

# Frank Zhou

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## EDUCATION

### Caltech, Pasadena, California

- Bachelor of Science (B.S.) in Electrical Engineering Oct 2013 – Jun 2017
  - Cumulative GPA: 3.9 / 4.0
  - Embedded Systems, Digital Design (FPGA), Analog Design, RF Design, Machine Learning, Circuits, Signals, Control Systems, Semiconductor Devices, Biodevices, Electromagnetic Engineering, Mechatronic Design

## WORK EXPERIENCE

### Caltech, Pasadena, California

- Undergraduate Research Fellow Jan 2016 – Present
  - Redesigned wireless feedback for wireless power transfer system under Professor Ali Hajimiri
  - Designed receiver controller capable of transmitting data, load switching, and charging USB devices
  - Designed generator controller capable of receiving data, communicating over SPI, and optimizing power transfer
  - Implemented protocols and designed algorithms to quickly optimize power transfer regardless of the receiver's location
- Teaching Assistant Oct 2015 – Present
  - Taught undergraduate students about software and hardware design for microprocessor systems
  - Topics include x86 assembly, schematic drawing, PCB design, timing analysis, hardware design, debugging, and soldering

### Honeybee Robotics, Pasadena, California

- Electrical Engineering Intern Feb 2015 – Oct 2015
  - Designed and implemented electrical systems on various robotic systems intended for extraterrestrial sample collection
  - Worked on electrical schematics, electrical assembly, PCB design and fabrication, and PLC design

### Jet Propulsion Lab, Pasadena, California

- Undergraduate Research Fellow Jun 2014 – Aug 2014
  - Wrote Python scripts that parse the Curiosity Rover's telemetry data and automatically generate photorealistic animations in Blender
  - Implemented a GUI for an application that reduces meshes of 2.5D objects to create models of Martian terrain (C++)

## PROJECTS

### Caltech Robotics Team, Electrical Subteam Lead

Oct 2013 – Present

- Team designs and builds a new underwater autonomous vehicle to navigate an obstacle course each year
- Won 1st place out of over 50 teams at the International AUVSI Underwater Vehicle Competition in 2016
- Designed entire electrical architecture from scratch to power all devices and to establish communication between computer and sensors/actuators
- Used a CAN bus communication network to pass messages between different ARM microcontroller modules

### Acoustic Communication System

Sep 2016 – Dec 2016

- Designed a system with ARM microcontrollers to facilitate communication between two computers through acoustic pings
- Microcontroller simultaneously samples the filtered outputs of four microphones and analyzes the phase differences between the signals at a specific frequency to calculate the 3D direction of the sound
- System reports direction of sound to the computer as a unit vector through RS232 connection

### Blackfin MP3 Player

Jan 2015 – Jul 2015

- Created a fully functional MP3 player controlled by a Blackfin microprocessor
- Fully designed schematics for microprocessor, display, keypad, audio, IDE, DRAM, SRAM, and ROM sections and designed PCB
- Wrote firmware for the completed system in C and assembly

### Power Grid Visualization, Electrical Lead

Dec 2014 – Mar 2015

- Visualized research on the optimization of distributed power networks under Professor Steven Low
- Constructed an LED table of 150 individually addressable LEDs that change colors based on the time varying nodal voltages of a real power network
- Presented work at the 2015 ARPA-E Energy Summit

### Caltech ME72 Design Competition, Electrical Lead

Sep 2015 – Mar 2016

- Designed three teleoperated robots capable of gathering and shooting soccer balls for Caltech design course
- Implemented control system using gamepads, Teensy microprocessors, and XBee radios

## SKILLS

### Electrical

- Schematic and PCB design using Altium
- Designing and debugging embedded systems
- Designing and debugging FPGA systems
- Debugging using test equipment (scope, logic analyzer, etc.)
- Soldering
- CAN, RS232, TTL, RS485, SPI, and USB communication protocols

### Programming Languages

- C, C++, Python, VHDL, x86 assembly, Blackfin assembly, MATLAB, LABVIEW, and Mathematica

### Mechanical

- Mechanical design using Solidworks
- Machine shop tools (mill, lathe, drill press, waterjet, laser cutter, 3D printer)

## INTERESTS

Robotics, networks, consumer electronics, Internet of things, hiking, snowboarding, board games, video games

## LANGUAGES

- English: Native language.
- Chinese: Fluent (speaking, reading, writing).
- Spanish: Intermediate (speaking, reading, writing).

## REFERENCES

### ▪ Professor Ali Hajimiri

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Caltech  
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### ▪ Glen George

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