Isaac Dcruz

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EDUCATION

UNIVERSITY OF PENNSYLVANIA **Philadelphia, PA**
B.S. Computer Science and Mathematics *Anticipated Graduation: May 2027*

- **GPA**: 4.0
- **Relevant Coursework**: Discrete Mathematics, Programming Languages and Techniques (OCaml), Honors Multivariable Calculus, Honors Linear Algebra and Differential Equations, Data Structures and Algorithms, Theory of Computation

TECHNICAL SKILLS/QUALIFICATIONS

- **Programming Languages:** Java, Python, JavaScript, HTML, CSS, OCaml, TypeScript
- **Frameworks/Tools:** React, Next.js, Clerk, Postgresql, Node.js, MongoDB, Swing, LaTeX, Numpy, TailwindCSS
- **Certifications:** Applied Data Science Lab (SQL/NoSQL, APIs, Machine Learning)

PROJECTS

Kleanzy | *JavaScript, HTML, CSS, Node.js, MongoDB*

- Developed full-stack for a prototype social media app geared towards creating and joining community cleanup events
- Implemented user signup/login with database storage through MongoDB for account information
- Created a user-friendly frontend supporting online user-community interaction
- Awarded 3rd place in the Congressional App Challenge, recognized by CT State Rep. Jim Himes

SwipeFlix | *TypeScript, TailwindCSS, Next.js, Node.js, React, Clerk, Postgresql*

- Developed a full-stack app that allows users to get personalized movie/tv show recommendations
- Implemented user authentication using Clerk with database storage through Postgresql
- Created a responsive UI with TypeScript using Shadcn components and React framework

Fluid Dynamics Simulation | *JavaScript, HTML, CSS*

- Self-studied fluid dynamics, including concepts like divergence, curl, the Poisson pressure equations, Navier-Stokes equations, etc, as well as CFD and how to implement these physical concepts through code (e.g. Jacobi iteration)
- Optimized performance through vectorized operations significantly reducing required computation time
- Developed custom visualization system for real-time pressure and velocity field rendering (Eulerian grid-based)
- Modeled the relative velocity and pressure fields under varying starting conditions

Double Pendulum Simulation | *Python, Numpy*

- Self-studied fundamentals of chaotic motion, especially how the initial conditions impact double pendulum motion
- Used the principle of least action from Lagrangian mechanics to obtain the Euler-Lagrange equations that model the movement of the system, which were then evaluated using the Runge-Kutta approximation method

Chess Game | *Java, Swing*

- Implemented chess from scratch, including complex game logic, such as castling, checks/checkmate, en passant, etc.
- Significantly reduced move generation time by using bitboard representation and bitwise operations
- Developed an interactive GUI using Java Swing that displays legal moves and facilitates gameplay

WORK EXPERIENCE

Kumon Learning Center Math Instructor *(August 2020 – June 2024)* **Stamford, CT**

- Mentored students weekly across various math levels ranging up through Calculus III and statistics
- Closely monitored student progress by grading completed work, adapting teaching methods on an individualized basis
- Coordinated with center director to optimize curriculum delivery and student assessment methods
- Developed strong organizational skills by managing center inventory and logistics

HONORS

- Columbia University Science Honors Program: coursework in Complex Analysis and Quantum Computing Devices
- Rensselaer Medal Scholarship Recipient (awarded by the Rensselaer Polytechnic Institute)
- American Invitational Mathematics Examination Qualifier x3 (top 2.5% nationally in the AMC competition)
- Selected for the Connecticut State Math Team (ARML), competed nationally (2021-2024)
- AP Scholar with Distinction: 5s on AP Calculus BC, AP Statistics, AP Computer Science A, AP Physics C: Mechanics, and AP Physics C: Electricity & Magnetism