Willy R. Vasquez

wrv@utexas.edu
https://alum.mit.edu/www/wrv/

EDUCATION

The University of Texas, Austin, TX
Candidate for Ph.D. Electrical and Computer Engineering **Expected Ph.D.**: May 2022

- **Current Research:** Verifiable Computation & Video Decoder Security
- **Adviser:** Prof. Mohit Tiwari & Prof. Hovav Shacham

Massachusetts Institute of Technology (MIT), Cambridge, MA **B.S:** June 2015
M.Eng, B.S. in Computer Science and Engineering **M.Eng**: September 2017

- **Undergraduate Thesis:** Optimizing SAT/SMT Solvers with Machine Learning and Program Synthesis
- **M.Eng. Thesis:** Auditable Private Ledgers

RELEVANT SKILLS

Programming Go, Java, Rust, Python; Git; Android SDK
Language Fluent in both English and Spanish; Beginner Chinese

PUBLICATIONS

Narula, N., **Vasquez, W.**, and M. Virza. *Privacy-preserving Auditing on Distributed Ledgers*. In NSDI. Renton, Washington, 2018.

EXPERIENCE

UT Systems Security Lab – Video Decoder Security
Research Assistant with Hovav Shacham August 2019 – Present

- Evaluate the security of hardware video decoders by constructing malformed video files
- Write a software video decoder in Rust, along with necessary tools to generate malformed video files

UT Spark Research Lab – Verifiable Computation
Research Assistant with Mohit Tiwari August 2017 – Present

- Research and understand verifiable computing primitives, including SNARKs, Interactive Proofs, and arithmetic circuit compilation
- Build upon existing verifiable computing constructions to improve prover overhead

Samsung Austin Research Center (SARC) – Evaluating Samsung Processor Security
Research Intern in the Samsung Performance Architecture (SPA) Team Summer 2019

- Evaluated hardware fixes related to Spectre variant 2
- Provide design recommendations to ensure side-channel resistant processor components

Microsoft Research – Optimizing Verifiable Computing
Research Intern in the Security and Privacy Group Summer 2018

- Improve the performance of a verifiable state machine system called Spice (OSDI ‘18) with memoization techniques
- Design balanced tree data structures in Python that minimize the number of balance operations with minimal depth

MIT Digital Currency Initiative (DCI) – Masters Research
Research Assistant with Neha Narula August 2016 – August 2017

- Research technologies and tools to add privacy-enabling technologies to blockchains
- Design and implement zero-knowledge proofs and homomorphic commitment schemes atop distributed ledger technologies in Go
- Paper accepted to NSDI ‘18

Raytheon BBN Technologies – Cybersecurity Group
Associate Cyber Research Scientist August 2015 – August 2016

- Contributed to the design and analysis of DARPA funded cybersecurity efforts
- Designed behavioral malware signatures that rely on results from static analysis results of Android applications
- Engineered suggestors and constraint solvers for the generation of potential vulnerabilities in commodity devices
- Participated in business development initiatives by providing new business development ideas and perform research for feasibility of ideas
- Organized biweekly group tech talks with internal and external speakers

MIT Sloan School of Management – Vulnerability Research and Vulnerability Market Analysis
Research Assistant with Michael Siegel May 2015 – August 2015

- Fuzzed multiple versions of a popular program using AFL to provide evidence for a model of cyber vulnerability discovery
- Assisted in parsing bug bounty information from HackerOne and other data sources to create a systems dynamics model of the vulnerability market

Benemérita Universidad Autónoma de Puebla (BUAP) – School of Computer Science
Research Assistant with Miguel Angel León Chávez June 2015 – July 2015

- Developed iPhone and server applications that used pairing based cryptography to perform an electronic voting protocol
- Explored the implementation of Barreto-Naehrig curves with the Optimal-Ate pairing in Java and C implementations

MIT Undergraduate Research Opportunity (UROP) - Computer-Aided Programming Group: Synthesizing a Synthesizer
Undergraduate Research with Armando Solar-Lezama September 2014 – May 2015

- Parsed output from a SMT-LIB v2 parser using python to a Sketch Domain Specific Language directed acyclic graph (DAG) format
- Implemented a testing suite to discover common operations in DAGs to transform into rewrite rules for SMT solvers
- Presented work at EECScon 2015 and work became part of a larger NSF grant

MIT UROP - Theory of Computation Group: Proof of Work Attribute Based Encryption
Undergraduate Research with Shafi Goldwasser June – August 2014

- Devised a protocol to combine Attribute Based Encryption (ABE) with proof of work (POW) schemes for a POW decryption mechanism
- Collaborated with a graduate student; Explored lattice cryptographic schemes in order to implement them and develop a library

Symantec Corporation (Twice), Waltham, MA
Mobility Software Solutions Intern June – August 2013, 2014

- Designed and developed internal use Android application for management and administration of Mobility Manager, formerly App Center
- Developed a load testing script to mimic iOS devices using Apache JMeter for performance analysis of Mobility Manager

Secunetics, Reston, VA
Associate Consultant January 2014

- Assisted in securing the U.S. Department of Interior's network from malicious external and internal activity
- Developed a web dashboard to mimic security incident and event management (SIEM) capabilities by gathering logs and reports from intrusion detection and prevention systems using Meteor and Rickshaw for manual correlation

LEADERSHIP

GraduatE ECE (GREECE) @ UT
Co-President and Co-Founder January 2018 – Present

- Founded GREECE to promote an ECE-wide community of graduate students through social, academic, and corporate events
- Lead a board of 9 other students in achieving our mission through event organization and promotion, partnering with the ECE department, and partnering with corporate sponsors

MAES (Latinos in Science and Engineering) Boston Professional Chapter (http://maesboston.org)
Vice President July 2016 – July 2017

- Coordinate and plan networking and outreach opportunities to Boston area Latino STEM Professionals
- Support Boston area MAES Student Chapters by exposing them to professionals and providing chapter governance support

MAES Student Chapter (http://mymaes.org)
National Student Representative, Vice President of Marketing for Local Chapter September, 2013 – May 2015

- Represent all of the East Coast MAES chapters on the National Board of Directors and help fulfill MAES's vision nationwide
- Design MIT MAES's website and advertising material for campus wide events
- Increased MIT MAES's alumni donations with targeted design changes to the website

MITSec (MIT Security Club) (http://mitsecurityclub.mit.edu/)
President, Cofounder May, 2013 – May 2015

- Partnered with a fellow classmate to bring together MIT's talent in applied and theoretical security
- Organize meetings and lectures to teach the MIT populace about network and computer security

MIT LUChA (La Unión Chicana por Aztlan) (http://lucha.mit.edu/)
President, Vice President, Webmaster, Social Chair, ECCSF Chair, Academic Chair December, 2011 – May 2015

- Coordinated and planned ECCSF Conference at MIT for 150 participants from all over the East Coast
- Designed new LUChA webpage using Twitter Bootstrap as a frontend
- Organized, advertised for, and ran the logistics of campus wide events, such as our Independence Day BBQ and Day of the Dead Party

WORKSHOPS/HACKATHONS

Atlantic Council Cyber 9/12 Strategy Challenge, March 2019
The Cyber 9/12 Strategy Challenge is an annual cyber policy and strategy competition where students from across the globe compete in developing policy recommendations tackling a fictional cyber catastrophe. Competed in a team of four responding to potential vulnerabilities in the 2020 census.

Atlantic Council Cyber 9/12 Strategy Challenge, Austin Regional, December 2018 – Semi-finalist
Regional version of Cyber 9/12 Strategy Challenge. Competed in a team of four responding to denial of service attacks of Internet of Things (IoT) and critical infrastructure.

DeepSpec Summer School 2017
Deep dive into formal methods using the Coq Theorem Prover for high assurance systems and design formally verified software. Explored technologies such as CompCert, Vellvm, QuickChick, CertiKOS, and many more. Also participated in the Coq Intensive, reviewing Benjamin Pierce's Software Foundations textbook.
Technologies used: Coq Theorem Prover

LATISM El Hackathon 2015 – Consejera (1st Place Winner)
Web platform for guiding parents who are not familiar with US school system on how to best support their child, while providing security and privacy guarantees from used technology.
Technologies used: Mylar (Meteor.js), MongoDB, Bootstrap

Battelle Cyber Auto Challenge 2014 – Automobile CyberSecurity
First-hand experience exploring the security of automobiles, from attacks, defenses, and policy
Technologies used: SocketCAN, VehicleSpy, Python

Facebook Summer of Code 2013 – Facemood
Semantic analysis of Facebook friend's statuses to determine if they are having a good day or a bad day.
Technologies used: PHP, Facebook API, Heroku, Semantic API

Hopper Storm and Finagle+ Hackathon 2013 – Storm Hackathon
Semantic analysis of tweets combined with geographic data to determine regional perception of particular topics.
Technologies used: Twitter Storm, Semantic API, Google Map API

ACTIVITIES AND INTERESTS

Texas Blockchain Advisor • Central American Student Association • MAES • Cryptography • Weight Lifting • Mathematics • MITSec Security Capture the Flag competitions • UT ISSS

HONORS AND ACHIEVEMENTS

Virginia & Ernest Cockrell, Jr. Fellowship In Engineering (2018, 2019) • UT Austin Whaley Engineering Fellowship Scholar (2017) • BeVisible 2016 Most Inspiring Latinx Engineers • MIT Office of Multicultural Programming Excellence Through Adversity Award (2015) MAES National Leadership Conference First Place Presentation (2013) • Ronald McDonald HACER Scholarship for Academic Excellence (2011)