Nicholas Currault

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Education

California Institute of Technology
Pasadena, CA

Bachelor of Science in Computer Science, GPA: 3.8/4 — *June 2021*

- **Robert L. Noland Leadership Award**: selected by Dean for special qualities of leadership *May 2021*
- **Gnome Club**: selected for "leadership and positive impact on the Caltech community" *April 2021*

Phoenix Country Day School
Paradise Valley, AZ

GPA: 4.0/4 — *June 2017*

- Math Award, Physical Science Award, Latin Award, Senior Prize, Bausch & Lomb Award

Stanford University
Stanford, CA

High School Summer College program, GPA: 4.0/4 — *June 2016–August 2016*

Professional & Leadership Experience

Caltech CS 131: Programming Languages
Pasadena, CA

Teaching Assistant — *March 2021 - June 2021*

- Graded projects and answered student questions in upper-level computer science course
- Material included several programming languages, formal semantics, and implementation of interpreters in OCaml

Amazon
Tempe, AZ

SDE (Software Development Engineer) Intern — *June 2020 - September 2020*

- Utilized React, Formik with internal Amazon libraries to create a publicly deployed page and its supporting backend

OpenX
Pasadena, CA

Engineering Intern, SDET (Software Development Engineer in Test) — *June 2019 - August 2019*

- Implemented automated testing pipelines on Google Cloud Platform for the Data QA team

Caltech Astrophysics
Pasadena, CA

Summer Undergraduate Research Fellow — *May. 2018 - Aug. 2018*

- Worked on data reduction algorithms for Hubble Space Telescope images of protoplanetary disks

Caltech Board of Control
Pasadena, CA

Chair *March 2020–April 2021*, Secretary *March 2019-2020*, Representative *March 2018-2019* — *March 2018 - April 2021*

- Elected member of committee for hearing cases of potential Honor Code violations at Caltech.

Dabney Hovse
Pasadena, CA

Comptroller & IMSS Representative — *January 2018 - June 2021*

- Elected to manage House server/website. Implemented new house website and related web apps.

Caltech Robotics Team
Pasadena, CA

Software team member — *October 2017 - March 2019*

- Helped implement YOLO, a neural-net-based object detection library, on a RoboSub robot

Blue Tide Robotics, FRC #2840
Paradise Valley, AZ

President *2016-2017*, Head of Media *2015-2016*, Head of Programming/Electrical *2015-2016* — *June 2013 - August 2017*

Skills

Languages Python, C/C++, OCaml, Haskell, x86-64 Assembly, MATLAB, Mathematica, CUDA, PHP, SQL, LaTeX

Libraries TensorFlow, Keras, Pandas, NumPy, Scikit-learn, Flask, jQuery, React, React-Redux, Apache Spark, Socket.IO

Projects

For more project details, see NicholasCurrault.com.

Ditch Day GPS Puzzle

- Designed puzzle for Caltech Ditch Day in which students had to work together remotely via cell phone GPS data to search a virtual map

Searching for Fixpoints in Cryptographic Hash Functions

- Used CUDA to search for hash fixpoints in SHA-1 Merkel Trees to make a git commit that references its own hash prefix.
- Compared CPU vs GPU: optimized GPU implementation generated 8-character prefix over 200 times faster than a CPU implementation

Nearer, Farther

- Socket.IO-based music queuing systems for Dabney and Blacker House at Caltech, written in Python with Flask

Telegram Bots

Secret Hitler, Quantum Go Fish, Forward Stickers, Ranked Pairs

- Created bots that enable Telegram users to play Secret Hitler, a social-deduction board game; Quantum Go Fish (a quantum-physics-based variation on the classic card game); create and organize stickers out of forwarded messages; and create polls decided with the Ranked Pairs algorithm.

Machine Learning projects

- Worked with a team of other Caltech students to generate a model to predict cases of COVID-19 in the U.S. as part of a Caltech challenge
- Used hidden Markov models and recurrent neural networks to generate poems in the style of Shakespearean sonnets
- Created data visualizations of the MovieLens dataset using matrix factorization algorithms

Systems projects

- Worked with group of Caltech students in Operating Systems course to complete an implementation of the Pintos operating system
- Created a command shell that supports input/output redirection, piping, EOF (Ctrl+D) to exit
- Implemented an 8-bit Harvard architecture soft CPU with support for about 100 instructions in a hardware description language for a CPLD.
- Threading library in C and x86-64 assembly
- Explicit heap memory allocator (with best-fit strategy, constant-time memory deallocation)

Brady vs Grey

- Created this PHP/Bootstrap web app as a response to Hello Internet (podcast).
- Was recognized by podcast creators, received over 12,000 page views following its release and over 200,000 in its lifetime as a result.

Othello AI

- Created an AI that plays Othello, optimized using alpha-beta pruning and bit boards to predict board state 9 moves ahead in the allotted game time.
- Finished 28th out of 83 bots in 2018 Caltech tournament.

Project Euler

- Solved 153 math/programming challenge problems as of Fall 2020.