

# Yura Perov

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## CONTACT INFORMATION

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+44-754-790-92-74 (*only if really urgent, please*)

## CURRENT

**Babylon Health**, London, UK  
July 2018 — *Present*.  
Senior Research Scientist.

October 2016 — June 2018.  
Bayesian Data Scientist / Research Scientist.

## EDUCATION / QUALIFICATIONS

**Oxford University**, Department of Engineering Science, Wolfson College, Oxford, UK  
October 2014 — May 2016.

Master's by Research. Studies and research in Machine Learning and Artificial Intelligence, in particular in Probabilistic Programming. Supervised by Prof. Frank Wood. Master's thesis "Applications of Probabilistic Programming".

**Oxford University**, Department of Engineering Science, Somerville College, Oxford, UK

October 2013 — October 2014.  
Visiting Student at Prof. Frank Wood's group.

**Siberian Federal University**, Krasnoyarsk, Russia

2010—2014.  
Bachelor's of Science in Mathematics with honours from the Institute of Mathematics and Computer Science. GPA 5.0/5.0.

**Massachusetts Institute of Technology**, Cambridge, MA, USA

September 2012 — August 2013.  
Computer Science and Artificial Intelligence Laboratory (EECS/BCS).  
Visiting student at the Computational Cognitive Science Group (Prof. Tenenbaum) and the Probabilistic Computing Group (Dr. Mansinghka).

**Yandex School of Data Analysis**, Moscow, Russia

Autumn Term, 2011.  
Computer Science Department, 3 Master Degree's equivalent courses (remotely). GPA 5.0/5.0.

**Siberian Federal University**, Krasnoyarsk, Russia

2008—2010 (2 years of Bachelor's degree).  
Faculty of Economics. GPA 5.0/5.0.

**Gymnasium #3**, Krasnoyarsk, Russia

1997—2008.  
Graduated with honours.

## LANGUAGES

English (fluent), Russian (native).

## SKILLS

- Languages and technologies: C++, Python (matplotlib, scikit-learn), Clojure, Scheme, PHP, MATLAB, MySQL, ActionScript (Adobe Flash), HTML, JavaScript, Visual Basic, VBA, Church, Venture, Anglican.

- Machine Learning: Bayesian Modelling, Monte Carlo methods (especially Markov Chain MC and Sequential MC), Probabilistic Programming. Experience with other major areas of Machine Learning (including Neural Networks).

## EXPERIENCE

### **Invrea (start-up)**, Oxford, UK

*Co-founder, Executive Officer*

**January — September 2016**

Bringing the state-of-the-art generative modelling machine learning methods (probabilistic programming, sequential / Markov chain Monte Carlo) into Microsoft Excel. Check out at <https://invrea.com/>.

### **Oxford University**, Oxford, UK

*Master's by Research student, previously Visiting Student*

**October 2013 — May 2016**

- Research on probabilistic programming (generative modelling, Bayesian inference, MCMC and SMC), neural networks (especially their applications for better probabilistic inference), and automatic program synthesis.
- Contributed to probabilistic programming language and system “Anglican”. <http://www.robots.ox.ac.uk/~fwood/anglican/>. The system is written in Clojure.
- Led with Prof. Frank Wood the Probabilistic Programming Reading Group 2013—2014 @ Oxford.
- Co-organized Bayesian Nonparametrics Lunches 2013—2015 @ Oxford (with Dr. François Caron, Prof. Frank Wood and Prof. Yee Whye Teh).
- Teaching assistance at the Machine Learning Summer School 2014 (Reykjavik, Iceland) for the course “Probabilistic Programming and Bayesian Nonparametrics” by Prof. Frank Wood.
- Teaching assistance for the class B14 “Information Engineering Systems”.

### **Massachusetts Institute of Technology**, Cambridge, MA USA

*Visiting Student* **January 2012 — August 2012 (remotely), September 2012 — August 2013**

- Research in probabilistic programming. Visiting student at the Computational Cognitive Science Group (Prof. Tenenbaum) and the Probabilistic Computing Group (Dr. Mansinghka).
- Implemented a prototype Clojure-based MCMC engine for a variant of probabilistic programming language Church, and added a multithreaded approximate MCMC scheme that runs multiple inference steps at the same time.
- Worked as the first lead developer for the Venture project, co-designed its first inference engine prototype, and contributed to the design of the VentureScript language and the overall system architecture. The prototype of Venture was written in C++ and Python.
- Implemented and debugged several Venture programs for machine learning and statistics — including variants of topic modeling, nonparametric clustering, and regression. Also applied topic models to real-world datasets.
- Contributed to research on generative probabilistic graphics programs for breaking simple CAPTCHAs and finding 3D road scenes. Results were published in our paper “Approximate Bayesian Image Interpretation using Generative Probabilistic Graphics Programs”, which was accepted for the full oral presentation at NIPS 2013 (acceptance rate: 20 of 1420).
- Contributed to an application of Venture to geophysics, as part of a project with Shell, and visited Shell Research in Houston, TX, to support the presentation of preliminary results.
- The visit and research was supported by Google “Rethinking AI” Grant and Russian President’s Fellowship.

### **École Polytechnique Fédérale de Lausanne**, Switzerland

*Summer Intern*

**June 2012 — August 2012**

- Research in machine learning, AI and robotics. Project “Locomotion of Modular Robots: Optimizing Modular Robots Locomotion in Simulation and Applying Results to Real-World Robot”. School of Engineering, Biorobotics Laboratory. Supervised by Rico Möckel, Massimo Vespignani, Soha Pouya, Stéphane Bonardi, Prof. Auke Jan Ijspeert. Used C++.

**Siberian Federal University**, Krasnoyarsk, Russia

*Undergraduate Research*

**May 2011 — June 2012**

- Undergraduate research in optimization, genetic algorithms, supervised by Semenkin Evgeniy Stanislavovich<sup>1</sup>.

**Krasnoyarsk State Pedagogical University**, Krasnoyarsk, Russia

*Undergraduate Research*

**2010—2011**

- Co-developed interactive handbook (self-tutor) “Programming” for undergraduate students”. PI of the project: Laletin Nicolay Victorovich<sup>2</sup>. The project was ranked the second in the competition organized by the Pedagogical University (Krasnoyarsk).

START-UP /  
INDUSTRY  
EXPERIENCE

**Project and company (LLC) “Proverim.com”**

*Co-founder, CTO*

**Autumn of 2007 — 2012**

- “Proverim.com” was the system of electronic mark-book for schools. It was run in Russia, Kazakhstan, and Mongolia. Co-author, co-founder, leader of IT-department (2 subordinates), small research, programmer, full-time combined with studies. The technical basis of the project had been conceived and implemented by me, then advanced by our great team. Used C++, Visual Basic, HTML, and JS.

**Freelancer (sites and programs developer)**

*Project manager, programmer*

**2006—2014**

AWARDS, GRANTS,  
AND SPOTLIGHTS

- The Oxford Clarendon Fund Scholarship and the Cambridge International Scholarship. Courteously declined.
- National fellowship of the Government of the Russian Federation, October 2013. For outstanding studying and research activities.
- All-Russian Fellowship “Lift to the Future”, August 2013. Funded by Russian company “Sistema”. Grant holder.
- Conference “Neural Information Processing Systems Conference” 2012. Workshop “Probabilistic Programming: Foundations and Applications”, Lake Tahoe, Nevada, USA. Spotlight (short talk) and poster presentation, “Efficient, Envelope-based Multicore Markov Chain Inference for Church”.  
Venture demo session (given by Vikash Mansinghka and Yura Perov).
- Switzerland, École Polytechnique Fédérale de Lausanne, the poster session of the EPFL Summer Research Program, August 2012. Best Student Poster Award (1st place) for the project “Locomotion of Modular Robots: Optimizing Modular Robots Locomotion in Simulation and Applying Results to Real-World Robot”.
- Russian President’s Fellowship Award for outstanding students, which was given to conduct research at MIT for one academic year. \$32,000.
- Switzerland, École Polytechnique Fédérale de Lausanne, School of engineering, Biorobotics Laboratory, Prof. Ijspeert, June—August 2012. Summer Research School in Technology and Life Sciences (acceptance rate: more than 27 people per place all over the world). Supervised by Rico Möckel, Massimo Vespignani, Soha Pouya, Stéphane Bonardi, Prof. Auke Jan Ijspeert. \$4800 scholarship.

<sup>1</sup>Professor in Siberian Federal University.

<sup>2</sup>Professor in Krasnoyarsk State Pedagogical University.

- USA, Boston, MIT, “StartUp Access” program, 6—10 February 2012. Presentation of the business project “ProverimCom”, its achievements and prospects (as a chief technical officer of the project).
- Practical task in Machine Learning from Yandex during RuSSIR/EDBT Summer School. Award, 1st place (First Prize).
- Microsoft Computer Vision School, Moscow, 2011. Diploma for successfully completing the school. Organizers: Microsoft Research, Lomonosov Moscow State University. 4th result in the practical task (tuning the classifier).

PAPERS, POSTERS,  
AND REPORTS

- Paper “Inference Over Programs That Make Predictions”, Yura Perov. The International Conference on Probabilistic Programming, 2018.
- Paper “A comparative study of artificial intelligence and human doctors for the purpose of triage and diagnosis”, Salman Razzaki, Adam Baker, Yura Perov, Katherine Middleton, Janie Baxter, Daniel Mullarkey, Davinder Sangar, Michael Taliercio, Mobasher Butt, Azeem Majeed, Arnold DoRosario, Megan Mahoney, Saurabh Johri. arXiv, June 2018.
- Paper “A Universal Marginalizer for Amortized Inference in Generative Models”, Laura Douglas, Iliyan Zarov, Konstantinos Gourgoulis, Chris Lucas, Chris Hart, Adam Baker, Maneesh Sahani, Yura Perov, Saurabh Johri. NIPS 2017 Workshop on Advances in Approximate Bayesian Inference.
- Master’s Thesis “Applications of Probabilistic Programming”, Oxford, 2016. <http://arxiv.org/abs/1606.00075>
- Paper “Spreadsheet Probabilistic Programming”, 2016, arXiv. <http://arxiv.org/abs/1606.04216>
- Paper “Nonparametric Bayesian Models for Unsupervised Activity Recognition and Tracking”, Neil Dhir, Yura Perov and Frank Wood, International Conference on Intelligent Robots and Systems (IROS 2016).
- Paper “Automatic Sampler Discovery via Probabilistic Programming and Approximate Bayesian Computation”, Yura Perov and Frank Wood, the International Conference on Artificial General Intelligence 2016 (Springer).
- Abstract and poster “Data-driven Sequential Monte Carlo in Probabilistic Programming”, Yura Perov, Tuan Anh Le and Frank Wood, NIPS Workshop on Black Box Learning and Inference (2015).
- Bachelor’s Thesis on Generative Probabilistic Programming (in Russian language), Krasnoyarsk, Cambridge (US), Oxford, 2014. <http://arxiv.org/abs/1601.07224>
- Abstract and poster “Learning probabilistic programs”, Yura Perov and Frank Wood, NIPS Probabilistic Programming Workshop (2014).
- Talk abstract “Probabilistic programming and automatic programming” in “Approaches and Applications of Inductive Programming” (Dagstuhl Seminar 13502). Dagstuhl Reports. ISSN 2192-5283. Edited by Sumit Gulwani, Emanuel Kitzelmann, and Ute Schmid. URL <http://drops.dagstuhl.de/opus/volltexte/2014/4507>.
- Paper “Venture: a higher-order probabilistic programming platform with programmable inference”, Vikash Mansinghka, Daniel Selsam, Yura Perov. <http://arxiv.org/abs/1404.0099>
- Paper “Approximate Bayesian Image Interpretation using Generative Probabilistic Graphics Programs”, Vikash K. Mansinghka, Tejas D. Kulkarni, Yura N. Perov, Joshua B. Tenenbaum. NIPS 2013. **Accepted for full oral presentation (acceptance rate: 20/1420 = 0.014%)**. (Also arXiv:1307.0060)

- Paper “Gait optimization for Roombots modular robots — Matching simulation and reality”, Rico Möckel, Yura Perov, Anh The Nguyen, Massimo Vespignani, Stéphane Bonardi, Soha Pouya, Alexander Spröwitz, Jesse van den Kieboom, Frédéric Wilhelm, Auke Jan Ijspeert. IROS 2013. (**acceptance rate:**  $903/2089 = 43\%$ ).
- Abstract/Poster “Efficient, Envelope-based Multicore Markov Chain Inference for Church”, Yura Perov and Vikash Mansinghka. NIPS 2012 “Probabilistic Programming: Foundations and Applications” Workshop.
- Poster “Locomotion of Modular Robots: Optimizing Modular Robots Locomotion in Simulation and Applying Results to Real-World Robot”, Yura Perov, Rico Möckel, Massimo Vespignani, Soha Pouya, Stéphane Bonardi, Auke Jan Ijspeert. Switzerland, EPFL, Summer research program symposium. **Best poster award.**
- Paper “System description manual of the project ”System of Electronic Mark-book for Schools Proverim.com”” (in Russian), Yura Perov. Intelligent Systems and Technologies: State-of-the-art and Outlook. Proceedings of International Summer School-Conference in Artificial Intelligence for students and young researches. Tver, 2011. **Best student paper award.**
- Review paper “Innovative Economic Growth in Russia: problems and perspectives” (in Russian), Yura Perov and Tatiana V. Kovaleva. Modern problems of the economics. Collected articles of the XV Interregional Theoretical and Practical Student Conference in Economics, Siberian Federal University, Krasnoyarsk, 2009. **Best student paper award.**

## TALKS

### “Explorations in probabilistic programming: generative probabilistic graphics programming and new research directions”.

The talk was given at

- Prof. Ryan Adams’ group’s meeting (Harvard),
- Prof. Rastislav Bodík’s group’s meeting (University of California, Berkeley),
- to Prof. Stuart Russell’s students (University of California, Berkeley),
- at Prof. Tom Griffiths’ group’s meeting (University of California, Berkeley),
- and Prof. Percy Liang’s group’s meeting (Stanford),
- in Microsoft Research (Bangalore, India, hosted by Dr. Aditya Nori).
- at Oxford University’s Robotics seminar.

### “Generative probabilistic programming: applications and new ideas”.

The talk was given at

- in Microsoft Research (Cambridge, UK, hosted by Dr. John Winn).
- in Cambridge University, within the series of Machine Learning seminars at the Cambridge University Engineering Department (hosted by Prof. Zoubin Ghahramani).

**Talk “Automatic Programming and Probabilistic Programming”.** Dagstuhl Seminar, ”Approaches and Applications of Inductive Programming”, the 8—11th of December, 2013.