Denis Osipychev

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Professional Area

Autonomous systems architecture and hierarchical artificial intelligence.
Control policy optimization, hybrid systems for scheduling, deep reinforcement learning.
Machine learning under constraints, generative modeling and synthetic data generation.

Professional Experience

Boeing Research & Technology, Huntsville, Alabama USA   *2018 – present*
AI Software Engineer at Center for Applied Simulation and Analytics (CASA)
Research in general autonomy, intelligent systems, and decision-making.
Autonomous reasoning, decision-making, and risk assessment for mission planning.
Consulting, prototyping, and supporting a broad range of AI activities.

University of Illinois at Urbana-Champaign, Urbana, Illinois USA   *2016 – 2018*
Research Assistant at Coordinated Science Laboratory (CSL)
Decision-making algorithms for modern agricultural robotics. Reinforcement learning for multi-agent optimization. Precision agriculture.

Oklahoma State University, Stillwater, Oklahoma USA   *2014 – 2016*
Graduate Research Assistant at Advanced Technology Research Center (ATRC)
Human-activity recognition, behavior modeling and classification.
Decision-making algorithms for autonomous driving vehicles and human-in-the-loop systems.
Learning from demonstration, imitation learning for robots.

Education

University of Illinois at Urbana-Champaign, Urbana, Illinois USA
Department of Ag and Bio Engineering
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
M.S. in Electrical and Computer Engineering, Control Systems, 2015

Moscow Power Engineering Institute, Moscow, Russia
M.S. in Electronic Equipment, February, 2006
B.E. in Electronics, May, 2004

Top Projects

Learning-enabled planning and control for aerial dogfight – *AFS, Boeing*
Synthetic data generation for visual perception pipeline – *Boeing*
Assurance guarantees for learning-enabled hybrid systems – *Boeing*
Local path-planning, collision avoidance, and navigation for taxiing – *Boeing*
Defect analysis and process optimization for composite manufacturing – *Boeing*
Defense against deception and adversarial attacks on cyber-physical systems – *Boeing*
Distributed decentralized cooperative policy planning for Capture the Flag – *UIUC, AFRL*
Policy optimization for a swarm of agricultural robots – *UIUC*
Model based collision avoidance for autonomous vehicles – *Okstate*
Navigation, path-planning and control of autonomous vehicle prototype – *Okstate*

Publications	Fremont D., Chiu J., Margineantu D., Osipychev D., Seshia S., Formal Analysis and Redesign of a Neural Network-Based Aircraft Taxiing System with VerifAI. Submitted CAV 2020. Osipychev D., Chowdhary G., Distributed Deep Policy Sharing for Competitive Adversarial Environment. 2018 Archived, NIPS Workshop "Deep Reinforcement Learning". McAllister W., Osipychev D., Davis A., Agbots: Weeding a field with a team of autonomous robots. 2019 Elsevier. McAllister W.*, Osipychev D.*, 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. Osipychev D., Tran D., Sheng W., Chowdhary G., Proactive MDP-based Collision Avoidance Algorithm for Autonomous Car. 2014 NIPS Workshop "From Bad Models to Good Policies".
Coding Proficiency	Experience in agile software development and integration of the following: o Deep RL-agents (incl. DDPG, GA3C, DQN, PG) on Tensorflow/Pytorch libraries o Regression, classification, GAN models on Pytorch libraries o Dynamics simulations and surrogates (multi-agent systems, vehicle dynamics, construction equipment, game-theory, computer games) o Integration to real robotic systems (software/hardware in the loop, ROS, Gazebo) o Task-optimization methods (Q-learning, genetic/evolutionary algorithms, graph search, RRT) o Utility function optimization techniques (SGD, GD, potential fields, elastic bands, particle swarm, leap-frog) Simulation of physical and control processes, visualization, and GUI Languages: Python, C++, JavaScript