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

- **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

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

Teaching

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

Talks

- **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

- **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, 2019×2
  - 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

- **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*