

# ALEXEY KASHAPOV

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## EXPERIENCE AND INTERNSHIPS

### Visiting student

#### MIT CSAIL, HCI Engineering

November 2019 - Present Cambridge, MA

- Worked on the research PhotoChromeleon with a professor Stefanie Mueller. **Paper is in preparation for UIST 2020**
- Proposed a solution for an object pose estimation with a known 3D model of the object with accuracy **0.5 cm**
- Implementing an algorithm for a pixel to pixel projections matching between two projectors. We expect to achieve the **accuracy in 1-2 pixels**

### Software Developer Intern

#### WareVision, Robotic startup company

June - August 2019 Moscow, Russia

- Built a decision-making system based on ROS for autonomous mobile platform and an UAV for warehouses stocktaking which let the company show a **live demo for fund seeking**
- Implemented a motion control algorithm for differential drive mobile platform for ROS, which includes trajectory creating and trajectory following

### Robotics Software Developer

#### Eurobot 2019, Robotic Contest with Autonomous Robots

October 2018 - June 2019 La-Roche-sur-Yon, France

- Developed a real-time computer vision algorithm for semantic segmentation using U-Net, OpenCV, Scikit-Image. The aim was to find specific objects and their positions. The accuracy is **1cm** and **3 fps** speed
- Built a decision making system for two autonomous mobile robots with unexpected situation processing
- Made a protocol interaction between high-level Odroid XU4 and low-level STM32f4 on the Odroid XU4 side

## RESEARCH

3D Mask R-CNN. Neural network for instance semantic segmentation on color image and depth map

#### MIT, Mechatronics Research Laboratory

September 2019 - Present Cambridge, MA

- Built a new deep learning architecture for instance segmentation - 3D-Mask R-CNN, which inputs are color image and associated depth map. The key point is combining features from depth map and image in a backbone.
- Collected and annotated a dataset with the most accurate 3D camera in the world - Zivid OnePlus S
- Trained 3D-Mask R-CNN with collected data on modified Mask R-CNN framework from Facebook: included my own model to the model zoo and adapted training and testing scripts
- Got better results than Mask R-CNN on **4%** in Average Precision
- **Paper is in preparation for IROS 2020**

## EDUCATION

### Master degree

#### Skolkovo Institute of Science and Technology

expected June 2020 Moscow, Russia

- Major: Information Systems and Technologies (GPA 4.9/5.0)
- Related coursework: Information and Coding Theory, Control Systems Engineering, Systems Engineering, Robotics

### Bachelor degree

#### Novosibirsk State University

Aug 2014 - June 2018 Novosibirsk, Russia

- Major: Physical and Technical Informatics (GPA:4.7/5.0)
- Related coursework: Mathematical analysis, Functional analysis, Differential equations, Probability theory and statistics, Discrete Math, Object Oriented Programming, Network technologies, Operating Systems

## SKILLS

### Programming:

Python, C++, C, Java, MySQL

### Tools&Frameworks:

ROS, OpenCV, PyTorch, Blender, Scikit-Image, Numpy, Django, Unix OS

## HONORS & AWARDS

- Skoltech's academic mobility grant
- Eurobot Open 2019 Finals, **Runner-up** in Finals among 40 teams, that qualified from National stage; Got the **1<sup>st</sup>** in a group stage
- National stage Eurobot Open 2019, **Winner**
- Skoltech's president stipend
- Russian National contest "I am a professional" in direction of Computer Science, **Medalist**

## ACTIVITIES

### Team mentor

#### Eurobot 2020, Robotic Contest with Autonomous Robots

October 2019- Present

- Helped to draft a milestone and guided how to adapt a deep learning model - YOLOv3 to solve their object detection problem.
- Suggest data augmentation techniques which improve accuracy of model by **5%**