Roman Ibrahimov

Contact Information

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Education

Purdue University, West Lafayette, IN, USA — *Jan 2020-present*
M.S., Aeronautics and Astronautics, CGPA: 4.0/4.0

- **IEEE RAS Summer School on Multi-Robot Systems**, CTU, Prague, Czechia, *1-5 Aug 2022*
  Multi-UAV control, perception, localization, and planning
- **DroneCamp**, University of California, ANR, Monterey, California, USA, *27 June - 1 July, 2022*
  UAV hardware & sensors, mission planning, flight skills, safety & regulations

Skolkovo Institute of Science and Technology, Moscow, Russia — *Sep 2018-May 2020*
M.S. ***with Distinction***, Space and Engineering Systems, CGPA: 4.85/5.0

ADA University, Baku, Azerbaijan — *Sep 2014-May 2018*
B.S. ***Summa Cum Laude***, IT and Systems Engineering, CGPA: 3.90/4.0

- **ITMO University**, St. Petersburg, Russia, *Spring 2017*
  Exchange Student, Control Systems and Robotics, CGPA: 5.0/5.0
- **Middle East Technical University**, Ankara, Turkey, *Spring 2016*
  Exchange Student, Electrical and Electronics Engineering, CGPA: 3.80/4.0

Honors and Awards

Purdue University Poster Symposium Best Poster Award — *April, 2022*

Skolkovo Foundation Full Graduate Scholarship — *2018-2020*

ACM SIGGRAPH Asia Best Demonstration Award — *November, 2019*

Skolkovo Presidential Scholarship — *November, 2019*

President's List of Honor, ADA University — *2014-2017*

Erasmus+ Exchange Scholarship, METU — *Spring 2016*

FameLab World Finalist, Cheltenham, the UK — *June 2015*

1st place, Microsoft ImagineCup Competition, Baku, Azerbaijan — *May 2015*

4th place, International Rudolf Ortvay Competition in Physics, Hungary — *Dec 2014*

Work Experience

Research Assistant, NASA RETH Institute, IN, USA — *May 2021-present*
Situational Awareness team

Teaching Assistant, Purdue University — *Jan 2021-present*
CNIT 155 Introduction to Software Development Concepts (in Python)

Teacher, Landau High School, Baku, Azerbaijan — *Aug 2020-Dec 2020*
Cambridge IGCSE Computer Science

Instructor, International College in Baku, Baku, Azerbaijan — *June 2020-Dec 2020*
Scholastic Assessment Test (SAT), Graduate Record Examinations (GRE)

Intern, Universal Robots, Moscow, Russia *Summer 2019*
Human-Robot Collaboration (HRC) through a quadcopter

Visiting Research Student, Joint Institute of Nuclear Research, Dubna, Russia *Summer 2018*
Supervisor: Prof. Marek Peryt

Intern, Azercosmos OJSCo, Baku, Azerbaijan *Summer 2017*
Networking Systems at Ground Control Department

Teaching Assistant, ADA University *2015-2017*
COE 244 Digital Logic Design, ENCE 2402 Electrical Circuits, PHYS 102 Physics II

Instructor, Baku Higher Oil School *Fall 2016*
Robotics Bootcamp for the underrepresented university students

Instructor, ADA Math Center *2015-2016*
Co-created the center, helped students in Electrical Circuits and Physics courses

Extracurricular Course Instructor, Baku Anatolian High School *Fall 2015*
Taught Experimental Physics and Microcontroller courses to the 9th and 10th graders

Intern, R.I.S.K. Company, Baku, Azerbaijan *Summer 2015*
IT Hardware Systems

Project Experience

Resilient Extraterrestrial Habitats, NASA RETH Institute, Purdue University *May 2021-present*
- A control-theoretic autonomy framework to support resilient design and operation
- Automated active learning framework with robots and humans-in-the-loop
- Methods for detection and diagnosis of anticipated and unanticipated faults
- Establishing SmartHabs with autonomous abilities to sense, anticipate and respond

Bio-inspired nano-quadcopter for map building, Purdue University *Sep 2021-present*
-API on FreeRTOS to read sensor reading on the quadcopter
- Sending sensor reading to the ROS base station via radio
- Collecting point cloud from the quadcopter and building map
- Predicting the map of the environment using ML techniques

Human-Drone Interaction through a Tactile Wearable, Skoltech *Oct 2018-May 2020*
- A human-drone communication with impedance control and vibrotactile feedback
- A tactile wearable built with eccentric rotating mass (ERM) motors
- Virtual Reality (VR) application built based C# for teleoperation and aerial manipulation
- Remote object manipulation with drones

Balloon Satellite for Testing Solar Cells in High Altitude, Skoltech *Sep 2018-Jan 2019*
- Model-based Systems Engineering for mission success
- CubeSat built with on-board controller, solar cells, storage devices, and GPS tracking system
- Data collected about current, voltage and temperature (CVT) of the tested solar cells
- Retrieved payload with no damage after landing from 35km maximum altitude

Gas Leak Detecting Mobile Robot for NICA Collider, JINR *Summer 2018*
- Autonomous navigation around elliptical collider
- Mobile robot with an on-board temperature camera
- Computer Vision (CV) algorithm based on Python for detection nitrogen gas leak from the collider
- Computer-based user interface for remote monitoring

Publications

R. Ibrahimov, R. Wang, S. Sun, and F. Tajiki "A Bio-inspired Nano-quadcopter for 2D Mapping Using AI,", *Purdue University Poster Symposium 2022* , West Lafayette, Indiana, USA, Apr. 26, 2022

A. Behjat, **R. Ibrahimov**, A. Lenjani, A. Barket, K. Martinus, A. Maghareh, D. Whitaker, I. Bilionis, and S. Dyke, "A Computational Framework for the Evaluation of Resilience in Deep Space Habitat Systems,", *ASME*

2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference , St. Louis, Missouri, USA, Aug. 14-17, 2022, (preprint)

E. Tsykunov, A. Fedoseev, E. Dorzhieva, R. Agishev, **R. Ibrahimov**, D. Vasquez, L. Labazanova, and D. Tsetserukou, "DroneStick: Flying Joystick as a Novel Type of Interface," *ACM SIGGRAPH Asia 2021 Emerging Technologies*, Virtual, Dec. 14-17, 2021

E. Karmanova, V. Serpiva, S. Perminov, **R. Ibrahimov**, A. Fedoseev, and D. Tsetserukou, "SwarmPlay: A Swarm of Nano-Quadcopters Playing Tic-tac-toe Board Game against a Human," *ACM SIGGRAPH 2021 Emerging Technologies*, Virtual, Aug. 9-13, 2021

R. Ibrahimov, N. Zherdev, and D. Tsetserukou, "DroneLight: Drone Draws in the Air using Long Exposure Light Painting and ML," *29th IEEE International Conference on Robot & Human Interactive Communication (IEEE RO-MAN 2020)*, Naples, Italy, Aug. 31-Sept. 4, 2020

E. Tsykunov, R. Agishev, **R. Ibrahimov**, T. Moriyama, L. Labazanova, H. Kajimoto, and D. Tsetserukou "SwarmCloak: Landing of Two Micro-Quadrotors on Human Hands Using Wearable Tactile Interface Driven by Light Intensity," *2020 IEEE Haptics Symposium* , Washington DC, USA, March 28-31, 2020

R. Ibrahimov, E.Tsykunov, V. Shirokun, A. Somov, and D. Tsetserukou, "DronePick: Object Picking and Delivery Teleoperation with a Drone Controlled by a Tactile Wearable," *28th IEEE International Conference on Robot & Human Interactive Communication (IEEE RO-MAN 2019)*, New Delhi, India, 2019

E. Tsykunov*, **R. Ibrahimov***, D. Vasquez, D. Tsetserukou, "SlingDrone: System for Navigation and Interaction with the Environment Using a Single Drone and VR," *25th ACM Symposium on Virtual Reality Software and Technology (VRST 2019)*, Sydney, Australia, 2019
***-** authors contributed equally to the paper

E. Tsykunov, R. Agishev, **R. Ibrahimov**, L. Labazanova, T. Moriyama, H. Kajimoto, D. Tsetserukou, "SwarmCloak: Landing of a Swarm of Nano-Quadrotors on Human Arms," *Int. Conf. on Computer Graphics and Interactive Technologies (ACM SIGGRAPH Asia 2019), Emerging Technologies,* Brisbane, Australia, 2019, (**Best Demonstration Award**).

E.Tsykunov, R. Agishev, **R. Ibrahimov**, A. Tleugazy, and D. Tsetserukou, "SwarmTouch: Guiding Swarm of Nano-Quadrotors with Impedance Control using Wearable Tactile Interface," *IEEE Transactions on Haptics*, 2019

G. Yashin, D. Trinitatova, R. Agishev, **R. Ibrahimov**, and D. Tsetserukou, "AeroVR: Virtual Reality Teleoperation System for the UAV Robotic Manipulator," *19th IEEE International Conference on Advanced Robotics (ICAR 2019)*, Belo Horizonte, Brazil, 2019

E. Tsykunov, R. Agishev, **R. Ibrahimov**, T. Moriyama, L. Labazanova, H. Kajimoto, D. Tsetserukou, "SwarmCloak: Landing of Two Micro-Quadrotors on Human Hands Using Wearable Tactile Interface Driven by Light Intensity," *IEEE Haptics Symposium (Haptics 2020)*, Washington DC, US, 2020

Conference and Journal Reviewer

IEEE International Conference on Robotics and Automation (ICRA) 2021, IEEE ICRA 2020, ACM Conference on Human Factors in Computing Systems (CHI) 2020, Virtual Reality & Intelligent Hardware Journal 2020

Technical Skills

Programming: C/C++, Java, Python, MATLAB/Simulink, LabVIEW, LaTeX

Robotics: Robot Operating System (ROS), ROS2, Gazebo, RViz, Unity

MCUs: myRIO, Arduino, Libelium

Mechanical: CAD (SolidWorks), 3D Printing, soldering, laser/plasma cutting

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