Sumit Gulwani - Resume

Primary Affiliation: Research Manager/Principal Researcher @ Microsoft, Redmond
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Research Interests: Program Synthesis, End-user Programming, Intelligent Tutoring Systems, Formal Methods.

Employment & Education

- **Research Manager/Principal Researche**r (July 2014 - present)
  Microsoft, Redmond, USA
- **Principal Researcher** (March 2014 – June 2014)
  Microsoft Research, Redmond, USA
- **Senior Researcher** (June 2011 – February 2014)
  Microsoft Research, Redmond, USA
- **Researche**r (Aug 2005 – May 2011)
  Microsoft Research, Redmond, USA
- **Ph.D.,** Computer Science (2000-2005)
  University of California at Berkeley
  Advisor: Prof. George Necula
  Winner of ACM SIGPLAN Doctoral Dissertation Award
- **B.Tech,** Computer Science and Engineering (1996-2000)
  Indian Institute of Technology (IIT), Kanpur, India
  GPA: 4.00
  Winner of President's Gold Medal

Awards

- **ACM SIGPLAN Robin Milner Young Researcher Award**, 2014 [citation]
- **Distinguished Artifact Award**, PLDI 2015
- **Distinguished Paper Award**, PLDI 2013
- **Best Paper Award**, PPoPP 2013
- **Distinguished Paper Award**, FSE 2011
- **IIT Kanpur West Coast Alumni Leadership Award,** 2008.
  - Citation: For "recognition of his leadership as a young alumni and for contributions to research excellence."

Graduate school awards

- **ACM SIGPLAN Outstanding Doctoral Dissertation Award**, 2005.
- **C.V. Ramamoorthy Distinguished Research Award, 2005.**
  - Citation: For "outstanding contributions to a new research area in computer science".
- **Microsoft Phd Research Fellowship** for graduate studies, 2004-05.
- **UC Regents Fellowship** for graduate studies, 2000-01.

Microsoft internal awards

- **MSR Outstanding Contributions to Impossible Things Initiative**, 2012 (for Program Synthesis work)
- **Microsoft Thought Leadership Award**, 2011 (for Office-by-Example technology)
- **Microsoft Gold Star Award**, 2010.
  - Citation: "For your exceptional contributions to the Impossible Things Initiative, in particular your technical vision and leadership, strong collaborative efforts, and development of key synthesis technologies."

- **Microsoft Golden Volcano Award** and **runner-up for Thought Leadership Award**, 2010 (for Excel-by-Example technology).
- **Microsoft Gold Star Award**, 2008.
    - Citation: "Sumit has shown unusual maturity in pursuing a challenging and coherent research agenda (new foundational program analysis techniques) and applying it to unconventional program analysis problems (static complexity estimation, tamper-resistant software) with strong results."

Undergraduate Awards

- **President's Gold Medal** award for "best academic performance in the graduating class in all disciplines of the undergraduate programs at IIT Kanpur", May 2000.
- **Proficiency award** for "best undergraduate thesis in Computer Science and Engineering discipline at IIT Kanpur", May 2000.
- **Dr. V. Rajaraman Scholarship** for "excellent academic performance at IIT Kanpur", 1999-2000.
- **Hughes Software Systems Best Student award** (at national level), 1998.

High School awards

- **City Montessori School Best Student award** (among more than 1000 students), 1995.
- **National Talent Search Scholarship** awarded by the government of India, 1993-2000.

Professional Activities & Accomplishments

- **Adjunct Faculty Member** @ Indian Institute of Technology (IIT) Kanpur, India.
- **Affiliate Faculty Member** @ University of Washington.
- **EECS Industrial Advisory Board** @ Oregon State University.
- **Media Articles**
    - Ode to the Automata Tutor
    - FlashExtract (released as part of the Windows Management Framework 5.0 preview)
    - Bing Code Search Makes Developers More Productive
    - Flash Fill (Excel feature in Office 2013)
    - Flash Fill Gives Excel a Smart Charge
    - Computers will raise the IQ of the World
    - Programming for Dummies
    - Computer Programming Itself
    - Excel programming for nonprogrammers
    - Automatically grading programming homework (The Auto Grader)
- **Invited Talks at Conferences, Workshops, Colloquiums**: CBSOFT 2015, SYNT 2015, ECOOP 2015, Distinguished Lecture Series at Upenn (April 2015), POPL 2015, PLMW 2015, ILP 2014, ASSESS 2014, GECCO 2014, T4E 2013, Maryland CS Colloquium (Sep 2013), ExCAPE Summer School on Software Synthesis (June 2013), SYNASC 2012, WAMBSE 2012, ISEC 2012, PASTE 2011, AVM 2011, FMCAD 2010, AVM 2010, PPDP 2010, WING 2010, FOPARA 2009, CAV 2009, HAV 2008, VSTTE 2006, UW/MSR Summer Institute on Trends in Testing 2004
- **Technology Transfers to real world**
    - Programming-by-example technology for extracting structured data out of semi-structured documents (FlashExtract); Ships as the ConvertFrom-String cmdlet in **Powershell** in Windows 10 and custom-field extraction utility in **Azure OMS** (Operations Management Suite).
    - Programming-by-example technology for string transformations tech-transferred to Excel; Ships as **Flash Fill feature in Excel 2013**.
    - Automated grading and feedback generation for automata construction problems: Tool used by **10+ Universities**.
    - Automated grading and feedback generation for programming problems: Tools used at **IIT Kanpur and MIT**.
    - SPEED tool (static resource bound analysis) used internally by SQL Performance Team.
    - SPEED tool tech-transferred to Premier Field Engineering Team and shipped as part of **.NET Code Review Services**.
- Authored **34 patent applications** (Granted: 13, Under review: 21) and **100+ research papers**.

- **Invited Lectures** (1 week each)
  - Marktoberdorf International Summer School, August 2015
  - Marktoberdorf International Summer School, August 2013
  - Summer School on Formal Techniques at Menlo College, Atherton, CA, May 2012
  - Summer School on Logic and Theorem Proving in Programming Languages at University of Oregon, 2009
  - Static Program Analysis course at UCLA, May 2008
  - Program Analysis and Verification course at IISc-Bangalore, 2007
- **Ph.D. Students:**
  - Saurabh Srivastava (Univ. of Maryland at College Park; now runs a startup 20n.com), co-advised with Jeff Foster
  - Florian Zuleger (TU Darmstadt; now tenure-track faculty at same institute), co-advised with Helmut Veith
  - Rishabh Singh (MIT; now at MSR), co-advised with Armando Solar-Lezama
  - Erik Andersen (Univ. of Washington, now tenure-track faculty at Cornell), co-advised with Zoran Popovic
  - Vu Le (UC-Davis; now at Microsoft), co-advised with Zhendong Su
  - Daniel Perelman (Univ of Washington; now at Microsoft), co-advised with Dan Grossman
  - Alex Polozov (Univ. of Washington)
- **Program Committee Member**: POPL 2016 ERC, PLOOC 2015, AInF 2015, KDD 2015, PLDI 2015 ERC, POPL 2015 ERC, ASSESS 2014, PLOOC 2014, Learning at Scale 2014, PLDI 2014, PLDI 2013 ERC, CICM 2012, CC 2012, SAS 2011, POPL 2011, PLDI 2010, VMCAI 2010, ESOP 2010, PLDI 2009 SRC, SAS 2009, CC 2008.
- **Workshop/Seminar Organization:**
  - Dagstuhl Seminar on Approaches and Applications of Inductive Programming, Dec 2013
  - Workshop on Programming Languages Technology for Massive Open Online Courses (PLOOC), June 2013 (Co-located with PLDI 2013)
  - Dagstuhl Seminar on Software Synthesis, Apr 2012.
  - Dagstuhl Summer School on Software Synthesis, Aug 2011.
  - Workshop on *Quantitative Analysis of Software*, co-located with CAV 2009, Grenoble, France
  - Workshop on *Security and Reliability in Software Systems*, co-located with FSTTCS/APLAS 2008, Bangalore, India
- Participant on **NSF Grants** (including multi-million dollar NSF Expedition), **NSF Panels**, **DARPA ISAT Meetings**.
- Member of Graduate Admissions Committee, computer science division, UC-Berkeley, 2004.
- Teaching Assistant for upper-division course ``Programming Languages and Compilers" (cs164), UC-Berkeley, Spring 2003.

Refereed Conference & Journal Publications

Detailed list available from http://research.microsoft.com/en-us/um/people/sumitg/publications.html

- [CACM '15] Inductive Programming Meets the Real World
- [OOPSLA '15] FlashMeta: A Framework for Inductive Program Synthesis
- [OOPSLA '15] Automating Grammar Comparison
- [UIST '15] User Interaction Models for Disambiguation in Programming by Example
- [CAV '15] Predicting a Correct Program in Programming By Example
- [IJCAI '15] FlashNormalize: Programming by Examples for Text Normalization
- [IJCAI '15] Compositional Program Synthesis from Natural Language and Examples
- [IJCAI '15] Personalized Mathematical Word Problem Generation
- [PLDI '15] FlashRelate: Extracting Relational Data from Semi-Structured Spreadsheets Using Examples
- [ICSE '15 Demonstrations Track] StriSynth: Synthesis for Live Programming
- [TOCHI '15] How Can Automatic Feedback Help Students Construct Automata?
- [CHI '15] A Framework for Automatically Generating Interactive Tutorials
- [CHI '15] Automatic Game Progression Design through Analysis of Solution Features
- [CHI '15] Mixed-Initiative Approaches to Global Editing in Slideware

- [AAAI '15] Automatic Generation of Alternative Starting Positions for Simple Traditional Board Games
- [POPL '15] Automating Repetitive Tasks for the Masses (Keynote Paper)
- [CACM '14] Example-Based Learning in Computer-Aided STEM Education
- [FSE '14] Feedback Generation for Performance Problems in Introductory Programming Assignments
- [KDD '14] LaSEWeb: Automating Search Strategies Over Semi-structured Web Data
- [GECCO '14] Applications of Program Synthesis to End-User Programming and Intelligent Tutoring Systems (Invited Talk Paper)
- [SIGMOD '14] NLyze: Interactive Programming by Natural Language for SpreadSheet Data Analysis and Manipulation
- [AAAI '14] Programming by Example using Least General Generalizations
- [AAAI '14] Automatic Synthesis of Geometry Problems for an Intelligent Tutoring System
- [PLDI '14] FlashExtract: A Framework for Data Extraction by Examples
- [PLDI '14] Test-Driven Synthesis
- [IUI '14] A Practical Framework for Constructing Structured Drawings
- [LPAR '13] Solving Geometry Problems using a Combination of Symbolic and Numerical Reasoning
- [UIST '13] A Colorful Approach to Text Processing by Example
- [MobiSys '13] SmartSynth: Synthesizing Smartphone Automation Scripts from Natural Language
- [IJCAI '13] Automatically Generating Problems and Solutions for Natural Deduction
- [IJCAI '13] Automated Grading of DFA constructions
- [CAV '13] Recursive Program Synthesis
- [PLDI '13] Automated Feedback Generation for Introductory Programming Assignments
- [PLDI '13] Static Analysis for Probabilistic Programs: Inferring Whole Program Properties from Finitely Many Paths
- [CHI '13] A Trace-based Framework for Analyzing and Synthesizing Educational Progressions
- [ICML '13] A Machine Learning Framework for Programming by Example
- [PPoPP '13] From Relational Verification to SIMD Loop Synthesis (**Best Paper Award & Nominated for CACM Research Highlights**)
- [CACM '12] Spreadsheet Data Manipulation using Examples **(Research Highlights Paper)**
- [CACM '12] Continuity and Robustness of Programs **(Research Highlights Paper)**
- [SYNASC '12] Synthesis From Examples: Interaction Models and Algorithms **(Invited Talk Paper)**
- [AAAI ‘12] Automatically Generating Algebra Problems
- [VLDB '12] Learning Semantic String Transformations from Examples
- [PLDI '12] Type-Directed Completion of Partial Expressions
- [CHI '12] QuickDraw: Improving Drawing Experience for Geometric Diagrams
- [CAV '12] Synthesizing Number Transformations from Input-Output Examples
- [WAMBSE '12] Synthesis from Examples **(Invited Talk Paper)**
- [JSTTT '12] Template-based Program Verification and Program Synthesis (Journal paper)
- [FSE '11] Proving Programs Robust (**Distinguished Paper Award** & **Invited to CACM Research Highlights**)
- [POPL '11] Automating String Processing in Spreadsheets using Input-Output Examples (**Invited to CACM Research Highlights**)
- [PLDI '11] Spreadsheet Table Transformations from Examples (**Invited to CACM Research Highlights**)
- [PLDI '11] Synthesizing Geometry Constructions
- [PLDI '11] Synthesis of Loop-Free Programs
- [PLDI '11] Path-based Inductive Synthesis for Program Inversion
- [SAS '11] Bound Analysis of Imperative Programs with the Size-change Abstraction
- [OOPSLA '11] A Simple Inductive Synthesis Methodology and its Applications
- [PLDI '10] The Reachability-Bound Problem
- [POPL '10] From Program Verification to Program Synthesis
- [POPL '10] Continuity Analysis of Programs
- [PPDP '10] Dimensions in Program Synthesis **(Invited Talk Paper)**
- [ICSE '10] Oracle-Guided Component-Based Program Synthesis

- [ICCPS '10] Synthesizing Switching Logic for Safety and Dwell-Time Requirement
- [PLDI '09] Control-Flow Refinement and Progress Invariants for Bound Analysis
- [PLDI '09] Program Verification using Templates over Predicate Abstraction
- [POPL '09] SPEED: Precise and Efficient Static Estimation of Program Computational Complexity ,
- [POPL '09] A Combination Framework for Tracking Partition Sizes
- [CAV '09] SPEED: Symbolic Complexity Bound Analysis **(Invited Talk Paper)**
- [CAV '09] VS3: SMT Solvers for Program Verification (Tools Paper)
- [VMCAI '09] Constraint-based Invariant Inference over Predicate Abstraction
- [VMCAI '09] Synthesizing Switching Logic using Constraint Solving (Journal version appears in STTT 11]
- [PLDI '08] Program Analysis as Constraint Solving
- [PLDI '08] Inferring Locks for Atomic Sections
- [CAV '08] A Numerical Abstract Domain based on *Expression Abstraction* and *Max Operator* with Application in Timing Analysis
- [CAV '08] Constraint-based Approach for Analysis of Hybrid Systems
- [CAV '08] Proving Conditional Termination
- [ESOP '08] Cover Algorithms and their Combination
- [ESOP '08] Ranking Abstractions
- [POPL '08] Lifting Abstract Interpreters to Quantified Logical Domains
- [POPL '07] Program Verification as Probabilistic Inference
- [CAV '07] An Abstract Domain for Analyzing Heap-Manipulating Low-Level Software
- [ESOP '07] Computing Procedure Summaries for Interprocedural Analysis
- [VMCAI '07] Assertion Checking Unified
- [PLDI '06] Combining Abstract Interpreters
- [ESOP '06] Assertion Checking over Combined Abstraction of Linear Arithmetic and Uninterpreted Functions
- [Ph.D. Dissertation '05] Program Analysis using Random Interpretation (**Winner of the ACM SIGPLAN Doctoral Dissertation Award**)
- [POPL '05] Precise Interprocedural Analysis using Random Interpretation
- [POPL '04] Global Value Numbering using Random Interpretation
- [SAS '04] A Polynomial-Time Algorithm for Global Value Numbering (Journal version appears in Science of Computer Programming, 2007)
- [SAS '04] Path-Sensitive Analysis for Linear Arithmetic and Uninterpreted Functions
- [FSTTCS '04] Join Algorithms for the Theory of Uninterpreted Functions
- [POPL '03] Discovering Affine Equalities using Random Interpretation
- [CADE '03] A Randomized Satisfiability Procedure for Arithmetic and Uninterpreted Function Symbols (Journal version appears in Information and Computing 2005)
- [WCW '00] WebCaL: A Domain Specific Language for Web Caching

References

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