CANTURK ISCI

CONTACT INFORMATION

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RESEARCH INTERESTS

- Computer architecture and its interaction with systems software
- Architectural and real-system techniques for power-efficient and reliable computing systems

EDUCATION

Ph.D. **Princeton University**, Princeton, NJ — Sep 2001 – Present
Electrical Engineering
Advisor: Margaret Martonosi
Thesis Title: *"Workload Adaptive Power Management with Live Phase Monitoring and Prediction"*
Expected graduation date: May 2007

M.A. **Princeton University**, Princeton, NJ — Sep 2001 – May 2003
Electrical Engineering
Advisor: Margaret Martonosi

M.Sc. **University of Westminster**, London, UK — Sep 2000 – Sep 2001
VLSI System Design (*Graduated with Distinction*)
Advisors: Izzet Kale and R.C.S. Morling
Thesis Title: *"Pseudo-Random Testing of Arithmetic Circuits"*

B.Sc. **Bilkent University**, Ankara, Turkey — Sep 1996 – Jun 2000
Electrical and Electronics Engineering (*Graduated with High Honors*)

HONORS AND AWARDS

Graduate Fellowship, Princeton University, Department of Electrical Engineering — 2001 – 2002

M.Sc. with Distinction, University of Westminster, Department of Electronic Systems, London, UK — 2001

Millennium Scholarship, awarded by British Council to a single candidate in Turkey for postgraduate study in Britain — 2000 – 2001

Ranked 33rd in National Selection Examination for Graduate Studies (LES) among approximately one hundred thousand candidates, Turkey — 2000

Undergraduate Fellowship, Bilkent University, Ankara, Turkey — 1996 – 2000

Ranked 45th in National University Entrance Exam among approximately 1.5 million candidates, Turkey — 1996

Ranked 11th in National Physics Olympiads, Turkey — 1995

PROFESSIONAL EXPERIENCE

Princeton University, Department of Electrical Engineering, Princeton, NJ

Research Assistant in Parapet Research Group — Sep 2001 – Present

- Conducted research on characterizing processor power and thermal behavior on real systems. Developed runtime power and temperature estimation frameworks.
- Investigated power phase behavior of applications. Demonstrated effective phase classification techniques based on runtime performance monitoring and application control-flow signatures with dynamic instrumentation.
- Devised novel online phase detection, phase and duration prediction methods that are resilient to real-system variability effects.
- Designed and evaluated workload-adaptive dynamic power management techniques for real systems and future chip multiprocessor architectures.

Intel Hillsboro, Corporate Technology Group/System Technology Lab, Hillsboro, OR

Intern in Platform Capabilities Lab — Summer 2006

Worked on energy-efficient resource allocation in heterogeneous data centers. Developed architectural feature based analytical models and training based statistical methods to predict workload behavior across platforms. Implemented a phase prediction based, workload adaptive frequency scaling governor for a new multi-core server platform. Designed allocation policies that utilize across-platform workload behavior predictors for energy-efficient management of large-scale data centers.
Managers: Ram Chary/Rick Forand, *Mentor:* Eugene Gorbatov

IBM T.J. Watson Research Center, Yorktown Heights, NY

Intern in Reliability and Power Aware Microarchitectures Group — Summer 2005

Worked on global power management techniques for chip multiprocessors. Developed a trace based multiprocessor analysis tool for early evaluation of global power management policies. Explored different methods for dynamically tuning the execution of individual cores to meet chip-level power/ performance goals. Designed and evaluated per-core dynamic voltage and frequency scaling policies to meet chip-wide power budget targets.
Manager: Pradip Bose, *Mentor:* Alper Buyuktosunoglu

IBM T.J. Watson Research Center, Yorktown Heights, NY

Co-op in Reliability and Power Aware Microarchitectures Group — Jul 2004 – Dec 2004

Worked on runtime performance monitoring and phase analysis of IBM POWER4 systems. Designed long-term value and duration prediction methodologies for workload performance phase behavior with applications to dynamic voltage and frequency scaling. Contributed in automated thermal microbenchmark generation for online temperature analysis of real systems.
Manager: Pradip Bose, *Mentor:* Alper Buyuktosunoglu

Bilkent University, Ankara, Turkey

Summer Researcher in Electronics Engineering Department — Summer 1999

Contributed in the programming of Texas Instruments, C54x Series DSP Chip and hardware platform development for communications project.

ASELSAN Electronics Inc., Ankara, Turkey

Intern in Electronic Design Department — Summer 1998

Worked on the design and testing of voltage controlled oscillator systems.

ACTIVITIES

Student Member, IEEE — 1999 – Present

Chair of Academic Affairs, Princeton University Graduate Student Government — 2005 – 2006

Organizer of Computer Engineering Graduate Workshop (CEW), — 2002 – 2003
Princeton University, Department of Electrical Engineering

Reviewer for PACT'03, HPCA'04, ISCA'04, ISLPED'04, ASPLOS'04, MICRO'04, ISLPED'05, PAC2'05, CAL'05, ISPASS'06, ASPLOS'06, SC'06, TPDS'07, TCAD'07, HPPAC'07, DAC'07, ISCA'07

PUBLICATIONS

(Electronic copies available at `http://www.princeton.edu/~canturk/ETC/publications.html`)

Canturk Isci, Gilberto Contreras and Margaret Martonosi, ***Live, Runtime Phase Monitoring and Prediction on Real Systems with Application to Dynamic Power Management***. In 39th ACM/IEEE International Symposium on Microarchitecture (MICRO-39), Dec 2006. [Acceptance rate: 24%]

Canturk Isci, Alper Buyuktosunoglu, Pradip Bose, Chen-Yong Cher and Margaret Martonosi, ***An Analysis of Efficient Multi-Core Global Power Management Policies: Maximizing Performance for a Given Power Budget***. In 39th ACM/IEEE International Symposium on Microarchitecture (MICRO-39), Dec 2006. [Acceptance rate: 24%]

Canturk Isci and Margaret Martonosi, ***Phase Detection and Prediction on Real Systems for Workload-Adaptive Power Management***. In SRC Student Symposium, Oct 2006.

Canturk Isci and Margaret Martonosi, ***Phase Characterization for Power: Evaluating Control-Flow-Based and Event-Counter-Based Techniques***. In 12th International Symposium on High-Performance Computer Architecture (HPCA-12), Feb 2006. [Acceptance rate: 15%]

Canturk Isci and Margaret Martonosi, ***Detecting Recurrent Phase Behavior under Real-System Variability***. In IEEE International Symposium on Workload Characterization (IISWC'05), Oct 2005. [Acceptance rate: 33%]

Canturk Isci, Margaret Martonosi and Alper Buyuktosunoglu, ***Long-term Workload Phases: Duration Predictions and Applications to DVFS***. In IEEE MICRO, Special Issue on Energy Efficient Design, Sep/Oct 2005.

Canturk Isci, Zhigang Hu, Margaret Martonosi and Pradip Bose, ***Building Microarchitectural Stressmarks for Thermal Testing***. In Austin Conference on Energy-Efficient Design (ACEED-2005) [*Internal Track*], Mar 2005.

Canturk Isci, Margaret Martonosi and Alper Buyuktosunoglu, ***Workload Phase Duration Prediction and its Application to DVFS***. In Austin Conference on Energy-Efficient Design (ACEED-2005) [*Internal Track*], Mar 2005.

Canturk Isci, Gilberto Contreras and Margaret Martonosi, ***Hardware Performance Counters for Detailed Runtime Power and Thermal Estimations: Experiences and Proposals***. In Hardware Performance Monitor Design and Functionality Workshop in conjunction with 11th International Symposium on High-Performance Computer Architecture (HPCA-11), Feb 2005.

Canturk Isci and Margaret Martonosi, ***Runtime Power Monitoring in High-End Processors: Methodology and Empirical Data***. In 36th ACM/IEEE International Symposium on Microarchitecture (MICRO-36), Dec 2003. [Acceptance rate: 25%]

Canturk Isci and Margaret Martonosi, ***Identifying Program Power Phase Behavior Using Power Vectors***. In 6th IEEE International Workshop on Workload Characterization (WWC-6), Nov 2003. [Acceptance rate: 30%]

Canturk Isci, ***Pseudo-Random Testing of Arithmetic Circuits***. M.Sc. Thesis, University of Westminster, London, UK, Oct 2001.

PATENTS AND DISCLOSURES

Alper Buyuktosunoglu, Pradip Bose, Chen-Yong Cher, Canturk Isci, Prabhakar Kudva and Margaret Martonosi, ***System and Method of Efficient Resource Management by Predicting Stable Durations of a Workload Phase***. Patent filed, Jul 2006.

Eugene Gorbatov, Canturk Isci and Ripal Nathuji, ***Energy-Efficient Resource Allocation in Data Centers***. Intel Invention Disclosure, Sep 2006.

COMPUTER SKILLS

C, Perl, Matlab, Pascal, VHDL, Verilog, Spice, Mentor Graphics EDA tools (Renoir, ModelSim, Design Architect, Leonardo, QuickFault, QuickGrade)

LANGUAGES

Turkish and English (Fluent), German (Basic)