

Contact information

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Research interests

Design and implementation of programming languages, program verification, concurrency, distributed systems, certified programming, type theory, static program analysis, functional programming.

1 Education

KU Leuven, Leuven, Belgium. November 2008–November 2012.

Ph.D. in Computer Science, November 2012.

- Thesis title: *Operational Aspects of Type Systems*
- Advisor: prof. Dave Clarke

Saint Petersburg State University, Saint Petersburg, Russia. 2003–2008.

M.Sc. in mathematics, Dept. of Mathematics and Mechanics, GPA 5.0/5.0, June 2008.

- Thesis title: *Extraction of musical notation from a musical signal*
- Advisor: prof. Andrey E. Barabanov

Saint Petersburg Lyceum 239, Saint Petersburg, Russia. 2001–2003.

High school degree with specialization in physics and mathematics.

2 Employment

- **University College London**, Department of Computer Science. London, UK
Lecturer (Assistant Professor). Started November 2015.
- **IMDEA Software Institute**, Madrid, Spain
Post-doctoral Researcher. December 2012–October 2015.
- **Microsoft Research**, Cambridge, UK
Research Intern. Programming Principles and Tools group. July–September 2012.
- **JetBrains Inc.**, Saint Petersburg, Russia
 - *Software Engineer*. IntelliJ IDEA. March 2007–December 2012 (off-site since November 2008).
 - *Intern*. IntelliJ IDEA team. September 2006–March 2007.
- **OpenWay**, Saint Petersburg, Russia
Summer School Intern. June 2006–September 2006
- **Informational Systems for Business**, Saint Petersburg, Russia
Software Engineer. August 2005–June 2006.

3 Publications and Manuscripts

3.1 Journal articles

1. **Modular, Higher-Order Cardinality Analysis in Theory and Practice**
Ilya Sergey, Dimitrios Vytiniotis, Joachim Breitner and Simon Peyton Jones
Journal of Functional Programming, volume 27, e11, January 2017.

2. **Pushdown Flow Analysis with Abstract Garbage Collection**
J. Ian Johnson, Ilya Sergey, Christopher Earl, Matthew Might and David Van Horn
Journal of Functional Programming, volume 24, issue 2-3, pages 218–283, May 2014.
3. **A correspondence between type checking via reduction and type checking via evaluation**
Ilya Sergey and Dave Clarke
Information Processing Letters, volume 112, issue 1-2, pages 13–20, January 2012.

3.2 Articles in conference proceedings

4. **Concurrent Data Structures Linked in Time**
Germán Andrés Delbianco, Ilya Sergey, Aleksandar Nanevski and Anindya Banerjee
31st European Conference on Object-Oriented Programming (ECOOP 2017), 27/81 \approx 33% accepted.
5. **Programming Language Abstractions for Modularly Verified Distributed Systems**
James R. Wilcox, Ilya Sergey and Zachary Tatlock
The 2nd Summit on Advances in Programming Languages (SNAPL 2017).
6. **Hoare-style Specifications as Correctness Conditions for Non-linearizable Concurrent Objects**
Ilya Sergey, Aleksandar Nanevski, Anindya Banerjee and Germán Andrés Delbianco
31st ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA 2016), 52/203 \approx 26% accepted.
7. **Experience Report: Growing and Shrinking Polygons for Random Testing of Computational Geometry Algorithms**
Ilya Sergey
21st ACM SIGPLAN International Conference on Functional Programming (ICFP 2016), 37/118 \approx 31% accepted.
8. **Mechanized Verification of Fine-grained Concurrent Programs**
Ilya Sergey, Aleksandar Nanevski and Anindya Banerjee
36th ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2015), 58/303 \approx 19% accepted.
9. **Specifying and Verifying Concurrent Algorithms with Histories and Subjectivity**
Ilya Sergey, Aleksandar Nanevski and Anindya Banerjee
24th European Symposium on Programming (ESOP 2015), 33/115 \approx 29% accepted.
10. **Communicating State Transition Systems for Fine-Grained Concurrent Resources**
Aleksandar Nanevski, Ruy Ley-Wild, Ilya Sergey and Germán Andrés Delbianco
23rd European Symposium on Programming (ESOP 2014), 27/109 \approx 25% accepted.
11. **Modular, Higher-Order Cardinality Analysis in Theory and Practice**
Ilya Sergey, Dimitrios Vytiniotis and Simon Peyton Jones
41st ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages (POPL 2014), 51/220 \approx 23% accepted.
12. **Monadic Abstract Interpreters**
Ilya Sergey, Dominique Devriese, Matthew Might, Jan Midtgaard, David Darais, Dave Clarke and Frank Piessens
34th ACM SIGPLAN International Conference on Programming Language Design and Implementation (PLDI 2013), 46/267 \approx 17% accepted.
13. **Introspective Pushdown Analysis of Higher-Order Programs**
Christopher Earl, Ilya Sergey, Matthew Might and David Van Horn
17th ACM SIGPLAN International Conference on Functional Programming (ICFP 2012), 32/88 \approx 36% accepted.
14. **Calculating Graph Algorithms for Dominance and Shortest Path**
Ilya Sergey, Jan Midtgaard and Dave Clarke
11th International Conference on Mathematics of Program Construction (MPC 2012), 13/27 \approx 48% accepted.

15. **Gradual Ownership Types**
Ilya Sergey and Dave Clarke
21st European Symposium on Programming (ESOP 2012), 28/88 \approx 32% accepted.

3.3 Peer-reviewed workshop articles

16. **A Concurrent Perspective on Smart Contracts**
Ilya Sergey and Aquinas Hobor
1st Workshop on Trusted Smart Contracts (WTSC 2017)
17. **Deriving Interpretations of the Gradually-Typed Lambda Calculus**
Álvaro García Pérez, Pablo Nogueira and Ilya Sergey
ACM SIGPLAN 2014 Workshop on Partial Evaluation and Program Manipulation (PEPM 2014)
18. **Fixing Idioms – A recursion primitive for applicative DSLs**
Dominique Devriese, Ilya Sergey, Dave Clarke and Frank Piessens
ACM SIGPLAN 2013 Workshop on Partial Evaluation and Program Manipulation (PEPM 2013)
19. **Towards Gradual Ownership Types**
Ilya Sergey and Dave Clarke
International Workshop on Aliasing, Confinement and Ownership (IWACO 2011)
20. **From type checking by recursive descent to type checking with an abstract machine**
Ilya Sergey and Dave Clarke
Eleventh Workshop on Language Descriptions, Tools and Applications (LDTA 2011)
21. **Automatic refactorings for Scala programs**
Ilya Sergey, Dave Clarke and Alexander Podkhalyuzin
The First Scala Workshop - Scala Days 2010
22. **A semantics for context-oriented programming with layers**
Dave Clarke and Ilya Sergey
International Workshop on Context-Oriented Programming (COP 2009)

3.4 Book chapters

23. **Ownership Types: A Survey**
Dave Clarke, Johan Östlund, Ilya Sergey and Tobias Wrigstad.
Aliasing in Object-Oriented Programming: Types, Analysis and Verification, Springer, 2013.

3.5 Publications in informal proceedings

24. **Implementation of Gradual Ownership Types for Java using Attribute Grammars** (in Russian). Ilya Sergey. *Soft. Engineering*, issue 6, pages 49–79, St Petersburg State University publishing, 2011.
25. **Extraction of musical notation from musical signal** (in Russian).
Ilya Sergey and Andrey Barabanov. *Phonetical Lyceum*, issue 4, Faculty of Philology and Arts, St Petersburg State University publishing, 2009.
26. **Implementation of JVM-based languages support in IntelliJ IDEA**. Ilya Sergey. *International Workshop on Multiparadigm Programming with Object-Oriented Languages (MPOOL 2008)*.

3.6 Lecture notes

27. **Programs and Proofs: Mechanizing Mathematics with Dependent Types**
Ilya Sergey. *Lecture notes with exercises*, available at <http://ilyasergey.net/pnp>.

4 Funding and Scholarships

- Research Institute in Verified Trustworthy Software Systems (VeTSS), August 2017, **£55,561**, 8-month project on the topic *Automated Reasoning with Fine-Grained Concurrent Collections*;
- EPSRC First Grant, September 2016, **£101,009**, 18-month project on the topic *Program Logics for Compositional Specification and Verification of Distributed Systems*;
- Vladimir Potanin Federal Scholarship Program winner (2004, 2005, 2007)

5 Selected Projects and Software

- **DISEL: Distributed Separation Logic**, a mechanized framework for compositional verification of distributed systems, *primary contributor*. Sources available at <https://github.com/DistributedComponents/disel>.
- **FCSL: Fine-grained Concurrent Separation Logic**, a verification tool for fine-grained concurrent programs, *primary contributor*. Project site: <http://software.imdea.org/fcsl>.
- **Geometry Testing**, a QuickCheck-style framework for randomized testing of geometric algorithms, *sole implementer*. Available at <https://github.com/UCL-PPLV/geometry-testing>.
- **La Clojure** plugin for IntelliJ IDEA, *founder and maintainer*. Sources available at <http://github.com/JetBrains/la-clojure>.

More projects on GitHub: <http://github.com/ilyasergey> and <http://github.com/UCL-PPLV>.

6 Teaching

6.1 Teaching at UCL

- Spring 2017: **comp104p – Theory 2, Analysis of Algorithms** (142 students), *Lecturer*
- Spring 2017: **comp203p – Software Engineering and HCI** (124 students), *Scenario Project Designer*
- Spring 2016: **comp104p – Theory 2, Analysis of Algorithms** (155 students), *Lecturer*
- Spring 2016: **comp203p – Software Engineering and HCI** (94 students), *Scenario Week Designer*
- Spring 2016: **comp2012 – Directed Reading** (11 students), *Second Examiner* (with James Brotherston)

6.2 Teaching at summer schools and seminars

- August 2014: **Programs and Proofs: Mechanizing Mathematics with Dependent Types** **Saint Petersburg State University**, Saint Petersburg, Russia
Course Designer, Summer School Lecturer

6.3 Teaching at KU Leuven

- Fall 2011: **B-KUL-H04L5A – Comparative Programming Languages**, *Teaching Assistant*
- Fall 2010: **B-KUL-H04H8B – Formal systems and their applications**, *Teaching Assistant, 2nd Lecturer*
- Fall 2009: **B-KUL-H04H8B – Formal systems and their applications**, *Teaching Assistant, 2nd Lecturer*

7 Academic Service

7.1 Chair/Organiser

- The Fourth International Workshop on Coq for Programming Languages (CoqPL 2018), *Co-organiser (with Yves Bertot)*
- ICFP 2017, *Student Research Competition Chair*
- 6th South of England Regional Programming Language Seminar (S-REPLS 6), *Organiser*

7.2 Program/External Review Committees

- ICFP 2018: *23rd ACM SIGPLAN International Conference on Functional Programming* (PC)
- APLAS 2017: *15th Asian Symposium on Programming Languages and Systems* (PC)
- Scala 2017: *Scala Symposium 2017* (PC)
- SAS 2017: *24th Static Analysis Symposium* (PC)
- WTSC 2017: *1st Workshop on Trusted Smart Contracts* (PC)
- POPL 2017: *44th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages* (PC)
- PEPM 2017: *ACM SIGPLAN 2017 Workshop on Partial Evaluation and Program Manipulation* (PC)
- TMPA 2017: *4th International Conference on Tools And Methods of Program Analysis* (PC)
- Scala 2016: *Scala Symposium 2016* (PC)
- TAPAS 2016: *The Seventh Workshop on Tools for Automatic Program Analysis* (PC)
- SEIM 2016: *1st Russian Conference on Software Engineering and Information Management* (PC)
- ESOP 2016: *25th European Symposium on Programming* (PC)
- STOP 2015: *International Workshop on Scripts to Programs* (PC)
- PPDP 2014: *16th International Symposium on Principles and Practice of Declarative Programming* (PC)
- Scala 2014: *The Fifth Annual Scala Workshop* (PC)

7.3 Reviewing for Journals

- Journal of Automated Reasoning (JAR) (2017)
- ACM Transactions on Programming Languages and Systems (TOPLAS) (2014, 2015 × 2, 2016, 2017)
- Philosophical Transactions of the Royal Society of London (2017),
- Journal of Functional Programming (JFP) (2015)
- Formal Aspects of Computing (2015).

7.4 Additional Conference and Workshop Refereeing

PLDI 2017, TACAS 2017, ESOP 2017, ATVA 2016, CONCUR 2016, DISC 2015, ECOOP 2015, ESOP 2015, POPL 2015, GPCE 2014, ICFP 2014, CSF 2014, PROLE 2013, SAIRP 2013, CC 2013, ESOP 2013, POPL 2013, CPP 2012, ECOOP 2012, NFM 2012, ESOP 2012, DSL 2011, IWACO 2011, Coordination 2010, Coordination 2009.

7.5 Other Service

- SPLASH 2017 Workshops, *Workshop Program Committee member*
- ICFP 2016, Student Research Competition, *Selection Committee member*
- ECOOP 2014, *Artifact Evaluation Committee member*

8 Invited Keynote Talks

1. Keynote speaker at *Russian National Conference on Programming Languages and Compilers* Rostov-on-Don, Russia. April 2017. <http://plc.sfedu.ru>
Talk title: *Dependent Types for Verification of Real-World Programs*
2. Keynote speaker at *15th International Symposium on Principles and Practice of Declarative Programming (PPDP 2013)*, Madrid, Spain. September 2013.
Talk title: *Monadic Abstract Interpreters*

9 Selected Invited Seminar Presentations and Technical Talks

- *Programming and Proving with Distributed Protocols*
Heriot-Watt University, UK (July 2017); IMDEA Software Institute, Spain (June 2017); Aarhus University, Denmark (May 2017); University of California San Diego, US (May 2017); Imperial College London, UK (November 2016)

- *Programming and Proving with Concurrent Resources*
University of York, UK (October 2016); University of Cambridge, UK (June 2016); Aarhus University, Denmark (June 2016); MPI-SWS, Germany (May 2016); Imperial College London, UK (May 2016); Middlesex University, UK (May 2016); University of Birmingham, UK (January 2016); Queen Mary University of London, UK (December 2015); University College London, UK (April 2015); Microsoft Research, Cambridge, UK (March 2015).
- *Reasoning about non-linearizable concurrent objects*
Dagstuhl Seminar 16201, Germany (May 2016); University of Kent, UK (April 2016).
- *Anatomy of mechanized reasoning about fine-grained concurrency*
Dagstuhl Seminar 15191, Germany (May 2015).
- *Programming with Proofs*
Google, London, UK (April 2015); Russian Academy of Sciences, St Petersburg, Russia (August 2014).
- *Communicating State Transition Systems for Fine-Grained Concurrent Resources*
IMDEA Software Institute, Spain (April 2014); Concurrency Yak, San Diego, US (January 2014); HOPE 2013 Workshop, Boston, US (September 2013).
- *Static Analysis and Code Optimizations in Glasgow Haskell Compiler*
St Petersburg Functional Programming meetup, Russia (December 2012)
- *Gradual Ownership Types*
IMDEA Software Institute, Spain (July 2012); Aarhus University, Denmark (December 2011).
- *Scripting an IDE for DSL awareness*
Devovx 2009, Antwerp, Belgium (November 2009)
- *Clojure support in IntelliJ IDEA*
The Bay Area Clojure User Group meetup, San Francisco, US (June 2009).
- *Cross-Language Development in IntelliJ IDEA*
JAX 2009, Mainz, Germany (April 2009).
- *Cross-Language Development Experience on the JVM*
Devovx 2008, Antwerp, Belgium (December 2008).

10 Visiting Fellowship

- **Aarhus University**, Aarhus, Denmark, September–October 2010 and November–December 2011.
Visiting PhD student. Host: prof. Olivier Danvy.
- **École Polytechnique Fédérale de Lausanne**, Lausanne, Switzerland. August 2009.
Visiting PhD student. Host: prof. Martin Odersky.

11 Language Skills

English (fluent, IELTS 8.0, C1 CEFR), Spanish (fluent, B1 CEFR), Dutch (good, B2 CEFR, NT2 complete), French (good, B2 CEFR), Danish (basic, A1 CEFR), Russian (mother tongue).

References

Available upon request.