Alëna Rodionova

School of Engineering and Applied Science, Electrical & Systems Engineering Department
University of Pennsylvania, Philadelphia, PA, USA 19104
alena.rodionova@seas.upenn.edu

EDUCATION

Ph.D. in Electrical and Systems Engineering August 2017 – present
University of Pennsylvania, *Philadelphia, PA, USA*

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

Autonomous systems, cyber-physical systems, formal analysis, control and verification theory.

PROFESSIONAL EXPERIENCE

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

HONORS AND AWARDS

Best of Session Award October 2020
39th Digital Avionics Systems Conference (DASC), San Antonio, TX (Virtual)

MIT EECS Rising Star award October 2018
Awarded annually to "about 40 outstanding EECS graduate and postdoctoral women"

Fellowship Award from University of Pennsylvania May 2017
Awarded to PhD students in recognition of exceptional performance

Best Student Paper Award April 2016
19th 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

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.

PUBLICATIONS: JOURNALS

1. **A. Rodionova**, Y. V. Pant, C. Kurtz, K. J. Jang, H. Abbas and R. Mangharam, Learning-'N-Flying: A Learning-based, Decentralized Mission Aware UAS Collision Avoidance Scheme, *ACM Transactions on Cyber-Physical Systems*, [Accepted]. [pdf]
2. Y. V. Pant, M. Z. Li, **A. Rodionova**, R. A. Quaye, H. Abbas, M. S. Ryerson and R. Mangharam, FADS: A Framework for Autonomous Drone Safety Using Temporal Logic-Based Trajectory Planning. *Transportation Research Part C: Emerging Technologies*, [Under review].
3. 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]
4. 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]
5. **A. Rodionova** and E. Rezanova. Stability of two-layer fluid flow. *Journal of Applied Mechanics and Technical Physics*, 57(4):588–595, 2016. [pdf]
6. V. Bekezhanova and **A. Rodionova**. Longwave stability of two-layer fluid flow in the inclined plane. *Fluid Dynamics*, 50(6):723–736, 2015. [pdf]

PUBLICATIONS: PEER-REVIEWED CONFERENCES AND WORKSHOPS

7. K. Jang, Y. V. Pant, **A. Rodionova**, R. Mangharam, Learning-to-Fly RL: Reinforcement Learning-based Collision Avoidance for Scalable Urban Air Mobility, *2020 IEEE/AIAA 39th Digital Avionics Systems Conference (DASC)*, 2020. [Best of Session Award] [pdf]

8. **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*. [pdf]

9. **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*. [pdf]

10. H. Abbas, K. Mamouras, **A. Rodionova**, R. Alur, 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]

11. 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]

12. 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]

13. **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

14. **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

15. 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

16. **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]

17. **A. Rodionova** and V. Bekezhanova. 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]

18. **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]

19. **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]

20. **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]

21. 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

Grace Hopper Celebration (GHC), Poster presentation September 2020
Verifying Safety Laws for Automated Vehicles
Orlando, FL (Virtual)

Intel Autonomous Driving Community Of Practice 2019: RSS Workshop November 2019
Robustness-Guided Testing of RSS Rules
Intel Labs, Hillsboro, OR

PRECISE Industry Day 2019, Poster presentation October 2019
Verifying Robot Safety Laws for Autonomous Vehicles
University of Pennsylvania, Philadelphia, PA

EECS Rising Stars Workshop, Poster presentation October 2018
Foundations of Safe Autonomy: On-Board Verification and Formally-Constrained Machine Learning
Massachusetts Institute of Technology, Cambridge, MA

CyberCardia (NSF Frontiers) PI Meeting April 2018
Quantitative Regular Expressions for Arrhythmia Detection Algorithms
Georgia Institute of Technology, Atlanta, GA

CyberCardia (NSF Frontiers) PI Meeting April 2016
Cardiac Arrhythmias Analysis: VT/SVT Discrimination Algorithm
Stony Brook University, Stony Brook, NY

ARVI Meeting December 2015
Temporal Logic as Filtering
Estonian Academy of Science, Tallinn, Estonia

CyberCardia (NSF Frontiers) PI Meeting September 2015
On Temporal Logic and Signal Processing
NSF Stafford Place, Arlington, VA

Institute of Computational Modeling, Research Seminar September 2014
Stability of Two-Layer Fluid Flow with Evaporation Effect
Krasnoyarsk, Russia

Kyrgyz State Technical University, Invited talk April 2014
Enumerative Combinatorics
Bishkek, Kyrgyzstan

TEACHING EXPERIENCE

Teaching Assistant Fall 2020
ESE-500 Linear Systems Theory, University of Pennsylvania

Teaching Assistant Spring 2020
CIS-520 Machine Learning, University of Pennsylvania

Teacher of Mathematics September 2012 – February 2015
School of Physics and Mathematics
Siberian Federal University, Russia

Teacher of Mathematics September 2013 – July 2014
Krasnoyarsk Educational Institution Lyceum 6, Russia

Teaching Assistant August 2010, 2011
Krasnoyarsk Summer School
Siberian Federal University, Russia

PROFESSIONAL SERVICE

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

English: proficient
Russian: native
German: basic