

FRANCISCA VASCONCELOS

(858) · 353 · 5367 ◊ francisc@mit.edu
http://web.mit.edu/francisc/www/
https://www.linkedin.com/in/franciscavasconcelos

EDUCATION

Massachusetts Institute of Technology *Class of 2020*

Major Electrical Engineering & Computer Science, Physics **GPA:** 5.0/5.0 **Societies** IEEE ◊ APS ◊ SWE
Honors Tau Beta Pi - Top 12.5% School of Engineering ◊ Eta Kappa Nu - Top 25% EECS Department

Torrey Pines High School *Class of 2016*

GPA Unweighted (9-12) 4.00/4.00 ◊ Weighted (9-12) 4.58/4.00 ◊ Weighted (10-12) 4.79/4.00
Academic National Merit Scholar Finalist ◊ National AP Scholar ◊ Top 4 Student in Science, Math, and Art

PUBLICATIONS

Vasconcelos, F., Vasconcelos, N., Person-following UAVs. In the proceedings of IEEE conf. *Winter Applications of Computer Vision (WACV)*, Lake Placid, NY, March 2016.

RESEARCH & WORK EXPERIENCE

Rigetti Computing Junior Quantum Engineering Intern

June - August 2019

Supervisors: Peter Karalekas, Marcus DaSilva

- improving the algorithmic performance of noisy quantum devices using ensembling techniques from machine learning

MIT RLE Engineering Quantum Systems SuperUROP

June 2018 - Present

Supervisor: Morten Kjaergaard (Postdoc) ◊ Prof. William Oliver, Terry Orlando, and Simon Gustavsson's Lab

- project title: *Extending Quantum State Tomography (QST) for Superconducting Quantum Processors*
- expanded lab's QST suite (based on MLE) from 2-qubit to n-qubit systems and improved runtime by 100x factor
- developing novel QST approach using generative adversarial networks
- programmed an FPGA (with Megan Yamoah) to speed-up lab's measurement of the quantum computer
- improved speed and computation resources of data analysis code for waveguide QED experiment

MIT Media Lab Camera Culture UROP

Sept. 2017 - Sept. 2018

Supervisor: Achuta Kadambi (Grad Student) ◊ Prof. Ramesh Raskar's Lab

- worked on LIDAR to "see through fog," using 2-laser interferometry
- worked on learning a general transformation to boost ImageNet classification performance of major networks (i.e. AlexNet)

NASA Jet Propulsion Laboratory (JPL) Engineering Intern

June 2017 - Aug. 2017

Supervisor: Jose Velazco (Researcher) ◊ Ground Communication Group (333K)

- worked with other interns to create "smart" monitoring system for new Deep Space Network amplifiers, consisting of thousands of ESP32s connected to central database and visualization/control webpage
- modified CAD designs of Inter-Satellite Omnidirectional Optical Communicator transmitters to incorporate LIDAR functionality

MIT CSAIL NetMIT UROP

Oct. 2016 - June 2017

Supervisors: Deepak Vashit (Grad Student) & Anubhav Jain (MEng) ◊ Prof. Dina Katabi's Lab

- developed an API and "Smart Home" application (smart alarm clock) for the group's research on wireless location tracking
- developed location data collection iOS application to train neural network to improve localization pattern recognition

Sidus Solutions Engineering Intern

June 2015 - Aug. 2015

Small San Diego Marine Technology Company

- soldered micro-controllers, programmed GUIs, CADed product parts on Solidworks, fixed broken camera systems, tested products, and laser etched logo information into products

LEADERSHIP EXPERIENCE

MIT SWE Technology Chair

Nov. 2016 - Present

MIT Society of Women Engineers

- organize workshops to teach SWE club members about tech topics (ie. Personal Websites, LaTeX, Quantum Computing, etc.)
- volunteer at events to teach local elementary and high-school girls about science
- distribute funds for STEM projects to empower Women, through SWEcubator

MIT IEEE URTC Conference Chair

Jan. 2017 - Present

2018 MIT IEEE Undergraduate Research Technology Conference

- led small group of students to organize 4th ever IEEE URTC (2018), a 3-day conference (approx. 300 attendees), at Stata Center
- there were 67 posters, 59 papers, and 16 lightning talks with 8 different conference tracks and 5 keynote speakers
- managed almost all logistics including sponsorship, publicity, registration, set-up, attendee housing, etc.
- served as Paper/Posters Chair for the 2017 conference, getting reviewers for all the submissions and keynote speakers
- serving as Conference Advisor for the 2019 conference, guiding the new conference chairs and board

MIT Associate Advisor

Sept. 2017 - May 2018

Assistant to Prof. Dennis Freeman

- advised group of freshman on classes and navigating MIT, attended registration meetings with advisor

TEACHING & EDUCATION EXPERIENCE

The Coding School Nonprofit Curriculum Developer & Teacher

June 2018 - Present

Paid Teaching, Volunteer Curriculum Development, and TCS Advisory Board

- taught high-school girl for 2-weeks on Python programming foundation using TCS curriculum
- designed student's final project, watch "The Imitation Game" and code an enigma machine
- revamped first unit of curriculum with more problems and created LaTeX template to be used for entire curriculum
- leading development of a Quantum Computing curriculum
- only undergraduate member of TCS Non-Profit Young Professionals Advisory Board

MIT Undergraduate Research Journal (MURJ) Copy Editor & Features Staff

Sept 2018-Present

Volume 36 Fall 2018 & Volume 37 Spring 2019

- Author of "Quantum Computing @ MIT" - conducted interviews with Prof. Isaac Chuang, Prof. Dirk Englund, Prof. Aram Harrow, Prof. William Oliver

MIT EECS Intro to Quantum Computing IAP Course Teacher

Jan 2019

6.s089 ◊ Taught with Amir Karamlou & Megan Yamoah

- 4 week crash course on quantum computing open to MIT community, no quantum mechanics knowledge required
- specifically lectured on quantum algorithms: Grover search and Quantum Fourier Transform
- developed QuTip problem set questions and ran tutorials on QuTip and IBM Quantum Experience
- received a 6.7/7 rating on MIT course evaluations (6/20 eligible students responded)

TPHS Math Tutoring

Nov 2012 - Jan 2015

After-School Math Tutoring Center (Unpaid)

- tutored students in all grade levels in high school math courses including geometry, algebra, and calculus

SUMMER SCHOOLS

Undergraduate School on Experimental Quantum Information Processing (USEQIP)

May - June 2019

University of Waterloo Institute for Quantum Computing

- 2-week summer school with lectures and labs by IQC faculty
- lectures: ion traps, superconducting qubits, photonics, NMR computing, NV centers, quantum algorithms, QKD, quantum error correction, quantum measurement, superconductivity
- labs: NV centers, low temperature superconductivity, superconducting qubit fabrication, BB84 QKD photonics implementation, optical donuts with birefringent optics, NMR 2-qubit computer Grover's algorithm implementation

Fondazion Bruno Kessler WebValley Student & Developer

June 2016 - July 2016

Summer Program (3 weeks) - ISEF Special Award

- 1 week of lectures & 2 weeks of work (with 13 other international students) on low-cost portable spectrometer to measure fruit ripeness (works on berries, basilica leaves, and grapes)
- worked on machine learning for fruit classification (Random Forests, SVMs, PCA, etc.)

CERN Student Visitor

June 2015 - Aug 2015

Trip to the European Center for Nuclear Research (1 week) - ISEF Special Award

- lectures by CERN engineers, scientists, & mathematicians with visits to experimentation facilities

TECHNICAL STRENGTHS

Languages	Python ♦ Matlab ♦ Verilog ♦ C/C++ ♦ Visual Basic ♦ HTML ♦ Java ♦ Mathematica ♦ Swift ♦ Android
Software	Unix/Linux ♦ LaTeX ♦ PyTorch ♦ SciKit Learn ♦ OpenCV
Hardware	SolidWorks ♦ 3D Printing ♦ Laser Cutting ♦ Arduino ♦ RaspberryPi

SCHOLARSHIPS

2018	D.E. Shaw Latitude Fellowship ♦ Palantir Women in Technology Scholarship ♦ SWE GE Women's Network
2017	SWE GE Women's Network Scholarship
2016	SanDisk Scholar ♦ SWE Paula Loring Simon Scholarship ♦ SD Society of Women Engineers ViaSat Scholarship Cabrillo Civics Scholarship ♦ NCWIT Aspirations Scholarship San Diego Winner & National Runner-Up John Pinto Memorial Scholarship ♦ SD AFCEA Scholarship ♦ Athena Pinnacle Scholarship

AWARDS & HONORS

2019	MIT Rhodes and Marshall's Fellowship Competition Nominee Microsystems Annual Research Conference Top 10 Presentation Award
2018	MIT School of Engineering Barry Goldwater Nominee ♦ SWE Outstanding Board Member Johnson & Johnson MIT Summer Research Fellowship
2016	MIT Museum "Girl's Day: The Secret Life of Robots" Invited Speaker ISEF : "Robotics & Intelligent Machines" 2nd Place Grand Award ♦ WebValley Special Award GSDSEF : ISEF Sweepstakes ♦ Intel Excellence in Computer Science ♦ IEEE ♦ SWE ♦ AFCEA ♦ ASME ♦ AMS Professional Engineers in CA Government ♦ SCJSHS 1st Place ♦ Mathematica Student Wolfram Certification 1 Scholastic Gold Key & 3 Honorable Mentions
2015	ISEF : "Robotics & Intelligent Machines" 4th Place Grand Award ♦ CERN & United Technologies Special Awards GSDSEF : Sweepstakes ♦ MTS 1st Place ♦ Intel Excellence in Computer Science ♦ AFCEA ♦ EAA ♦ NAVY ONR 2 Scholastic Silver Keys & 2 Honorable Mentions ♦ UCSD COSMOS Panelist
13-14	CA Senate Award ♦ NHS & NAHS Inductee ♦ Trained with Portuguese WU17 National Soccer Team

PERSONAL & CLASS PROJECTS

LED Audio Visualizer (It's Lit)

June 2017 - Jan 2018

Sponsored by MIT MakeLodge

- used two parallel series of 250+ LEDs to create audio visualization lighting to hang in dorm kitchen and room
- built small circuit with microphone and Arduino to receive and process audio input, developed processing algorithm
- LEDs changed color according to frequency, based on Fast Hartley Transformation (FHT) binning of audio signal
- LEDs changed brightness according to beat, based on local derivative of audio signal

'Beta' CPU Design

Feb 2017 - May 2017

MIT Computation Structures (6.004) Class Lab/Project

- over course of semester designed components of CPU from AND, OR, MUX, etc. logic level
- design and combined an Arithmetic Logic Unit (ALU), Register File (REGFILE), Program Counter (PC), Control Logic (CTL), and Data Memo to design small 'Beta' CPU with Jade software

Strobe Shoes

Jan 2017 - April 2017

MIT ProjX Project

- put resistive sensor pressure in sole of shoe to detect steps and mounted LED strips around sole

- sewed and programmed embedded electronics onto shoe in order create multi-color sparkling effect around sole with each step

Levitating Water Droplet Fountain

Nov 2016 - Dec 2016

MIT Mens Et Manus (6.A01) Freshman Seminar Project

- built box with dripping water and strobe lights to make droplets appear as though they were levitating
- CADed and laser cut wooden enclosure, designed and soldered LED circuit, programmed Arduino with color pattern

Object Recognition Based UAV Control (Person-following UAVs)

July 2014 - May 2016

Research Project

- programmed an AR Parrot drone to follow people based on computer vision recognition of a patterned badge
- created real time badge-detection algorithm based on Harris corner detection, light-compensating dot product, and affine transformation (inspired by human vision)
- presented at 2015 GSDSEF, 2015 CSSF, 2015 ISEF, 2015 C4ISR Symposium, 2016 IEEE WACV, 2016 SCJSHS [awards below]

Shape-Shifting Origami Robotics

Nov 2015 - May 2016

Science Fair Project

- designed, 3D-printed, and constructed a robot that can fold into several shapes inspired by principles of origami
- presented at 2016 GSDSEF, 2016 CSSF, 2016 ISEF [awards below]

Quantum

July 2015 - August 2015

Android App

- developed an app that explains the Standard Model, with goal of making quantum physics easily accessible and understandable
- free on Google Play (100,000+ installs), presented to Congressman Scott Peters, displayed in US Capitol Building for 1 year

EXTRACURRICULARS & OUTREACH

MIT

MIT SWE ♦ MIT IEEE/ACM ♦ MIT MURJ ♦ MIT Women's Club Soccer ♦ MIT Women's Club Volleyball
MIT WMBR ♦ MIT TBP ♦ MIT HKN ♦ MIT Associate Advisors ♦ The Coding School Nonprofit

TPHS

TPHS NAHS ♦ TPHS Red Cross ♦ TPHS NHS ♦ TPHS FRC Robotics ♦ TPHS UAV Club
GSDSEF Student Advisory Board ♦ TPHS Math Tutoring ♦ Limbs with Love Nonprofit