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Nikolay Nikolov

Research Interests

Deep Reinforcement Learning, Robotics, Deep Learning, Computer Vision

Education

Oct 2014 -Jun 2018 **Imperial College London**, *MEng Electronic and Information Engineering*.
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 -Jun 2018 **ETH Zurich**, *MEng Exchange Student*.
Courses: *Deep Learning* • *Probabilistic Artificial Intelligence* • *Dynamic Programming and Optimal Control* • *Machine Learning* • *Vision Algorithms for Mobile Robots*

Experience and Research

Sep 2017 -Present **Learning & Adaptive Systems Group**, *Research Assistant*, ETH Zurich.
Distributional Reinforcement Learning
- Supervisor: *Prof. Andreas Krause*

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

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*
- Developed Bayesian formulation for volumetric occupancy fusion from depth camera
- Prototyped real-time implementation for a CPU and a CUDA-enabled GPU
- Demo: http://nikonikolov.com/projects/bfusion
- Paper submission to IEEE RA-Letters and ICRA 2018

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: http://nikonikolov.com/projects/wkquad

Publications

under review **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 compatible with OpenAI gym
- Specifically designed for research, speed, ease of use and metric plotting
- Reproduces common algorithms such as DQN, DDPG, TRPO, PPO, REINFORCE, 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: http://nikonikolov.com/projects/asda
- Designed the full stack software architecture for the project in ROS
- Designed and implemented the algorithmic pipeline for mapping, localization and motion planning
- Team leader for our group of 8 students

2017 **A2Z Drone Delivery**, *Brown Univeristy*, Providence, RI, US.
Raspberry Pi-operated DJI M-100 to deliver food in Brown University
- Preliminary demo: http://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