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 – Jan 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*

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 – Dec.2021*
  Relevant Subjects: Machine learning, Numerical linear algebra, Algorithms, Python, Linux

Professional Experience

- **OZON TECH** — Innopolis, Russia
  Middle Software Developer (Localization and Mapping (SLAM) team), Self-Driving Group — *Jun. 2021 – present*
  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, bash, Cyber RT

- **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

- **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*
  Topic: Development of electronics hardware system of two autonomous mobile robots.
  - 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

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

Teaching Experience

- **Innopolis University** Innopolis, Russia
  TA's 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
  TA's 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

- 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

Honors & Awards

- Scholarship for Phd in Computer Science at Oregon State University, Professor Fuxin Li (USA, 2022)
- Scholarship for Phd in Computer Science at Luleå University of Tech., Professor George Nikolakopoulos (Sweden, 2020)
- Scholarship for Phd in Computer Science at Innopolis University, Professor 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 competitions "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)