

Nikolay Nikolov

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Research Interests

Deep Reinforcement Learning, Robotics, Deep Learning, Computer Vision

Education

- Oct 2014 **Imperial College London**, *BEng + MEng Electronic and Information Engineering*.
-Jun 2018 First Class Honors 72.1/100%; 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 **ETH Zurich**, *MEng Exchange Student*.
-Jun 2018 Courses: *Deep Learning • Probabilistic Artificial Intelligence • Dynamic Programming and Optimal Control • Machine Learning • Vision Algorithms for Mobile Robots*

Experience and Research

- Sep 2017 **Learning & Adaptive Systems Group**, *Research Assistant*, ETH Zurich.
-Present
 - Supervisor: *Prof. Andreas Krause*
 - Master Thesis on *Deep Exploration in Reinforcement Learning via Information-Directed Sampling*
 - Developed an approach which outperforms Bootstrapped DQN and UCB on the Atari games
 - Additional extracurricular research project on *Distributional RL for Continuous Control*

July 2017 **Ocado Technology**, *Robotics Research Intern*, Hatfield, UK.
-Sep 2017 *Deep Reinforcement Learning for robot picking*
 - Implemented a deep RL system for picking objects from a basket using a camera
 - Based on the visual servoing paper by *Levine et al. (2016)*, Google Brain
 - Implemented in TensorFlow and deployed on a UR10 robotic arm via ROS

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

June 2015 **Aerial Robotics Lab**, *Research Assistant*, Imperial College London.
-Dec 2016 *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 **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

- in progress **Deep Reinforcement Learning Library.**
Open-source Deep RL library implemented TensorFlow and OpenAI gym
 - Designed for research, reusability and metric plotting. Source: github.com/nikonikolov/rltf
 - Reproduces common core algorithms such as DQN, DDPG, PPO, etc.

- 2017 **Autonomous Snack Delivery Android**, *Imperial College London*.
Baxter robot that autonomously delivers snacks indoors (third-year group project)
 ○ Supervisor: *Prof. Petar Kormushev* (Robot Intelligence Lab)
 ○ Demo: nikonikolov.com/projects/asda
 ○ Designed the full stack software architecture for the project in Python, C++ and ROS
 ○ Designed and implemented the algorithmic pipeline for mapping, localization and motion planning
 ○ Technical team lead for our group of 8 students
- 2017 **A2Z Drone Delivery**, *Brown Univeristy*, Providence, RI, US.
Raspberry Pi-operated DJI M-100 drone to deliver food in Brown University
 ○ 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 ROS
 ○ Implemented an Extended Kalman Filter for sensor fusion for localization
- 2017 **Machine Learning for Movie Recommendation**.
 Collaborative Filtering system for movie recommendation
- 2016 **HackZurich**, *Zurich, Switzerland*.
 Image-processing and Optical Character Recognition (OCR) app that can scan grocery receipts to keep track of fridge contents. Implemented using OpenCV and Google OCR API
- 2016 **Autonomous Raspberry Pi Robotic Car**.
 Autonomous car that uses Monte-Carlo localization to optimally navigate and recognize obstacles
- 2016 **C90 to MIPS compiler**.
 Self-hosted C90 compiler implemented in C++, flex and bison
- 2015 **Eye tracking on FPGA**.
 Real-time image-processing FPGA architecture that tracks human eye movements

Skills

Programming C/C++ • Python • Java • Shell • MATLAB • JavaScript • HTML/CSS • SQL
 Software TensorFlow • gym • ROS • OpenCV • CUDA • scikit-learn • git • Linux • GNU
 Research Deep Reinforcement Learning • Robotics • Deep Learning • SLAM • Vision
 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-Present Imperial College Robotics Society - Member
 2007-Present Aikido - 1st Dan Black Belt
 2015-2016 Imperial Entrepreneurs - Vice President