Vasumathi (Vasu) Raman

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github: github.com/vraman
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Professional Experience	**Nuro, Inc.**, Mountain View, CA	February 2018-present

Software Engineer

Built key prediction, planning and interactive planning capabilities, including integration of machine-learned models with heuristic and rule-based approaches. Designed metrics and built evaluation pipelines for prediction and planning. Founding member and Community Chair of Women of Nuro organization, responsible for company-wide education and ally-building.

Zoox, Inc., Menlo Park, CA — October 2016-January 2018

Research Engineer

Algorithmic development and software implementation of planning and control capabilities for self-driving vehicles. Technical lead on key elements of decision planning including signal-controlled intersections, unprotected junction handling and lane changes. Cross-functional coordination and alignment with product management and other engineering teams.

United Technologies Research Center, Berkeley, CA — August 2015-August 2016

Senior Scientist

Projects across all business units, with a focus on decentralized intelligence, privacy and security for cyberphysical systems. Led projects on formal verification of jet engine control logic and disaster management for smart buildings.

California Institute of Technology, Pasadena, CA — August 2013-July 2015

Postdoctoral Scholar

Advisors: Richard Murray (Caltech) and Sanjit Seshia (UC Berkeley)

Developed a novel framework for model-predictive control of systems subject to temporal logic specifications.

Education

Cornell University, Ithaca, NY — 2007 - 2013

Ph.D., Computer Science (Graduate Minor in Economics)

Advisor: Hadas Kress-Gazit

Thesis: *"Explaining Unsynthesizability of High-Level Robot Behaviors"*:

- Generating concise explanations for unsynthesizable LTL specifications for robot control, exploiting the structure of control tasks and novel techniques from formal methods.

- Automatically constructing robot hybrid controllers that guarantee safe execution and goal fulfillment for tasks involving low-level controllers of arbitrary relative execution times.

Wellesley College, Wellesley, MA — 2003 - 2007

B.A., Computer Science and Mathematics, *magna cum laude*

University of Edinburgh, Scotland, UK — Spring 2006

Visiting Student at the School of Informatics

Awards and Honors

NSF EAGER Award for Collaborative Research (2016)

Co-PI on a $200,000 grant on *"Socially Responsible Smart Cities"*: algorithms for smarter delivery of community services through population sensing and urban technology.

Heidelberg Laureate Forum Invitee (2014)

Fully funded week-long retreat with winners of the Fields Medal, Abel Prize, Turing Award, and Rolf Nevanlinna Prize. One of 200 selected from over 2000 applicants.

Outstanding TA Award, Cornell Department of Computer Science (2008-09)

Certificate of achievement for outstanding contributions as a Teaching Assistant

John McMullen Dean's Fellowship, Cornell University College of Engineering (2007-08)

Merit-based fellowship awarded to first-year PhD students

Phi Beta Kappa (awarded March 2007), **Sigma Xi** (awarded May 2007)

Wellesley College Computer Science Department Honors
  Honors Thesis: *"Learning Primitive Predicates for Probabilistic Planning"*
  Advisors: Ellen Hildreth (Wellesley), Leslie Kaelbling (MIT)
Jerome A. Schiff Honors Thesis Fellowship (2006-2007)

Skills	*Programming Languages, Libraries and Tools*: C++, Java, Python, Matlab, git, svn, ROS
	Topics of Expertise: planning and control algorithms for mobile robots, verifiable robotics

Software

BluSTL   github.com/BluSTL/BluSTL
MATLAB toolkit for automatically generating hybrid controllers from specifications written in Signal Temporal Logic.

Linear Temporal Logic MissiOn Planner (LTLMoP)   ltlmop.github.io/
Modular Python toolkit for designing, testing, and implementing hybrid controllers generated automatically from task specifications written in Structured English, Temporal Logic or a subset of Natural Language.

Small But Complete GROne Synthesizer   github.com/VerifiableRobotics/slugs
C++ stand-alone reactive synthesis tool for generalized reactivity(1) synthesis.

The Temporal Logic Planning Toolbox (TuLiP)   tulip-control.sourceforge.net/
Python code for automatic synthesis of correct-by-construction embedded control software.

Leadership and Service

Mentoring
  Summer interns at Zoox (C. Paxton '17) and Nuro (D. Friedovich-Keil '18, O. Zeng '19)
  Caltech Women Mentoring Women, Cornell SWE Mentor, Cornell CSGO-ACSU Mentor
  Advised over 10 undergraduate and graduate students at Cornell, Caltech and UC Berkeley.

CURIE Academy Summer Program Robotics Instructor   July 2012

Instructor for Caltech ME/CS 132: Advanced Robotics   Spring 2015

Teaching Volunteer at MacCormick Secure Center   June-August 2011
  Maximum-security correctional facility for young men aged 16-21. who have committed violent crimes. Ran weekly sessions on oral and written communication and job interview preparation. Small class sizes and one-on-one instruction with inmates nearing release.

Computer Science Graduate Organization (CSGO)   2009 - 2011
  Founding Member and Social Chair, coordinating department-wide social events.

Expanding Your Horizons   2007 - 2013
  One-day conference for 7th-9th grade girls comprising hands-on workshops.
  Fundraising Chair (2012, 2013): Raised over $25,000 each year to fund the conference.
  Lansing Correctional Center Outreach Chair (2011, 2012): Organized satellite conference at the Lansing Correctional Center for Girls.
  Diversity Chair (2009, 2010): Recruited more than 20 new participants from rural and inner city schools each year.
  Workshop Coordinator (2008-2012): Organized workshops on various topics in CS including introductory graph theory and Scratch programming.

Selected Publications

Vasumathi Raman, Hadas Kress-Gazit, "Explaining Impossible High-Level Robot Behaviors". IEEE Transactions on Robotics, 29(1): 94-104, 2013.

Vasumathi Raman, Alexandre Donzé, Dorsa Sadigh, Richard M. Murray, Sanjit A. Seshia. "Reactive Synthesis from Signal Temporal Logic Specifications". In Proc. of the 2015 International Conference on Hybrid Systems: Computation and Control (HSCC 2015). Seattle, WA, USA. April 2015.

Vasumathi Raman, Constantine Lignos, Cameron Finucane, Kenton Lee, Mitch Marcus, Hadas Kress-Gazit. "Sorry Dave, I'm Afraid I Can't Do That: Explaining Unachievable Robot Tasks Using Natural Language". In Proc. of the 2013 Robotics: Science and Systems Conference (RSS 2013). Berlin, Germany. June 2013.