

# Patricia Adriana Suriana

## Business Address

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## Home Address

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<b>Education</b>	<b>Stanford University</b> PhD Candidate in Computer Science	<b>Palo Alto, CA</b> September 2018 — Present
	<b>Massachusetts Institute of Technology (MIT)</b> Master of Engineering in Electrical Engineering and Computer Science Thesis: <i>Fourier-Motzkin with Non-Linear Symbolic Constant Coefficients</i>  Bachelor of Science in Electrical Engineering and Computer Science	<b>Cambridge, MA</b> February 2016  June 2014 <b>GPA: 5.0/5.0</b>
<b>Skills</b>	<b>Programming:</b> Python, Java, C/C++, Go, MATLAB, Mathematica, Halide <b>Languages:</b> Indonesian (Native), Chinese (Basic), Japanese (Advanced), English (Advanced) <b>Other:</b> Experience with Instron, FTIR, SMD soldering, PCB layout	
<b>Research Interests</b>	Application of machine learning to structural biology, programming language (domain specific language), distributed systems, search and path planning, high-performance computing.	
<b>Research/ Internship Experience</b>	<b>Stanford University – Dror Lab</b> <i>Graduate Student</i> <ul style="list-style-type: none"><li>Work on application of machine learning to molecular structural prediction.</li></ul> <i>Advisor: Ron Dror</i>	<b>Palo Alto, CA</b> January 2019 — Present
	<b>Google Research – Machine Intelligence</b> <i>Halide Compiler — Software Engineer</i> <ul style="list-style-type: none"><li>Worked on the core of the Halide compiler to make the Halide programming language faster, more expressive, and more robust.</li></ul> <i>Manager: Andrew Adams</i>	<b>Mountain View, CA</b> February 2016 — September 2018
	<b>MIT CSAIL – Commit Group</b> <i>Fourier-Motzkin with Non-Linear Symbolic Constant Coefficients — Master's Student</i> <ul style="list-style-type: none"><li>Extend Fourier-Motzkin elimination (FME) method to handle nonlinear symbolic constant coefficients during code generation.</li><li>Integrate the extended FME to the existing Halide library.</li></ul> <i>Advisors: Prof. Saman Amarasinghe, Shoaib Kamil, Riyadh Baghdadi</i>	<b>Cambridge, MA</b> February 2015 — January 2016
	<b>Square Enix – Advanced Technological Division</b> <i>Artificial Intelligence — Software Engineer Intern</i> <ul style="list-style-type: none"><li>Responsible for creating tools that analyze and extract various spatial features given the navigation meshes of the game levels.</li><li>All codes were written in C++.</li></ul> <i>Manager: Ingimar Gudmundsson</i>	<b>Tokyo, Japan</b> September 2014 — January 2015
	<b>Facebook – Infrastructure</b> <i>Wormhole Publisher/Subscriber System — Software Engineer Intern</i> <ul style="list-style-type: none"><li>Responsible for improving the performance and adding new functionality to Wormhole, a publish-subscribe platform that allows different Facebook apps to receive an ordered and reliable stream of data changes.</li><li>All codes were written in C++11.</li></ul> <i>Manager: Petchean Ang</i>	<b>Menlo Park, CA</b> June 2014 — August 2014

**MIT CSAIL – Learning and Intelligent Systems Group***CSP-Based Method for Solving Manipulation Problems — MIT 6.UAP Research Project*

- Transformed hierarchical task and motion planning approach for solving robot manipulation problem as constraint satisfaction problem (CSP).
- Constructed the CSP formulation (variables, domain, and constraints) for a simplified manipulation problem in 2D and integrated the problem formulation into a generic CSP-solver, CPlan, by Van Beek and Chen.
- Analyzed the performance of the CSP-based solver, in term of running time, on slightly modified Sokoban puzzles.
- All codes were written in C.

*Advisors: Prof. Tomás Lozano-Pérez***Cambridge, MA***February 2014 —**May 2014***MIT – Computational Fabrication Group***Interactive Stability Analysis for 3D Printed Design — Research Assistant*

- Integrated rigid body simulation framework into the user interface of data-driven system for helping non-expert users produce fabricable design.
- Used state-of-the-art numerical methods for the simulation of rigid bodies to perform virtual product testing (object stability testing), thus ensuring the integrity of user-created designs.
- All codes were written in C++.

*Advisors: Assoc. Prof. Wojciech Matusik, David Levin***Cambridge, MA***September 2013—**May 2014***Microsoft – Windows Core Group***Storage and File System (ReFS) — Software Developer Intern*

- Augmented ReFS to efficiently answer the query of which files own some block of the disk.
- Designed and implemented additional global tables embedded in checkpoint upon volume initialization to track block allocation information using B+ tree data structure. Coalesce adjacent rows when possible to save spaces.
- Incorporated the allocation information into the data scrub phase to speed up the process.
- All codes were written in C/C++.

*Manager: J.R. Tipton, Malcolm Smith***Redmond, WA***June 2013 —**August 2013***MIT 6.S063 – Building Mobile Applications***App Inventor Internationalization — MIT Final Class Project*

- Designed and implemented the framework necessary for the internationalization of App Inventor.
- Implementation involves using language translation maps/files and Google GwtLocale.
- Modified the existing user interface to incorporate the internationalization framework to allow users to switch between different languages.
- All codes were written in Java and JavaScript.

*Advisors: Paul Medlock-Walton, Andrew McKinney, Prof. Hal Abelson***Cambridge, MA***March 2013 —**May 2013***Linear Technology***Wireless Nickel-Metal Hydride (NiMH) Battery Charger — Research Intern*

- Built compact circuit boards for battery charging and discharging.
- Designed circuit schematics of hysteresis wireless battery charger.
- Responsible of NiMH and Lithium-Ion (Li-ion) battery discharge/charge curve profile characterization
- Project included laying out PCBs using Proteus ISIS/ARES, soldering SMD using microscope.

*Manager: Thilani Bogoda, Eko Lisuwandi***Chelmsford, MA***January 2013 —**February 2013***MIT – Digital Integrated Circuit and Systems Group***Low Power Computational Imaging for Portable Multimedia Devices — Research Assistant*

- Develop an embedded signal processing, to enable medical imaging for heart-rate monitoring on portable multimedia devices.
- Responsible of algorithmic optimization for hardware implementation to reduce computational complexity and memory requirements (MATLAB). The algorithm used is based on the work of Prof. Fredo Durand, et al: Eulerian-Video Magnification.

**Cambridge, MA***September 2012 —**May 2013*

- Some optimizations involve dividing data into several pieces to allow parallel processing of data and using Fast Fourier Transform filtering technique to decrease the runtime.

*Advisor: Prof. Anantha Chandrakasan, Rahul Rithe*

#### **Microsoft – Windows Core Group**

*Hyper-V Virtual Machine — Software Developer Intern*

- Investigate and prototype a system for opportunistically improving the physical memory characteristics of running virtual machines.
- Built a mechanism for defragmenting non-contiguous memory blocks and swapping remote pages with local pages.
- Using this mechanism, implemented the ability to defrag a virtual machine with fragmented memory and to migrate a virtual machine between NUMA nodes.
- Integration with smart external controller for balancer driven defrag controls and node migration.
- All codes were written in C/C++.

*Manager: Lars Reuther, Kevin Broas*

**Redmond, WA**

*June 2012 —*

*August 2012*

#### **MIT CSAIL – Robot Locomotion Group**

*Cover Tree for Fast Nearest-neighbor Search — Research Assistant*

- Implemented cover tree algorithm for fast nearest-neighbor search (Codes were written in Java).
- Original algorithm was modified to allow search on points with semi-definite positive matrices as distance metric.
- Point insertion and search algorithm were implemented using ellipsoidal containment to accommodate non-symmetric distances between points.

*Advisor: Russ Tedrake, Andy Barry*

**Cambridge, MA**

*February 2012 —*

*May 2012*

#### **Linear Technology**

*Wireless Power Transfer System — Research Intern*

- Built compact receiver boards demonstrating novel wireless power transfer technology.
- PCB components: Buck converter, Alphanumeric LED display, LC Tank, Priority Encoder, 7-Segment Driver.
- Project included laying out PCBs using Proteus ISIS/ARES, soldering SMD using microscope.

*Manager: Eko Lisuwandi*

**Chelmsford, MA**

*January 2012 —*

*February 2012*

#### **MIT Plasma Science and Fusion Center, Alcator C-Mod**

*Phase and Frequency Control for a Spectrograph-Shutter Combination — Research Assistant*

- Responsible of implementing code (for Galil motion controller) which control the relative phase of a spectrograph and CCD shutter.
- The spectrograph and the CCD shutter must be in-phase within four-second time window starting from when the camera is triggered to allow maximum exposure to the spectrum discharged by the plasma injected with Boron particles.
- Built a simulation model of the PID controller for the CCD shutter in Simulink to facilitate PID tuning.

*Advisor: Dr. Bruce Lipschultz, Roza Tesfaye*

**Cambridge, MA**

*October 2011 —*

*December 2011*

#### **The Frankel Center, Ben-Gurion University of the Negev**

*Unique Permutation Hashing - Research Assistant*

- Responsible for the implementation and performance analysis of Unique Permutation Hashing algorithm
- All codes were written in Python.

*Advisor: Prof. Shlomi Dolev*

**Beer Sheva, Israel**

*June 2011 —*

*August 2011*

#### **The David H. Koch Institute for Integrative Cancer Research at MIT**

*Detection of Absorption into Rabbit Urothelium of Drugs Released from an Intravesical Drug Delivery Device — UROP*

- Responsible for material characterization of biodegradable materials (PLGA and PGS) for potential drug delivery device, specifically for urological applications.
- Conducted material imaging, mechanical testing, and mass measurements using Instron and FTIR.

*Advisors: Prof. Michael J. Cima, Jennifer Shepherd, Ph.D.*

**Cambridge,**

**MA**

*January — May*

*2011*

**Honors and  
Awards**

Stanford Engineering Fellowship, 2018  
Member of Tau Beta Pi Honor Society  
Invitation to Eta Kappa Nu Honor Society  
11<sup>th</sup> Asian Physics Olympiad, Taiwan: First rank of Bronze medal (April 2010)

**Publications**

Riyadh Baghdadi, Jessica Ray, Malek Ben Romdhane, Emanuele Del Sozzo, Abdurrahman Akkas, Yunming Zhang, **Patricia Suriana**, Shoaib Kamil, and Saman Amarasinghe. *Tiramisu: a polyhedral compiler for expressing fast and portable code*. International Symposium on Code Generation and Optimization (CGO'19). Washington DC, USA. February, 2019.

Riyadh Baghdadi, Jessica Ray, Malek Ben Romdhane, Emanuele Del Sozzo, **Patricia Suriana**, Shoaib Kamil, Saman Amarasinghe. *Tiramisu: a Three-Layered Abstraction for Hiding Hardware Complexity from DSL Compilers*. ArXiv e-prints. February, 2018.

**Patricia Suriana**, Andrew Adams, Shoaib Kamil. *Associative Reductions in Halide*. International Symposium on Code Generation and Optimization (CGO), February, 2017, Austin, USA.

**Patricia A. Suriana**. *Fourier-Motzkin with Non-Linear Symbolic Constant Coefficients*. MEng Thesis, Massachusetts Institute of Technology. Cambridge, MA. February, 2016.