Sagar Jyoti Chaki

Home
5700 Bunkerhill Street, Apt. 1005
Pittsburgh, PA - 15206-1166, USA
Phone: +1 (412) 661-1030
email: `chaki+@cs.cmu.edu`
URL: `http://www.cs.cmu.edu/~chaki`

Office
Wean Hall 4212
Carnegie Mellon University
Pittsburgh, PA - 15213, USA
Phone: +1 (412) 268-5942
Fax: +1 (412) 268-5576

Citizenship: Indian

Visa: F1 (Student)

Objective: Full-time industrial or academic researcher position.

Research Interests:

- Formal methods
- Specification, verification, analysis and testing of software
- Concurrency and software security
- Publish-subscribe systems

Education:

Carnegie Mellon University (CMU) Pittsburgh, USA	**Ph.D., Computer Science** Dissertation topic: *A counterexample guided abstraction refinement framework for verifying concurrent C programs* Adviser: Prof. Edmund M. Clarke **Microsoft** Graduate Student **Fellow**	**1999 - present**
Indian Institute of Technology (IIT) Kharagpur, India	**B.Tech.(Hons.), Computer Science & Engineering** Dissertation: *Symbolic and automata-theoretic model checking for timed abstraction of Verilog descriptions.* Advisers: Prof. P. P. Chakrabarti & Prof. P. Dasgupta GPA: **9.82/10**, **President** of India **Gold Medal**	**1995 - 1999**

Professional and research experience:

- **MAGIC project at CMU** (December 2001 - present) Developed a framework for automated and compositional verification of concurrent C programs. Basis of my Ph.D. dissertation. Details and download at: `http://www.cs.cmu.edu/~chaki/magic`.
- **SPEAR project at CMU** (December 1999 - present) Developed and implemented algorithms for efficient matching in publish-subscribe systems using Binary Decision Diagrams (BDDs). Details and download at: `http://www.cs.cmu.edu/~chaki/spear`.
- **Summer Intern at Microsoft Research (MSR)** (May 2001 - July 2001) Worked in the Software Productivity Tools (SPT) group on type-based model extraction and verification of concurrent π-Calculus programs. Implemented a tool, PIPER, that (i) extracts a CCS model from a π-Calculus program using user-supplied annotations, (ii) translates the CCS model to Promela and (iii) verifies it using the SPIN model checker.
- **Summer Intern at MSR** (May 2000 - July 2000) Worked in the SLAM project (SPT group) on the verification of concurrent Boolean programs. Implemented a tool, BEACON, for verifying safety properties of thread-safe libraries and used it to verify critical safety properties of a thread-safe memory manager developed at MSR.

- **Computer Architecture Project at CMU** (October 1999 - November 1999) Worked on a technique for hiding load latencies using previous register values in modern superscalar processors. Simulations done using the Simplescalar toolkit indicated considerable performance gains for Spec95 benchmarks. Project report at `http://www.cs.cmu.edu/~chaki/740proj`.
- **B.Tech. Dissertation at IIT** (July 1997 - April 1998) Developed symbolic model checker using the CUDD BDD package to verify timed properties of Verilog descriptions of systems.
- **Design Lab project at IIT** (January 1999 - April 1999) Developed C++ libraries similar to Parallel Virtual Machine (PVM) to support distributed applications on a network of workstations.
- **Other Projects at IIT** (1995 - 1999) Compiler for a subset of C; hardware implementation of a 4-bit CPU; hardware/firmware for a real time object counter; design and implementation of a time division multiplexer; development of a graphical editor using X-Motif etc.
- **Summer Intern at Tata Consultancy Services (TCS), Calcutta, India.** (May 1998 - July 1998) Developed web-based Problem Management Utility using Lotus Notes to maintain a database of hardware and software problems faced by TCS, their solutions and other details.

Invited Talks:

- Vulnerability Analysis Branch, US Department of Defense, November 21, 2003.
- Microsoft Research, February 6, 2003.

Awards and Honors:

- **Microsoft Graduate Fellowship**, 2001-2003.
- Carnegie Mellon Computer Science Departmental Fellowship, Sep 1999 to present.
- **President of India Gold Medal** at IIT for best academic performance in batch.
- **President of India Silver Medal** at IIT for best academic performance in department.
- Jagadis Bose National Science Talent Search (JBNSTS) scholarship, June 1995 to June 1999
- B. P. Poddar Merit Scholarship, July 1998 to April 1999.
- Annual awards at IIT for best academic performance in the batch.

Development Skills:

- **OS:** Unix and variants, Windows (Win32), MS DOS development.
- **Languages:** C, C++, Lex, Yacc, Java, Ocaml, Promela, Verilog, SQL, Fortran 77, HTML, and MIPS / Alpha / x86 assembly.
- **Development:** Verification using CUDD; programmable logic and micro-controller based logic design; development of parallel programs using threads; development of network applications using Berkeley sockets; GUI development using X-Motif.

Publications: (Details and download at `http://www.cs.cmu.edu/~chaki/academics`).

Refereed Journal Papers

- Modular Verification of Software Components in C, *to appear as invited article in special issue of Transactions on Software Engineering (TSE)*, Sagar Chaki, Edmund Clarke, Alex Groce, Somesh Jha, Helmut Veith.
- Efficient Verification of Sequential and Concurrent C Programs, *to appear in special issue of Formal Methods in System Design (FMSD)*, Sagar Chaki, Edmund Clarke, Alex Groce, Jöel Ouaknine, Ofer Strichman, Karen Yorav.

Refereed Conference and Workshop Papers

- Automated, compositional and iterative deadlock detection, *to appear in the Second ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE) 2004*, Sagar Chaki, Edmund Clarke, Jöel Ouaknine, Natasha Sharygina.
- State/Event-based Software Model Checking, *to appear in the Fourth International Conference on Integrated Formal Methods (IFM) 2004*, Sagar Chaki, Edmund Clarke, Jöel Ouaknine, Natasha Sharygina, Nishant Sinha.
- Predicate Abstraction with Minimum Predicates, *in Proc. of the 12th Advanced Research Working Conference on Correct Hardware Design and Verification Methods (CHARME) 2003*, Sagar Chaki, Edmund Clarke, Alex Groce, Ofer Strichman.
- Automated Compositional Abstraction Refinement for Concurrent C Programs: A Two-Level Approach, *in Proc. of the 2nd Workshop on Software Model Checking (SoftMC) 2003*, Sagar Chaki, Jöel Ouaknine, Karen Yorav, Edmund Clarke.
- Integrating Publish/Subscribe into a Mobile Teamwork Support Platform, *in Proc. of the 15th International Conference on Software Engineering and Knowledge Engineering (SEKE) 2003*, Sagar Chaki, Pascal Fenkam, Harald Gall, Somesh Jha, Engin Kirda, Helmut Veith.
- Modular Verification of Software Components in C, *an ACM-SIGSOFT Distinguished Paper in the 25th International Conference on Software Engineering (ICSE) 2003, pages 385-395*, Sagar Chaki, Edmund Clarke, Alex Groce, Somesh Jha, Helmut Veith.
- Types as Models: Model Checking Message Passing Programs, *in Proc. of the 29th Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL) 2002*, Sagar Chaki, Sriram K. Rajamani, Jakob Rehof.
- Parameterized Verification of Multithreaded Software Libraries, *in Proc. of Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2001*, Thomas Ball, Sagar Chaki, Sriram K. Rajamani.
- Efficient Filtering in Publish-Subscribe Systems using Binary Decision Diagrams, *in Proc. of the 23rd International Conference on Software Engineering (ICSE) 2001*, Alexis Campailla, Sagar Chaki, Edmund Clarke, Somesh Jha, Helmut Veith.
- Abstractions for Model Checking of Event Timings, *in Proc. of IEEE International Symposium on Circuits and Systems (ISCAS) 2001*, Jatindra K. Deka, S. Chaki, Pallab Dasgupta, P. P. Chakrabarti.

Languages: Fluent English, native Bengali speaker.

Personal Interests: Hindi and Bengali music, playing cricket, reading novels, puzzle solving.

References:

- Prof. Edmund M. Clarke, Carnegie Mellon University, USA, email: `emc@cs.cmu.edu`.
- Dr. Sriram Rajamani, Microsoft Research, USA, email: `sriram@microsoft.com`.
- Dr. Thomas Ball, Microsoft Research, USA, email: `tball@microsoft.com`.
- Prof. Randal E. Bryant, Carnegie Mellon University, USA, email: `bryant@cs.cmu.edu`.

Others available upon request.