Jana Tumova | Curriculum Vitae

Robotics, Perception, and Learning Department, KTH Royal Institute of Technology
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Personal Data

Date of birth: 5 September, 1984
Sex: Female
Nationality: Czech

Education

Masaryk University **Brno, Czech Republic**
PhD in Informatics *May 2013*
Thesis: *Quantitative Formal Methods for High-level Robot Path Planning*
Supervisor: Ivana Černá
Consultant: Jiří Barnat
Rerum Naturalium Doctor Degree (RNDr.) awarded in May 2010.

Masaryk University **Brno, Czech Republic**
Master Degree (Mgr.) in Informatics *Feb 2009*
Thesis: *Verification of Probabilistic Systems Against Quantified Linear Properties*
Supervisor: Jiří Barnat
Specialization: Parallel and Distributed Systems
Graduated with honors

Masaryk University **Brno, Czech Republic**
Bachelor Degree (Bc.) in Applied Informatics *Jun 2006*
Thesis: *Parallel Qualitative Verification of Probabilistic Systems*
Supervisor: Jiří Barnat

Employment

Royal Institute of Technology (KTH) **Stockholm, Sweden**
Tenure-track Assistant Professor in Software Technology *Jun 2016 – present*
School of Computer Science and Communication
Robotics, Perception, and Learning Department

Royal Institute of Technology (KTH) **Stockholm, Sweden**
Postdoctoral Researcher *Apr 2013 – May 2016*
School of Electrical Engineering
Department of Automatic Control
With the ACCESS Linnaeus Center since Jul 2013, with ICT TNG SRA in 2015
Supervisor: Dimos Dimarogonas
Project: Distributed formal methods-based control of a cooperating team of robots from temporal logic specifications within EU STREP RECONFIG (Cognitive, Decentralized Coordination of Heterogeneous Multi-Robot Systems via Reconfigurable Task Planning)

Masaryk University (MU) **Brno, Czech Republic**
PhD Student *2009 – 2013*
Faculty of Informatics (FI), Laboratory of Parallel and Distributed Systems
Supervisors: Ivana Černá, Jiří Barnat
Project: Quantitative formal methods for high-level robot path planning from temporal logic specifications

Visiting Positions

Singapore-MIT Alliance for Research and Technology (SMART) **Singapore**
Visiting Researcher *Jul 1, 2014 – Jul 11, 2014*
Supervisor: Daniela Rus
Project: Maximally satisfying scheduling for mobility on demand

SMART **Singapore**
Visiting Graduate Student *Aug 2012*
Supervisors: Emilio Frazzoli, Daniela Rus
Project: Least-violating autonomous car motion planning with a set of formally specified motion rules

Massachusetts Institute of Technology (MIT) **Cambridge, MA, USA**
Visiting Graduate Student *Feb 2012 – May 2012*
Department of Aeronautics and Astronautics, Laboratory for Information and Decision Systems
Supervisors: Emilio Frazzoli, Daniela Rus
Project: Efficient techniques for least-violating robot path planning with a conflicting set of linear temporal logic mission specifications

Boston University (BU) **Boston, MA, USA**
Visiting Graduate Student *Sep 2009 – Feb 2010, May 2011 – Aug 2011*
Department of Mechanical Engineering, Hybrid and Networked Systems Lab
Supervisor: Calin Belta
Project: Formal control and analysis of piecewise affine systems from temporal logic specifications; Correct-by-design optimal robot path planning with temporal logic requirements

Eindhoven University of Technology (TUE) **Eindhoven, The Netherlands**
Visiting Undergraduate Student (Exchange Program Socrates Erasmus) *Feb 2007 – Jul 2007*
Department of Mathematics and Computer Science

Research Grant Participation

Co4Robots
H2020-ICT-2016-1 EU project 2017-2020 *To start in Jan 2017*
Co4Robots: Achieving Complex Collaborative Missions via Decentralized Control and Coordination of Interacting Robots
KTH PI and project coordinator: Dimos Dimarogonas

PlaTE
Small Visionary Project KTH CSC 2016 *2016*
PlaTe: Multi-robot Planning under Temporal-Epistemic goals
PI: Dilian Gurov

AEROWORKS
H2020-ICT-2014-1 EU project 2015-2018 *2015 - present*
AEROWORKS: Collaborative Aerial Robotic Workers
KTH PI: Dimos Dimarogonas

RECONFIG
FP7-ICT9 EU project 2013-2016 *2013 - present*
RECONFIG: Cognitive, Decentralized Coordination of Heterogeneous Multi-Robot Systems via Reconfigurable Task Planning
KTH PI and project coordinator: Dimos Dimarogonas

FIMU Control
KONTAKT II (LH) Grant of the Ministry of Education, Youth and Sports of Czech Republic *2011 - 2013*
FIMU Control: Control and Verification of Complex Hybrid Systems
PI: Ivana Černá

Invited Seminar Talks

- Maximally-Satisfying LTL Strategy Synthesis for Robot Motion Planning; MU, Laboratory of Formal Methods, Logic and Algorithms, *Nov 2014*

- Formal Methods in Robot Control: Maximally-satisfying Planning; Bielefeld University, Research Institute for Cognition and Robotics, *Jun 2014*
- Intersections of Theoretical Computer Science, Robotics, and Automatic Control; MU Informatic Colloquium, *Apr 2014*
- Formal Methods in Robot Control: Maximally-satisfying Planning; KTH ACCESS Internal Seminar Series, *Apr 2014*
- Formal Methods in Least-violating Robot Path Planning with Complex Goals; Charles University, Department of Distributed and Dependable Systems, *Sep 2013*
- Optimal Robot Path Planning with LTL Specifications; Vienna University of Technology, Cyber-Physical Systems Group, *Apr 2013*
- Least-violating Robot Path Planning with LTL Specifications; Brno University of Technology, Automated Analysis and Verification Research Group, *Nov 2012*
- Minimum-Violating Robot Path Planning with Temporal Logic Mission Specification; KTH, Automatic Control Lab, *Oct 2012*
- Formal Verification and Control of (Robotic) Systems with Quantitative Aspects; Vienna University of Technology, Cyber-Physical Systems Group, *Sep 2012*
- Quantitative Model Checking and Control Strategy Synthesis: Automata-based Approach; MIT, Aerospace Robotics and Embedded Systems Group, *Mar 2012*

Professional Activities

Program Committee Member

- Hybrid Systems: Computation and Control (HSCC) 2015, 2016, 2017
- Robotics: Science and Systems Conference (RSS) 2015
- IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC) 2015, 2016
- Hybrid Systems Biology (HSB) 2015, 2016

Program Organizer

- Open Invited Track on Hybrid Control Synthesis for Multi-Robot Systems at IFAC World Congress 2017 *co-organizer with Dimos Dimarogonas from KTH*
- International Workshop on Formal Engineering approaches to Software Components and Architectures (FESCA) 2016, 2017 *co-organizer with Jan Kofron from Charles University*
- Invited sessions Formal Methods in Control I and II at American Control Conference (ACC) 2014 *co-organizer with Majid Zamani from Technical University Munich*

Session Chair

- Formal Methods/Software and Architecture at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2014
- Formal Methods in Control I and II at American Control Conference (ACC) 2014 *co-chair with Majid Zamani*

Reviewer

Journals

The IEEE Transactions on Automatic Control, Automatica, The IEEE Transactions on Control Systems Technology, European Journal of Control, The IEEE Transactions on Robotics, The International Journal on Software Tools for Technology Transfer (STTT)-SPIN, Electronic Communications of the EASST, Logic Journal of the IGPL

Conferences

Hybrid Systems: Computation and Control (HSCC), IEEE Conference on Decision and Control (CDC),

American Control Conference (ACC), European Control Conference (ECC), IEEE Multi-conference on Systems and Control (MSC), IEEE International Conference on Automation Science and Engineering (CASE), Robotics: Science and Systems Conference (RSS), IEEE International Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), International Symposium on Theoretical Aspects of Software Engineering (TASE), International Conference on Quantitative Evaluation of Systems (QEST), International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM)

Professional Society Member

IEEE, IEEE Technical Committee On Hybrid Systems, IEEE Control Systems Society, IEEE Robotics and Automation Society

Awards

ACCESS Linnaeus Center Scholarship **KTH**
Selected as one of 4 winning candidates from over 130 applicants *2013*

Rector's Award for the Best Students in the Doctoral Programmes **MU**
Awarded to 4 PhD students from MU in 2013 *2013*

Dean's Award for Outstanding Doctoral Thesis **FI MU**
For the thesis "Quantitative Formal Methods for High-level Robot Path Planning" *2013*

Ľudmila Čuchranová Stipend **Slovak and Czech Republics**
Travel grant awarded by Slovak-Czech Women's Fund *2012*

Best Paper Award **MEMICS**
For the paper entitled Timed Automata Approach to Verification of Systems with Degradation *2011*
with Jiří Barnat and Ivana Černá

Scholarship **QMC PhD school**
Scholarship awarded by Quantitative Model Checking PhD school (registration fee waived) *2010*

Dean's Award for Excellent Academic Performance **FI MU**
Awarded to graduating Master students *2009*

Rector's Program to Support Master Students' Creative Work **MU**
Student research grant on Formal Verification of Probabilistic Models *2007 – 2008*
supervised by Ivana Černá

Dean's Award for Excellent Academic Performance **FI MU**
Awarded to graduating Bachelor students *2006*

Scholarship Program for Support of Students' Quality Creative Results **FI MU**
Awarded repeatedly *2006 – 2010*

Teaching

Lecturer **KTH**

- Artificial Intelligence Course, *Fall 2016*
- Graduate Course on Hybrid Systems, *Spring 2015*

Guest Lecturer **KTH**

- Hybrid and Embedded Control Systems Course, *Spring 2014, 2015, 2016*

Seminar Tutor (seminar groups of 15-25 students) **MU**

- Automata and Grammars, *Fall semesters in 2006 – 2008, 2010 – 2012*
- Algorithm Design II, *Spring semester 2011*
- Formal Languages and Automata I, *Spring semesters in 2006, 2008, 2010*
- Introduction to C Language, *Spring semester 2005*

Teaching Assistant **MU**

- Automata and Grammars, *Fall semesters in 2006 – 2008, 2010 – 2012*
- Algorithm Design II, *Spring semester 2011*
- Formal Languages and Automata I, *Spring semesters in 2006, 2008, 2010*
- Introduction to C Language, *Spring semester 2005*
- Selected Topics on Automata Theory, *Fall semesters in 2009 – 2012*
- Induction and Recursion, *Fall semesters in 2005 – 2007, Spring semesters in 2006, 2008*

Supervision

PhD student co-supervisor **KTH**

- Jesper Karlsson: Co-supervised with Danica Kragic, and Dimos Dimarogonas *in progress since 2016*
- Lars Lindemann: Co-supervised with Dimos Dimarogonas *in progress since 2016*
- Alexandros Nikou: Co-supervised with Dimos Dimarogonas *in progress since 2015*
- Pedro Pereira: Co-supervised with Dimos Dimarogonas and Dimitris Boskos, *in progress since 2014*

Master thesis co-supervisor **KTH**

- Viking Flyhammar: Verification of variants of fuel level display; industrial master thesis with Scania, *2015*
- Anders Gidmark: Verification of variants of distributed automotive control systems; industrial master thesis with Scania, *2015*
- Pete Watcharawit: Probabilistic analysis of immunological systems, *2015*
- Geoffray Battiston: Collaborative action planning for humanoid robots exchanging a small object, *2014*
- Olivier Balland: Collaborative motion planning of humanoid robots, *2014*
- Maryam Oryani:Applying agent-based modeling to studying emergent behaviors of the immune system cells, *2014*
- Adrien Rigaud: Formal control synthesis for complex collaborative LTL tasks, *2013*
- Etienne Dargaud: Pick-up and delivery planning in multi-agent systems under temporal logic specifications, *2013*

Departmental Activities

Disciplinary committee member **FI MU**
One of tree student members *Sep 2006–Feb 2012*

Other Activities

Additional Education

LCCC Workshop on Formal Verification of Embedded Control Systems **Lund, Sweden**
Additional Education, 1 week *Apr 2013*

Quantitative Model Checking PhD School **Copenhagen, Denmark**
Additional Education, 1 week *Mar 2010*

Other Teaching Activities

Courses for High-School Teachers **MU**
Project for Further Education of Pedagogues in Natural and Formal Sciences *May 2010 – Nov 2011*

Voluntary Co-Organization of Educational Activities for High School Students
KSI **MU**
All year round competition for high school students *2006 – 2012*
Five series of complex computer science homeworks

INTERSOB **MU**
Annual interdisciplinary competition for teams of high school students *2008 – 2012*
A full day of interactive, interdisciplinary educational tasks

INTERLOS **MU**
Annual competition for teams of high school students *2009 – 2012*
An afternoon online competition in cryptography, programming, and logical exercises

K-SCUK **MU**
Annual week-long retreat for talented high-school students *2006, 2012*
Aimed at development of their exceptional skills and education in computer science

Publications

[J1] Jana Tumova, Dimos V. Dimarogonas. Multi-Agent Planning under Local LTL Specifications and Event-Based Synchronization, *Automatica*, 2016.

[J2] Meng Guo, Jana Tumova, Dimos V. Dimarogonas. Communication-Free Multi-Agent Control under Local Temporal Tasks and Relative-Distance Constraints, *IEEE Transactions on Automatic Control*, 2016.

[J3] Yushan Chen, Jana Tumova, Alphan Ulusoy, Calin Belta. Temporal Logic Robot Control based on Automata Learning of Environmental Dynamics. *The International Journal of Robotics Research*, 32(5): 547-565. 2013.

[J4] Boyan Yordanov, Jana Tumova, Ivana Černá, Jiří Barnat, Calin Belta. Formal Analysis of Piecewise Affine Systems through Formula-Guided Refinement. *Automatica*, 49(1):261-266, 2013.

[J5] Jiří Barnat, Ivana Černá, Jana Tumova. Verification of Systems with Degradation. *Computing and Informatics*, 31(3):507-530, 2012.

[J6] Boyan Yordanov, Jana Tumova, Ivana Černá, Jiří Barnat, and Calin Belta. Temporal Logic Control of Discrete-Time Piecewise Affine Systems. *IEEE Transactions on Automatic Control*, 57(6):1491-1504, 2012.

[J7] Stephen L. Smith, Jana Tumova, Calin Belta, Daniela Rus. Optimal Path Planning for Surveillance with Temporal Logic Constraints. *The International Journal of Robotics Research*, 30(14):1695–1708, 2011.

[C1] Jana Tumova, Dimos V. Dimarogonas. Synthesizing Least-limiting Guidelines for Safety , In *IEEE Conference on Decision and Control (CDC)*, 2015.

[C2] Jana Tumova, Sertac Karaman, Calin Belta, Daniela Rus. Least-Violating Planning in Road Networks from Temporal Logic Specifications, In *International Conference on Cyber-Physical Systems (ICCPS)*, 2015.

[C3] Alexandros Nikou, Jana Tumova, Dimos V. Dimarogonas. Cooperative Task Planning Synthesis for Multi-Agent Systems Under Timed Temporal Specifications, In *American Control Conference (ACC)*, 2016.

[C4] Jana Tumova, Dimos V. Dimarogonas. Decomposition of Multi-Agent Planning under Distributed Motion and Task LTL Specifications, In *IEEE Conference on Decision and Control (CDC)*, 2015.

[C5] Meng Guo, Jana Tumova, Dimos Dimarogonas. Hybrid Control of Multi-Agent Systems under Local Temporal Tasks and Relative-Distance Constraints, In *IEEE Conference on Decision and Control (CDC)*, 2015.

[C6] Anastasios Tsiamis, Jana Tumova, Charalampos Bechlioulis, George Karras, Dimos V. Dimarogonas, Kostas Kyriakopoulos. Decentralized Leader-Follower Control under High Level Goals without Explicit Communication, In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2015.

[C7] Meng Guo, Jana Tumova, Dimos V. Dimarogonas. Cooperative Decentralized Multi-agent Control under Local LTL Tasks and Connectivity Constraints. In *IEEE Conference on Decision and Control (CDC)*, pages 75 – 80, 2014.

[C8] Jana Tumova, Dimos V. Dimarogonas. A Receding Horizon Approach to Multi-Agent Planning from Local LTL Specifications. In *American Control Conference (ACC)*, pages 1775 – 1780, 2014.

[C9] Jana Tumova, Alejandro Marzinotto, Dimos V. Dimarogonas, Danica Kragic. Maximally Satisfying LTL Action Planning. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 1503–1510, 2014.

[C10] Luis I. Reyes-Castro, Pratik Chaudhari, Jana Tumova, Sertac Karaman, Emilio Frazzoli, Daniela Rus. Incremental Sampling-Based Algorithm for Minimum-Violation Motion Planning. In *IEEE Conference on Decision and Control (CDC)*, pages 3217–3224, 2013.

[C11] Jana Tumova, Luis I. Reyes-Castro, Sertac Karaman, Emilio Frazzoli, Daniela Rus. Minimum-violating Planning with Conflicting Specifications. In *American Control Conference (ACC)*, pages 200–205, 2013.

[C12] Jana Tumova, Gavin C. Hall, Sertac Karaman, Emilio Frazzoli, Daniela Rus. Least-violating Control Strategy Synthesis with Safety Rules. In *Hybrid Systems: Computation and Control (HSCC)*, pages 1–10, 2013.

[C13] Mária Svoreňová, Jana Tumova, Ivana Černá, Jiří Barnat. Attraction-Based Receding Horizon Path Planning with Temporal Logic Constraints. In *IEEE Conference on Decision and Control (CDC)*, pages 6749–6754, 2012.

[C14] Yushan Chen, Jana Tumova, Calin Belta. LTL Robot Motion Control based on Automata Learning of Environmental Dynamics. In *IEEE International Conference on Robotics and Automation (ICRA)*, pages 5177–5182, 2012.

[C15] Jiří Barnat, Ivana Černá, Jana Tumova. Timed Automata Approach to Verification of Systems with Degradation. In *Annual Doctoral Workshop on Mathematical and Engineering Methods in Computer Science (MEMICS)*, volume LNCS 7119, pages 86–95, 2011.

[C16] Jana Tumova, Boyan Yordanov, Calin Belta, Ivana Černá, Jiří Barnat. A Symbolic Approach to Controlling Piecewise Affine Systems. In *IEEE Conference on Decision and Control (CDC)*, pages 4230–4235, 2010.

[C17] Boyan Yordanov, Jana Tumova, Calin Belta, Ivana Černá, Jiří Barnat. *Formal Analysis of Piecewise Affine Systems through Formula-Guided Refinement*. In *IEEE Conference on Decision and Control (CDC)*, pages 5899–5904, 2010.

[C18] Stephen L. Smith, Jana Tumova, Calin Belta, Daniela Rus. Optimal Path Planning under Temporal Logic Contstraints. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 3288–3293, 2010.

[C19] Jiří Barnat, Ivana Černá, Jana Tumova. Quantitative Model Checking of Systems with Degradation. In *International Conference on Quantitative Evaluation of SysTems (QEST)*, pages 21 –30, 2009.

[C20] Jiří Barnat, Luboš Brim, Ivana Černá, Milan Češka, Jana Tumova. *Local Quantitative LTL Model Checking*. In *International Workshop on Formal Methods for Industrial Critical Systems (FMICS)*, pages 63–78, 2008.

[C21] Jiří Barnat, Luboš Brim, Ivana Černá, Milan Češka, Jana Tumova. ProbDiVinE-MC: Multi-core LTL Model Checker for Probabilistic Systems. In *International Conference on Quantitative Evaluation of Systems (QEST)*, pages 77–78, 2008.

[C22] Jiří Barnat, Luboš Brim, Ivana Černá, Milan Češka, Jana Tumova. ProbDiVinE: A Parallel Qualitative LTL Model Checker. In *International Conference on Quantitative Evaluation of Systems (QEST)*, pages 215–216, 2007.