

# Alvaro Velasquez

## Curriculum Vitae

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United States citizen

### Education:

#### University of Central Florida

- PhD candidate in Computer Science
- Master's of Science in Computer Science (Graduation date: May, 2016)
- Bachelor of Science in Computer Science with Honors (Graduation date: May, 2014)
  - Honors Thesis: Computation of Boolean Formulas Using Sneak Paths in Crossbar Computing (**Best Thesis Award**).
  - Minor in Mathematics

### Publications:

- **A. Velasquez** and S. K. Jha, "Fault-Tolerant In-Memory Computing Using Paths-Based Logic and Heterogeneous Components." In *2018 21st Design, Automation and Test in Europe (DATE)*.
- **A. Velasquez** and S. K. Jha, " Computation of Boolean matrix chain products in 3D ReRAM." In *Circuits and Systems (ISCAS), 2017 IEEE International Symposium on*, pp. 1-4. IEEE, 2017.
- **A. Velasquez**, P. Wojciechowski, K. Subramani, S. L. Drager and S. K. Jha, "The Cardinality-Constrained Paths Problem: Multicast Data Routing in Heterogeneous Communication Networks," *2016 15th IEEE International Symposium on Network Computing and Applications (NCA)*, Cambridge, MA, 2016, pp. 126-130. doi: 10.1109/NCA.2016.7778606
- **A. Velasquez** and S. K. Jha, "Parallel boolean matrix multiplication in linear time using rectifying memristors," *2016 IEEE International Symposium on Circuits and Systems (ISCAS)*, Montreal, QC, 2016, pp. 1874-1877. doi: 10.1109/ISCAS.2016.753893
- Z. Alamgir, K. Beckmann, N. Cady, **A. Velasquez** and S. K. Jha, "Flow-based computing on nanoscale crossbars: Design and implementation of full adders," *2016 IEEE International Symposium on Circuits and Systems (ISCAS)*, Montreal, QC, 2016, pp. 1870-1873. doi: 10.1109/ISCAS.2016.7538936
- **A. Velasquez** and S. K. Jha, "Fault-tolerant in-memory crossbar computing using quantified constraint solving," *2015 33rd IEEE International Conference on Computer Design (ICCD)*, New York, NY, 2015, pp. 101-108. doi: 10.1109/ICCD.2015.7357090
- **A. Velasquez** and S. K. Jha, "Automated synthesis of crossbars for nanoscale computing using formal methods," *Proceedings of the 2015 IEEE/ACM International Symposium*

on *Nanoscale Architectures (NANOARCH 15)*, Boston, MA, 2015, pp. 130-136. doi: 10.1109/NANOARCH.2015.7180599

- **A. Velasquez** and S. K. Jha, "Parallel computing using memristive crossbar networks: Nullifying the processor-memory bottleneck," *2014 9th International Design and Test Symposium (IDT)*, Algiers, 2014, pp. 147-152. doi: 10.1109/IDT.2014.7038603
- F. Hussain, **A. Velasquez** and S. K. Jha, "Exploiting Heterogeneous Parallel Programming for Developing an Educational Neuromorphic Computing Simulator," *Workshop on Education for High-Performance Computing (EduHPC 2014)*, New Orleans, LA, 2014.
- F. Hussain, **A. Velasquez**, E. Sassano and S. K. Jha, "Putting humpty-dumpty together: Mining causal mechanistic biochemical models from big data," *2014 IEEE 4th International Conference on Computational Advances in Bio and Medical Sciences (ICCABS)*, Miami, FL, 2014, pp. 1-6. doi: 10.1109/ICCABS.2014.6863914

#### **Submitted for Publication:**

- **A. Velasquez**, P. Wojciechowski, K. Subramani, S. L. Drager and S. K. Jha, "A Graph-Theoretic Approach to Multicast Routing in Constrained Heterogeneous Networks".
- **A. Velasquez** and S. K. Jha, "In-Memory Parallel Computation of Graph Transitive Closure Using 3D Crossbar Memory".

#### **Patents:**

- S. K. Jha, D. E. Rodriguez, J. E. van Nostrand, and **A. Velasquez**, "Computation of Boolean Formulas Using Sneak Paths in Crossbar Computing," Patent number: US9319047 B2.
- **A. Velasquez** and S. K. Jha, "3D Crossbar Architecture for Fast, Efficient In-Memory Computing of Graph Transitive Closure," Patent pending (Technology #33694), [http://technologies.tt.research.ucf.edu/technologies/33694\\_3d-crossbar-architecture-for-fast-efficient-in-memory-computing-of-graph-transitive-closure](http://technologies.tt.research.ucf.edu/technologies/33694_3d-crossbar-architecture-for-fast-efficient-in-memory-computing-of-graph-transitive-closure)

#### **Posters:**

- **A. Velasquez** and S. K. Jha, "Memristor Crossbars for Parallel Big-Data Stochastic Computing," *2015 52<sup>nd</sup> ACM/EDAC/IEEE Design Automation Conference (DAC)*, San Francisco, CA, 2015.
- S. K. Jha, D. E. Rodriguez, and **A. Velasquez**, "Computation of Boolean Formulae Using Sneak Paths in Crossbar Computing," Poster presented at the *2014 51<sup>st</sup> ACM/EDAC/IEEE Design Automation Conference (DAC)*, San Francisco, CA, 2014.
- **A. Velasquez**, "Memristor-Crossbar Computing," Alvaro Velasquez. *2014 Command, Control, Communications, Cyber and Intelligence (C4I) Technology Review Days*, Utica, NY, 2014.

## Employment:

- **Air Force Research Laboratory**, Rome, NY      **Title:** Research Computer Scientist  
**Department:** Advanced Planning and Autonomous Command and Control Systems  
branch (RISC)      May, 2018
- **Air Force Research Laboratory**, Rome, NY      **Title:** Research Contractor  
**Department:** Trusted Systems branch (RITA)      June, 2017 – August, 2017
- **Air Force Research Laboratory**, Rome, NY      **Title:** Research Contractor  
**Department:** Trusted Systems branch (RITA)      June, 2016 – August, 2016
- **Air Force Research Laboratory**, Rome, NY      **Title:** Research Contractor  
**Department:** Advanced Planning and Autonomous Command and Control Systems  
branch (RISC)      June, 2015 – August, 2015
- **Griffis Institute**, Rome, NY      **Title:** Consultant  
**Department:** Information Directorate      September, 2014 – December, 2014
- **University of Central Florida**, Orlando, FL      **Title:** Graduate Research Assistant  
**Department:** Electrical Engineering and Computer Science      August, 2014–May, 2015
- **Air Force Research Laboratory**, Rome, NY      **Title:** Research Contractor  
**Department:** Trusted Systems branch (RITA)      May, 2014 – August, 2014
- **DiSTI Corporation**, Orlando, FL      **Title:** Software Engineer Intern  
**Department:** Internal Research and Development      September, 2012 – March, 2014
- **University of Central Florida**, Orlando, FL      **Title:** Research Assistant  
**Department:** Center for Research in Computer Vision      May, 2013 – August, 2013
- **Palm Beach State College**, Lake Worth, FL      **Title:** Tutor  
**Department:** Computer Lab      Nov, 2011 - May, 2012

## Honors:

- **National Science Foundation Graduate Research Fellowship 2015-2018**
- **University of Central Florida Founder's Day Award 2015**
- **University of Central Florida Dean's Fellowship**
- **SFFP 2014** (Summer Faculty Fellowship Program) at the Air Force Research Laboratory.
- **Summer Mentoring Fellowship 2014** at UCF
- **HIM** (Honors in the Major) Spring 2014 Grant
- **HIM** (Honors in the Major) at UCF
- **REU 2013** (Research Experience for Undergraduates) in Computer Vision at UCF
- **MCAI 2013** (Monte-Carlo Methods in Artificial Intelligence) at Oregon State University