Leo Hanxu

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Education

University of Waterloo — Waterloo, Canada
PhD, Computer Science, — *Jan. 2025 – Dec. 2029*

- Research in physics-based simulation, specifically fluid-based simulation, under the supervision of Professor Christopher Batty

University of Toronto — Toronto, Canada
Bachelor of Applied Science, Computer Engineering, 4th year + PEY; — *Sep. 2019 – May 2024*

- **GPA: 3.86/4.00**, Highest Sessional Average: **93.3%**, Dean's Honours List for All Semesters.
- Course Taken (Course Mark): Computer Graphics (**93%**), Linear Algebra (**93%**), Calculus(**92%**), Multivariable Calculus(**90%**), Matrix Algebra (**93%**)

Research Experience

Research Assistant under Professor Levin — Toronto, Canada
Dynamic Graphics Project Lab — *May 2024 – Current*

- Project Description: Working with PhD student Abhishek Madan on the project about smooth distance constraint for co-dimensional geometry.

Research Assistant under Professor Genov — Toronto, Canada
Intelligent Sensory Microsystems Laboratory: Image Sensor — *May 2021 – July 2021*

- Project Description: Develop a new generation of camera with new capabilities such as the ability to sort the incoming photon based on their properties.
- Task: Develop a **Python API** that communicates with the chip and determine whether the chip output is correct. Working and discussing with PhD students and learning new concepts including Huffman Decoding and using OpalKelley library.

Work Experience

AMD — Toronto, Canada
SOC FEINT Silicon Design — *May 2022 – June 2023*

- Responsible for creating automation scripts to extract and organize errors in Verilog using **Perl**.
- Responsible for maintaining the CDC tool, resulting in a 30% reduction in error reports.
- Responsible for mentoring and training new interns.

Projects

Computer Graphics Project (C++)

- Implement various computer graphics projects in various sub-fields.
- Rendering: Rasterization, anti-aliasing, ray tracing, texture mapping, bump map.
- Geometry: Clark-Catmull subdivision.
- Character Based Animation: Forward kinematic, motion retargetting, backward kinematic, catmull-rom spline, linear skinning.
- Physics Based Animation: Fast Cloth Simulation of Mass-Spring Systems, Deformable Object simulation using both Mass-Spring System and using FEM. (https://github.com/Winnerrang/CSC417-PBA-Lab)

Optics Simulation and Education Website (Unity, C#)

- Simulate the microscopic behavior of light such as wave propagation and polarization.
- Create the interactive website, so that student can change the parameter of light and optic device to observe change of electric field of the light.
- Website Link: https://ece496-game-project.github.io/

Operating System: OS161 (C)

- Designed and developed a BSD-like operating system that supported synchronization (lock, semaphore and CV), process management (fork, waitpid, execv) and virtual memory management (TLB fault / page fault handler, demand paging, copy-on-write, swapping).
- Achieved full mark in synchronization and process management section, 166/175 in virtual memory management. **Rank 1st** in the peer class.

Branch Prediction(C++)

- Implemented the branch prediction algorithm based on the paper titled "Analysis of O-Geometric History Length branch predictor."
- Competed with 41 other groups in the Computer Architecture class.
- Finally achieved a branch prediction accuracy of **95.03%** and secured the **2nd place** on the leaderboard.

Small C Compiler (C++)

- Implement various stage of compiler including, AST Tree Builder, Semantic Check, IR Generation, Control Flow Analysis

Geographical Information System with Related Algorithm (C++)

- Designed a city Geographic Information System using C++ and OpenStreetMap database, along with UI design.
- Solved the shortest path problem by implementing Dijkstra algorithm and A* heuristic algorithm.
- Optimized a solution to the Traveling Salesman Problem (TSP), an NP-hard problem, using heuristic methods including greedy algorithm, two-opt, and simulated annealing. **Ranked 9th** out of over 100 teams in the final results.

Bitsummt Game Jam (C#)

- Responsible for C# programming related to game logic in an 11-member Chinese-Japanese team, and developed a side-scrolling parkour game based on Unity.
- Responsible for program development related to enemy AI, random map generation, and score ranking in the game.

Skills

Programming: C, C++, C#

Game Engine: Unity

Graphics related interests: Physics-Based Animation