

Rizwana Begum

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SUMMARY

- Ph.D candidate and Graduate Research Fellow at Drexel University, with experience in computer architecture, circuit design, and mobile systems; specifically in power and performance modeling, memory subsystem architecture, and Linux scheduler subsystem.
- *Research Interests:* Power-efficient computer architecture, cross-component energy management of mobile computing platforms, exploring hardware and operating system support for system-wide energy proportionality.

EDUCATION

Ph.D., Computer Engineering Drexel University, Philadelphia, PA Adviser: Dr. Mark Hempstead	April 2012 - present GPA: 4.0
M.S., Computer Engineering Drexel University, Philadelphia, PA	March 2012 GPA: 3.95
B.S., Electrical and Electronics Engineering Birla Institute of Technology and Science (BITS) - Pilani, India	May 2008 GPA: 3.8

RESEARCH EXPERIENCE

Drexel University Philadelphia, PA	<i>Graduate Research Fellow</i> April 2012 - present
<ul style="list-style-type: none">• Designed a predictive performance and energy model for mobile systems capable of scaling both core and DRAM frequency. The cross-component model considers the impact of scaling frequency of one component on the performance and energy of the other component. The accuracy of the model is established using Cortex-A9 core and LPDDR3 memory (<i>ICCD'16</i>).• Invented new metrics, <i>Inefficiency</i> and <i>Power-Agility Metrics</i>. <i>Inefficiency</i> is a novel way to specify energy constraints to the systems optimizing performance under energy constraints (<i>IISWC'15</i>). <i>Power-Agility Metrics</i> measure the capability of the system to dynamically adapt its energy consumption with changes in workload characteristics (<i>ICCD'15</i>).• Developed new power management algorithms for energy-constrained systems to search for optimal core and memory frequency settings under given <i>Inefficiency</i> budget with low overhead (<i>ICCD'16</i>).• Designed <i>Agile Android</i> system capable of dynamically adapting its energy consumption to changing workload demands to stay under specified energy constraints by integrating the above mentioned models and algorithms into Gem5, a C++ and python based cycle-accurate architecture simulator (<i>ICCD'16</i>).• Exploring the energy-performance trade-offs provided by other components of the system such as network and GPU in order to manage their energy consumption by extending <i>agile android</i> system.	

PROFESSIONAL EXPERIENCE

Qualcomm Inc.

DSP team, India

Embedded Engineer 2

January 2008 - April 2010

- Experienced in profiling and estimating the system requirements of embedded projects. Projected memory and MIPS requirements, estimated the impact on HW utilization, bus traffic and processing time (hence video fps) using ETM (Embedded Trace Macrocell) for ARM microprocessor, and Qualcomm proprietary tools for DSP.
- Developed, tested and supported sub-modules of standard video codecs (MPEG4, H264) written for Qualcomm DSP processors in assembly language, and ARM processors in embedded C. Experienced in using JTAGs, Trace32 debugging tools.
- Have experience working with boot loaders, interrupt service routines, memory allocations, cache optimizations, threads scheduling and prioritization.
- Proposed two major chip level power optimizations for future chipsets of Qualcomm- reducing bus clock frequency & optimizing video hardware cycles. Took initiative in learning and educating the team members about video decoder implementation on Qualcomm chipsets and H264 video codec standard in general.

Accenture Services Private Ltd.

India

Undergraduate Intern

May 2006-August 2006

TEACHING EXPERIENCE

- ECEEC353 - Systems Programming (Winter'16)
- ECEEC302 - Digital Systems Projects (Fall'15)
- ECEEC621 - High Performance Computer Architecture (Winter15)
- ECEEC690 - Advanced Programming (Fall14)
- ECEL302 - Electronics Laboratory course (Winter13, Winter14)
- ECEL303 - Electronics Laboratory course (Fall12, Fall13, Spring13)

SELECTED GRADUATE PROJECTS

Drexel University

Philadelphia, PA

*Graduate Research Assistant**September 2010 - March 2012*

- Evaluated power and performance gains using temporary file system 'tmpfs' along with traditional file system (hard disks and DRAM) in general purpose computers and web servers.
- Implemented and tested various VHDL designs on Spartan-3 board using Xilinx ISE. Worked on XMIT, SRAM interfacing using hyper terminal, floating point arithmetic using coregen, FIFO using SRAM.
- Have done projects involving extensive programming in C for a multi-core processor in Linux environment. Developed Perl scripts to automate the code execution.

PUBLICATIONS

- **Rizwana Begum**, Mark Hempstead, Guru Prasad and Geoffery Challen. *New Interfaces for Achieving Power Agility on Mobile Devices*, (Poster) International Workshop on Mobile Computing Systems and Applications (HotMobile), 2014.

- **Rizwana Begum**, Guru Prasad Srinivasa, David Werner, Mark Hempstead and Geoffrey Challen. *Energy-Performance Trade-offs on Energy-Constrained Devices with Multi-Component DVFS*. Proceedings of the IEEE International Symposium on Workload Characterization (IISWC), Oct 2015.
- **Rizwana Begum** and Mark Hempstead. *Power Agility Metrics: Measuring Dynamic Characteristics of Energy Proportionality*. Proceedings of the IEEE International Conference on Computer Design (ICCD), Oct 2015.
- **Rizwana Begum**, Guru Prasad Srinivasa, Mark Hempstead and Geoffrey Challen. *Algorithms for CPU and DRAM DVFS Under Inefficiency Constraints*. To appear in the Proceedings of the IEEE International Conference on Computer Design (ICCD), Oct 2016.

PROFESSIONAL ACTIVITIES

- Reviewer at IEEE International Conference on Computer Design (ICCD), 2015.
- Reviewer at International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD), 2015.

ACADEMIC HONORS & AWARDS

- Received ACM SIGMOBILE travel grant for poster presentation at the International Workshop on Mobile Computing Systems and Applications (HotMobile), 2014.
- Received Suryadevara Basavaiah Family Educational Fund Award (April, 2013) in Drexel University for meritorious performance in graduate studies.
- Received performance excellence awards twice in Qualcomm Inc.
- Received 4 year full academic scholarship for Bachelors of Engineering at BITS-Pilani, India.
- Honor Student, Gold Medalist in 12th Grade.

SKILLS

General Skills: Digital Design, Performance and Energy Modeling, Computer Architecture, Mobile Systems, Operating Systems, Metrics

Scripting and Programming Languages: C, C++, Python, VHDL, embedded C, Perl

Simulators, Tools and Chipsets: Gem5, ModelSim, Xilinx ISE, Matlab, Eclipse IDE, Synopsys Design Compiler, Pandaboard, ODROID-S (android platform), ARM9 and ARM11, Qualcomm chipsets, Xilinx Spartan3 starter kit(FPGA)

Other: Latex, Git

REFERENCES

- **Dr. Mark D. Hempstead**
Associate Professor, Department of Electrical and Computer Engineering
Tufts University, Medford, MA
Email: mark@ece.tufts.edu
- **Dr. Baris Taskin**
Associate Professor, Department of Electrical and Computer Engineering
Drexel University, Philadelphia, PA
Email: taskin@coe.drexel.edu