

# Alan De-Hao Cheng

## Education

- 2015–2019 (Bachelors) **Massachusetts Institute of Technology, Cambridge, MA**, GPA - 4.5/5.0  
Undergraduate student. Bachelor of Science in Electrical Engineering and Computer Science (6-2).  
2019–2020 (Masters) Anticipated Masters of Engineering in Electrical Engineering and Computer Science  
Courses: • Computational Photography • Computer Graphics • UI Design • Mobile and Sensor Computing • Computer System Engineering • Introductory Digital Systems Laboratory • Intro to Machine Learning • Elements of Software Construction • Intro to Algorithms • Signals and Systems • Computation Structures • Discrete Mathematics • Multivariable Calculus • Differential Equations
- 2010–2015 **Portland State University, Portland, OR**, GPA - 4.0/4.0  
Credit courses: • Digital Systems • Digital Design Using Hardware Design Languages • Intelligent Robotics I&II • Quantum Computing

## Experience

- Sep 2018 – Present **Student Researcher (SuperUROP), MIT RLE, Cambridge, MA**, Energy-Efficient Multimedia Systems Group  
• Research on energy efficient depth map estimation for time-of-flight cameras  
• Implemented augmented reality pipeline using estimated depth map with OpenGL, OpenCV, Open3D, and ORB-SLAM2
- Jun 2018 – Aug 2018 **Software Intern, Airbnb, San Francisco, CA**, Guest Growth Discovery Team  
• SEO Keyword Tracker - Developed distributed system for tracking search results including databases, crawlers, and visualizations
- Aug 2017 – Present **Student Researcher, MIT Media Lab, Tangible Media Group, Cambridge, MA**  
Undergraduate research project: Dynamic Soundscape for Physical Movement  
• Developed system that measured physical movement with IMU and ToF ranging sensor on embedded system, and generated sound after receiving data via bluetooth using an iOS backend
- Jan 2018 – Feb 2018 **Software Intern, Twitch, San Francisco, CA**, Video Transcoder Group  
• Analyzed automated closed captioning techniques for livestreams
- Oct 2016 – Aug 2017 **Student Researcher, MIT Media Lab, Cambridge, MA**, Tangible Media Group  
Undergraduate research project: Sonic Prototyping Tool for Adaptable Sensation Feedback  
• Developed mobile device prototype that distorts sounds from physical actions using Raspberry Pi  
• Implemented audio processing for sound distorting using the Synthesis Toolkit
- May 2016 – Aug 2016 **Research Intern, MIT Lincoln Laboratory, Lexington, MA**  
• Implemented embedded design for DARPA modular radio project  
• Designed implementation of SRIO on NXP embedded system development board using Yocto Linux Kernel
- Feb 2016 – May 2016 **Introduction to EECS (6.01) Student Lab Assistant, MIT, Cambridge, MA**  
• Collaborated with course instructors to modify and improve labs; assisted other students with labs
- Jun 2014 – Aug 2014 **Technical Intern, Rockwell Collins, Wilsonville, OR**  
• Developed LABVIEW software to autonomously scan hologram cells using a laser scan system, reducing measurement time by 560%  
• Developed calibration method to measure luminance with an inexpensive camera
- Apr 2010 – Sep 2015 **Student Researcher, Portland State University, Portland, OR**  
Research in Digital Design, Computer Vision, Quantum Computing, and more. Projects are listed in my LinkedIn

## Projects

- Sep 2016 **SplitPay**, <http://devpost.com/software/splitpay-qdibxt>  
• Created webapp that scans receipts and automatically splits charges to others  
• Implemented image processing algorithm with OpenCV to binarize and deskew color image to make OCR more accurate  
2016: HackMIT: Rough Draft Ventures Prize
- Nov 2016 **YHack 2016 Project: SentiBoard, Corsair API Prize - 1st Place**, Team Leader, <https://devpost.com/software/sentiboard>  
• Created app to change keyboard backlighting based-off the user's written and facial expressions.  
• Implemented image processing algorithm with OpenCV to recognize emotion in camera livestream  
• Helped implement sentiment recognition in text with NLP using NLTK
- 2013 – 2015 **A Novel Human Machine Interface Using 3D Vision, Support Vector Machine Classification, and Kalman Filter Optimization**  
• Invented a novel, all-in-one portable touchscreen projector to create smarter and lower cost HMI devices  
• Engineered a co-processing interface between the software on an Intel Atom CPU and a FPGA implementation of the Kalman Filter using Faddeev's Algorithm  
2015: Intel International Science and Engineering Fair (ISEF) – Finalist  
2014: Google Science Fair – US Regional Finalist  
2014: Project featured in Photonics Spectra Magazine Article, "Ones to Watch" in August edition
- 2011 – 2015 **Methodology to Create Hardware Oracles for Solving Constraint Satisfaction Problems**  
• Invented a methodology to create hardware-based oracles for solving constraint satisfaction problems using Verilog-HDL  
• Created new methodology that uses a hardware-based search algorithm to effectively solve these problems  
2015: Intel Science Talent Search - Semifinalist

## Activities

- Jan 2017 **Battlecode 2017 Competition, MIT, Cambridge, MA**  
Team leader; software developer  
• Finalist: 13th place team out of 374 total teams

## Publications

- May 2013 Alan Cheng, Edison Tsai, Marek Perkowski, "Methodology to Create Hardware Oracles for Solving Constraint Satisfaction Problems," 22nd International Workshop on Post-Binary ULSI Systems
- May 2012 Alan Cheng, Edison Tsai, Marek Perkowski, Yushi Wang, Anu Rajendar, "Comparison of Maslov's Quantum Costs and LNNM Quantum Costs for Four Types of Multi-qubit Toffoli Gates," 21st International Workshop on Post-Binary ULSI Systems

## Skills

- |                  |                            |         |           |
|------------------|----------------------------|---------|-----------|
| • Digital Design | • Embedded Systems         | • Java  | • Python  |
| • FPGA           | • Computer Vision (OpenCV) | • C/C++ | • LABVIEW |