A Taxonomy for Architecting Safer Autonomous Unmanned Systems

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APPENDIX SELECTED PRIMARY STUDIES

The selected primary studies are listed as follows:

Study	Author(s), title, channel of publication	Year
[29]	Jeevith Hegde, Ingrid Bouwer Utne, Ingrid Schjølberg, and Brede Thorkildsen. A Bayesian approach to risk modeling of autonomous subsea intervention operations. (Reliability Engineering & System Safety)	2018
[38]	James T Luxhøj and Ahmet Öztekin. A regulatory-based approach to safety analysis of unmanned aircraft systems. (HCI)	2009
[8]	Osiris A. Valdez Banda, Sirpa Kannos, Floris Goerlandt, Pieter H. A. J. M. van Gelder, Martin Bergström, Pentti Kujala. A systemic hazard analysis and management process for the concept design phase of an autonomous vessel. (Reliability Engineering & System Safety)	2019
[64]	Xunyu Zhong, Jun Tian, Huosheng Hu, Xiafu Peng. Hybrid Path Planning Based on Safe A* Algorithm and Adaptive Window Approach for Mobile Robot in Large-Scale Dynamic Environment. (Journal of Intelligent & Robotic Systems)	2020
[44]	Samyeul Noh. Decision-Making Framework for Autonomous Driving at Road Intersections: Safeguarding Against Collision, Overly Conservative Behavior, and Violation Vehicles. (IEEE Transactions on Industrial Electronics)	2018
[33]	Qazi Hamza Jan, Sascha Klein, Karsten Berns. Safe and Efficient Navigation of an Autonomous Shuttle in a Pedestrian Zone. (RAAD)	2019
[2]	Raja Ben Abdessalem, Annibale Panichella, Shiva Nejati, Lionel C Briand, and Thomas Stifter. Testing autonomous cars for feature interaction failures using many-objective search. (ASE)	2018
[35]	Józef Lisowski. Sensitivity of Safe Trajectory in a Game Environment on Inaccuracy of Radar Data in Autonomous Navigation. (Sensors)	2019
[5]	Daniel Althoff, Matthias Althoff, and Sebastian Scherer. Online safety verification of trajectories for unmanned flight with offline computed robust invariant sets. (IROS)	2015
[57]	Yue Wang, Swarat Chaudhuri, and Lydia E Kavraki. Bounded policy synthesis for POMDPs with safe-reachability objectives. (AAMAS)	2018
[23]	Michael Gerstmair, Alexander Melzer, Alexander Onic, and Mario Huemer. On the Safe Road Toward Autonomous Driving: Phase noise monitoring in radar sensors for functional safety compliance. (IEEE Signal Processing Magazine)	2019
[43]	Yannik Nager, Andrea Censi, and Emilio Frazzoli. What lies in the shadows? Safe and computation-aware motion planning for autonomous vehicles using intent-aware dynamic shadow regions. (ICRA)	2019
[51]	Christoph A Thieme and Ingrid B Utne. Safety performance monitoring of autonomous marine systems. (Reliability Engineering & System Safety)	2017
[39]	Mathilde Machin, Jérémie Guiochet, HélèneWaeselynck, Jean-Paul Blanquart, Matthieu Roy, and Lola Masson. SMOF: A safety monitoring framework for autonomous systems. (IEEE Transactions on Systems, Man, and Cybernetics: Systems)	2016
[27]	Nikita Bhardwaj Haupt and Peter Liggesmeyer. A Runtime Safety Monitoring Approach for Adaptable Autonomous Systems. (SAFECOM)	2019
[30]	Nico Hochgeschwender. Adaptive Deployment of Safety Monitors for Autonomous Systems. (SAFECOM)	2019
[56]	AkifumiWachi, Yanan Sui, YisongYue, and Masahiro Ono. Safe exploration and optimization of constrained mdps using gaussian processes. (AAAI)	2018
[62]	Ruohan Zhang, Yue Yu, Mahmoud El Chamie, Behçet Açikmese, and Dana H Ballard. Decision-Making Policies for Heterogeneous Autonomous Multi-Agent Systems with Safety Constraints. (IJCAI)	2016
[36]	Lantao Liu and Nathan Michael. An MDP-based approximation method for goal constrained multi-MAV planning under action uncertainty. (ICRA)	2016
[28]	Daojing He, Yinrong Qiao, Sammy Chan, and Nadra Guizani. Flight Security and Safety of Drones in Airborne Fog Computing Systems. (IEEE Communications Magazine)	2018
[17]	Mahir Dursun and Ismet Cuhadar. Risk based multi criteria decision making for secure image transfer between unmanned air vehicle and ground control station. (Reliability Engineering & System Safety)	2018
[15]	Ewen Denney, Ganesh Pai, and Ibrahim Habli. Perspectives on software safety case development for unmanned aircraft. (DSN)	2012
[9]	Barry, Andrew J., Anirudha Majumdar, and Russ Tedrake. Safety verification of reactive controllers for UAV flight in cluttered environments using barrier certificates.(ICRA)	2012
[55]	Inna Vistbakka, Amin Majd, and Elena Troubitsyna. Multi-layered Approach to Safe Navigation of Swarms of Drones. (SAFECOM)	2018
[53]	Federico Vicentini, Mehrnoosh Askarpour, Matteo Rossi, Dino Mandrioli. Safety Assessment of Collaborative Robotics Through Automated Formal Verification. (IEEE Transactions on Robotics)	2020
[31]	Bin Hu and Peter Seiler. Pivotal decomposition for reliability analysis of fault tolerant control systems on unmanned aerial vehicles. (Reliability Engineering & System Safety)	2015
[7]	John D Andrews, J Poole, andWen-Hua Chen. Fast mission reliability prediction for Unmanned Aerial Vehicles. (Reliability Engineering & System Safety)	2013
[60]	Nataliya Yakymets, S. Dhouib, Hadi Jaber, Agnes Lanusse. Model-driven safety assessment of robotic systems. (IROS)	2013
[41]	Richard Melnyk, Daniel Schrage, Vitali Volovoi, and Hernando Jimenez. A third-party casualty risk model for unmanned aircraft system operations. (Reliability Engineering & System Safety)	2014
[16]	Ewen Denney, Ganesh Pai, and Iain Whiteside. Modeling the safety architecture of UAS flight operations. (SAFECOM)	2017
[47]	Stephen L. Smith, Jana Tumova, Calin Belta, Daniela Rus. Optimal path planning under temporal logic constraints. (IROS)	2010
[61]	Esen Yel, Tony X Lin, and Nicola Bezzo. Self-triggered Adaptive Planning and Scheduling of UAV Operations. (ICRA)	2018
[12]	Julien Brunel and Jacques Cazin. Formal Verification of a Safety Argumentation and Application to a Complex UAV System. (SAFECOM)	2012

Study	Author(s), title, channel of publication	Year
[52]	Cumhur Erkan Tuncali, James Kapinski, Hisahiro Ito, and Jyotirmoy V Deshmukh. Reasoning about safety of learning-enabled components in autonomous cyber-physical systems (DAC)	2018
[59]	Matt Webster, Michael Fisher, Neil Cameron, and Mike Jump. Formal Methods for the Certification of Autonomous Unmanned Aircraft Systems (SAFECOM)	2011
[50]	Zachary N Sunberg, Mykel J Kochenderfer, and Marco Pavone. Optimized and trusted collision avoidance for unmanned aerial vehicles using approximate dynamic programming. (ICRA)	2016
[45]	Ahmet Oztekin, Cynthia Flass, and Xiaogong Lee. Development of a framework to determine a mandatory safety baseline for unmanned aircraft systems. (Journal of Intelligent & Robotic Systems)	2012
[48]	Jonathan Sprauel, Andrey Kolobov, and Florent Teichteil-Königsbuch. Saturated path-constrained MDP: Planning under uncertainty and deterministic model-checking constraints. (AAAI)	2014
[14]	Jesimar da Silva Arantes, Márcio da Silva Arantes, Claudio Fabiano, Motta Toledo, Onofre Trindade Júnior, Brian C Williams. An embedded system architecture based on genetic algorithms for mission and safety planning with uav. (GECCO)	2017
[42]	Meltz, Daniel, and Hugo Guterman. Functional Safety Verification for Autonomous UGVs—Methodology Presentation and Implementation on a Full-Scale System. (IEEE Transactions on Vehicular Technology)	2019
[46]	Junaed Sattar and James J Little. Ensuring safety in human-robot dialog—A cost-directed approach. (ICRA)	2014
[25]	Vinicius G Goecks, GregoryMGremillion, Vernon J Lawhern, John Valasek, and Nicholas R Waytowich. Efficiently combining human demonstrations and interventions for safe training of autonomous systems in real time. (AAAI)	2019
[37]	Lifeng Liu, Yingxuan Zhu, Tim Tingqiu Yuan, Jian Li. Continuous Safe Learning Based on First Principles and Constraints for Autonomous Driving. (SafeAI@AAAI)	2020
[20]	David Fridovich-Keil, Sylvia L Herbert, Jaime F Fisac, Sampada Deglurkar, and Claire J Tomlin. Planning, fast and slow: A framework for adaptive real-time safe trajectory planning. (ICRA)	2018
[22]	Fei Gao, William Wu, Yi Lin, and Shaojie Shen. Online safe trajectory generation for quadrotors using fast marching method and bernstein basis polynomial. (ICRA)	2018
[11]	Mario Brito and Gwyn Griffiths. A Bayesian approach for predicting risk of autonomous underwater vehicle loss during their missions. (Reliability Engineering & System Safety)	2016
[26]	Paula Gonçalves, José Sobral, and Luís Andrade Ferreira. Unmanned aerial vehicle safety assessment modelling through petri Nets. (Reliability Engineering & System Safety)	2017
[18]	Raj Gautam Dutta, Xiaolong Guo, Teng Zhang, Kevin Kwiat, Charles Kamhoua, Laurent Njilla, and Yier Jin. Estimation of safe sensor measurements of autonomous system under attack. (DAC)	2017
[40]	Paulo Henrique M. Maia, Lucas Vieira, Matheus Chagas, Yijun Yu, Andrea Zisman, Bashar Nuseibeh. Cautious Adaptation of Defiant Components. (ASE)	2019
[34]	Sisir Karumanchi, Karl Iagnemma, and Steve Scheding. Mobility Erosion: High speed motion safety for mobile robots operating in off-road terrain. (ICRA)	2013
[63]	Shun Zhang, Edmund H Durfee, and Satinder P Singh. Minimax-Regret Querying on Side Effects for Safe Optimality in Factored Markov Decision Processes.(IJCAI)	2018
[32]	Pooyan Jamshidi, Javier Cámara, Bradley Schmerl, Christian Kästner, and David Garlan. Machine Learning Meets Quantitative Planning: Enabling Self-Adaptation in Autonomous Robots. (SEAMS)	2019
[65]	Brian D. Ziebart, Nathan D. Ratliff, Garratt Gallagher, Christoph Mertz, Kevin M. Peterson, James A. Bagnell, Martial Hebert, Anind K. Dey, Siddhartha S. Srinivasa. Planning-based Prediction for Pedestrians. (IROS)	2009
[19]	Bruno L Esperance and Kamal Gupta. Safety Hierarchy for Planning With Time Constraints in Unknown Dynamic Environments. (IEEE Transactions on Robotics)	2017
[58]	Yijing Wang, Zhengxuan Liu, Zhiqiang Zuo, Zheng Li, Li Wang, and Xiaoyuan Luo. Trajectory Planning and Safety Assessment of Autonomous Vehicles Based on Motion Prediction and Model Predictive Control. (IEEE Transactions on Vehicular Technology)	2019
[1]	Abdessalem, Raja Ben and Nejati, Shiva and Briand, Lionel C and Stifter, Thomas. Testing vision-based control systems using learnable evolutionary algorithms. (ICSE)	2018
[10]	Raja Ben Abdessalem, Shiva Nejati, Lionel C Briand, and Thomas Stifter. Testing advanced driver assistance systems using multi-objective search and neural networks. (ASE)	2016
[21]	Alessio Gambi, Tri Huynh, and Gordon Fraser. Generating effective test cases for self-driving cars from police reports. (FSE)	2019
[3]	Flavia Sofia Acerbo, Herman Van der Auweraer, Tong Duy Son. Safe and Computational Efficient Imitation Learning for Autonomous Vehicle Driving. (ACC)	2020
[4]	Ankit Agrawal, Sophia J. Abraham, Benjamin Burger, Chichi Christine, Luke Fraser, John M. Hoeksema, Sarah Hwang, Elizabeth Travnik, Shreya Kumar, Walter J. Scheirer, Jane Cleland-Huang, Michael Vierhauser, Ryan Bauer, Steve Cox. The Next Generation of Human-Drone Partnerships: Co-Designing an Emergency Response System. (CHI)	2020
[54]	Michael Vierhauser, Sean Bayley, Jane Wyngaard, Wandi Xiong, Jinghui Cheng, Joshua Huseman, Robyn Lutz, Jane Cleland-Huang. Interlocking Safety Cases for Unmanned Autonomous Systems in Shared Airspaces. (IEEE Transactions on Software Engineering)	2019
[6]	Daniel Althoff, James J. Kuffner, Dirk Wollherr, and Martin Buss. Safety assessment of robot trajectories for navigation in uncertain and dynamic environments. (Autonomous Robots)	2012
[24]	Julio Godoy, Ioannis Karamouzas, Stephen J Guy, and Maria L Gini. Moving in a Crowd: Safe and Efficient Navigation among Heterogeneous Agents. (IJCAI)	2016
[49]	Stern, Roni, and Brendan Juba. Efficient, Safe, and Probably Approximately Complete Learning of Action Models (IJCAI)	2017
[13]	Adam Bry, Nicholas Roy. Rapidly-exploring Random Belief Trees for Motion Planning Under Uncertainty. (ICRA)	2011