

# Sergey Mechtaev

Lecturer (Assistant Professor), University College London

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**Address:** Department of Computer Science, University College London,  
Gower Street, London WC1E 6BT, United Kingdom

**Office:** Room 3.06, Engineering Front Building

**Email:** s.mechtaev@ucl.ac.uk

**Personal email:** mechtaev@gmail.com

**Website:** <http://mechtaev.com>

**Mobile phone:** +44 (0)79 3560 2279

## RESEARCH INTERESTS

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

## EDUCATION

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- **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

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- **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

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

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

- **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

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**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

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- **Edwin Lesmana Tjong** National University of Singapore  
MSc co-advisor 2017–2018  
Thesis: Use of Repairs Tool to Fix Security Vulnerabilities

## TEACHING

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- **CS4218 Software Testing and Debugging** National University of Singapore  
Teaching Assistant January 2015–May 2015

## TALKS

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- **Semantic Program Repair** Shenzhen, China  
*Southern University of Science and Technology* July 2019
- **Semantic Program Repair** London, United Kingdom  
*Imperial College London* May 2019
- **First-Order and Second-Order Symbolic Execution** Saint-Petersburg, Russia  
*JetBrains Research* April 2019
- **Semantic Program Repair** London, United Kingdom  
*University College London* July 2018
- **Semantic Program Repair Using a Reference Implementation** Gothenburg, Sweden  
*International Conference on Software Engineering 2018* May 2018
- **Semantic Program Repair Using a Reference Implementation** Schloss Dagstuhl, Germany  
*Dagstuhl Seminar 18151 on Program Equivalence* 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

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- **Program committee:**
  - International Conference on Automated Software Engineering (ASE) 2019
- **Reviewer:**
  - Transactions on Software Engineering (TSE) 2017, 2018, 2019
  - Empirical Software Engineering (EMSE) 2017, 2018, 2019
  - Transactions on Software Engineering and Methodology (TOSEM) 2018, 2019
- **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

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- **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