

Sergey Mechtaev

Lecturer (Assistant Professor), University College London

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RESEARCH INTERESTS

- **Software engineering:** automated program repair, software testing.
- **Formal methods:** symbolic execution, constraint solving, software verification.
- **Programming languages:** program synthesis, program analysis.

EDUCATION

- **National University of Singapore, School of Computing** Singapore
Doctor of Philosophy
August 2012–July 2018
Thesis: Semantic program repair; Supervisor: Abhik Roychoudhury; GPA: 4.4
- **Saint Petersburg State University, Mathematics & Mechanics Faculty** Saint Petersburg, Russia
Specialist
September 2006–July 2011
Thesis: Generic programming library for OCaml; Supervisor: Dmitry Boulytchev; GPA: 4.7

EMPLOYMENT

- **University College London** London, United Kingdom
Lecturer
February 2019–Present
Software System Engineering group, CREST centre
- **National University of Singapore** Singapore
Research Assistant
March 2017–January 2019
TSUNAMi centre
- **Fondazione Bruno Kessler** Trento, Italy
Intern
February 2016–June 2016
Research Unit in Embedded Systems
- **Lanit-Tercom, Inc** Saint-Petersburg, Russia
Software Developer
May 2010–July 2012
HaSCoL hardware-description language
- **OOO Dvin** Saint-Petersburg, Russia
Software Developer
June 2009–April 2010
Video surveillance software startup

PUBLICATIONS

Google Scholar: <https://scholar.google.com.sg/citations?user=XTFR93cAAAAJ&hl=en>

DBLP: <https://dblp.uni-trier.de/pers/hd/m/Mechtaev:Sergey>

- **Evaluating Automatic Program Repair Capabilities to Repair API Misuses** TSE'21
Maria Kechagia, Sergey Mechtaev, Federica Sarro, Mark Harman
Transactions on Software Engineering
- **Re-factoring Based Program Repair Applied to Programming Assignments** ASE'19
Yang Hu, Umair Z. Ahmed, Sergey Mechtaev, Ben Leong, Abhik Roychoudhury
International Conference on Automated Software Engineering 2019

- **Crash-Avoiding Program Repair** ISSTA'19
Xiang Gao, Sergey Mechtaev, Abhik Roychoudhury
International Symposium on Software Testing and Analysis 2019
- **Symbolic Execution with Existential Second-Order Constraints** FSE'18
Sergey Mechtaev, Alberto Griggio, Alessandro Cimatti, Abhik Roychoudhury
Symposium on the Foundations of Software Engineering 2018
- **Test-equivalence Analysis for Automatic Patch Generation** TOSEM'18
Sergey Mechtaev, Xiang Gao, Shin Hwei Tan, Abhik Roychoudhury
Transactions on Software Engineering and Methodology 2018
- **Semantic Program Repair Using a Reference Implementation** ICSE'18
Sergey Mechtaev, Manh-Dung Nguyen, Yannic Noller, Lars Grunske, Abhik Roychoudhury
International Conference on Software Engineering 2018, Acceptance: 105/502 = 21%
- **A Correlation Study Between Automated Program Repair and Test-suite Metrics** EMSE'17
Jooyong Yi, Shin Hwei Tan, Sergey Mechtaev, Marcel Boehme, Abhik Roychoudhury
Empirical Software Engineering Journal 2017
- **Codeflaws: A Programming Competition Benchmark for Evaluating Automated Program Repair Tools** ICSE'17-Poster
Shin Hwei Tan, Jooyong Yi, Yulis, Sergey Mechtaev, Abhik Roychoudhury
International Conference on Software Engineering, Poster track 2017
- **Angelix: Scalable Multiline Program Patch Synthesis via Symbolic Analysis** ICSE'16
Sergey Mechtaev, Jooyong Yi, Abhik Roychoudhury
International Conference on Software Engineering 2016, Acceptance: 101/530 = 19%
- **DirectFix: Looking for Simple Program Repairs** ICSE'15
Sergey Mechtaev, Jooyong Yi, Abhik Roychoudhury
International Conference on Software Engineering 2015, Acceptance: 84/452 = 18%
- **Eliminating Boilerplate Code in Objective Caml Programs** SysProg'11
Sergey Mechtaev
System Programming 2011
- **Efficiently Scrapping Boilerplate Code in OCaml** ML'11
Dmitri Boulytchev, Sergey Mechtaev
Workshop on ML 2011

PROJECTS

GitHub: <https://github.com/mechtaev>

- **Angelix:** the first constraint-based program repair system that scales to large real-world programs. Angelix generated a patch for the well-known Heartbleed vulnerability; it has been downloaded by researchers from over 60 institutions, and has been used in several projects including an intelligent tutoring system at IIT Kanpur. <http://angelix.io>
- **program-repair.org:** a community-driven website on program repair that was initiated and designed by me. Since its release, researchers from 7 institutions have contributed to this website; it has 200-300 unique visitors per month. <http://program-repair.org>
- **ocaml-syb:** an adaptation of Scrap Your Boilerplate approach for OCaml. This library has been used in the compiler of HaSCoL hardware-description language. The prototype is available here: <http://oops.math.spbu.ru/syb-ocaml/>

SUPERVISION

- **Nikhil Parasaram (PhD)**
First supervisor. Second supervisor: Earl T. Barr
Thesis: TBA

University College London
September 2019–Present

- **Liu Yu (PhD)**
Co-advisor. Other advisors: Abhik Roychoudhury, Emmanuel Letier
Thesis: TBA
National University of Singapore/CREST
September 2020–Present
- **Mahdi Nasrollahi (MEng)**
First supervisor.
Thesis: TBA
University College London
October 2020–May 2021
- **Boyang Zhang (MSc)**
First supervisor. Second supervisor: Justyna Petke
Thesis: TBA
University College London
January 2020–August 2020
- **Naum Anteski (MEng)**
First supervisor. Second supervisor: Jens Krinke
Thesis: TBA
University College London
October 2019–May 2020
- **Max Bertfield (BSc)**
First supervisor. Second supervisor: Jens Krinke
Thesis: TBA
University College London
September 2019–May 2020
- **Edwin Lesmana Tjong (MSc)**
Second supervisor. First supervisor: Abhik Roychoudhury
Thesis: Use of Repairs Tool to Fix Security Vulnerabilities
National University of Singapore
2017–2018

TEACHING

- **COMP0010 Software Engineering**
Tutor
University College London
September 2020–December 2020
- **COMP0010 Software Engineering**
Tutor
University College London
September 2019–December 2019
- **CS4218 Software Testing and Debugging**
Teaching Assistant
National University of Singapore
January 2015–May 2015

TALKS

- **Semantic Program Repair**
NUS Computing Research Week
Singapore (via video conferencing)
August 2020
- **Synthesis of Software Patches Using Symbolic Execution**
62nd CREST Open Workshop on Program Repair and GI
London, United Kingdom
January 2020
- **Automated Repair of Security Vulnerabilities**
Shonan Meeting 160 on Fuzzing and Symbolic Execution
Tokyo, Japan
September 2019
- **Semantic Program Repair**
Southern University of Science and Technology
Shenzhen, China
July 2019
- **Semantic Program Repair**
Imperial College London
London, United Kingdom
May 2019
- **First-Order and Second-Order Symbolic Execution**
JetBrains Research
Saint-Petersburg, Russia
April 2019
- **Semantic Program Repair**
University College London
London, United Kingdom
July 2018
- **Semantic Program Repair Using a Reference Implementation**
International Conference on Software Engineering 2018
Gothenburg, Sweden
May 2018
- **Semantic Program Repair Using a Reference Implementation**
Dagstuhl Seminar 18151 on Program Equivalence
Schloss Dagstuhl, Germany
April 2018

- **Semantics-based Program Repair** Singapore
School of Computing, National University of Singapore April 2017
- **Efficient Exploration of Patch Spaces for Automated Program Repair** Saint-Petersburg, Russia
JetBrains Research March 2017
- **Towards a Synergy of Syntax-based and Semantics-based Program Repair** Schloss Dagstuhl, Germany
Dagstuhl Seminar 17022 on Automated Program Repair January 2017
- **Angelix: Scalable Multiline Program Patch Synthesis via Symbolic Analysis** Austin, USA
International Conference on Software Engineering 2016 May 2016
- **Constraint-based Automated Program Repair** Trento, Italy
Fondazione Bruno Kessler May 2016
- **DirectFix: Looking for Simple Program Repairs** Florence, Italy
International Conference on Software Engineering 2015 May 2015

SERVICE

- **Organiser:**
 - 62nd CREST Open Workshop (COW) on Automated Program Repair and Genetic Improvement 2020
 - International Workshop on Automated Program Repair (APR) co-located with ICSE 2020
 - International Workshop on Automated Program Repair (APR) co-located with ICSE 2021
 - International Conference on Software Engineering Student Research Competition (ICSE SRC) 2022
- **Program committee:**
 - International Conference on Automated Software Engineering (ASE) 2019
- **Reviewer:**
 - Transactions on Software Engineering (TSE) 2017, 2018, 2019, 2021
 - Empirical Software Engineering (EMSE) 2017, 2018, 2019, 2020, 2021
 - Transactions on Software Engineering and Methodology (TOSEM) 2018, 2019, 2020
 - Science of Computer Programming 2020
 - Formal Method in System Design (FMSD) 2020
- **Subreviewer:**
 - International Conference on Automated Software Engineering (ASE) 2013
 - International Symposium on Software Testing and Analysis (ISSTA) 2015
 - International Conference on Software Testing, Verification, and Validation (ICST) 2017
 - Symposium on the Foundations of Software Engineering (FSE) 2017
 - International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2019

AWARDS

- **IMDA Excellence Prize 2019** Singapore
National University of Singapore 2019
- **Outstanding Doctoral Dissertation Award** Montreal, Canada
ACM SIGSOFT 2019
- **Research Achievement Award** Singapore
National University of Singapore 2016
- **NEERC Northern Subregional Programming Contest Honorable Mention** Saint Petersburg, Russia
ACM ICPC 2007