

# Keerthan Jaic

## Curriculum Vitae

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### Research Interests

Computer Architecture; Programming Languages, Embedded Systems.

### Education

2011–Present **M.S, Computer Engineering**, *Clemson University*, Clemson, SC, 3.72/4.

2007–2011 **B.E. (Hons), Electrical and Electronics Engineering**, *Birla Institute of Technology and Science, Pilani*, Goa, India.

### Research

Ongoing **Architectural support for transiently powered computer systems**, *Advisors: Dr Jacob Sorber, Dr Melissa Smith.*

We are investigating various techniques to allow embedded processors to run longer by sacrificing quality when energy availability is low. We are modifying the openMSP430, an open-source CPU written in verilog to quantify the potential energy savings.

- Developed tools to profile the power consumption of applications using an RTL model of a CPU and Synopsys EDA tools.
- Developed a high level python based simulator to explore the effects of potential architectural modifications on various applications
- Working with two ECE undergraduate students to modify the openMSP430 CPU.

2013–Present **Enhancing hardware design flows**, *Advisor: Dr Melissa Smith.*

I contribute to MyHDL, an open-source python based hardware description language. I also develop other tools to simplify hardware description and HW/SW co-design.

- Side project inspired by the challenges faced during past FPGA projects
- Extended MyHDL to support modeling of class/instance attributes and converting them to Verilog and VHDL.
  - Allows better abstraction during hardware design by allowing class objects to be used as interfaces
  - Simplifies HDL module declarations and instantiations since class instances can be used as buses
  - Facilitates HW/SW co-design by enabling sharing of data structures between hardware and software code.
- Developed a library to reduce boilerplate code during hardware design and testing

2014 **Wireless structural health monitoring system**, *Advisors: Dr Jacob Sorber, Dr Sez Atamturkur.*

I was a part of a team that developed a low cost, energy efficient wireless structural monitoring system. The system consisted of MSP430 based wireless sensor nodes and a beaglebone black used as a basestation. We deployed the system at Fort Sumter national monument.

- Cross-disciplinary collaboration with civil engineering research group
- Deployment at Fort Sumter has been successfully operating since October 2014
- In charge of developing the sensor node, basestation software and guiding an undergraduate CS student working with me.
- Assisted in the design of the hardware platform

2013 **FPGA based network intrusion detection system**, *Advisor: Dr. Melissa Smith.*

Developed an open source 10Gbps NIDS in collaboration with Solarflare Communications Inc. The system was developed for and tested on a Solarflare network card with an inline FPGA. My work consisted of hardware for the FPGA and software for configuring the FPGA and processing results.

- Worked individually on hardware and software development
- Designed a memory efficient hardware pattern matching system
- Currently investigating optimizing the pattern matching system for bio-informatics data and extending the NIDS to support 100G network adapters.

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## Publications

2015 Jaic, Keerthan and Melissa C Smith. "Enhancing hardware design flows with MyHDL". In: *Proceedings of the 23rd ACM/SIGDA international symposium on Field-programmable gate arrays (FPGA)*.

2014 Jaic, Keerthan, Melissa C Smith, and Nilim Sarma. "A practical network intrusion detection system for inline FPGAs on 10GbE network adapters". In: *Proceedings of the IEEE 25th International Conference on Application-specific Systems, Architectures and Processors (ASAP)*.

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## Teaching Experience

Fall 2011 **ECE 327: Digital Systems Design**, *Graduate Grading Assistant*, Clemson University.

Spring 2012 **ECE 273: Computer Organization Lab**, *Graduate Teaching Assistant*, Clemson University.

Summer 2012

Fall 2012 **ECE 209: Logic Lab**, *Graduate Teaching Assistant*, Clemson University.

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## Service

Conference subreviewer: ReConFig 2012, FCCM 2014

2011–present **Future Engineers Program**, *Volunteer*, Clemson Elementary School.

The Future Engineers program was developed by Dr Melissa C. Smith for educational outreach