Yitong (Tony) Zhao

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Updated Jan 14, 2024; check the newest version *here*, the top 20 activities and honors *here*, the photography resume *here*.

Education

Princeton International School of Math and Science (PRISMS)

📅 Sept 2021 — current   📍 PRISMS, NJ

- GPA (Freshmen - Junior, unweighted): **3.99/4.00**
- SAT : **1570/800 (Math 800/800, English 770/800)**

CS/CE-related courses:

- **Freshmen:** Precalculus (A); Principles of Computer Science (A); Applied Engineering 1 (A)
- **Sophomore:** AP Calculus BC (A); AP Computer Science Plus (A); Applied Engineering 2 (A)
- **Junior:** Differential Equation (A-); Multivariable Calculus (A); Linear Algebra (A); Artificial intelligence (A); CS/AI Research (A)
- **Senior:** Advanced Robotics; Interactive Media & Game Design; CS/AI Research; AP Statistics

MIT 6.S081

📅 June 2022 — July 2022

- An operating system open course.
- Completed all labs and lectures independently; wrote detailed notes about my approaches in each lab. Examples include *Lab3* and *Lab11*.
- Solutions to the labs are available in this *GitHub repository*.
- listed as *reference material on csdiy.wiki*.

Ray Tracing in One Weekend / The Next Week

📅 Aug 2022 — Oct 2022

- Built a ray tracer that includes functionalities in the first two volumes of the book. Source code available in this *GitHub repository*.
- Implemented additional features like multi-threading not included in the book.

Stanford CS144

📅 Dec 2022 — Jan 2023

- A course on computer networks and TCP protocol.
- Completed the first four labs, finishing an implementation of TCP.
- Posted detailed notes about my approaches on my personal website: *CS144 Notes*.

GAMES101

📅 June 2023 — July 2023

- Course on modern computer graphics; completed all lectures
- Participated in a lab for the more advanced course *GAMES202* on real-time rendering.

Digital Logic Design Summer Course

📅 July 2023   📍 Cooper Union, NY

- Developed a Flappy Bird game using logic gate chips.
- Used the knowledge to led CS club project on building *full adders with logic gate chips.*

NYT Photojournalism as Art

📅 Jun 2024   📍 School of New York Times, NY

- Learned history, techniques, and ethics of photojournalism.
- Created a *photo essay* on Life in New York City.
- Created a *zine* with other students.

ICP Analog Photography

📅 Aug 2024   📍 International Center of Photography, NY

- *Black-and-White Film photography*: learned film development and darkroom printing.
- *Film Scanning*: learned film digitalization with DSLR and film scanner.

CS/CE Projects

Personal website

📅 Aug 2021 — current

- Started the website to share detailed solutions for competitive programming problems.
- Extended to include notes from open courses, articles on topics like the low-level implementation of function calls, and contributions to OI wiki.
- Published articles like one about *treaps* for OI wiki and another about *function calls* accepted by Luogu Daily.
- Multiple articles listed as top search results in Google, such as *implementation of function calls.*

IBCP (Innovative Bot Coding Playground) [*frontend*, *backend*]

📅 Apr 2023 — Aug 2024

- An educational tank game where users write scripts for human/bot-bot matches.
- Modular design for easy customization (gameplay tweaks, control modes like keyboard/controller), adaptable to different skill levels.
- Running bots on difference threads/processes to prevent blocking, ensuring smooth gameplay.
- Debugging tools for beginners, with advanced strategies for experienced users (like async APIs and multithreading).
- Built a collision engine from scratch, supporting boolean operations on shapes through computational geometry.
- Use websocket for real-time communication between frontend/bot and backend, ensuring easy multilanguage support.
- *2nd Place in CS* and *ACM Award*, North Jersey STEM fair.

PyAutoGrade

📅 Sept 2023 — current   📍 PRISMS, NJ

- Python project that evaluate student code submissions.
- Handles memory leaks, infinite loops, security issues including file access, and more.
- Support simulated I/O for testing, students can directly use `input()` and `print()` in their code.

Rust Parser in OCaml

📅 Jul 2024 — Aug 2024   📍 Stony Brook University, NY

- Partially support parsing Rust source code into an AST using OCaml.

- Use Menhir as the parser generator, and OCamllex for lexical analysis.
- Solved various syntax conflict in LR(1) parsing, including using a Python pre-processor.
- Developed automatic AST visualization tool using *ppxlib* metaprogramming tool and *Mermaid.js*.

Neural networks

📅 Oct 2022

- Built a fully-connected neural network from scratch to recognize hand-written digits in the MNIST dataset.

Chess

📅 Dec 2022 — Jan 2023   📍 PRISMS, NJ

- Developed chess software; In charge of GUI using *swing*.
- Implemented various algorithms for chess bot, including alpha-beta pruning, transposition tables, principle variation search, etc.

Magnetic field in solenoids illustration video using Manim

📅 Aug 2023   📍 PRISMS, NJ

- Created an illustration video using Manim to explain the uniform magnetic field in solenoids.

Experiences and Positions

Computer Science Club

📅 Sept 2021 – current; 4hr/wk; 36wk/yr   📍 PRISMS, NJ

- Club leader starting from junior year.
- Established the *club website*.
- Led projects such as house event webstie, building full adders with logic gate chips, and creating math illustration videos with Manim.
- Organized a trip to *PyCon*, including a special session with CMU's admission officers.
- Invited professionals to give talks on topics like open-source software.

Teaching assistant for Principles of Computer Science

📅 Sept 2023 – current; 3hr/wk; 30wk/yr   📍 PRISMS, NJ

- Developed PyAutoGrade to automate grading.
- Providing review sessions and office hours for students.
- Provided suggestion on curriculum design.

Student intern at StonySystems, CSIRE program

📅 Jul-Aug 2024; 65hr/wk; 7wk/yr   📍 Stony Brook University, NY

- Worked in *Prof. Shuai Mu*'s StonySystems lab on improving C++ memory safety and interoperability with Rust.
- Refactored a *codebase* on Rust-like smart pointers in C++.
- Partially implemented a *Rust compiler frontend* using OCaml.
- Presented progress weekly and wrote reports on C++/Rust interop.

Honors and Achievements

Gold Division, *USA Computing Olympiad (USACO)*

📅 Mar 2023

High School Mathematical Contest in Modeling (HIMCM)

📅 Nov 2023

- Meritorious, ranked in the top 202 among 967 teams. Best result of my school in past 4 years.

Carnegie Mellon Informatics and Mathematics Competition in Programming (CMIMC Programming)

📅 Apr 2023

- 4th place (Optimization Round, with two problems out of three ranked 1st and 3rd), 6th (New Language Round), and 14th place overall out of 115 teams.

North Jersey STEM fair

📅 Mar 2024   📍 Kean University, NJ

- *Second Place in CS*
- *Association for Computing Machinery (ACM) Award*

Pennsylvania Classic (PClassic)

📅 Apr 2023   📍 University of Pennsylvania, PA

- 5/50th place in the Advanced Division.

124/424, *Battlecode (An AI bot competition by MIT)*

📅 Jan 2023

Honors and Achievements (Non-CS/CE)

International Photography Award (IPA)
- 1 *Honorable Mention* in People/Lifestyle
- 10 Official Selections [*1*, *2*, *3*, *4*, *5*, *6*, *7*, *8*, *9*, *10*]

Scholastic Art and Writing Awards
- Photography
  - ‣ National: 1 Silver Medal
  - ‣ Regional: 3 Gold Keys, 2 Silver Keys, 5 Honorable Mentions
- Critical Essay
  - ‣ Regional: 2 Silver Keys, 1 Honorable Mention

Software/Programming Language Skills

- Adobe Lightroom   ●●●●○
- C++   ●●●●○
- Python/Kotlin/Java   ●●●○○
- OCaml   ●●●○○
- Typst/Latex/Hexo   ●●●○○
- Linux/Git/AutoCAD/OnShape/Logisim   ●●●○○
- Adobe Photoshop/Premiere Pro   ●●○○○

References

- *Mr. Ti Zhou*, CS Department, Stony Brook University
- *Mr. Philip Tang*, CS Teacher, PRISMS
- *Ms. Alice O'Malley*, International Center of Photography
- *Dr. Smita Sood*, Mathematics Teacher, PRISMS

Hobby

Outside CS/CE, I'm interested in photography. The following image is one of my favorites. See my *portfolio* for more.