



## PROFESSIONAL EXPERIENCE

### NEC Laboratories USA

Princeton, NJ, USA

Jun 2005 – Aug 2005

*Summer Intern*

Worked on developing an efficient SAT-based bounded model checking technique for concurrent software based on the software verification tool F-soft. Developed and implemented a new technique that combines partial-order reduction and atomicity-based methods, in an on-the-fly manner, to explore a reduced set of thread interleavings. Evaluated on concurrent file system software benchmarks.

### Software Engineering Institute

Pittsburgh, PA, USA

Jun 2002 – Aug 2002

*Summer Intern*

Developed a theory of composition for component-based systems.

### Verimag Labs

Grenoble, France

May 2000 – Aug 2000

*Summer Intern*

Modeled and verified Domino circuits with OpenKronos, a timed automaton based verifier.

## PUBLICATIONS

"SAT-based Compositional Verification using Lazy Learning". with Edmund Clarke. *In Proc. of 19th Intl. Conference on Computer Aided Verification (CAV), 2007. (To appear)*

"Compositional Verification of System-on-Chip Designs", with Edmund Clarke. *SRC Student Symposium, October 2006. **Best Paper in Session Award.***

"Assume-Guarantee Reasoning for Deadlock", with Sagar Chaki, *In Proc. of the 6th Intl. Conference on Formal Methods in Computer-Aided Design (FMCAD), 2006.*

"Symbolic Model Checking of Concurrent Programs using Partial Orders and On-the-fly Transactions", with Vineet Kahlon and Aarti Gupta, *In Proc. of 18th Intl. Conference on Computer Aided Verification (CAV), 2006.*

"Program Compatibility Approaches" with Edmund Clarke and Natasha Sharygina, *In the Proceedings of the Formal Methods for Components and Objects (FMCO) symposium, 2005.* (Tutorial paper)

"Automated Assume-Guarantee Reasoning for Simulation Conformance", with Sagar Chaki, Edmund Clarke and Prasanna Thati, *In Proc. of 17th Intl. Conference on Computer Aided Verification (CAV), 2005.*

"Dynamic Component Substitutability Analysis", with Sagar Chaki, Edmund Clarke and Natasha Sharygina, *In Proc. of Intl. Conference on Formal Methods (FM), 2005.*

"Concurrent Software Verification with States, Events, and Deadlocks", with Sagar Chaki, Edmund Clarke, Joel Ouaknine and Natasha Sharygina, *Journal on Formal Aspects of Computing (FACJ), 2005.*

"Grand Challenge: Model Check Software", with Edmund Clarke and Himanshu Jain, *In NATO Workshop on Verification of Infinite-State Systems with Applications to Security (VISSAS), 2005.* (Invited paper)

"State/Event-based Software Model Checking", with Sagar Chaki, Edmund Clarke, Joel Ouaknine, and Natasha Sharygina, *In Proc. of Fourth Intl. Conference on Integrated Formal Methods (IFM), 2004.*

"Range Allocation for Separation Logic", with Muralidhar Talupur, Ofer Strichman and Amir Pnueli, *In Proc. of 16th Intl. Conference on Computer Aided Verification (CAV), 2004.*

"Verification of Evolving Software", with Sagar Chaki and Natasha Sharygina, *In Proc. of the 3rd International Workshop on Specification and Verification of Component-based Systems (SAVCBS), 2004.*

"Symbolic Model Checking of Software", with Flavio Lerda and Michael Theobald, *In Proc. of Workshop on Software Model Checking (SoftMC), 2003.*

"A Basis for Composition Language CL", with James Ivers and Kurt Walnau, Technical Note, CMU/SEI-2002-TN-026.

**PAPERS IN PREPARATION** "Dynamic Component Substitutability Analysis", with Sagar Chaki, Edmund Clarke and Natasha Sharygina, Journal version.

**REVIEWER** CAV, TACAS, VMCAI, FMCAD, DAC, FMSD.

**SELECTED TALKS** Compositional Verification for System-on-Chip Designs, SRC Student Symposium, October 2006.  
 Dynamic Component Substitutability Analysis, SRC Review, ICAST meeting, ONR Review, GM Review, Toyota meeting, 2006, 2005.  
 Compositional Verification of Evolving Component-based Systems, IBM India Research Labs, Delhi, India, June 2006.  
 Compositional Verification of Evolving Component-based Systems, Tata Research Development and Design Center (TRDDC), Pune, India, June 2006.  
 Modeling in SystemC, Guest Lecture, Course on *Logic Design Using Simulation, Synthesis and Verification Techniques* (18-341), Carnegie Mellon University, Spring 2006.  
 Abstraction in Model Checking, Guest Lecture, Course on *Introduction to Model Checking* (15-817), Carnegie Mellon University, Spring 2005.

**PROGRAMMING EXPERIENCE** SYMODA: A tool for automated compositional verification of hardware systems using lazy learning algorithms, part of thesis research, under development. (current size: ~24K lines of templated C++ code)  
 MAGIC: Co-implemented compositional reasoning in the MAGIC tool. (~20K lines of C++ code)  
 SMOD: Implemented a graph-based decision procedure for difference logic. (~5K lines of C++ code)

**COMPUTER SKILLS** Operating Systems: Unix, Linux, Windows.  
 Languages: C, C++, Java, SML, SystemC, Verilog, Perl, Flex, Bison.

**RESEARCH TOOLS** YICES, FOCI, SMV, SPIN, PVS, MAGIC, CUDD Library, ZChaff solver.

**ACADEMIC DISTINCTIONS** Obtained Rank 177 in the IIT JEE competition, 1997.  
 Obtained 1st Rank in the State Engineering Entrance Exam, 1997.  
 National Science Talent Search Scholarship.

**REFERENCES** Prof. Edmund M. Clarke, Computer Science Department, Carnegie Mellon University.  
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 Prof. Don Thomas, Electrical and Computer Engineering Department, Carnegie Mellon University.  
 email: thomas@ece.cmu.edu  
 Prof. Oded Maler, Verimag, Grenoble, France.  
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 Dr. Aarti Gupta, NEC Labs America, Princeton, NJ, USA.  
 email: agupta@nec-labs.com  
 Dr. Corina Pasareanu, Robust Software Engineering Group, NASA Ames Research Center, CA, USA.  
 email: pcorina@email.arc.nasa.gov

**EXTRA-CURRICULAR**

- Languages Spoken: English (Fluent), Hindi (Native).
- Interests: Music – Vocals, Poetry, Writing, Squash.
- Technical Head of the First BITWISE contest, an online programming competition organized (yearly) by the Computer Science and Engineering Department, IIT Kharagpur.