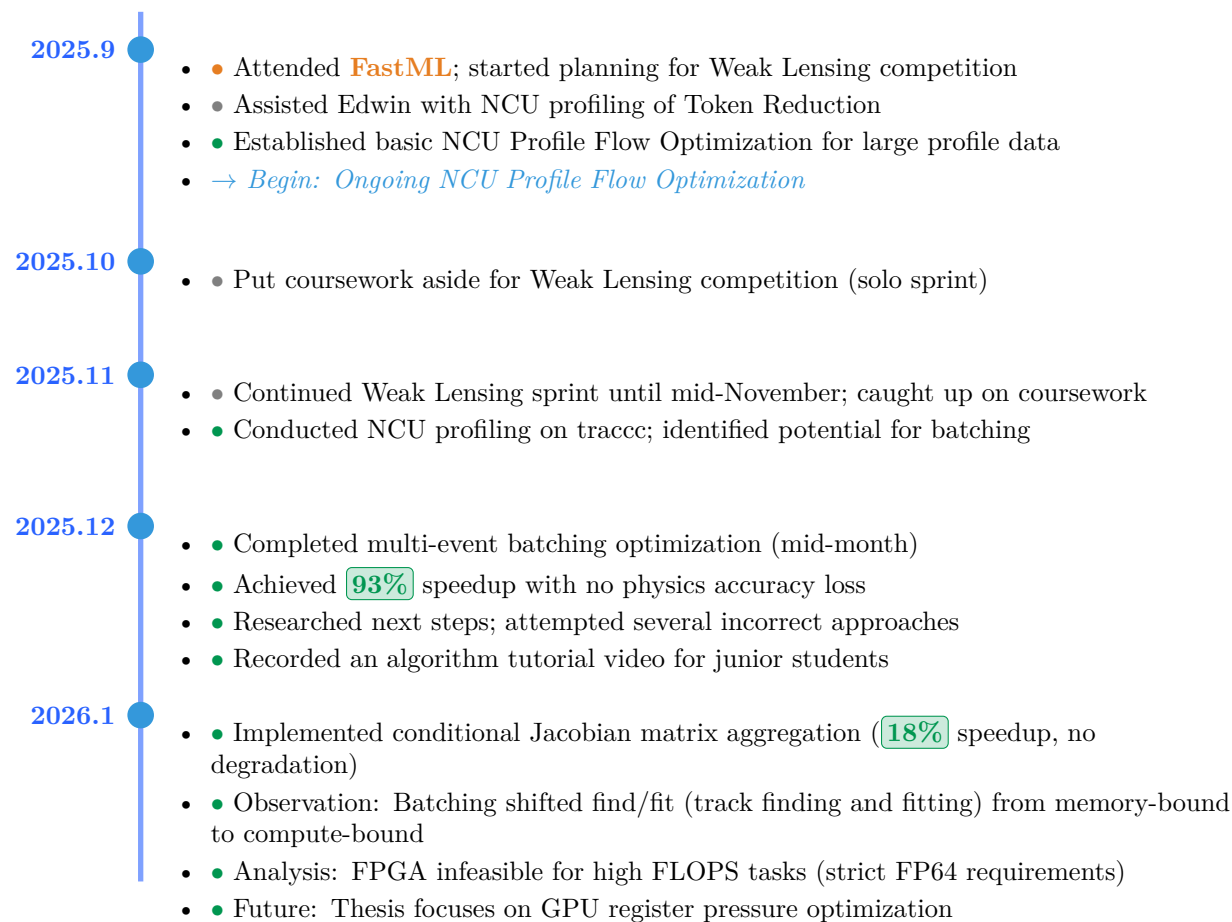
# Research Timeline of Master Thesis

Hao-Chun Liang

November 2024 – January 2026

- 
- 2024.11–2025.1
- Established the traccc (GPU track reconstruction) environment
- 2025.2–2025.3
- Studied traccc code and algorithms (over 70,000 lines)
  - Analyzed next steps and reported to parallelization meeting
  - Revised the manuscript for YunChen's paper
- 2025.4
- Set up the Nvidia Nsight Systems (profiler) environment
  - Profiled traccc to identify bottlenecks
  - Created figures for YunChen's paper
- 2025.5
- Analyzed bottlenecks; attempted code modifications and debugging
  - Split the fit kernel, increasing throughput by 10%
  - Assisted YunChen with the VLSICAD (conference) submission
- 2025.6
- Replaced Kalman gain matrix (track fitting computation) operations with INT8 MLP
  - Achieved 186% speedup but observed physics accuracy degradation
  - Reported results to parallelization meeting
  - Assisted YunChen with the TJCAS (conference) submission
  - Attempted Nsight Compute (kernel profiler) setup (severe environmental issues)
- 2025.7
- Prepared slides & scripts (EN/CN) for YunChen's VLSICAD 2025 oral
  - Prepared slides & scripts for the TJCAS oral presentation
  - Successfully established the Nvidia Nsight Compute (NCU) environment
- 2025.8
- Created posters for TJCAS and FastML
  - Attended VLSICAD and TJCAS

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Legend

● Technical/Optimization   ● Conference/Paper   ● Collaboration/Other

**Green Badge** = Performance Achievement   **Red Text** = Accuracy Concern   **Blue Sidebar** = NCU Flow Optimization Period

Key Performance Achievements

<b>10%</b>	Fit kernel splitting	2025.5
<b>186%</b>	INT8 MLP replacement (with accuracy trade-off)	2025.6
<b>93%</b>	Multi-event batching (no accuracy loss)	2025.12
<b>18%</b>	Conditional Jacobian aggregation (no accuracy loss)	2026.1