

Yitong (Tony) Zhao

@tony.zhao@prismsus.org Personal website GitHub: @ttzytt Stack Overflow: @ttzytt

Student at Princeton International School of Mathematics and Science.

Education

Princeton International School of Math and Science (PRISMS)

- Sept 2021 — current PRISMS, NJ
- GPA (Freshmen - Junior, unweighted): **3.99/4.00**
- SAT
 - Superscore: **1550/1600** (Math: **800/800**, English: **750/800**)
 - Single sitting: **1520/1600**

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.
- Won [Second Place in CS](#) and an [Association for Computing Machinery \(ACM\) Award](#) at the 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

- 📅 Jul-Aug 2024; 60hr/wk; 7wk/hr 📍 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

USA Computing Olympiad (USACO)

- 📅 Mar 2023
- Entered the gold division.

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), 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
- 5th place in the Advanced Division.

Battlecode

- 📅 Jan 2023
- Ranked 124th out of 434 participants.

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
 - 1 National Silver Medal
 - 3 Regional Gold Keys
 - 2 Regional Silver Keys
 - 5 Regional Honorable Mentions
- Critical Essay
 - 2 Regional Silver Keys
 - 1 Regional 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 | ●●●●●● |

Hobby

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

