

# Alëna Rodionova

School of Engineering and Applied Science, Electrical & Systems Engineering Department  
University of Pennsylvania, Philadelphia, PA, USA 19104  
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## EDUCATION

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- Ph.D. in Electrical and Systems Engineering** August 2017 – present  
University of Pennsylvania, *Philadelphia, PA, USA*  
*Dissertation:* Robot Safety Laws for Autonomous Systems
- M.S. in Applied Mathematics and Informatics (with honors)** June 2014  
Siberian Federal University, *Russia*  
*Thesis:* Stability of Two-Layer Fluid Flows
- B.S. in Mathematics (with honors)** June 2012  
Siberian Federal University, *Russia*  
*Thesis:* Solving Constrained Optimization Problems by using Genetic Algorithm

## RESEARCH INTERESTS

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Autonomous Systems, Cyber-Physical Systems, Formal Analysis, Control and Verification Theory.

## PROFESSIONAL EXPERIENCE

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- Research Scientist Graduate Intern** June 2020 – August 2020  
Intel Corporation, *Santa Clara, CA*  
Autonomous Driving Research Lab  
*Project:* Automatic Safety Constraints Boundary Estimation for Decision-Making in Automated Vehicles
- Graduate Technical Intern** June 2019 – August 2019  
Intel Labs, *Hillsboro, OR*  
Autonomous Driving Research Lab  
*Project:* Automated Driving Safety Analysis, Software Integration with RSS Library
- Research and Development Intern** June 2018 – August 2018  
General Motors, *Warren, MI*  
GM Global Technical Center  
ECS Process, Methods and Tools Group  
*Project:* Correctness Preserving Optimization of Deep Neural Networks
- Research Assistant** February 2015 – November 2017  
Vienna University of Technology, *Vienna, Austria*  
Institute of Computer Engineering  
Cyber-Physical Systems Group  
*Project:* A Specification Language for Emergent Properties

**Project Assistant**

June 2013 – February 2015

Russian Academy of Sciences, Siberian Branch, *Russia*

Institute of Computational Modeling

*Projects:* Convection Motions with Interfaces and Their Stability

The Study of Nonlinear Heat and Mass Transfer Regimes and Their Stability in Binary Mixtures

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**HONORS AND AWARDS****EECS Rising Stars, MIT**

October 2018

Awarded to top women in Electrical Engineering and Computer Science

**Fellowship Award from University of Pennsylvania**

May 2017

Awarded to PhD students in recognition of exceptional performance

**Best Student Paper Award**

April 2016

19<sup>th</sup> ACM International Conference on Hybrid Systems: Computation and Control (HSCC 2016)CPS Week 2016, *Austria***Best Paper Presentation Award**

April 2014

10th All-Russian Scientific Students Conference “Youth and Science”, *Russia***Vladimir Potanin Foundation Scholarship Contest**

February 2011, 2012

Awarded to top Bachelor and Master students nation-wide, *Russia*

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**PATENTS**

1. **A. Rodionova** and I. Alvarez. Method and device for determining a configuration for an autonomous vehicle, 2020. US Patent App. 16/726,276. [\[pdf\]](#)
2. P. M. Peranandam, R. Sethu, and **A. Rodionova**. Correctness preserving optimization of deep neural networks, 2018. US Patent App. 16/227,195.

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**PUBLICATIONS: JOURNALS**

1. Y. V. Pant, M. Z. Li, R. A. Quayle, **A. Rodionova**, H. Abbas, M. Ryerson and R. Mangharam, FADS: Framework for autonomous drone safety. *IEEE Transactions on Intelligent Transportation Systems*, [\[Under review\]](#).
2. H. Abbas, **A. Rodionova**, K. Mamouras, E. Bartocci, S. A. Smolka, and R. Grosu. Quantitative regular expressions for arrhythmia detection. *IEEE/ACM transactions on computational biology and bioinformatics*, 16(5):1586–1597, 2018. [\[pdf\]](#)
3. H. Abbas, R. Alur, K. Mamouras, R. Mangharam, and **A. Rodionova**. Real-time decision policies with predictable performance. *Proceedings of the IEEE*, 106(9):1593–1615, 2018. [\[pdf\]](#)
4. **A. Rodionova** and E. Rezanova. Stability of two-layer fluid flow. *Journal of Applied Mechanics and Technical Physics*, 57(4):588–595, 2016. [\[pdf\]](#)
5. V. Bekezhanova and **A. Rodionova**. Longwave stability of two-layer fluid flow in the inclined plane. *Fluid Dynamics*, 50(6):723–736, 2015. [\[pdf\]](#)

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**PUBLICATIONS: PEER-REVIEWED CONFERENCES AND WORKSHOPS**

6. **A. Rodionova**, Ignacio J. Alvarez, M. S. Elli, F. Oboril, J. Quast, and R. Mangharam, How safe is safe enough? Automatic safety constraints boundary estimation for decision-making in automated Vehicles, *IEEE Intelligent Vehicles Symposium*, 2020.
7. **A. Rodionova\***, Y. V. Pant\*, K. J. Jang, H. Abbas, R. Quaye and R. Mangharam, Learning-to-Fly: learning-based collision avoidance for scalable urban air mobility, *IEEE International Conference on Intelligent Transportation Systems*, 2020.
8. H. Abbas, K. Mamouras, **A. Rodionova**, A. Rajeev, J. Liang, S. Dixit, and R. Mangharam. A novel programming language to reduce energy consumption by arrhythmia monitoring algorithms in implantable cardioverter-defibrillators. In *Proceedings of the 39th Heart Rhythm Scientific Sessions*, 2018. [\[pdf\]](#)
9. H. Abbas, M. O’Kelly, **A. Rodionova**, and R. Mangharam. Safe at any speed: A simulation-based test harness for autonomous vehicles. In *International Workshop on Design, Modeling, and Evaluation of Cyber Physical Systems*, pages 94–106. Springer, 2017. [\[pdf\]](#)
10. H. Abbas, **A. Rodionova**, E. Bartocci, S. A. Smolka, and R. Grosu. Quantitative regular expressions for arrhythmia detection algorithms. In *International Conference on Computational Methods in Systems Biology*, pages 23–39. Springer, 2017. [\[pdf\]](#)
11. **A. Rodionova**, E. Bartocci, D. Nickovic, and R. Grosu. Temporal logic as filtering. In *Proceedings of the 19th International Conference on Hybrid Systems: Computation and Control*, pages 11–20, 2016. [\[pdf\]](#) [\[Best Student Paper Award\]](#)

#### PUBLICATIONS: BOOK CHAPTERS

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12. **A. Rodionova**, E. Bartocci, D. Nickovic, and R. Grosu. Temporal logic as filtering. In A. Pretschner, D. Peled, and T. Hutzelmann, editors, *Dependable Software Systems Engineering*, volume 50 of *NATO Science for Peace and Security Series - D: Information and Communication Security*, pages 164–185. IOS Press, 2017. [\[pdf\]](#)

#### PUBLICATIONS: MAGAZINE ARTICLES

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13. H. Abbas, M. E. O’Kelly, **A. Rodionova**, and R. Mangharam. A drivers license test for driverless vehicles. *ASME Dynamic Systems and Control Magazine*, 139(12):S13–S16, 12 2017. [\[pdf\]](#)

#### PUBLICATIONS: CONFERENCES AND WORKSHOPS WITHOUT PROCEEDINGS

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14. **A. Rodionova**, M. O’Kelly, H. Abbas, V. Pacelli, and R. Mangharam. An autonomous vehicle control stack. In G. Frehse and M. Althoff, editors, *ARCH17. 4th International Workshop on Applied Verification of Continuous and Hybrid Systems*, volume 48 of *EPiC Series in Computing*, pages 44–51. EasyChair, 2017. [\[pdf\]](#)
15. **A. Rodionova**. Longwave stability of two-layer fluid flow in the inclined plane. In *Proceedings of the 15th All-Russian Young Scientists Conference on Mathematical Modelling and Information Technologies*, 2014. [\[pdf\]](#)
16. **A. Rodionova** and V. Bekezhanova. Stability of two-layer fluid flow with evaporation effect and long-wave perturbations. In *Proceedings of the 10th All-Russian Scientific Conference of Students and Young Scientists: Youth and Science*, 2014. [\[pdf\]](#) [\[Best Paper Presentation Award\]](#)
17. **A. Rodionova** and V. Bekezhanova. Microscale static two-layer fluid flow in the inclined plane. In *Proceedings of the 9th All-Russian Scientific Conference of Students and Young Scientists: Youth and Science*, 2013. [\[pdf\]](#)
18. **A. Rodionova** and I. Panfilov. Static and dynamic penalty functions for constrained optimization in genetic algorithms. In *Proceedings of the 8th All-Russian Scientific Conference of Students and Young Scientists: Youth and Science*, 2012. [\[pdf\]](#)

19. S. Senashov, **A. Rodionova**, and I. Shefer. New contact transformations. In *Proceedings of the 14th International Scientific Conference Reshetnev Readings*, volume 14, page 456, 2010. [\[pdf\]](#)

## SELECTED TALKS AND PRESENTATIONS

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<b>Intel Autonomous Driving Community Of Practice 2019: RSS Workshop</b> <i>Robustness-Guided Testing of RSS Rules</i> Intel Labs, Hillsboro, OR	November 2019
<b>PRECISE Industry Day 2019, Poster presentation</b> <i>Verifying Robot Safety Laws for Autonomous Vehicles</i> University of Pennsylvania, Philadelphia, PA	October 2019
<b>EECS Rising Stars Workshop, Poster presentation</b> <i>Foundations of Safe Autonomy: On-Board Verification and Formally-Constrained Machine Learning</i> Massachusetts Institute of Technology, Cambridge, MA	October 2018
<b>CyberCardia (NSF Frontiers) PI Meeting</b> <i>Quantitative Regular Expressions for Arrhythmia Detection Algorithms</i> Georgia Institute of Technology, Atlanta, GA	April 2018
<b>CyberCardia (NSF Frontiers) PI Meeting</b> <i>Cardiac Arrhythmias Analysis: VT/SVT Discrimination Algorithm</i> Stony Brook University, Stony Brook, NY	April 2016
<b>ARVI Meeting</b> <i>Temporal Logic as Filtering</i> Estonian Academy of Science, Tallinn, Estonia	December 2015
<b>CyberCardia (NSF Frontiers) PI Meeting</b> <i>On Temporal Logic and Signal Processing</i> NSF Stafford Place, Arlington, VA	September 2015
<b>Institute of Computational Modeling, Research Seminar</b> <i>Stability of Two-Layer Fluid Flow with Evaporation Effect</i> Krasnoyarsk, Russia	September 2014
<b>Kyrgyz State Technical University, Invited talk</b> <i>Enumerative Combinatorics</i> Bishkek, Kyrgyzstan	April 2014

## TEACHING EXPERIENCE

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<b>Teaching Assistant</b> CIS520 Machine Learning, <i>University of Pennsylvania</i>	Spring 2020
<b>Teacher of Mathematics</b> Krasnoyarsk Educational Institution Lyceum 6, <i>Russia</i>	September 2013 – July 2014
<b>Teacher in Extracurricular Activities</b> Krasnoyarsk Preschool 3, <i>Russia</i>	February 2013 – May 2013

## PROFESSIONAL SERVICE

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### Journal Reviewer

- Chaos: An Interdisciplinary Journal of Nonlinear Science, 2018
- International Journal of Formal Methods in System Design (FMSD), 2017
- International Journal on Software Tools for Technology Transfer (STTT), 2017

### Conference Reviewer

- International Workshop on Autonomous Systems Design (ASD), 2020
- International Conference on Cyber-Physical Systems (ICCPS), 2020, 2018
- International Conference on Embedded Software (EMSOFT), 2019, 2018
- International SPIN Symposium on Model Checking of Software (SPIN), 2017
- International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2016
- International Conference on Runtime Verification (RV), 2016
- International Symposium on Automated Technology for Verification and Analysis (ATVA), 2016
- International Workshop on Hybrid Systems Biology, (HSB), 2016
- International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS), 2015
- International Conference on Computational Methods in Systems Biology (CMSB), 2015

## LANGUAGES SKILLS

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**English:** proficient

**Russian:** native

**German:** basic