Patricia Adriana Suriana

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Education

Stanford University — **Palo Alto, CA**
PhD Candidate in Computer Science — *September 2018 — Present*

Massachusetts Institute of Technology (MIT) — **Cambridge, MA**
Master of Engineering in Electrical Engineering and Computer Sciences — *February 2016*
Thesis: *Fourier-Motzkin with Non-Linear Symbolic Constant Coefficients*

Bachelor of Science in Electrical Engineering and Computer Sciences — *June 2014*
GPA: 5.0/5.0

Skills

Programming Ability: Python, Java, C/C++, Go, MATLAB, Mathematica, Halide
Language: Bahasa Indonesia (Native), Chinese (Basic), Japanese (Advanced)
Other: Experience with Oscilloscope, Instron, FTIR, SMD soldering, PCB layout

Research Interests

Application of machine learning to structural biology, programming language (domain specific language), distributed systems, search and path planning, high-performance computing.

Research/ Internship Experience

Stanford University – Dror Lab — **Palo Alto, CA**
Graduate Student — *January 2019 — Present*
- Work on application of machine learning to molecular structural prediction.

Advisor: Ron Dror

Google Research – Machine Intelligence (GCam) — **Mountain View, CA**
Halide Compiler — Software Engineer — *February 2016 — September 2018*
- Worked on the core of the Halide compiler to make the Halide programming language faster, more expressive, and more robust.

Manager: Andrew Adams

MIT CSAIL – Commit Group — **Cambridge, MA**
Fourier-Motzkin with Non-Linear Symbolic Constant Coefficients — Master's Student — *February 2015 — January 2016*
- Extend Fourier-Motzkin elimination (FME) method to handle nonlinear symbolic constant coefficients during code generation.
- Integrate the extended FME to the existing Halide library.

Advisors: Prof. Saman Amarasinghe, Shoaib Kamil, Riyadh Baghdadi

Square Enix – Advanced Technological Division — **Tokyo, Japan**
Artificial Intelligence — Software Engineer Intern — *September 2014 — January 2015*
- Responsible for creating tools that analyze and extract various spatial features given the navigation meshes of the game levels.
- All codes were written in C++.

Manager: Ingimar Gudmundsson

Facebook – Infrastructure — **Menlo Park, CA**
Wormhole Publisher/Subscriber System — Software Engineer Intern — *June 2014 — August 2014*
- 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.
- All codes were written in C++11.

Manager: Petchean Ang

MIT CSAIL – Learning and Intelligent Systems Group **Cambridge, MA**
CSP-Based Method for Solving Manipulation Problems — MIT 6.UAP Research Project *February 2014 — May 2014*

- 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

MIT – Computational Fabrication Group **Cambridge, MA**
Interactive Stability Analysis for 3D Printed Design — Research Assistant *September 2013— May 2014*

- 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

Microsoft – Windows Core Group **Redmond, WA**
Storage and File System (ReFS) — Software Developer Intern *June 2013 — August 2013*

- 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

MIT 6.S063 – Building Mobile Applications **Cambridge, MA**
App Inventor Internationalization — MIT Final Class Project *March 2013 — May 2013*

- 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

Linear Technology **Chelmsford, MA**
Wireless Nickel-Metal Hydride (NiMH) Battery Charger — Research Intern *January 2013 — February 2013*

- 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

MIT – Digital Integrated Circuit and Systems Group **Cambridge, MA**
Low Power Computational Imaging for Portable Multimedia Devices — Research Assistant *September 2012 — May 2013*

- 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.

- 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 **Redmond, WA**

Hyper-V Virtual Machine — Software Developer Intern *June 2012 — August 2012*

- 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

MIT CSAIL – Robot Locomotion Group **Cambridge, MA**

Cover Tree for Fast Nearest-neighbor Search — Research Assistant *February 2012 — May 2012*

- 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

Linear Technology **Chelmsford, MA**

Wireless Power Transfer System — Research Intern *January 2012 — February 2012*

- 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

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

Phase and Frequency Control for a Spectrograph-Shutter Combination — Research Assistant *October 2011 — December 2011*

- 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

The Frankel Center, Ben-Gurion University of the Negev **Beer Sheva, Israel**

Unique Permutation Hashing - Research Assistant *June 2011 — August 2011*

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

A*dvisor: Prof. Shlomi Dolev*

The David H. Koch Institute for Integrative Cancer Research at MIT **Cambridge, MA**

Detection of Absorption into Rabbit Urothelium of Drugs Released from an Intravesical Drug Delivery Device — UROP *January — May 2011*

- 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.

Honors and Awards

Stanford Engineering Fellowship, 2018
Member of Tau Beta Pi Honor Society
Invitation to Eta Kappa Nu Honor Society
11th 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 4–8, 2017, Austin, USA.

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