

# Sergey Mechtaev

Lecturer (Assistant Professor), University College London

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## 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>

- **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

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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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- **Naum Anteski (MEng)** University College London  
First supervisor. Second supervisor: Jens Krinke  
Thesis: TBA October 2019–Present
- **Nikhil Parasaram (PhD)** University College London  
First supervisor. Second supervisor: Earl T. Barr  
Thesis: TBA September 2019–Present

- **Max Bertfield (BSc)** University College London  
*First supervisor. Second supervisor: Jens Krinke*  
Thesis: TBA  
*September 2019–Present*
- **Zhang Jiang (PhD)** National University of Singapore  
*Second supervisor. First supervisor: Abhik Roychoudhury*  
Thesis: TBA  
*August 2019–Present*
- **Edwin Lesmana Tjong (MSc)** National University of Singapore  
*Second supervisor. First supervisor: Abhik Roychoudhury*  
Thesis: Use of Repairs Tool to Fix Security Vulnerabilities  
*2017–2018*

## TEACHING

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

## TALKS

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- **Automated Repair of Security Vulnerabilities** Tokyo, Japan  
*Shonan Meeting 160 on Fuzzing and Symbolic Execution*  
*September 2019*
- **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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- **Organiser:**
  - 62nd CREST Open Workshop (COW) on Automated Program Repair and Genetic Improvement 2020
- **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