Mark Santolucito

211 AKW, Yale University – 06511 New Haven
+1 (413) 570 3116 • mark.santolucito@yale.edu
www.marksantolucito.com

Research Interests

Program Synthesis/Verification, Data Science, Software Engineering, Security, Computer Music

Education

Yale University **New Haven, CT**
Computer Science Ph.D. - Advisor: Ruzica Piskac *2020 (Expected)*

Yale University **New Haven, CT**
Computer Science M.S. - Advisors: Paul Hudak†, Ruzica Piskac *2013–2015*
Relevant Coursework: Software Analysis and Verification, Formal Semantics, Data Mining, Syntax Design, Compilers, Category Theory, Sound Synthesis, Robotics, Complexity

Amherst College **Amherst, MA**
Computer Science B.A. & Music B.A., Cum Laude *2009–2013*
Advisors: Scott Kaplan, Jason Robinson

Professional Experience

Amazon **New York, NY**
SDE Intern - AWS Security Automation *Summer 2018*
Applying my research on configuration file analysis to use machine learning to automatically build CloudFormation verification tools for code quality and security.

Geumgang University **Nonsan, South Korea**
Visiting Faculty *Feb 2016–Aug 2016*
Worked with other faculty and administration to design four-year curriculum map for new Computer Science major at the university. Taught three courses of my own design in a mix of Korean and English.

World Scholars, LLC **New Haven, CT**
Co-Founder, CTO *Feb 2017–*
Co-founded an international educational exchange that has hosted more than 75 students in 4 separate programs with a revenue of $60,000 USD in 2018. Designed curriculum, taught lectures, and managed technical operations. `www.worldscholars.global`

Awards and Honors

Associates in Teaching
Yale CTL *Fall 2019*
The competitive Associates in Teaching (AT) program, allows doctoral students work jointly with a cooperating faculty member to conceptualize or redesign, plan, and deliver an undergraduate course.

AAAS/Science Program for Excellence in Science
AAAS *Oct. 2018*
Awards deserving graduate students and postdocs working in the life sciences with a one-year sponsored membership in AAAS/Science.

Advanced Graduate Leadership Program
Yale University *2018-*
A program designed to provide doctoral students with experience and training beyond the research lab. Also provides $3000 to fund additional career development.

Accelerator Funding
TSAI City Center for Innovation *Jan 2018*
Awarded $1000 from the Yale Entrepreneurship center to fund project and participate in accelerator program. Lead a team of four undergraduates to build free-space optics (laser) based mesh network to deliver secure and uncensored internet to infrastructure poor areas.

Rohan Fellow
Yale University *2017-2018*
Graduate School funding support provided by the Theres and Dennis M. Rohan Fellowship Fund at Yale.

Heidelberg Laureate Forum
Young Researcher Award *Oct. 2017*
An invitation and funding to attend the 5th HLF with Turing Award winners and Fields Medalists.

Student Research Competition
FMCAD *Oct. 2016*
3rd Place Award for best student presentation.

Carle Fellow
Yale University *2014-2015*
Graduate School funding support provided by the Robert Willets Carle Scholarship Fund at Yale.

Travel Funding Awards
Summer schools: SSFT15, OPLSS2015, SAT/SMT2015, VTSA2017, ProbProg2017
Conferences: USENIX Security 2019, CAV2015/16/17, ICFP2015, POPL2016, FMCAD2016.

Best Undergraduate Thesis
Amherst College *May 2013*
Awarded to the student who has written the best Computer Science thesis of the graduating class.

Lerner Piano Prize
Amherst College *May 2013*
Awarded to the student who has achieved an exceptional level of ability and expressivity in the musical arts.

Copeland Commission
Amherst College *March 2013*
Collaborating with Prof. of Music Stephanie Robinson, to create a motion tracking sound-art installation for "Art in the Place of Art".

Pease Research Fellowship
Amherst College *Fall 2012*
In recognition and support of research in Representations of Media and Media Technology.

Dean of Faculty Funding
Amherst College *June 2012*
Grant for undergraduate thesis research in Media Technology.

Teaching Experience

- *CPSC334: Creative Embedded Systems* *Fall 2019*
  Co-Instructor/Co-Course Designer Yale University
- *CS101: Intro to Computer Science* *Spring 2016*
  Instructor/Course Designer Geumgang University
- *CS201: Object Oriented Programming* *Spring 2016*
  Instructor/Course Designer Geumgang University
- *CS032: Computer Music* *Spring 2016*
  Instructor/Course Designer Geumgang University
- *CPSC432/MUSI427: Computer Music Sound Synthesis* *Spring 2019, Spring 2018*
  Teaching Fellow Yale University
- *CPSC431/MUSI428: Algorithmic Computer Music* *Fall 2019, Fall 2018, Spring 2015*
  Teaching Fellow Yale University
- *CPSC134/MUSI372: Programming Musical Applications* *Fall 2015*
  Teaching Fellow Yale University
- *CPSC112: Intro to Android App Development* *Fall 2014*
  Teaching Fellow Yale University

- *COSC111/COSC112: Introduction to Computer Science I/II* — *Fall 2011-Spring 2013*
  Lead TA — Amherst College

Student Project Advising
Nathan Nuñes, REU Summer Research '19 - An online interface for live programming by example
Maxwell Levatich, Summer Research '19 - Language agnostic SMT-based program repair
Kairo Morton, Summer Research '19 - Neural Network guided grammar selection for SyGuS
Nicholas Shoemaker, Independent Research '18/9 - Program transformations for MSP430
Elven Shum, Summer Research '19 - TSL synthesis for Android Apps with RxKotlin
Vivek Goplan, Summer Research '18 - Synthesizing SDNs as Functional Reactive Programs
Ryan Lim, BS Thesis '18 - Protecting Strong Anonymity in Mesh Networks
Kate Rogers, BS Thesis '18 - Synthesizing DSP Filters on Non-Commutative Sound Samples [10]
Drew Goldman, Independent Research '18 - On the Usability of Programming-By-Example for Scripting Tasks [11]
Halley Young, REU Summer Research '17 - Musical Refinement Types
Aeden Lombardo, REU Summer Research '17 - Synthesizing Music Synthesis [10]
Haohong Xu, BS Thesis '17 - Optimization of Synthesized Functional Reactive Programs
Aaron Shim, BS Thesis '16 - Towards Error-Free Configuration Files: A Learning Based Approach [12]
Marvin Qian, BS Thesis '15 - Representative Example Generation for Cooperative Programming

Invited Talks

Facebook Faculty Networking Event, San Francisco, USA — *June 2019*
Automated Firewall Repair and Verification.

NYC CS Fair, NY, USA — *March 2019*
How to Play Your Laptop Like an Instrument: Live Coding for Music

Code441 Hackathon, Hamilton, Bermuda — *Dec 2018*
Applications of Association Rule Learning and Neural Networks

IBM PL Day, Yorktown Heights, USA — *Dec 2018*
Learning to Verify Infrastructure as Code.

Xerox PARC, Palo Alto, USA — *Oct 2018*
Language Learning for Verification of Configuration Files

New England Programming Languages Symposium, Cambridge, USA — *Sept 2018*
Digital Signal Processing Programming-by-Example.

Verification and Synthesis for Software Evolution at ETAPS, Greece — *Apr 2018*
Learning Models of Configuration Correctness.

Learning in Verification Workshop at ETAPS, Greece — *Apr 2018*
Using Machine Learning to Synthesize Specifications for Configuration Files

IBM PL Day, Yorktown Heights, USA — *Dec 2017*
Synthesizing Functional Reactive Programs.

Roslyn High School, NY, USA — *Nov 2017*
Majoring in Computer Science - the Why and How.

Instituto Superior Técnico (IST), Portugal — *May 2017*
Language Learning for Verification of Configuration Files.

Saarland University, Germany — *Sept 2016*
Verifying Configuration Files with Examples.

Monthly Music Hackathon, NYC — *Jan 2015*
Workshop on Algorithmic Composition with Euterpea.

Service

Program Committee
SYNT 2019, ML4PL 2018, FARM 2016

Publicity Chair
FARM 2017, FARM 2016

Journal Referee
TOPLAS 2017

Reviewer
IMWUT 2019, NIME 2019

Subreviewer
iFM 2018, SMT 2017, ESOP 2017, ICDCIT 2016, VSTTE 2015

Artifact Evaluation Committee
PLDI 2018

Organizer
CAV 2017 Buddy System, CAV 2016 Buddy System, CAV 2015 Buddy System

OMI Associate Director
Organize events and manage student membership of the Open Music Initiative - omi.yale.edu

Yale CS Social Leader
Organize the weekly CS socials in the department 2016-2017

Publications (🗐 indicates published proceedings, ↓ᴬᵢ indicates alphabetic author ordering)

[1] **Formal methods and computing identity-based mentorship for early stage researchers**.
Mark Santolucito and Ruzica Piskac.
2020.
Under submission.

[2] **Using wearables for data driven decision making in education**.
Mark Santolucito, Dan Hoffman, Seungoh Paek, and Maria Hwang.
2020.
Under submission.

[3] **Grammar filtering for syntax-guided synthesis**.
Kairo Morton, Bill Hallahan, Elven Shum, Ruzica Piskac, and *Mark Santolucito*.
2020.
Under submission.

[4] 🗐 **Live programming by example**.
Mark Santolucito, William T. Hallahan, and Ruzica Piskac.
In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems*, May 2019.

[5] 🗐 **Studio report: Yale open music initiative**.
Scott Petersen, Mark Santolcuito, and Konrad Kaczmarek.
In *International Computer Music Conference (ICMC)*, 2019.

[6] 🗐 ↓ᴬᵢ **Temporal stream logic: Synthesis beyond the bools**.
Bernd Finkbeiner, Felix Klein, Ruzica Piskac, and *Mark Santolucito*.
In *International Conference on Computer Aided Verification (CAV)*, July 2019.

[7] ↓ᴬᵢ **System design with TSL**.
Bernd Finkbeiner, Felix Klein, Ruzica Piskac, and *Mark Santolucito*.
In *SYNT workshop at CAV*, July 2019.

[8] 🗐 ↓ᴬᵢ **Synthesizing functional reactive programs**.
Bernd Finkbeiner, Felix Klein, Ruzica Piskac, and *Mark Santolucito*.
In *Haskell Symposium*, October 2019.

[9] **Statically verifying continuous integration configurations**.
Mark Santolucito, Jialu Zhang, Ennan Zhai, and Ruzica Piskac.
CoRR, abs/1805.04473, 2018.
http://arxiv.org/abs/1805.04473.

[10] **Programming-by-example for audio: Synthesizing digital signal processing programs**.
Mark Santolucito, Kate Rogers, Aedan Lombardo, and Ruzica Piskac.
In *Functional Art and Music (FARM) at ICFP*, 2018.

[11] **Programming by example: Efficient, but not "helpful"**.
Mark Santolucito, Drew Goldman, Allyson Weseley, and Ruzica Piskac.
In *PLATEAU at SPLASH 2018*, 2018.
Also presented at SYNT 2018.

[12] **Synthesizing configuration file specifications with association rule learning**.
Mark Santolucito, Ennan Zhai, Rahul Dhodapkar, Aaron Shim, and Ruzica Piskac.
Proc. ACM Program. Lang., 1(OOPSLA), October 2017.

[13] **Version space learning for verification on temporal differentials**.
Mark Santolucito.
In *International Symposium on Software Testing and Analysis (ISSTA)*, 2017.
Also presented as poster at FMCAD 2016 Student Research Competition, 3rd Place Award.

[14] **Vehicle platooning simulations with functional reactive programming**.
Bernd Finkbeiner, Felix Klein, Ruzica Piskac, and *Mark Santolucito*.
In *Safe Control of Autonomous Vehicles Workshop at CPSWeek*, 2017.
https://arxiv.org/abs/1803.10383.

[15] **Probabilistic automated language learning for configuration files**.
Mark Santolucito, Ennan Zhai, and Ruzica Piskac.
In *International Conference on Computer Aided Verification (CAV)*, 2016.

[16] **Media Modules: Intermedia Systems in a Pure Functional Paradigm**.
Mark Santolucito, Donya Quick, and Paul Hudak.
In *International Computer Music Conference (ICMC)*, 2015.

[17] **Using javascript as an intermediate language for FRP**.
Mark Santolucito and Ruzica Piskac.
2015.
Poster at ICFP Student Research Competition.

[18] **Real-time interactive music in haskell**.
Paul Hudak, Donya Quick, *Mark Santolucito*, and Daniel Winograd-Cort.
In *Functional Art and Music (FARM) at ICFP*, 2015.

[19] **Communalizing the interfaces of single player games**.
Mark Santolucito and Maria Hwang.
2014.
Extended abstract in Digital Games Research Association Conference.

[20] **Raid the fridge!: Promoting healthy eating habits through the game Monster Appetitie**.
Maria Hwang, Pantiphar Chantes, and *Mark Santolucito*.
2014.
Extended Abstract and Poster at Games Learning and Society 10, Best in Show Award.

[21] **Simquabbin project: Game-based environmental science education in a virtual world**.
Mark Santolucito and Scott Payne.
2013.
Exteneded Abstract and Poster at Games Learning and Society 9.

[22] **Designing a community to support long-term interest in programming for middle school children**.
Kyle J. Harms, Jordana H. Kerr, Michelle Ichinco, *Mark Santolucito*, Alexis Chuck, Terian Koscik, Mary Chou, and Caitlin L. Kelleher.
In *Proceedings of the 11th International Conference on Interaction Design and Children*, IDC '12, New York, NY, USA, 2012. ACM.