

Technische Universität Berlin

Summer Internship

Summer '06

- Measured communication characteristics of sensor nodes in an indoor WSN testbed
- Used measurements to develop a novel localization algorithm for use in WSNs
- Designed and implemented general purpose application for visualizing localization techniques used in WSNs

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Thesis Work

January '04 – August '05

- Designed and implemented first generation radio stack for eyesIFX WSN nodes
- Collaborated with UC Berkeley and leaders in Wireless Sensor Network industry to design the second generation of the TinyOS operating system, TinyOS-2.x
- Wrote documentation and helped package software suite for the eyesIFX developers kit available from Infineon Technologies

Johns Hopkins Applied Physics Lab

Engineering Intern

Summer '03

- Developed set of application tools for use by the Navy's Ship Self Defense System
- Received official letter of appreciation from the laboratory for the work completed
- Continued to work remotely while attending graduate school

Motorola

Engineering Intern

Summer '00, Summer'01

- Worked with the Motorola DSP56300, porting assembly code into C
- Designed tool for profiling load of tasks running on the DSP
- Created various other application tools, wrote code to automate performance tests, and updated application tutorials

Comp Skills: nesC, TinyOS, C, C++, JAVA, XML, Scheme, Perl, OpenGL, Verilog, VHDL, Maple, LogicWorks, Xilinx ISE, Modelsim, MatLab, Oracle, IE3D design expert, Orcad, SPICE, LabView, ns2, TinyOS, Linux / BSD Kernel Hacking

Course Work: **EE courses:** Digital Systems, Electrical Systems, Control Systems, Analog Electronics, Machines and Power, Electromagnetic Fields, Electromagnetic Waves, Intro to DSP, High Speed Digital Design, Microwave Circuit Design, Communication Systems, Integrated Circuit Design

CS courses: Algorithm and program design, Data Structures, Computer Architecture, Artificial Intelligence, Software Engineering, Databases, Programming Language Concepts, Computer Graphics, Networks, Acceleration of Algorithms in Reconfigurable Hardware, Operating Systems, Advanced Algorithms, Embedded Computing Systems, Wireless Networking, Wireless Sensor Networks, Compiler Design and Implementation, Applications of Parallel Programming

Honors: Stanford Graduate Student Fellowship (Offered, but Declined)
Rose-Hulman Presidential Scholarship
Motorola Scholarship
Washington University Distinguished Master of Science Fellowship

Affiliations: **IEEE Student Member**
ACM Student Member
Tau Beta Pi - Vice President(2001) - National Engineering Honors Fraternity
Eta Kappa Nu - National Electrical Engineering Honors Fraternity
Pi Mu Epsilon - National Mathematics Honors Fraternity
Alpha Lambda Delta - Academic Honor Society for college freshman

Projects: **Tessellation** (Operating System for Manycore)
Tessellation is a new "exploded OS", structured around space-time partitioning and two-level scheduling between the operating system and application runtimes.
This project is the focus of my current research.

TinyOS-2.x (Operating system for Wireless Sensor Networks)

This is the successor to TinyOS 1.x, the most widely used operating system for wireless sensor network applications. I have been involved in this project since it began in 2004 and am the implementer and current maintainer of its Resource and Power management subsystems, its printf library, and its TOSThreads thread library.

Unified Power Management Architecture (UPMA) for Wireless Sensor Networks

This project proposes to unify the approaches taken for managing power in a wireless sensor network and provide an architecture in which existing strategies can be implemented and new strategies can be developed. Preliminary work has begun, with implementations existing for TinyOS-2.x.

Publications: Journal Papers:

Kevin Klues, Guoliang Xing, and Chenyang Lu. *Link Layer Driver Architecture for Unified Radio Power Management in Wireless Sensor Networks*. ACM Transactions on Embedded Computing Systems, accepted.

Guoliang Xing, Mo Sha, Greg Hackmann, **Kevin Klues**, Octav Chipara, and Chenyang Lu. *Towards Unified Radio Power Management for Wireless Sensor Networks*. Wireless Communications and Mobile Computing (WCMC), special issue on Distributed Systems of Sensors and Actuators, 9(3):313-323, March 2009.

Conference Proceedings:

Kevin Klues, Chieh-Jan Mike Liang, Jenogyueup Paek, Razvan Musaloiu-E, Ramesh Govindan, Philip Levis, and Andreas Terzis. *TOSThreads: Safe and Non-invasive Preemption in TinyOS*. In proceedings for The 7th ACM Conference on Embedded Networked Sensor Systems (Sensys 2009).

Kevin Klues, Vlado Handziski, Chenyang Lu, Adam Wolisz, David Culler, David Gay, and Phil Levis. *Integrating Concurrency Control and Energy Management in Device Drivers*. In proceedings for The 21st ACM Symposium on Operating Systems Principles (SOSP 2007).

Kevin Klues, Greg Hackmann, Octav Chipara, and Chenyang Lu. *A Component-Based Architecture for Power-Efficient Media Access Control in Wireless Sensor Networks*. In proceedings for The 5th ACM Conference on Embedded Networked Sensor Systems (SenSys 2007).

Kevin Klues, Guoliang Xing, and Chenyang Lu. *Link Layer Support for Flexible Radio Power Management in Wireless Sensor Networks*. In proceedings for The Fifth International Conference on Information Processing in Sensor Networks (IPSN 2007).

Workshop Proceedings:

Rose Liu, **Kevin Klues**, Steven Hofmeyr, Sarah Bird, Krste Asanovic, and John Kubiawicz. *Tessellation: Space-Time Partitioning in a Manycore Client OS*. In Proceedings of the first USENIX Workshop on Hot Topics in Parallelism (HotPar 2009).

Kevin Klues, Guoliang Xing, and Chenyang Lu. *Toward a Unified Radio Power Management Architecture for Wireless Sensor Networks*. In proceedings for The First International Workshop on Wireless Sensor Network Architecture (WWSNA 2007).

Conference Posters:

Kevin Klues, Guoliang Xing, Chenyang Lu. *A Unified Architecture for Flexible Radio Power Management in Wireless Sensor Networks*. In Proceedings for the 4th ACM Conference on Embedded Networked Sensor Systems, Sensys. Nov. 2006.

The TinyOS Alliance (presented by **Kevin Klues**). *TinyOS 2.1: Adding Threads and Memory Protection to TinyOS*. In Proceedings for the 6th ACM Conference on Embedded Networked Sensor Systems, Sensys. Nov. 2008.

Technical Reports:

Kevin Klues, Vlado Handziski, David Culler, David Gay, Phil Levis, Chenyang Lu, Adam Wolisz. *Dynamic Resource Management in a Static Network Operating System*. Technical Report WUCSE-2006-56, Washington University in St. Louis, Oct. 2006.

P. Levis, D. Gay, V. Handziski, J.-H.Hauer, B.Greenstein, M.Turon, J.Hui, **K.Klues**, C.Sharp, R.Szewczyk, J.Polastre, P.Buonadonna, L.Nachman, G.Tolle, D.Culler, and A.Wolisz. *T2: A Second Generation OS For Embedded Sensor Networks*. Technical Report TKN-05-007, Telecommunication Networks Group, Technische Universität Berlin, Nov. 2005

Other Works: Posters:

Kevin Klues. *Power Locks: Enabling Ultra Low Power Embedded Systems Applications with Minimal Developer Effort*. Stanford CS Forum. March 2008.

TinyOS Tutorials:

Resource Arbitration and Power Management
The TinyOS Printf Library
Writing Low-Power Applications

TinyOS Enhancement Proposals:

TEP105: Low Power Listening
TEP108: Resource Arbitration
TEP115: Power Management of Non-Virtualized Devices
TEP128: Platform Independent Non-Volatile Storage Abstractions
TEP134: The TOSThreads Thread Library

Talks:

TinyOS 2.1 Tutorial (TOSThreads)

- The 8th ACM / IEEE International Conference on Information Processing in Sensor Networks (April 2009)

The TinyOS Documentation Working Group

- TinyOS Technology Exchange (TTX) V (February 2008)

TinyOS 2.x Contrib

- TinyOS Technology Exchange (TTX) V (February 2008)

The TinyOS Operating System: Past, Present, and Future Directions

- Universität Erlangen-Nürnberg, Erlangen Germany (February 2008)
- Universität Karlsruhe, Karlsruhe Germany (February 2008)
- Technische Universität Berlin, Berlin Germany (February 2008)

A Component-Based Architecture for Power-Efficient Media Access Control in WSNs

- The 5th ACM Conference on Embedded Networked Sensor Systems (SenSys 2007)

Integrating Concurrency Control and Energy Management in Device Drivers.

- Universität Erlangen-Nürnberg, Erlangen Germany (February 2008)
- Universität Karlsruhe, Karlsruhe Germany (February 2008)
- The 21st ACM Symposium on Operating Systems Principles (SOSP 2007).

It's Not Just About Contributing Code Anymore

- TinyOS Technology Exchange (TTX) IV (April 2007)

Link Layer Support For Unified Radio Power Management in Wireless Sensor Networks.

- The 5th International Conference on Information Processing in Sensor Networks (IPSN 2007)

Towards a Unified Radio Power Management Architecture for Wireless Sensor Networks.

- The 1st International Workshop on Wireless Sensor Network Architecture (WWSNA 2007)

Teaching:

Hands-On TinyOS

- A three day mini-course on using TinyOS and all of its advanced features
- Lectures included an introduction to TinyOS, TOSThreads, and ICEM
- Run as a guest lecture course at RWTH Aachen (3/Feb/2009 – 5/Feb/2009)

REFERENCES GIVEN UPON REQUEST