Albert Gural

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Education

California Institute of Technology **Pasadena, CA**
Electrical Engineering with a minor in Computer Science, GPA: 4.0 *Oct. 2012 - present*

- **Selected Coursework:** Machine Learning and Data Mining, Algorithms, Computing Systems, Embedded Systems (FPGA Oscilloscope), Advanced Digital Systems Design (AVR Processor in VHDL), Mixed-mode Integrated Circuits, Feedback and Control Circuits, Signal-Processing Systems, Combinatorial Analysis, Stochastic Processes, Discrete Differential Geometry, Quantum Computation
- **Activities/Awards:** ACM-ICPC (head, *2015*; 4th place at regionals, *2014*; 3rd place at regionals, *2013*), The Kiyo and Eiko Tomiyasu SURF Scholar award from Caltech (*Summer, 2015*)

Thomas Jefferson High School for Science and Technology **Alexandria, VA**
Senior Research in Computer Science, GPA: 4.45 *Sept. 2008 - June 2012*

- **Activities/Awards:** Computer Team (co-captain, *2010-12*), USACO (algorithmic coding, gold division), ACSL (CS topics, 1st place individual, *2010-11*), Naval Research Lab (1st place project in CS, *2011*)

Work and Experience

Caltech (Azita Emami MICS Lab), *Named Summer Undergraduate Research Fellow* *Summer 2015*

- Designed and simulated a novel PLL-based potentiostat for measuring dopamine concentrations *in vivo*.
- Used Cadence Virtuoso with 45nm CMOS predictive models.

Jane Street Capital, *Software Developer Intern* *Summer 2014*

- Completed two projects - (1) fault-tolerant distributed lock server to replace NFS locks; (2) plugin support for the internal trader tool as well as a plugin ecosystem for trader developers with version control.
- Used OCaml (including the Async monad, RPCs, DynLoader).

Google (Research Division), *Software Engineering Intern* *Summer 2013*

- Developed image processing techniques to clean a sequence of object photos to QA specifications, allowing for a much larger class of object image sequences to be processed; currently for Google Shopping.
- Used C++, OpenCV, and the Ceres non-linear solver library.

Naval Research Laboratory, *Intern, High Performance Computing* *Summer 2011, 2012*

- *Summer 2012:* Built a molecular dynamics simulation in C; compared different integration step algorithms including brute force, linked cell, and monotonic Lagrangian grid.
- *Summer 2011:* Created an MPI (Message Passing Interface) library for parallel operations on a grid in C++, tested on a wave propagation simulation, then analyzed its efficiency.

California Institute of Technology, *Teaching Assistant* *2014, 2015*

- *Algorithms:* Lectured and created course materials for topics including graph algorithms, greedy algorithms, dynamic programming, flow networks, and linear programming.
- *Electronics Laboratory:* Conducted homework and laboratory sessions in topics including discrete analog components, op-amp circuits, and differential amplifier circuits.

Projects

Potentiostat utilizing an all-digital phase-locked loop in 45nm CMOS technology *Summer 2015*
Solid-state Tesla coil, built from scratch *Summer 2015*
Electronic automatic dog food dispenser *Spring 2015*
6-8 GHz all-digital delay-locked loop in 45nm CMOS technology, *group project* *Spring 2015*
8-bit AVR-compatible processor in VHDL for a Xilinx FPGA, *group project* *Winter 2015*
Differential geometry algorithms: mesh smoothing, flattening, surface flow *Fall 2014*
3-stage BJT amplifier with flat 40dB gain from 10Hz to 200kHz, *group project* *Spring 2014*
FPGA-based oscilloscope, designed and built from scratch *Spring 2014*
Robotrike firmware (interrupt-based OS written exclusively in x86 assembly) *Fall 2013*

Tools and Languages

C/C++, Java, Python, OCaml, Haskell, VHDL/Verilog, x86 Assembly, LaTeX, Mathematica, Git, Bash, OpenCV, MPI (parallelization platform), Altium, Altera and Xilinx toolchains, Cadence Virtuoso