Roman Ibrahimov

CONTACT INFORMATION

Resilient Extraterrestrial Habitats institute (RETHi)
Mann Building Suite 266
203 S Martin Jischke Dr., West Lafayette, IN 47907

E-mail: ibrahir@purdue.edu
Mobile: (574) 581-0957
Webpage: roman-ibr.github.io

EDUCATION AND PROFESSIONAL DEVELOPMENT

Purdue University, West Lafayette, IN, USA   *Jan 2021-present*
M.S., Aeronautics and Astronautics, CGPA: 3.9/4.0
Advisors: Prof. Shirley Dyke and Prof. David Cappelleri

- **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

Skoltech (in collaboration with **MIT**), Moscow, Russia   *Sep 2018-May 2020*
M.S. with Distinction, Space and Engineering Systems, CGPA: 3.9/4.0
Advisor: Prof. Dzimitry Tsetserukou

ADA University, Baku, Azerbaijan   *Sep 2013-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: 4.0/4.0

- **Middle East Technical University**, Ankara, Turkey, *Spring 2016*
  Exchange Student, Electrical and Electronics Engineering, CGPA: 3.80/4.0

RESEARCH INTERESTS

Planning & Control; UAV design; Multi-Robot Systems; Human-Robot Interaction; Cyber-Physical Systems; Haptics;

PUBLICATIONS

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

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.

PROJECT
EXPERIENCE

An inspection robot for Duke Energy Power Lines, Purdue University   *May 2022-present*
- *Model Predictive Control (MPC) for trajectory tracking*
- *Line detection using OpenCV*
- *Modeling the dynamics of the robot*
- *Hardware configuration and testing*

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-May 2022*
- *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 on 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*

WORK
EXPERIENCE

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

Teaching Assistant, Purdue University   *Jan 2021-May 2021*
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

Undergraduate 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 grades

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

HONORS AND AWARDS

Purdue University Poster Symposium Best Poster Award $750 *April 2022*

Skolkovo Foundation Full Graduate Scholarship *2018-2020*

ACM SIGGRAPH Asia Best Demonstration Award *November 2019*

Skolkovo Presidential Scholarship *November 2019*

Skolkovo Presidential Travel Award, $5000 *November 2019*

Skolkovo Presidential Travel Award, $4500 *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*

REVIEWER FOR CONFERENCE AND JOURNALS

IEEE Robotics and Automation Letters (RA-L) 2022; 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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