# Dr Saurabh Joshi

Department of Computer Science
Wolfson Building, Parks Road,
Oxford, OX1 3QD
United Kingdom

Office: (+44) 1865 610591
saurabh.joshi@cs.ox.ac.uk

**Current Position**

**Postdoctoral research fellow** with Prof. Daniel Kroening in Systems Verification group, Department of Computer Science, University of Oxford.

**Research Interests**

Developing and applying formal methods of program analysis, verification and repair to software and hardware systems.

**Education**

**PhD in Computer Science** Jul 2007–Feb 2013
Advisors: (Late) Prof. Sanjeev K Aggarwal, Prof. R K Shyamasundar.
Indian Institute of Technology, Kanpur.
Thesis submitted in July 2012.

**MTech (RA) in Computer Science** Jul 2003–Jul 2006
Advisor: Prof. Supratik Chakraborty. Indian Institute of Technology, Bombay.

**BE in Information Technology** Sep 1999–Jul 2003
Advisor: Prof. Ketan Kotecha. Sardar Patel University, VallabhVidyanagar.

**Research Experience**

**Post Doctoral Research Fellow** Aug 2012–Present
Department of Computer Science, University of Oxford, UK.
Tools developed : cbmc-repair, summarizer, Open-WBO[1], hasco

**Research Intern** May 2010–Sep 2010, Feb 2011–Apr 2011
Rigorous Software Engineering group, Microsoft Research, India.
Tools developed : Cbugs, AtomicInf

**Project Trainee** Aug '06-Jul '07
Software Engineering group, IBM India Research Lab, New Delhi, India.
Tools improved : SAFE

**Patent**

- "*Finding Bugs with Low False Alarms and Under-specified Harness*"
  with Shuvendu Lahiri and Akash Lal
  US patent number : 8793664. Patent Granted.

**Research Articles**

1. "*On Using Incremental Encodings in Unsatisfiability-based MaxSAT Solving*"
   with Ruben Martins, Vasco Manquinho and Inês Lynce
   Journal on Satisfiability, Boolean Modelling and Computation (submitted)
2. "*Safety Verification and Refutation by k-invariants and k-induction*"
   with Martin Brain, Daniel Kroening, Peter Schrammel
   SAS 2015 (submitted)
3. "*Property-Driven Fence Insertion using Reorder Bounded Model Checking*"
   with Daniel Kroening
   Computing Research Repository, abs/1407.7443. 2014
   FM 2015 (accepted)
4. "*Incremental Cardinality Constraints for MaxSAT*"
   with Ruben Martins, Vasco Manquinho and Inês Lynce
   20th International Conference on Principles and Practices of Constraint Programming (CP 2014)

[1] Winner of 1 gold and 1 silver medal for industrial benchmarks in MaxSAT 2014 challenge

5. "*Automatically Finding* `atomic` *Regions for Fixing Bugs in Concurrent Programs*"
   with Akash Lal
   Manuscript. Computing Research Repository, abs/1403.1749. 2014
6. "*A New Method of MHP Analysis for Languages with Dynamic Barriers*"
   with R K Shyamasundar and Sanjeev Aggarwal
   17th International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS), IPDPS Workshops, 2012
7. "*Under-specified Harness and Interleaved Bugs*"
   with Shuvendu Lahiri and Akash Lal
   39th Symposium on Principles of Programming Languages (POPL 2012)
8. "*Distributed Generalized Dynamic Barrier Synchronization*"
   with Shivali Agrawal and R K Shyamasundar
   12th International Conference on Distributed Computing and Networking (ICDCN 2011)
9. "*Reactivity in SystemC Transaction-Level Models*"
   with Frederic Doucet, R K Shyamasundar, Ingolf Krueger and Rajesh Gupta
   Haifa Verification Conference (HVC 2007)

## Doctoral Dissertation

My PhD thesis, titled "*Some problems in Analysis, Verification and Concurrent Programs*", dealt with three problems: (1) Precise may-happen-in-parallel (MHP) analysis for languages with dynamic barriers such as X10, (2) Differential analysis of concurrent programs to improve precision of verification under imprecise harness and (3) Property-driven automated synthesis of `atomic` regions under strong as well as weak atomicity semantics to repair concurrent programs.

## Teaching and Mentoring

- Mentoring Ganesh Narayanaswamy (a doctoral student)
  *"Efficient model-checking of programs under weak memory models"*
  University of Oxford
- Mentoring Rajdeep Mukherjee (a doctoral student)
  *"Hardware-Software co-verification using control-flow based partitioning"*
  University of Oxford
- Mentored Vincent Nimal (a doctoral student)
  *"Efficient fence synthesis for programs under weak memory models"*
  University of Oxford
- Class tutor for *Software Verification* — Hillary term 2015
  University of Oxford
- Teaching assistant for *Advanced Compiler Optimizations* — Jan 2012–Apr 2012
  Instructor : Dr Amey Karkare, IIT Kanpur.
- Project mentor for *"Sudoku Solver using a SAT Solver"* — Jan 2010–Apr 2010
  First year undergraduate course project, IIT Kanpur
- Project mentor for *"A Toy SAT Solver"* — Jan 2009–Apr 2009
  First year undergraduate course project, IIT Kanpur
- Teaching assistant for *Data Streaming Algorithms* — Jul 2008–Dec 2008
  Instructor: Prof. Sumit Ganguly, IIT Kanpur

## Teaching Interests

- Undergradulate level courses: Compilers, Operating System, Networks and Security, Software Engineering, Concurrent Programming
- Graduate level courses : Software Verification

## Other Academic Activities

- Reviewer: TACAS 2015, VMCAI 2015, HVC 2014, CAV 2014, VSTTE 2013, HiPC 2010, PPoPP 2010, Hack.IN 2009
- Invited Talk: "*Interleaved Bugs and Under-specified Harness*", Mysore Park Workshop on The Future of Debugging, Mysore, 2012.

## Other Notable Activities

- **System Administrator**, Department of CSE, IIT Kanpur. Jul 2007–Jul 2012
- **Graduate Student Representative**, Department of CSE, IIT Kanpur. Jul 2008–Jul 2012
- Organizing team member, FSTTCS Dec 2009
- Free and Open Source Software (FOSS) awareness talk
  Krishna Institute of Technology, Kanpur. Apr 2010
- Conducted a hands-on workshop on Linux installation and firewall
  Krishna Institute of Technology, Kanpur. Oct 2010
- **System Administrator**, CFDVS, IIT Bombay Jul 2003–Jul 2006
- Ranked in top **1%** amongst over 2700 teams at *Bitwise*–an international online programming contest organized by IIT Kharagpur. Feb 2006
- Team member of *SecNet* 2006–a network security workshop at IIT Bombay.
- Technical team lead of *SecNet* 2005–a network security workshop at IIT Bombay.
- Ranked in the top **0.6%** amongst over 37000 candidates in Graduate Aptitude Test in Engineering (GATE). Feb 2003
- Conducted a workshop on *Introduction to Artificial Intelligence* at *A little step* - a technical festival at G H Patel College of Engineering and Technology, VVN. Feb 2003

## References

To be provided upon request.