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Nikolay Nikolov

Research Interests

Deep Reinforcement Learning, Representation Learning, Meta Learning, Robotics

Education

Oct 2014 -Sep 2018 **Imperial College London**, *BEng + MEng Electronic and Information Engineering*.
First Class Honors *74.3/100%*; US GPA equivalent: *4.0/4.0*
Courses: *Robotics* • *Machine Learning* • *Computer Vision* • *Control* • *Operating Systems* • *Compilers* • *OOP* • *Mathematics* • *Networks* • *Databases* • *Algorithms and Data Structures*

Sep 2017 -Sep 2018 **ETH Zurich**, *MEng Exchange Student*.
Courses: *DL* • *ML* • *Probabilistic AI* • *Dynamic Programming and Optimal Control* • *Computer Vision*

Experience and Research

Dec 2018 -Present **Wayve**, *Reinforcement Learning Researcher*, Cambridge, UK.
- Worked on state-of-the-art Imitation Learning that can drive in highly complex urban European roads
- Developing Reinforcement Learning algorithms that efficiently learn from interventions

Sep 2017 -Sep 2018 **Learning & Adaptive Systems Group**, *Research Assistant*, ETH Zurich.
- Supervisor: *Prof. Andreas Krause*
- Master Thesis on *Exploration in Deep Reinforcement Learning via Information-Directed Sampling*
- Developed a state-of-the-art approach that uses the distribution of returns for efficient RL exploration

July 2017 -Sep 2017 **Ocado Technology**, *Robotics Research Intern*, Hatfield, UK.
Deep Reinforcement Learning for robot picking
- Implemented a deep RL system for picking objects from a basket (based on *Levine et al. (2016)*)
- Implemented in TensorFlow and deployed on a UR10 robotic arm via C++ and ROS

Jan 2017 -Sep 2017 **Dyson Robotics Lab**, *Research Assistant*, Imperial College London.
Bayesian Fusion for Volumetric SLAM based on Occupancy Mapping
- Supervisor: *Prof. Stefan Leutenegger*. Demo: nikonikolov.com/projects/bfusion
- Developed Bayesian formulation for volumetric occupancy fusion from depth camera
- Prototyped real-time implementation for a CPU and a CUDA-enabled GPU in C++

June 2015 -Dec 2016 **Aerial Robotics Lab**, *Research Assistant*, Imperial College London.
Built a Bio-inspired Bimodal Hexapod Quadcopter that can walk as hexapod and fly as quadcopter
- Supervisor: *Prof. Mirko Kovac*; Demo: nikonikolov.com/projects/wkquad

Publications

PDF **Urban Driving with Conditional Imitation Learning.** *Wayve, N Griffiths*, C Gurau*, J Hawke*, A Kendall*, P Mazur*, S Micklethwaite*, N Nikolov*, D Reda*, A Shah*, S Sharma*, R Shen**. Machine Learning for Autonomous Driving Workshop, NeurIPS 2019.

PDF **Information-Directed Exploration for Deep Reinforcement Learning.**
Nikolay Nikolov, Johannes Kirschner, Felix Berkenkamp, Andreas Krause.
International Conference on Learning Representations (ICLR), 2019.

PDF **Efficient Octree-Based Volumetric SLAM Supporting Signed-Distance and Occupancy Mapping.** *Emanuele Vespa, Nikolay Nikolov, Marius Grimm, Luigi Nardi, Paul H J Kelly, Stefan Leutenegger.* IEEE International Conference on Robotics and Automation (ICRA), 2018.

Selected Projects

2018 **Deep Reinforcement Learning Library**.
Open-source Deep RL library implemented TensorFlow and OpenAI gym
- High-quality reusable implementations of core RL algorithms: github.com/nikonikolov/rltf

2017 **Autonomous Snack Delivery Android**, *Robot Intelligence Lab, Imperial College London*.
Baxter robot that autonomously delivers snacks indoors (third-year group project)
- Supervisor: *Prof. Petar Kormushev*; Demo: nikonikolov.com/projects/asda
- Designed the stack for mapping, localization and motion planning in Python, C++ and ROS
- Technical team lead for our group of 8 students

2017 **A2Z Drone Delivery**, *Brown University*, Providence, RI, US.
DJI M-600 drone that can deliver food and drinks
- Preliminary demo: nikonikolov.com/projects/dronedelivery

2017 **Eurobot 2017 Robotics Competition**, *Imperial College London*.
Programmed a robot to recognize, collect and move objects in order to build a lunar base
- Designed and implemented the full stack software architecture for the robot in C++ and ROS
- Implemented an Extended Kalman Filter for sensor fusion for localization

2016 **Autonomous Raspberry Pi Robotic Car**.
Autonomous car that uses particle filtering to optimally navigate and recognize obstacles

2016 **C90 to MIPS compiler**.
Self-hosted C90 compiler implemented in C++

2015 **Eye tracking on FPGA**.
Real-time image-processing FPGA architecture that tracks human eye movements

Skills

Programming — Expert: *Python, C/C++* • Experienced: *Java, Shell, JavaScript, SQL, MATLAB*
Familiar with object-oriented and concurrent programming, algorithms and data structures

Research — Emphasis on *Deep Reinforcement Learning* and *Robotics*. Experience with simulations and real robots, developing and implementing RL methods. Background in *Deep Learning* and *SLAM*

Software — TensorFlow • PyTorch • gym • ROS • OpenCV • CUDA • scikit-learn • git • Docker • Linux

Languages — English • Bulgarian • Russian

Honors and Awards

2015 Jessel Rosen Research Award — *London, UK*
2013 International Young Physicists Tournament - Bronze Medal — *Taipei, Taiwan*
2013 STEM distinction by the President of Bulgaria — *Sofia, Bulgaria*

Online Courses

CS294: Deep Reinforcement Learning, *Sergey Levine, UC Berkeley*.
CS231n: Deep Learning, *Andrej Karpathy, Stanford*.
CS229: Machine Learning, *Andrew Ng, Stanford*.

Affiliations

2014-2018 Imperial College Robotics Society - Member and Eurobot Team Lead
2007-Present Aikido - 1st Dan Black Belt
2015-2016 Imperial Entrepreneurs - Vice President
2012-2014 Rotaract "Varna-Euxinograd" - Creator of an annual educational forum