Tamim I. Sookoor

CONTACT

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SECURITY CLEARANCE

Secret (expires: 2021)

CITIZENSHIP

United States of America

RESEARCH INTERESTS

My research interests cover embedded and networked sensor systems, wireless sensor networks, Cyber-Physical Systems (CPSs), and wireless embedded networks. My research has focused on reducing the effort required to build systems that use sensing, intelligence, and control to bridge the gap between the cyber- and physical-worlds through the development of compilers, programming languages, and debuggers that address the special needs posed by such systems. A second research thrust, that began a few years ago, is an application of CPSs to improve the energy efficiency of Smart Buildings.

EDUCATION

University of Virginia, Charlottesville, Virginia USA
Adviser: Prof. Kamin Whitehouse
Area of Study: Wireless Embedded Networks

PhD, Computer Science, May 2012 (Expected)

- Dissertation Topic: Retrofitting Centralized HVAC Systems for Occupant-Oriented Room-Level Heating and Cooling

M.S., Computer Science, December 2009

- Thesis: The Design of MDB: a Macrodebugger for Wireless Embedded Networks

Vanderbilt University, Nashville, Tennessee USA

B.E., Computer Engineering, May 2006

- *Summa cum Laude*, Honors in Engineering
- Minor in Mathematics

RESEARCH EXPERIENCE

University of Virginia *Graduate Research Assistant*

Advisor: Prof. Kamin Whitehouse **August 2006–Present**

- Implemented an occupancy-based HVAC control system to re-direct airflow in homes based on occupant needs in order to improve the efficiency of their heating and air conditioning systems.
- Developed the Smart Thermostat which learns the activity patterns in homes and strategically heats and cools them only when needed.
- Implemented MDB, the first macrodebugger for wireless embedded networks.
- Implemented MacroLab, a macroprogramming framework for cyber-physical systems.
- Helped deploy VineLab, the Olsson Hall wireless testbed at the University of Virginia.

- Developed Reliance, a reliable, latency-bound routing protocol and link quality maintenance technique for cyber-physical systems.
- Implemented an activity recognition system using a hip-mounted three-axis accelerometer and Sieve, an event classification framework developed at the University of Virginia.

Advisor: Prof. John Stankovic **August 2006–August 2007**

- Helped develop, implement, and deploy LUSTER, a wireless sensor network for environmental research.

The Wireless Sensor Networks Lab *Research Intern*

Supervisor: Dr. Marco Sgroi **May–August 2008**

- Implemented a gesture recognition-based computer interface using accelerometers on MicaZ motes and the Signal Processing In Node Environment (SPINE) framework.
- Collected and analyzed accelerometer and gyroscope data to identify projects that could be implemented using SPINE.
- Implemented a Matlab-based real-time visualization environment for sensor readings using SPINE.

Vanderbilt University *Undergraduate Researcher*

Advisor: Prof. Xenofon Koutsoukos **May 2005–May 2006**

- Participated in the Vanderbilt Undergraduate Summer Research Program in 2005 and continued research as an independent study project the following year.
- Implemented a parking space finder service.

Teaching Experience

University of Virginia *Graduate Teaching Assistant*

- Computer Networks **Spring 2007**
- Software Development Methods **Fall 2006**

Vanderbilt University *Tutor*

- Mathematics **2005–2006**

Scholarships and Fellowships

University of Virginia

- SenSys'09 Student Travel Award, 2009
- DuPont Fellowship, 2008
- IPSN Student Travel Award, 2007
- Graduate Research Assistantship, 2007–Present

Vanderbilt University

- Vanderbilt Undergraduate Summer Research Program Fellowship, 2005
- Vanderbilt School of Engineering Summer Research Program, 2005 (declined)
- Tennessee Tech REU in Network and Communication Systems, 2005 (declined)

Honors and Awards

University of Virginia

- ASEE SMART Scholarship Program Fellow, 2010
- U.Va. representative to VCGS 5th Annual Graduate Student Research Forum, 2010

Vanderbilt University

- Dean's Award for Outstanding Scholarship, 2006
- Dean's List with High Honors, All semesters
- Tau Beta Pi, National Engineering Honor Society, 2005–Present
- Eta Kappa Nu, Electrical and Computer Engineering Honor Society, 2005–Present
- Mortar Board, National College Senior Honor Society, 2005–Present

Professional Organization Memberships

Association of Computing Machinery (ACM)

- ACM SIGSOFT

Institute of Electrical and Electronic Engineers(IEEE)

- IEEE Computer Society
- IEEE Communications Society

Publications

Tamim Sookoor and Kamin Whitehouse, "SmartZone: Room-level HVAC Control using Residence Occupancy Models," (under preparation)

Tamim Sookoor, Brian Holben, Kamin Whitehouse. "Feasibility of Retrofitting Centralized HVAC Systems for Room-Level Zoning," (under submission)

Virginia Smith, **Tamim Sookoor**, Kamin Whitehouse. "Modeling Building Thermal Response to HVAC Zoning," to appear in *The Third International Workshop on Networks of Cooperating Objects*, Beijing, China, April 2012.

Kamin Whitehouse, Juhi Ranjan, Jiakang Lu, **Tamim Sookoor**, Carrie Burke, Galen Staengle, Anselmo Canfora, Hossein Haj-Hariri. "Towards Occupancy-driven Heating and Cooling," to appear in *IEEE Design & Test Special Issue on Green Buildings*, Jul/Aug. 2012.

Timothy Hnat, Vijay Srinivasan, Jiakang Lu, **Tamim Sookoor**, Raymond Dawson, John Stankovic, Kamin Whitehouse. "The Hitchhiker's Guide to Successful Residential Sensing Deployments," in *The 9th ACM Conference on Embedded Networked Sensing Systems (SenSys'11)*, Seattle, WA., Nov. 2011. (acceptance ratio 19.5%)

Jiakang Lu, **Tamim Sookoor**, Gao Ge, Vijay Srinivasan, Brian Holben, John Stankovic, Eric Field, and Kamin Whitehouse, "The Smart Thermostat: Using Occupancy Sensors to Save Energy in Homes," in *The 8th ACM Conference on Embedded Networked Sensor Systems (SenSys 2010)*, Zurich, Switzerland, Nov. 2010. (acceptance ratio 17%)

Timothy Hnat, **Tamim Sookoor**, Pieter Hooimeijier, Westley Weimer, and Kamin Whitehouse, "A Modular and Extensible Macroprogramming Compiler," in *Workshop on Software Engineering for Sensor Network Applications (SESENA 2010)*, Cape Town, South Africa, May 2010.

Tamim Sookoor, Timothy Hnat, Pieter Hooimeijer, Westley Weimer, and Kamin Whitehouse, "Macrodebugging: Global Views of Distributed Program Execution," in *The 7th ACM Conference on Embedded Networked Sensor Systems (Sensys 2009)*, Berkeley, CA, Nov. 2009. (acceptance ratio 17.6%)

Timothy W. Hnat, **Tamim I. Sookoor**, Pieter Hooimeijer, Westley Weimer, and Kamin Whitehouse, "MacroLab: A Vector-based Macroprogramming Framework for

Cyber-Physical Systems," in *The 6th ACM Conference on Embedded Networked Sensor Systems (SenSys 2008)*, Raleigh, NC, Nov. 2008. (acceptance ratio 16%)

L. Selavo, A. Wood, Q. Cao, **T. Sookoor**, H. Liu, A. Srinivasan, Y. Wu, W. Kang, J. Stankovic, D. Young, J. Porter, "LUSTER: Wireless Sensor Network for Environmental Research," in *The 5th ACM Conference on Embedded Networked Sensor Systems (SenSys 2007)*, Sydney, Australia, Nov. 2007. (acceptance ratio 16.8%)

Demos

Timothy W. Hnat, **Tamim I. Sookoor**, and Kamin Whitehouse "Demo Abstract: Macrodebugging with MDB," in *The 7th ACM Conference on Embedded Networked Sensor Systems (SenSys 2009)*, Berkeley, CA, Nov. 2009.

Tamim I. Sookoor, Timothy W. Hnat, and Kamin Whitehouse, "Demo Abstract: Programming Cyber-Physical Systems with MacroLab," in *The 6th ACM Conference on Embedded Networked Sensor Systems (SenSys 2008)*, Raleigh, NC, Nov. 2008.

Grant Writing Activity

Office of Emerging Frontiers in Research and Innovation (EFRI), *EFRI-SEED: Occupant Oriented Heating and Cooling*
PI: Cameron (Kamin) Whitehouse. My role: Prepared figures and graphs and assisted with proofreading and editing the proposal.
Total Amount: $1,999,642. Awarded: September 1, 2010.

University of Virginia Double 'Hoo Research Grant, *Title: Reducing the National Energy Consumption Through Occupancy-based HVAC Control*
PI: Tamim Sookoor.
Total Amount: $5,000. Submitted: February 19, 2010.

NSF Computer and Network Systems (CNS), *NeTS: Small: Time Travel Debugging for Wireless Embedded Networks*
PI: Cameron (Kamin) Whitehouse. My role: Prepared first draft of certain subsections of research approach and added references; and edited drafts of cumulative proposal.
Submitted: December 17, 2009.

Conferences Attended

2nd International Conference on Computational Sustainability (CompSust'10)
The 7th ACM Conference on Embedded Networked Sensor Systems (SenSys 2009)
The 6th ACM Conference on Embedded Networked Sensor Systems (SenSys 2008)
International Conference on Information Processing in Sensor Networks (IPSN 2007)

Service

Conference Reviewing

- First International Conference on Cyber-Physical Systems (ICCPS 2010)
- Sixth International Conference on Networked Sensing Systems (INSS 2009)
- 6th Conference on Sensor, Mesh and Ad Hoc Comm. and Networks (SECON 2009)
- Internet of Things Conference 2008

Demonstrations

- **Computer Science Day / SEAS Open House 2008, 2009, 2010**: Presented demos and posters to encourage high school students to engage in computer science.
- **Computer Technologies Career Academy 2009**: Presented hands-on demonstrations of wireless sensor network applications to middle school students.

Technical Skills

Programming Languages: C, C++, nesC, Java, HTML, Python, Perl, PHP, Lisp, UNIX shell scripting, SQL, SVN, Assembly

Application Programs: Matlab, Mathematica, MS Visual Studio 6.0/.Net, Eclipse

Operating Systems: TinyOS, μC/OS, Linux, Microsoft Windows, OS X

Hardware: Xbow and Sentilla motes, Tektronix and National Instruments hardware

Coursework

Graduate: Computer Organization, Theory of Computation, Algorithms, From Sensors to Scientists: Applications of Sensor Networks, Sensor Networks, Applied Statistics for Engineers and Scientists, Programming Paradigms for Wireless Embedded Systems, Operating Systems, Special Topics in Wireless Sensor Networks, Applications of CPSs

Undergraduate: Programming Languages, Program Design and Data Structures, Principles of Operating Systems I, Computer Organization, Probability and Statistics for Engineers, Microcontrollers, Embedded Systems, Signals and Systems, Discrete Structures, Intermediate Software Design

References

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