

# ALBERT GURAL

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MSC #466, Pasadena, CA 91126-0466

## Education

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### California Institute of Technology

Pasadena, CA

*Electrical Engineering with a minor in Computer Science, GPA: 3.8/4.0*

*Oct. 2012 - present*

- **Current Coursework:** Intro to Embedded Systems, Circuits and Systems, Wave Physics (first of a three part course in Quantum Physics and Statistical Mechanics), Complex Analysis
- **Past Coursework:** Semiconductor Devices, Solid-State Electronics (Lab), Intro to Algorithms, Intro to Computing Systems, Decidability and Tractability, Abstract Algebra, Probability and Statistics
- **Activities:** ACM Programming Contest (2012), Robotics Team (Electronics) (2012-13)
- **Awards:** Top 5 individual in Caltech's ACM team and fastest ACM regional problem solution (2012)

### Thomas Jefferson High School for Science and Technology

Alexandria, VA

*Senior Research in Computer Science, GPA: 4.45/4.00*

*Sept. 2008 - June 2012*

- **Relevant Coursework:** Microprocessor Electronics (including Motorola MC6800 Assembly programming), AP Computer Science, Artificial Intelligence, Single and Multivariable Calculus, Advanced Math Techniques with Linear Algebra, Differential Equations, Complex Analysis
- **Activities:** Computer Team (co-captain, 2010-12), Varsity Math Team, Botball Robotics, Physics Team
- **Awards:** USACO (algorithmic coding, top average score in silver division, 2010-12), ACSL (CS topics, 1<sup>st</sup> place team, 2010; 1<sup>st</sup> place individual, 2010-11), IDT (programming development, 1<sup>st</sup> place team, 2011), AIME qualifier (math, 2009-12), Naval Research Lab (1<sup>st</sup> place project in CS, 2011)

## Work and Experience

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### 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

### Planning, Design, and Construction of a High Tech Flashlight, for fun

*2011-13*

- Designed a circuit including an ATmega168 MCU, capacitive touch sensors, a 3W constant current LED driver, and USB connectivity, incorporating around 100 SMD components
- Designed and built the corresponding circuit board, including hot-air reworking SMD parts onto the board
- Programmed the board in Arduino and AVR C; designed and 3D-printed a prototype case

### 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

## Skills and Interests

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### Engineering Projects (built from scratch):

*Circuit Design and Construction:* Designed and etched circuit boards; soldered through-hole and SMD components (down to 0402 size) onto the boards. Also designed, built, and tested 4-layer boards

*Electronic Devices:* Lasers (solid-state diode, class 3B), flashlights using high power LEDs with MCU control and various peripherals (IR control, Li-Ion charging, etc), coilgun, rudimentary microprocessor oscilloscope

### Tools and Languages:

*Tools/Software:* L<sup>A</sup>T<sub>E</sub>X, Git, Mathematica, some Matlab, EAGLE PCB Design, Autodesk Inventor, LT spice, Oscilloscopes, Signal Generators, Soldering (hand, hot air), machine tools, basic laboratory equipment

*Languages/Libraries:* C/C++, Java, Python, HTML, CSS, JavaScript, x86 Assembly, Arduino/AVR C, OpenCV, Ceres non-linear solver, MPI (parallelization platform), some Bash

**Hobbies and Interests:** Mathematics and Computer Science; Analog and Digital Electronics; Puzzles; Designing, Developing, and Constructing Electronic Devices (mix of EE, CS, and ME); Graphical Arts  
See website for detailed project descriptions (<http://www.albertgural.com/projects/>).