

# Karthikeyan Manivannan

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## Education

### **Ph.D. Candidate (System Software Concentration)**

*University of California, Irvine (UCI)*

*Sep 2007 – till date*

### **M.S. in Electrical and Computer Engineering (System Software)**

*University of California, Irvine*

*Sep 2005 – Aug 2007*

### **B.Eng.(Hons) in Electrical and Electronics Engineering**

*Birla Institute of Technology and Science, Pilani, India*

*Aug 1998 – Jun 2002*

## Work Experience

### **Graduate Technical Intern, Intel Corporation, Santa Clara**

*Micro Binary Translator Team*

*June 2011 – 07 Sep 2011*

Working on optimizations for a new binary translation infrastructure that is being used for advanced development exploration.

### **Intern, Sun Microsystems Labs, Menlo Park, CA**

*Maxine Research Virtual Machine Project*

*May 2008 – Sep 2008*

Worked on a Beltway framework based parallel GC for the Maxine JVM. Implemented a new mechanism to implement efficient per thread safe-points and local variable access. Added support for generational garbage collection.

### **Intern, Atheros Communications Inc, Santa Clara, CA**

*Embedded Wireless Software Team*

*Jun 2006 – Sep 2006*

Implemented firmware enhancements for the Atheros 802.11n embedded-platform chip. Worked on bug-fixes and test bench development for the 802.11/b/g embedded-platform firmware.

### **Embedded Software Engineer, Skyworks Solutions Inc., India**

*Protocol Stack/Multimedia Team*

*Dec 2002 – Aug 2005*

Designed and developed an audio framework to control audio CODECs and interface them with the audio drivers on the ARM9 based Skyworks platform. Ported the Helix MP3 decoder onto the Skyworks Multimedia platform. Implemented features and optimizations for the Skyworks GSM protocol stack.

## Research Experience

### **Research Assistant, Secure Systems and Languages Lab, UCI**

*Advisor: Dr. Michael Franz*

*May 2009 – June 2011*

Implemented an Information Flow Control(IFC) framework on Maxine VE, a bare-metal Java Virtual Machine. This implementation supports fine-grained, multi-threaded IFC across the program heap, filesystem and network interfaces.

### **Research Assistant, Secure Systems and Languages Lab, UCI**

*Advisor: Dr. Michael Franz*

*Oct 2008 – April 2009*

Worked on the tracing-JIT compiler of the Maxine JVM. Implemented a framework for recording of recursive traces, and implemented optimization passes.

### **Research Assistant, Secure Systems and Languages Lab, UCI**

*Advisor: Dr. Michael Franz*

*Aug 2007 – May 2008*

Worked on the *Orchestra* multi-variant execution project which detects vulnerabilities in software by simultaneously running multiple variants of the software. Investigated dynamic variant generation techniques for x86 binaries using the Strata Dynamic Binary Translation infrastructure.

### **Research Assistant, Center for Embedded Computer Systems, UCI**

*Advisor: Dr. Daniel Gajski*

*Dec 2006 – Aug 2007*

Developed a GCC based front-end for the *No Instruction Set Compiler (NISC)* using the GIMPLE intermediate representation.

## Publications

### Refereed Papers

- “Decentralized Information Flow Control on a Bare-Metal JVM”, Karthikeyan Manivannan, Christian Wimmer, Michael Franz. In the Proceedings of the Cyber Security and Information Intelligence Research Workshop, 2010.
- “Multi-Variant Program Execution: Using Multi-Core Systems to Defuse Buffer-Overflow Vulnerabilities”, Babak Salamat, Andreas Gal, Todd Jackson, Karthikeyan Manivannan, Gregor Wagner, and Michael Franz. Proceedings of the International Conference on Complex, Intelligent and Software Intensive Systems (CISIS’08), Pages 843-848, March 2008.

### Refereed Posters

- “Massive-Scale Software Diversity as a Defense Mechanism”, Todd Jackson, Karthikeyan Manivannan, and Andrei Homescu. ASPLOS ’11, Newport Beach, 2011.
- “Trace Compilers Don’t Need Interpreters”, Michael Bebenita, Karthikeyan Manivannan, Andreas Gal, and Michael Franz. CGO ’09, Seattle, 2009.

### Technical Reports

- “Reverse Stack Execution”, Babak Salamat, Andreas Gal, Alexander Yermolovich, Karthikeyan Manivannan and Michael Franz. Technical Report No. 07-07, Donald Bren School of Information and Computer Sciences, University of California, Irvine, August 2007
- “Trace Based Compilation in Interpreter-less Execution Environments”, M. Bebenita, M. Chang, K. Manivannan, G. Wagner, M. Cintra, B. Mathiske, A. Gal, C. Wimmer, M. Franz; Technical Report No. 10-01, Donald Bren School of Information and Computer Science, University of California, Irvine; March 2010.

### M.S. Thesis

- “Design and development of a GCC based C front-end for the NISC compiler” , University of California , Irvine , August 2007.

## Patents

Efficient per-thread safepoints and local access. No.20100192139. Pending.

## Select Course Projects

### Advanced Compiler Construction

*Advisor: Dr. Michael Franz*

*Aug 2006 - Dec 2006*

Developed an SSA based optimizing compiler for an instructional programming language, in Java, which performs several compiler optimizations.

## Teaching

Programming Languages

Winter 2010

Computational Methods in ECE

Fall 2007 and Winter 2006

Systems and C Programming

Spring 2006

## Select Courses

Advanced Compiler Construction

Advanced System Software

Design and Analysis of Algorithms

Parallel Computer Architecture

## Computer Skills

**Programming:** Fluent: C, Java Fair: C++, Python Used: C#, MPI, UNIX Sockets  
**Protocols:** GSM Layer 3, TCP, IP, UDP

## Honours and Awards

ICS Fellowship (2007-2009), University of California, Irvine.