**Denis Osipychev**

**Contact Information**

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|  | |  |  | | --- | --- | | Huntsville, AL  35808, USA | phone: (707) 955 5595  e-mail: osipychev@gmail.com  web: [www.denisos.com](http://www.denisos.com/) | |

**Professional Area**

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|  | Autonomous systems, artificial intelligence, planning and decision-making.  Automated reasoning, control policy optimization, deep reinforcement learning.  Behavior modeling, human-in-the-loop, cooperative multi-agent systems.  Machine learning, generative modeling, data analytics for cyber-physical systems. |

**Professional Experience**

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|  | |  |  | | --- | --- | | ***Boeing Research & Technology, Huntsville, Alabama USA*** | ***2018 – present*** |   *AI Advanced Technologist at Center for Applied Simulation and Analytics (CASA)*  Research in general autonomy, intelligent systems, and decision-making with a focus on hierarchical architecture, reasoning and risk assessment for autonomous agents. Architecting, prototyping, and consulting a broad range of AI projects at Boeing and government research agencies.   * Developed a surrogate domain, end-to-end deep-learning agent, training procedures, and evaluation metrics for learning-based planning and control for a fighter-jet dogfight (DARPA ADT program). Placed the third in the final trial and captured DARPA ACE. * Authored a scalable multi-agent planning framework for mission planning tasks, including air combat, collision avoidance, mission operation. Abstracted the dimensionality of the MARL and solved the dimensionality reduction issue. * Designed and produced a series of autonomous capabilities for unmanned landing, take-off, on-ground taxiing, in-air collision avoidance, traffic deconfliction. Created evaluation metrics for regression, classification, policy models to provide assurances for mission-critical components of learning-based systems (DARPA AA). * Guided the Boeing-CMU collaboration on adaptive and robust AI agents via Genetic Curriculum training. Demonstrated the training methodology for agents robust to changes in scenario and dynamics. * Developed and integrated dynamic trajectory planner for local path-planning, dynamic collision avoidance, and navigation for airport taxiing of a full-scale airplane. * Guided the cybersecurity work for robust AI/ML agents to provide defensive capabilities against deception and adversarial attacks on cyber-physical systems. * Designed an active learning framework, synthetic data generation pipeline, training procedures to improve performance of visual perception system on a limited dataset.  |  |  | | --- | --- | | ***University of Illinois at Urbana-Champaign, Urbana, Illinois USA*** | ***2016 – 2018*** |   *Research Assistant at Coordinated Science Laboratory (CSL)*  Decision-making algorithms for modern agriculture. Reinforcement learning for multi-agent optimization. Precision agriculture and phenotyping through computer vision.   * Integrated policy optimization for agricultural robot swarm to coordinate the weeding. * Authored distributed cooperative policy planning for mission control/sensing (AFRL).  |  |  | | --- | --- | | ***Oklahoma State University, Stillwater, Oklahoma USA*** | ***2014 – 2016*** |   *Graduate Research Assistant at Advanced Technology Research Center (ATRC)*  Decision-making for autonomous driving vehicles and human-in-the-loop systems. Human-activity recognition, behavior modeling and classification.   * Developed model-based collision avoidance for autonomous vehicles. * Led integration of navigation, path-planning, and control to autonomous vehicle prototype. |

**Education**

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|  | ***University of Illinois at Urbana-Champaign, Urbana, Illinois USA***  PhD candidate, Ag and Bio Engineering & Computational Science Engineering  *Advisors: Drs. G. Chowdhary, H. Tran, M. West, A. Davis*  ***Oklahoma State University, Stillwater, Oklahoma USA***  MS in Electrical and Computer Engineering, Control Systems, 2015  “Collision avoidance for autonomous cars based on human intention”  ***Moscow Power Engineering Institute, Moscow, Russia***  MS in Electronic Equipment, February, 2006  BE in Electronics, May, 2004 |

**Publications**

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|  | * Osipychev D., Margineantu D., Reinforcement Learning-Based Air Traffic Deconfliction. Under reviews 2021 IROS. * P. Kouvaros, T. Kyono, F. Leofante, A. Lomuscio, D. Margineantu, D. Osipychev, Y. Zheng. Formal Analysis of Neural Network-based Systems in the Aircraft Domain. 2021 FM21. * Fremont D., Chiu J., Margineantu D., Osipychev D., Seshia S., Formal Analysis and Redesign of a Neural Network-Based Aircraft Taxiing System with VerifAI. 2020 CAV. * Osipychev D., Chowdhary G., Distributed Deep Policy Sharing for Competitive Adversarial Environment. 2018 NIPS Workshop ”Deep Reinforcement Learning”. * McAllister W., Osipychev D., Davis A., Agbots: Weeding a field with a team of autonomous robots. 2019 Elsevier. * Osipychev D., McAllister W., Chowdhary G., Davis A., Multi-Agent Planning for Coordinated Robotic Weed Killing. 2018 IROS conference. * Osipychev D., Tran D., Sheng W., Chowdhary G., Human intention-based collision avoidance for autonomous cars. 2017 American Control Conference (ACC). * Tran D., Du J., Sheng W., Tadesse E., Osipychev D., Sun Y., Bai H., A Human-Vehicle Collaborative Driving Framework for Driver Assistance. 2018 IEEE Intelligent Transportation Systems Transactions. * Tran D., Tadesse E., Osipychev D., et al., A collaborative control framework for driver assistance systems. 2017 ICRA conference. * Osipychev D., Tran D., Sheng W., Chowdhary G., Proactive MDP-based Collision Avoidance Algorithm for Autonomous Car. 2015 IEEE CYBER Conference, 2014 NIPS Workshop ”From Bad Models to Good Policies”. |

**Skills**

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|  | Experience in agile software development and integration of complex cyber-physical systems, simulations of physical and control processes, data analysis and visualization, GUI  Integration of algorithms and methods:   * Policy optimization (deep RL-agents on Pytorch and TF), task-optimization (Q-learning, genetic algorithms, graph search, RRT), and utility optimization (SGD, elastic bands, particle swarm), * Regression, classification, and GAN models on Pytorch libraries, * Dynamic simulations and surrogates for multi-agent systems, vehicle dynamics, robotics, computer games.   Integration platforms:   * ROS-based robotics, full-scale autonomous cars/airplanes, software/hardware in-the-loop simulations, Gazebo.   Languages: Python, C++, JavaScript |

**Interests**

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|  | Robotics, AI, gamedev, model rocketry, hiking, karting, welding, Futurama. |