Anton Egorov

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Education

- **Doctor of Philosophy (Ph.D.) in Computer Science (Robotics)** — Innopolis, Russia
  Innopolis University; GPA: 4.2 out of 5.0 — *Aug. 2020 – Feb.2022*

- **Master's with Honors in Information Systems and Technology (Robotics)** — Moscow, Russia
  Skolkovo Institute of Science and Technology (Skoltech); GPA: 5.0 out of 5.0 — *Sep. 2018 – Jun. 2020*

- **Bachelor's with Honors in Electronics and Nanoelectronics (Power electronics)** — Cheboksary, Russia
  Chuvash State University; GPA: 5.0 out of 5.0 — *Sep. 2014 – Jun. 2018*

Skills

- **Languages**: Python (Numpy, Sklearn, Scipy, Pandas, PyTorch, Tensorflow, Keras, OpenCV, Matplotlib), C++ (Eigen, pcl), Matlab-Simulink, Verilog and VHDL with FPGA
- **Frameworks & Tools**: Git, Docker (bazel, Cyber RT), Spark, Hadoop, Airflow, Grafana, Kafka, LaTeX

Experience

- **Oregon State University** — remote from Innopolis, Russia
  Research Assistant at Deep Machine Vision group (remote work) — *Feb. 2022 – Jul. 2022*
  Area: 3D reconstructions.
  - Co-organizer (Development Team) of the 3D Building Model Reconstruction challenge for the CVPR 2022 Workshop 2nd Workshop and Challenge on Computer Vision in the built environment for the design, construction, and operation of buildings
  - Focused on the tasks of floorplan reconstruction and 3D building model reconstruction and present appropriate interdisciplinary metrics for solving them.
  - Remote work with writing Hungarian matching, evaluation metrics (Endpoint, Surface, Volumetric) code for 2D and 3D Challenge

- **OZON TECH** — Innopolis, Russia
  Middle Data Scientist (Matching team), ML Group — *Mar. 2022 – present*
  Area: Developing product matching service

  Stack: PyTorch, Spark, Hadoop, Airflow, Grafana, Kafka.

- Innopolis, Russia
  Middle Software Developer (Localization and Mapping (SLAM) team), Self-Driving Group — *Jun. 2021 – Mar. 2022*
  Area: Development of Software for Self-Driving Trucks.
  - Worked with fusion sensors techniques
  - Developed a module for LiDAR to LiDAR calibration
  - Worked on a 3D LiDAR map building
  - Analyzed data collected from sensor systems

  Stack: C++ (Eigen, pcl), git, Docker(bazel, Cyber RT), bash

- **Innopolis University** — Innopolis, Russia
  Engineer in SLAM and Perception teams, Autonomous Transportation Systems Lab — *Nov. 2020 – Jun. 2021*
  Area: Development of Software for Self-Driving cars.
  - Worked on a 3D LiDAR map building
  - Applied matching method for robust LiDAR odometry
  - Analyzed LiDAR data collected
  - Implemented an accurate Semantic Segmentation and 3D Object detection based on LiDAR Point Clouds
  - Worked on visual road signs tracking

Stack: C++(Eigen, pcl), Python (PyTorch, ...), CNN, ROS, Docker, bash, Cyber RT

- **Huawei R&D** Moscow, Russia
  Junior Software Engineer at IRF team *Jul. 2020 – Aug. 2020*
  Topic: Research methods to improve the point cloud quality of automotive 3D LIDAR.
  - Worked on 3D LiDAR simulation

  Stack: Matlab

- **Skoltech** Moscow, Russia
  Graduate student in Intelligent Space Robotic Lab *Oct. 2018 – Jun. 2019*
  Topic: Development of electronics hardware system of two autonomous mobile robots.
  - Designed a printed circuit board for control Maxon motors, dinamixlels and proximity sensors
  - Prepared reliable the power supply system

  Adviser: Professor Dzmitry Tsetserukou

- **Relematika** Cheboksary, Russia
  Electrical Engineer *Jul. 2016 – Sep. 2018*
  - Developing analog electronic microprocessor parts for protection of power lines
  - Worked on development of output impulse formation circuits of definite duration of output signal for the calibration device and holding tests of the complex protection from arc faults
  - Development of a device: DC control relay for complex protection of power lines
  - Developing of a fiber-optic sensor for detecting a short circuit in substations
  - Ability to solder SMT PCB components using a microscope or reflow equipment
  - Repairing PCBs and building cable assemblies with reliability and ruggedness in mind

Internships

- **SMART VIEWING** remote from Cheboksary, Russia
  R&D Intern *Aug 2020 – Nov 2020*
  - Incorporating camera and scene geometry into deep learning models
  - Applying CNN on spherical image representation to get a panoramic semantic segmentation for 3D indoor reconstruction and modeling

  Stack: Python (PyTorch, ...), CNN.

- **The Robotics Institute, Carnegie Mellon University** Pittsburgh, PA, USA
  Graduate Research Intern in Biorobotics Lab (SLAM team) *Aug. 2019 – Jul. 2020*
  Topic: Investigating a robust an orientation-invariant 3D Place Recognition methods to improve large-scale a real-world robot 3D mapping
  - Developed a SphereVLAD, an orientation-invariant 3D Place Recognition (**77.91%** on Kitti, **89.28%** on Campus and **79.06%** on City) method via Spherical Harmonics in 3D LIDAR-based SLAM algorithm
  - Designed a coarse-to-fine sequence matching module SeqSphereVLAD, to improve 3D place identification accuracy (**99.93%** on Kitti, **98.88%** on Campus and **99.04%** on City)
  - Developed a Fast Sequence-matching Enhanced orientation-invariant 3D Place Recognition method
  - Designed a PSE-Match, a Viewpoint-free Place Recognition Method with Parallel Semantic Embedding

  In all experiments used average (%) of Average Recall @1 under 6 different orientation cases to evaluate place recognition accuracy

  Stack: Python (tensorflow, ...), SphericalCNN.

  Advisers: Professor Howie Choset, Postdoc.Peng Yin

- **Skoltech** Moscow, Russia
  Summer Intern Student in Intelligent Space Robotic Lab *Aug. 2019 – Jul. 2020*
  Topic: LocoGear: Locomotion Analysis of Robotic Landing Gear for Multicopters.
  - Prepared reliable and stable hardware (designed a PCB and power supply system) for legs and flying systems

- Set up and calibrate the robot
- Performed real-time simulation on a quadruped mobile robot
- Presented a poster at annual Skoltech industry day 2019

Stack: Matlab-Simulink, Altium Designer.

Advisers: Professor Dzmitry Tsetserukou, Dr.Grigoriy Yashin

- **Helmholtz-Zentrum Berlin für Materialien und Energie (HZB)** Berlin, Germany
  Undergraduate Summer Research Intern in the Institute for Solar Fuels *Jul. 2018 – Sep. 2018*

  Topic: Fabricate a solar water splitting device that produces hydrogen.
  - Fabricated a series of 2% Zn doped π-SnS coated with different buffer layers consisting CdS, Zn(O,S), MoS_2, or Ag_5SnS_6 of which the former two were coated with a 50nm layer of TiO_2, since electrochemically unstable
  - Investigated the photoelectrochemical properties a series of π-SnS devices
  - Presented a poster to committee of HZB and wrote a scientific blog post as a result of work

  Stack: AA-CVD, Magnetron sputtering, XRD, PEC and SEM analysis.

  Adviser: Adviser: Dr. Ibbi Ahmed

Additional Education

- **Tinkoff Bank Machine Learning project school** Sochi, Russia
  Machine Learning Research Student (Computer Vision team) *Mar. 2021*

  Final Project: Development of a Deepfake service - animated image, generated from the source image/video according to the motion and facial expressions of a driving video of another person.
  - Applied the First Order Motion Model for Image Animation
  - Implemented Super-Resolution based on Efficient Sub-Pixel CNN

  Stack: Python (PyTorch, OpenCV, Numpy, Matplotlib), GANs

- **OzonMasters – Program in Data Science and Data Engineering** Remote from Innopolis, Russia
  Data Science Student *Sep. 2021 – Jun. 2022*

  Relevant Subjects: Machine learning, Numerical linear algebra, Algorithms, Python, Linux

Teaching Experience

- **Innopolis University** Innopolis, Russia
  Teaching assistantship at Mobile Robotics and Autonomous Driving *Fall 2020*
  - Taught and prepared homework assignments for students **(9 senior students)**
  - Topic included: particle filter, linear and non-linear Kalman filters
  - Conducted course's final examination

- **Innopolis University** Innopolis, Russia
  Teaching assistantship at Introduction to Artificial Intelligence *Spring 2021*
  - Taught and prepared homework assignments for students **(50 sophomore students)**
  - Topic included: Searching and Optimization, Tree Searching and logic, including basics of PROLOG as a language for answering such problems, Evolutionary Algorithms

Publications

Google Scholar Citations=29, h-index=3, i10-index=1; Citations Homepage

- Peng Yin, Fuying Wang, **Anton Egorov**, Ji Zhang. "Fast Sequence-matching Enhanced orientation-invariant 3D Place Recognition," in *Proc. IEEE Transactions on Industrial Electronics journal (TIE)*, 2021. Accessed: Feb. 2021. [Online]. Available: doi: 10.1109/TIE.2021.3057025, https://ieeexplore.ieee.org/abstract/document/9351776
- Peng Yin, Ziyue Feng, Lingyun Xu, **Anton Egorov** and Bing Li. "PSE-Match: A Viewpoint-free Place Recognition Method with Parallel Semantic Embedding," in *Proc. IEEE Transactions on Intelligent Transportation Systems journal (T-ITS)*, 2021. Accessed: Aug. 2021. [Online]. Available: doi: 10.1109/TITS.2021.3102429, https://ieeexplore.ieee.org/abstract/document/9523568

- Peng Yin, Fuying Wang, **Anton Egorov**, Jiafan Hou, Ji Zhang, Howie Choset. "SeqSphereVLAD: Sequence Matching Enhanced Orientation-invariant Place Recognition," in *Proc. International Conference on Intelligent Robots and Systems (IROS 2020)*, Las Vegas, NV, USA, 2020. Accessed: Oct. 2020.
[Online]. Available: https://ieeexplore.ieee.org/document/9341727?denied=
- Grigoriy A. Yashin, **Anton Egorov**, Zhanibek Darush, Nikolay Zherdev, and Dzmitry Tsetserukou. "LocoGear: Locomotion Analysis of Robotic Landing Gear for Multicopters,"in *IEEE Journal on Miniaturization for Air and Space Systems (J-MASS)*, vol. 1, issue 2, pp.138-147. Accessed: Sep. 2020.
[Online]. Available: doi: 10.1109/JMASS.2020.3015525, https://ieeexplore.ieee.org/document/9163320/authors#authors

Workshops

- Co-organizer of 2nd Workshop and Challenge on Computer vision in the build environment for the design, construction, and operation of buildings segmentations. Held in conjunction with the *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2022*, New Orleans, Louisiana, USA, June 2022.

Honors & Awards

- Scholarship for PhD in Computer Science at **Oregon State University**, Prof. Fuxin Li (USA, 2022)
- Scholarship for PhD in Computer Science at **Luleå University of Tech.**, Prof. George Nikolakopoulos (Sweden, 2020)
- Scholarship for PhD in Computer Science at **Innopolis University**, Prof. Alexandr Klimchik (Russia, 2020-2022)
- Best Project Award in **Tinkoff Bank** ML project school, (Russia, 2021)
- Skoltech's academic mobility scholarship (Russia, 2019)
- 2nd place in the **world robotic competition** "Eurobot OPEN" Finals (France,2019)
[Online]. Available: https://truestory.skoltech.ru/reset
- Winner of the National stage "Eurobot OPEN" (Russia, 2019)
- Best Design Award in Robotics course (Skoltech, 2019)
- Best Project Award in Control and Systems Engineering course (Skoltech, 2019)
- Scholarship for Master's in Robotics at **Skoltech**, Professor Dzmitry Tsetserukou (Russia, 2018)
- **HZB** 2018 Undergraduate Fellowship, Dr. Ibbi Ahmed (Berlin, Germany)
- Participant of the 19th **World Festival** of Youth and Students (Russia, 2018)

Language Fluency

- Russian(native), English(fluent – TOEFL ITP)