BRUNO LACERDA

Senior Researcher in Robotics
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ABOUT ME

I am a Senior Researcher in Robotics at the Goal-Oriented Long-Lived Systems (GOALS) Lab, Oxford Robotics Institute, University of Oxford. My research focuses on the intersection of decision making under uncertainty, formal methods and mobile robotics. In particular, I am interested on the use of a combination of techniques from learning, planning and model checking to synthesise intelligent, robust and verifiable behaviour, both for single and for multi-robot systems.

Research Interests

- Sequential Decision Making under Uncertainty
- Probabilistic Model Checking
- Planning for Robots
- Multi-Robot Coordination
- Autonomy in Extreme Environments
- Shared Autonomy

EDUCATION

Instituto Superior Técnico, Lisbon, Portugal

- **PhD in Electrical and Computer Engineering** 2009–2013
  Thesis: Supervision of Discrete Event Systems Based on Temporal Logic Specifications
  Advisor: Pedro U. Lima
- **MSc in Mathematics and Applications** 2002–2007
  Thesis: Linear-Time Temporal Logic Control of Discrete Event Systems
  Advisors: Pedro U. Lima, Francisco M. Dionísio
- **BSc in Applied Mathematics and Computation** 2002–2007

RESEARCH POSITIONS

Oxford Robotics Institute, University of Oxford, Oxford, UK

- Senior Researcher in Robotics September 2018 – Present
- Postdoctoral Research Assistant in Robotics September 2017 – September 2018

University of Birmingham, Birmingham, UK April 2013 – September 2017

- Postdoctoral Research Fellow in Intelligent Robotics

Örebro University, Örebro, Sweden September 2008 – December 2008

- Research Intern

Instituto Superior Técnico, Lisbon, Portugal March 2008 – August 2008

- Research Intern

CONTRIBUTION TO PROJECTS

University of Oxford

- From Sensing to Collaboration: Engineering, Exploring and Exploiting the Building Blocks of Embodied Intelligence. *Leader of the Service and Inspection Flagship.* EPSRC Programme Grant
- Harvesting of Underwater Data from SensOr Networks (HUDSON). UK Research and Innovation

- Offshore Robotics for Certification of Assets (ORCA). UK Research and Innovation
- Robotics and Artificial Intelligence for Nuclear (RAIN). UK Research and Innovation

University of Birmingham

- Spatio-Temporal Representations and Activities for Cognitive Control in Long-Term Scenarios (STRANDS). EU-FP7
- Novel Dynamic Vehicle Scheduling and Path Planning Algorithms for Mobile Robotic and AGV Warehouse Order Picking. TSB Smart Award
- Learning the Structure and Dynamics of Human Environments to Support Intelligent Mobile Robot Behaviour. EPSRC First Grant

TEACHING

University of Oxford

- Research Lecture: Probabilistic Model Checking   Michaelmas Term 2020
  Topic: Planning under Uncertainty for Robot Systems
- Day Lecture: AIMS Centre for Doctoral Training   Hillary Term 2020–2022
  Topic: Planning under Uncertainty for Robot Systems
- Lecturer: Probabilistic Model Checking   Michaelmas Term 2018, 2019
  Shared lecturing duties with Marta Kwiatkowska (2018) and George Kenison (2019)

University of Birmingham

- Robot Programming   Semester 2 2015/2016, 2016/2017
  Two lectures each year on multi-robot coordination
- Lecturer: Intelligent Robotics   Semester 1 2014/2015
  Shared lecturing duties with Chris Burbridge and Lars Kunze
- Research Lecture: Intelligent Robotics   Semester 1 2013/2014
  Topic: Planning with Probabilistic Guarantees
- Demonstrator: Foundations of Computer Science   Semester 1 2013/2014

SUPERVISION

PhD Students

- Alex Rutherford (w/ N. Hawes & J. Foerster)   September 2022 – Present
  Topic: Multi-Agent Reinforcement Learning for Multi-Robot Coordination
- Carl Hentges (w/ N. Hawes & D. Parker)   September 2022 – Present
  Topic: Formal Methods for Planning with Uncertain Models
- Michal Staniaszek (w/ N. Hawes)   September 2022 – Present
  Topic: Long-Term Robot Inspection in Nuclear Environments
- Alex Stephens (w/ N. Hawes)   September 2021 – Present
  Topic: Planing for Long-Term Science Missions
- Matthew Budd (w/ N. Hawes & P. Duckworth)   September 2020 – Present
  Topic: Integrating MDP Planning with Gaussian Process Prediction
- Clarissa Costen (w/ N. Hawes)   September 2020 – Present
  Topic: Shared Autonomy with Formal Guarantees
- Mohamed Baioumy (w/ N. Hawes & P. Duckworth)   September 2019 – Present
  Topic: Variational Inference for Decision Making under Uncertainty
- Anna Gautier (w/ N. Hawes & M. Wooldridge)   September 2019 – Present
  Topic: Noncooperative Multi-Robot Systems
- Charlie Street (w/ Nick Hawes)   September 2018 – September 2022
  Topic: AI for Multi-Robot Systems
- Marc Rigter (w/ Nick Hawes)   September 2018 – Present
  Topic: Planning with Learned Models

· Michael Painter (w/ Nick Hawes)   September 2018 – Present
  Topic: Multi-Objective Mission Planning
· Fatma Faruq (w/ David Parker and Nick Hawes)   February 2017 – August 2021
  Topic: Simultaneous Task Allocation and Planning under Uncertainty
· Lenka Mudrova (w/ Nick Hawes)   June 2014 – September 2017
  Topic: Task Scheduling and Merging in Space and Time

Final Year Projects

· Alex Rutherford   October 2021 – May 2022
  4th Year Project. Topic: Multi-Agent Reinforcement Learning
· Yifeng Wei   October 2020 – May 2021
  4th Year Project. Topic: Trial-based Search for Generalised Stochastic Petri Nets
· Matthew Budd (w/ Paul Duckworth)   October 2019 – May 2020
  4th Year Project. Topic: Safe Exploration of MDPs with Gaussian Processes
· Han Zhou   October 2018 – May 2019
  4th Year Project. Topic: Auctioning for Multi-Robot Coordination
· Milan Tomy (w/ Jeremy Wyatt)   June 2017 – September 2017
  MSc Summer Project. Topic: Battery Scheduling in Autonomous Mobile Robots
· Joseph Shaw (w/ Nick Hawes)   October 2016 – April 2017
  BSc Final Year Project. Topic: Auctioning for Multi-Robot Coordination
· Pedro Elias (w/ Nick Hawes)   June 2015 – September 2015
  MSc Summer Project. Topic: Multi-agent Path Finding
· Eliot Dixon (w/ Nick Hawes)   June 2014 – September 2014
  MSc Summer Project. Topic: MDP Models for Mobile Service Robots
· Ken Poyner (w/ Nick Hawes)   June 2013 – September 2013
  MSc Summer Project. Topic: Autonomous Navigation Cost Estimation In Mobile Robots

RESEARCH VISITS

Delft University of Technology, Delft, The Netherlands   May 2016 – July 2016
· Host: Matthijs Spaan

University of California, Los Angeles, CA, USA   September 2011 – December 2011
· Host: Paulo Tabuada

University Carlos III de Madrid, Madrid, Spain   March 2010 – June 2010
· Host: Miguel A. Salichs

AWARDED FUNDING

Engineering and Physical Sciences Research Council   2020
· Programme Grant: "From Sensing to Collaboration: Engineering, Exploring and Exploiting the Building Blocks of Embodied Intelligence" ($\sim$£6M)
· Writing of two work packages

UK Research and Innovation   2020
· Research Project: "Harvesting of Underwater Data from SensOr Networks (HUDSON)" ($\sim$£400K)
· Writing of work package

LEaDing Fellows, a EU Marie Skłodowska-Curie COFUND Programme   July 2018
2 Year Fellowship, hosted at TU Delft

· Fellowship: "Cooperative Multi-Robot Transportation Systems with Guaranteed Quality of Service"
· Declined opportunity and stayed at University of Oxford

LES & EPS PERCAT Career Development Competition,
University of Birmingham
March 2016

· Travel support for research visit to TU Delft

Ramsay Research Travel Fund, School of Computer Science,
University of Birmingham
March 2016

· Subsistence support for research visit to TU Delft

Fundação para a Ciência e Tecnologia, Portugal

· Funding for PhD student research visit to UCLA	April 2011
· Funding for PhD student research visit to UC3M	November 2009
· Individual PhD studentship	January 2009 – December 2012

INVITED TALKS

· Flavors of Uncertainty in Verification, Planning, and Optimization Workshop (FUNCTION) @ International Colloquium on Automata, Languages and Programming (ICALP), Virtual	July 2021
· OxCav Group Seminar Series, University of Oxford, UK	June 2021
· WhiteMech Group Seminar Series, Sapienza University, Italy	April 2021
· Alan Turing Institute Seminar Series on Multi-agent Systems, UK	April 2021
· DEEC Young PhD Lecture Series, Instituto Superior Técnico, Lisbon, Portugal	January 2020
· *Lucia* School on AI and Robotics, Instituto Superior Técnico, Lisbon, Portugal	September 2017
· Robolog Workshop, IRISA, Rennes, France	June 2017
· Computer Science Department Seminar Series, University of Liverpool, UK	March 2017
· Workshop on Formal Methods in AI, University of Naples Federico II, Naples, Italy	February 2017

SERVICE

University of Oxford

· Head of Mobile Robot Deployments	September 2018 – Present
- Lead robot demo at Science and Ideas Festival, Oxford, Oxfordshire	December 2019
- Lead robot demo at Pembroke College Open Day	June 2019
- Lead robot demo at Blenheim Palace, Woodstock, Oxfordshire	January 2019
· Engineering Research Associate at Pembroke College	August 2018 – August 2022
· Participated in robot demo at Pembroke College Open Day	June 2018
· Organiser of the Oxford Robotics Research Group Seminars	May 2018 – Present
· Member of ORIon Robocup Team	November 2017 – Present

University of Birmingham

· Participated in several robot demos at various locations, e.g. London's Museum of Natural History, Birmingham's ThinkTank Science Museum, School of Computer Science and University of Birmingham's Open Days
2014 – 2018

Event Organization

· Co-organizer of the HRI 2023 Workshop on Variable Autonomy for Human-Robot Teaming (VAT)
· Co-organizer of the IJCAI 2021 Workshop on Robust and Reliable Autonomy in the Wild (R²AW)

Reviewing

· Funding Proposal
  - Expert reviewer for the NWO-Veni Programme
· Journal Editorial Board
  - Journal of Artificial Intelligence Research (JAIR) - 2021 – Present

- Journal Reviewing
  - Artificial Intelligence (AIJ); IEEE Transactions on Robotics (T-RO); IEEE Transactions on Automatic Control (TACON); Journal of Artificial Intelligence Research (JAIR); Autonomous Agents and Multiagent Systems (JAAMAS); IEEE Robotics & Automation Magazine (RAM); Formal Aspects of Computing (FAOC); Discrete Event Dynamic Systems (DEDS); Robotics and Autonomous Systems (RAS); IEEE Robotics and Automation Leters (RA-L); IEEE Control Systems Letters (L-CSS); IEEE Transactions on Systems, Man, and Cybernetics (SMC); IEEE Transactions on Automation Science and Engineering (T-ASE); IEEE Transactions on Intelligent Systems (IS); ACM Transactions on Modeling and Computer Simulation (TOMACS); ACM Transactions on Autonomous and Adaptive Systems (TAAS); Journal of Information Systems and Telecommunication (JIST); European Journal of Control (EJCON); MDPI Robotics.
- Conference Programme Committee Board
  - International Joint Conference on Artificial Intelligence (IJCAI) - 2021 – Present
- Conference Senior Programme Committee
  - AAAI Conference on Artificial Intelligence (AAAI) - 2022, 2023; International Joint Conference on Artificial Intelligence (IJCAI) - 2021
- Conference Programme Committee
  - International Conference on Principles of Knowledge Representation and Reasoning (KR) - 2021; Conference on Neural Information Processing Systems (NeurIPS) - 2020–2022; Robotics: Science and Systems (RSS) - 2020; AAAI Conference on Artificial Intelligence (AAAI) - 2018 – 2021; International Joint Conference on Artificial Intelligence (IJCAI) - 2017 – 2020; International Conference on Automated Planning and Scheduling (ICAPS) - 2016 – 2019, 2022, 2023; European Conference of Artificial Intelligence (ECAI) - 2016, 2018; International Conference on Autonomous Agents and Multiagent Systems (AAMAS) - 2014, 2016 – 2023.
- Conference Reviewing
  - IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS) - 2021; International Conference on Automated Planning and Scheduling (ICAPS) - 2021; IEEE Conference on Decision and Control (CDC) - 2018, 2019; International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) - 2017; American Control Conference (ACC) - 2016, 2018, 2021; IEEE International Conference on Robotics and Automation (ICRA) - 2015, 2018, 2020 – 2022; IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) - 2015 – 2021; IEEE International Conference on Automation Science and Engineering (CASE) - 2015, 2016, 2020; International Symposium on Distributed Autonomous Robotic Systems (DARS) - 2014.
- Workshop Programme Committee
  - UK Planning and Scheduling Special Interest Group (PlanSIG) - 2021; Agents and Robots for Reliable Engineered Autonomy Workshop @ ECAI - 2020; Formal Methods for Autonomous Systems Workshop - 2019, 2020; AAAI Spring Symposium on Integrating Representation, Reasoning, Learning, and Execution for Goal Directed Autonomy - 2018; Introspective Methods for Reliable Autonomy Workshop @ IROS; Autonomous Mobile Service Robots Workshop @ IJCAI - 2016; AI for Long-term Autonomy Workshop @ ICRA - 2016; Autonomous Robots and Multirobot Systems Workshop @ AAMAS - 2016, 2020, 2021; Artificial Intelligence and Robotics Workshop @ AAAI - 2014, 2016.

INDUSTRY POSITIONS

Everis, Consulting, IT, Outsourcing & Professional Services, Lisbon, Portugal	September 2007 - February 2008

- Junior Consultant

Mercer Human Resource Consulting, Lisbon, Portugal	April 2006 – September 2006

- Part-time Collaborator

PUBLICATIONS

Journal Publications

[1] Bruno Lacerda, Anna Gautier, Alex Rutherford, Alex Stephens, Charlie Street, and Nick Hawes. "Decision-Making under Uncertainty for Multi-Robot Systems". In: *AI Communications* (2022).

[2] Charlie Street, Sebastian Pütz, Manuel Mühlig, Nick Hawes, and Bruno Lacerda. "Congestion-Aware Policy Synthesis for Multirobot Systems". In: *IEEE Transactions on Robotics* (2022).

[3] Milan Tomy, Bruno Lacerda, Nick Hawes, and Jeremy L Wyatt. "Battery Charge Scheduling in Long-Life Autonomous Mobile Robots via Multi-Objective Decision Making under Uncertainty". In: *Robotics and Autonomous Systems* 133 (2020).

[4] Marc Rigter, Bruno Lacerda, and Nick Hawes. "A Framework for Learning from Demonstration with Minimal Human Effort". In: *Robotics and Automation Letters (RA-L)* 5.2 (2020).

[5] Bruno Lacerda and Pedro U. Lima. "Petri Net Based Multi-Robot Task Coordination from Temporal Logic Specifications". In: *Robotics and Autonomous Systems* 122 (2019).

[6] Bruno Lacerda, Fatma Faruq, David Parker, and Nick Hawes. "Probabilistic Planning with Formal Performance Guarantees for Mobile Service Robots". In: *International Journal of Robotics Research (IJRR)* 38.9 (2019).

[7] Nick Hawes, Christopher Burbridge, Ferdian Jovan, Lars Kunze, Bruno Lacerda, Lenka Mudrova, Jay Young, Jeremy Wyatt, Denise Hebesberger, Tobias Kortner, Rares Ambrus, Nils Bore, John Folkesson, Patric Jensfelt, Lucas Beyer, Alexander Hermans, Bastian Leibe, Aitor Aldoma, Thomas Faulhammer, Michael Zillich, Markus Vincze, Eris Chinellato, Muhannad Al-Omari, Paul Duckworth, Yiannis Gatsoulis, David C. Hogg, Anthony G. Cohn, Christian Dondrup, Jaime P. Fentanes, Tomas Krajnik, Joao M. Santos, Tom Duckett, and Marc Hanheide. "The STRANDS Project: Long-Term Autonomy in Everyday Environments". In: *IEEE Robotics Automation Magazine* 24.3 (2017).

[8] Bruno Lacerda and Pedro U. Lima. "On the Notion of Uncontrollable Marking in Supervisory Control of Petri Nets". In: *IEEE Transactions on Automatic Control* 59.11 (2014).

[9] Bruno Lacerda and Pedro U. Lima. "Linear-Time Temporal Logic Control of Discrete Event Models of Cooperative Robots". In: *Journal of Physical Agents* 2.1 (2008).

Conference Publications

[10] Clarissa Costen, Marc Rigter, Bruno Lacerda, and Nick Hawes. "Planning with Hidden Parameter Polynomial MDPs". In: *Proceedings of the 37th AAAI Conference on Artificial Intelligence (AAAI)*. 2023.

[11] Anna Gautier, Bruno Lacerda, Nick Hawes, and Michael Wooldridge. "Multi-Unit Auctions for Allocating Chance-Constrained Resources". In: *Proceedings of the 37th AAAI Conference on Artificial Intelligence (AAAI)*. 2023.

[12] Matthew Budd, Paul Duckworth, Nick Hawes, and Bruno Lacerda. "Bayesian Reinforcement Learning for Single-Episode Missions in Partially Unknown Environments". In: *Proceedings of the 2022 Conference on Robot Learning (CoRL)*. 2022.

[13] Marc Rigter, Bruno Lacerda, and Nick Hawes. "Rambo-RL: Robust Adversarial Model-Based Offline Reinforcement Learning". In: *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS)*. 2022.

[14] Matthew Budd, Georgios Salavasidis, Izzat Kamarudzaman, Catherine A Harris, Alexander B Phillips, Paul Duckworth, Nick Hawes, and Bruno Lacerda. "Probabilistic Planning for AUV Data Harvesting from Smart Underwater Sensor Networks". In: *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2022.

[15] Clarissa Costen, Marc Rigter, Bruno Lacerda, and Nick Hawes. "Shared Autonomy Systems with Stochastic Operator Models". In: *Proceedings of the 31st International Joint Conference on Artificial Intelligence (IJCAI)*. 2022.

[16] Marc Rigter, Bruno Lacerda, and Nick Hawes. "Planning for Risk-Aversion and Expected Value in MDPs". In: *Proceedings of the 32nd International Conference on Automated Planning and Scheduling (ICAPS)*. **Best Paper Award Runner-Up**. 2022.

[17]   Anna Gautier, Alex Stephens, Bruno Lacerda, Nick Hawes, and Michael Wooldridge. "Negotiated Path Planning for Non-Cooperative Multi-Robot Systems". In: *Proceedings of the 21st International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2022.

[18]   Charlie Street, Bruno Lacerda, Michal Staniaszek, Manuel Mühlig, and Nick Hawes. "Context-Aware Modelling for Multi-Robot Systems Under Uncertainty". In: *Proceedings of the 21st International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2022.

[19]   Marc Rigter, Bruno Lacerda, and Nick Hawes. "Risk-Averse Bayes-Adaptive Reinforcement Learning". In: *Proceedings of the 35th Conference on Neural Information Processing Systems (NeurIPS)*. 2021.

[20]   Fernando S. Barbosa, Bruno Lacerda, Paul Duckworth, Jana Tumova, and Nick Hawes. "Risk-Aware Motion Planning in Partially Known Environments". In: *Proceedings of the 2021 IEEE Conference on Decision and Control (CDC)*. 2021.

[21]   Alex Rutherford, Paul Duckworth, Nick Hawes, and Bruno Lacerda. "Motion Planning in Uncertain Environments with Rapidly-Exploring Random Markov Decision Processes". In: *Proceedings of the 2021 European Conference on Mobile Robots (ECMR)*. 2021.

[22]   Mohamed Baioumy, Paul Duckworth, Bruno Lacerda, and Nick Hawes. "Active Inference for Integrated State-Estimation, Control, and Learning". In: *Proceedings of the 2021 IEEE International Conference on Robotics and Automation (ICRA)*. 2021.

[23]   Marc Rigter, Bruno Lacerda, and Nick Hawes. "Minimax Regret Optimisation for Robust Planning in Uncertain Markov Decision Processes". In: *Proceedings of the 35th AAAI Conference on Artificial Intelligence (AAAI)*. 2021.

[24]   Paul Duckworth, Bruno Lacerda, and Nick Hawes. "Time-Bounded Mission Planning in Time-Varying Domains with Semi-MDPs and Gaussian Processes". In: *Proceedings of the 2020 Conference on Robot Learning (CoRL)*. 2020.

[25]   Matthew Budd, Bruno Lacerda, Paul Duckworth, Andrew West, Barry Lennox, and Nick Hawes. "Markov decision processes with unknown state feature values for safe exploration using Gaussian processes". In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2020.

[26]   Carlos Azevedo, Bruno Lacerda, Nick Hawes, and Pedro Lima. "Long-Run Multi-Robot Planning under Uncertain Action Durations for Persistent Tasks". In: *Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. 2020.

[27]   Mohamed Baioumy, Matias Mattamala, Paul Duckworth, Bruno Lacerda, and Nick Hawes. "Adaptive Manipulator Control using Active Inference with Precision Learning". In: *Proceedings of the 3rd UK-RAS Conference for PhD Students & Early-Career Researchers (UK-RAS)*. 2020.

[28]   Michael Painter, Bruno Lacerda, and Nick Hawes. "Convex Hull Monte-Carlo Tree Search". In: *Proceedings of the 30th International Conference on Automated Planning and Scheduling (ICAPS)*. 2020.

[29]   Charlie Street, Bruno Lacerda, Manuel Mühlig, and Nick Hawes. "Multi-Robot Planning Under Uncertainty with Congestion-Aware Models". In: *Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2020.

[30]   Carlos Azevedo, Bruno Lacerda, Nick Hawes, and Pedro Lima. "Long-Run Multi-Robot Planning With Uncertain Task Durations". In: *Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2020.

[31]   Milan Tomy, Bruno Lacerda, Nick Hawes, and Jeremy Wyatt. "Battery Charge Scheduling in Long-Life Autonomous Mobile Robots". In: *Proceedings of the 2019 European Conference on Mobile Robots (ECMR)*. Prague, Czech Republic, 2019.

[32]   Masoumeh Mansouri, Bruno Lacerda, Nick Hawes, and Federico Pecora. "Multi-Robot Planning Under Uncertain Travel Times and Safety Constraints". In: *Proceedings of the 28th International Joint Conference on Artificial Intelligence (IJCAI)*. Macau, China, 2019.

[33]   Fatma Faruq, Bruno Lacerda, Nick Hawes, and David Parker. "Simultaneous Task Allocation and Planning Under Uncertainty". In: *Proceedings of the 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Madrid, Spain, 2018.

[34] Bruno Lacerda, David Parker, and Nick Hawes. "Multi-Objective Policy Generation for Mobile Robots Under Probabilistic Time-Bounded Guarantees". In: *Proceedings of the 27th International Conf on Automated Planning and Scheduling (ICAPS)*. Pittsburgh, PA, USA, 2017.

[35] Lenka Mudrová, Bruno Lacerda, and Nick Hawes. "Partial Order Temporal Plan Merging for Mobile Robot Tasks". In: *Proceedings of the 22nd European Conference on Artificial Intelligence (ECAI)*. The Hague, Netherlands, 2016.

[36] Bruno Lacerda, David Parker, and Nick Hawes. "Optimal Policy Generation for Partially Satisfiable Co-Safe LTL Specifications". In: *Proceedings of the 24th International Joint Conference on Artificial Intelligence (IJCAI)*. Buenos Aires, Argentina, 2015.

[37] Jaime Pulido Fentanes, Bruno Lacerda, Tomáš Krajník, Nick Hawes, and Marc Hanheide. "Now or later? Predicting and maximising success of navigation actions from long-term experience". In: *Proceedings of the 2015 IEEE International Conference on Robotics and Automation (ICRA)*. Seattle, WA, USA, 2015.

[38] Lenka Mudrová, Bruno Lacerda, and Nick Hawes. "An Integrated Control Framework for Long-Term Autonomy in Mobile Service Robots". In: *Proceedings of the 7th European Conference on Mobile Robotics (ECMR)*. Lincoln, United Kingdom, 2015.

[39] Bruno Lacerda, David Parker, and Nick Hawes. "Optimal and dynamic planning for Markov decision processes with co-safe LTL specifications". In: *Proceedings of the 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Chicago, IL, USA, 2014.

[40] Bruno Lacerda and Pedro U. Lima. "LTL-Based Decentralized Supervisory Control of Multi-Robot Tasks Modelled as Petri Nets". In: *Proceedings of the 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. San Francisco, CA, USA, 2011.

[41] Bruno Lacerda and Pedro U. Lima. "Designing Petri Net Supervisors from LTL Specifications". In: *Proceedings of Robotics: Science and Systems VII (RSS)*. Los Angeles, CA, USA, 2011.

[42] Bruno Lacerda and Pedro U. Lima. "Designing Petri Net Supervisors for Multi-Agent Systems from LTL Specifications (Extended Abstract)". In: *Proceedings of the 10th International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS)*. Taipei, Taiwan, 2011.

[43] Bruno Lacerda, Pedro U. Lima, Javi Gorostiza, and Miguel A. Salichs. "Petri Net Based Supervisory Control of a Social Robot with LTL Specifications". In: *Proceedings of the 11th International Conference on Mobile Robots and Competitions*. Lisbon, Portugal, 2011.

[44] Bruno Lacerda and Pedro U. Lima. "Petri Nets as an Analysis Tool For Data Flow in Wireless Sensor Networks". In: *Proceedings of the 1st Portuguese Conference on Wireless Sensor Networks (CNRS)*. Coimbra, Portugal, 2011.

Workshop Publications

[45] Lara Brudermüller, Raunak Bhattacharyya, Bruno Lacerda, and Nick Hawes. "Time-Bounded Large-Scale Mission Planning Under Uncertainty for UV Disinfection". In: *ICAPS 2022 Workshop on Planning and Robotics (PlanRob)*. 2022.

[46] Matthew Budd, Georgios Salavasidis, Izzat Kamarudzaman, Catherine A Harris, Alexander B Phillips, Paul Duckworth, Nick Hawes, and Bruno Lacerda. "Probabilistic Planning for AUV Data Harvesting from Smart Underwater Sensor Networks". In: *ICAPS 2022 Workshop on Planning and Robotics (PlanRob)*. 2022.

[47] Charlie Street, Bruno Lacerda, Manuel Mühlig, and Nick Hawes. "Proactive Multi-Robot Task Allocation Under Spatiotemporal Uncertainty". In: *AAMAS 2022 Workshop on Autonomous Robots and Multirobot Systems (ARMS)*. 2022.

[48] Matthew Budd, Paul Duckworth, Nick Hawes, and Bruno Lacerda. "Mission Planning in Unknown Environments as Bayesian Reinforcement Learning". In: *IJCAI 2021 Workshop on Robust and Reliable Autonomy in the Wild (R^2AW)*. 2021.

[49] Clarissa Costen, Marc Rigter, Bruno Lacerda, and Nick Hawes. "Mixed Observability MDPs for Shared Autonomy with Uncertain Human Behaviour". In: *IJCAI 2021 Workshop on Robust and Reliable Autonomy in the Wild (R^2AW)*. 2021.

[50] Anna Gautier, Bruno Lacerda, Nick Hawes, and Michael Wooldridge. "Negotiated Path Planning for Non-Cooperative Multi-Robot Systems". In: *IJCAI 2020 Workshop on Multi-Agent Path Finding*. 2020.

[51] Masoumeh Mansouri, Bruno Lacerda, Nick Hawes, and Federico Pecora. "Multi-Robot Planning Under Uncertain Travel Times and Safety Constraints". In: *ICRA 2019 Workshop on Resilient Robot Teams: Composing, Acting, and Learning*. Montreal, Canada, 2019.

[52] Bruno Lacerda, David Parker, and Nick Hawes. "Policy Generation with Probabilistic Guarantees for Long-term Autonomy of a Mobile Robot". In: *FLoC 2018 Workshop on the Verification and Validation of Autonomous Systems (VaVAS)*. Oxford, United Kingdom, 2018.

[53] Bruno Lacerda, David Parker, and Nick Hawes. "Nested Value Iteration for Partially Satisfiable Co-Safe LTL Specifications (Extended Abstract)". In: *AAAI Fall Symposium on Sequential Decision Making for Intelligent Agents (SDMIA)*. Arlington, Virginia, USA, 2015.

[54] Bruno Lacerda, David Parker, and Nick Hawes. "Optimal Motion Planning for Markov Decision Processes with Co-Safe Linear Temporal Logic Specifications". In: *31st Workshop of the UK Planning & Scheduling Special Interest Group (PlanSIG)*. Edinburgh, Scotland, UK, 2014.

[55] Bruno Lacerda and Pedro U. Lima. "LTL Plan Specification for Robotic Tasks Modelled as Finite State Automata". In: *AAMAS 2009 Workshop on Agent Design: Advancing from Practice to Theory (ADAPT)*. Budapest, Hungary, 2009.