

# ALBERT GURAL

<http://www.albertgural.com/>

MSC #466

Pasadena, CA 91126-0466

agural@caltech.edu

(703) 346-2869

## Education

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### California Institute of Technology

Pasadena, CA

*Electrical Engineering with Computer Science Minor, GPA: 3.8/4.0*

*Oct. 2012 - present*

- **Relevant Coursework:** EE40 - Semiconductor Sensors and Actuators, APh9 - Solid-State Electronics, CS38 - Intro to Algorithms, CS24 - Intro to Computing Systems, CS21 - Decidability and Tractability, CS11 - ACM Competition, Ma5 - Abstract Algebra, Ma2b - Probability and Statistics
- **Activities:** ACM Programming Contest (2012), Robotics Team (Electrical) (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 Teams (co-captain, 2010-12), Varsity Math Team, Botball Robotics, Physics Team
- **Awards:** USACO (1<sup>st</sup> place average score in silver division, 2010-12), ACSL (1<sup>st</sup> place team, 2010; 1<sup>st</sup> place individual, 2010-11), AIME qualifier (2009-12), Naval Research Lab (1<sup>st</sup> place project in CS, 2011)

## Work and Experience

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### Google Research, Software Engineering Intern

*Summer 2013*

- Developed image processing techniques using C++, OpenCV, and Ceres non-linear optimizer to clean a sequence of object images to QA specifications
- Allows for a much larger class of object image sequences to be processed; currently for Google Shopping

### Naval Research Laboratory, Intern, High Performance Computing

*Summer 2011, 2012*

- *Summer 2012:* Built a molecular dynamics simulation in C; looked for an optimum integration step algorithm from brute force, linked cell, and MLG (monotonic Lagrangian grid)
- *Summer 2011:* Created an MPI (Message Passing Interface) library for parallel operations on a grid in C++, testing on a wave propagation simulation, then analyzed its efficiency

### Innovative Defence Technologies, Competitor

*Spring 2011*

- Developed software in Java for client/server XML data communication over TCP/IP sockets; won 1<sup>st</sup> place

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

*2011-13*

- Designed a circuit schematic including an ATmega168 MCU (28 pin VQFN package), capacitive touch sensors, a 3W constant current LED driver, and around 100 other SMD components
- Designed and ordered the corresponding circuit board, hot-air reworked SMD parts onto the board
- Programmed the board with a bootloader using V-USB for AVR; designed and 3D-printed prototype case

## 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 4-layer boards and custom-ordered them.

*Electronic Devices:* Lasers (658nm 200mW, 532nm 5mW, 405nm 20mW), Flashlights using high power 1W white LEDs with MCU control and various peripherals (IR control, Li-Ion charging, etc), some coilgun research.

### Tools, Software, and Languages:

*Tools:* Oscilloscopes, Signal Generators, Soldering (hand, hot air), machine tools, basic laboratory equipment

*Software:* EAGLE PCB Design, Autodesk Inventor, LT spice, Arduino, some HEX editors

*Proficient:* C/C++, Java, Python, L<sup>A</sup>T<sub>E</sub>X, HTML, CSS, JavaScript, x86 Assembly, OpenCV

*Familiar:* Mathematica, Ceres Solver, AVR/Arduino C, PIC & MC6800 Assembly, Fortran, Bash

**Hobbies and Interests:** Mathematics and Computer Science; Analog and Digital Electronics; Puzzles;

Planning, Designing, and Making Electronic Devices (mix of EE, ME, and CS); Graphical Arts

See website for detailed project descriptions (<http://www.albertgural.com/projects/>).