

# REZA ALIASGARI RENANI

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## EDUCATION

### Moscow Institute of Physics and Technology (MIPT, Phystech)

September 2024 – June 2026

M.Sc. in Applied Mathematics and Physics, Program: Plasma Physics, GPA: 4.7/5.0

Moscow, Russian Federation

**Thesis title:** Investigation of radiation induced effects on FPGA-based signal processing systems for space applications.

### Moscow Institute of Physics and Technology (MIPT, Phystech)

September 2020 – June 2024

B.Sc. in Technical Physics, Program: Aerospace Technology, GPA: 4.56/5.0

Moscow, Russian Federation

**Thesis title:** Investigation of the effects of low energy (1 - 20 keV) electrons and high energy (1 MeV) gamma quanta irradiation on the electro-physical properties of dielectric-semiconductor structures.

## RESEARCH EXPERIENCE

### Design Center for the Development of Microprocessor Technology for AI Systems, System-on-Chip Development Laboratory

September 2024 – Present

Programmer / RTL Design Engineer

Moscow, Russian Federation

- **DSP Implementation**

Ported mathematical algorithms into efficient Verilog implementations. Built a fixed-point library and LUT-based function approximations (Horner's method) to support fixed-point computations. Implemented image processing algorithms (rgb2hsv, color segmentation, Sobel edge detection, global tone-mapping, frame summing, demosaicing, bird's-eye view, fisheye correction) via Simulink HDL code generation and manually written Verilog. Optimized latency and throughput, resolved synchronization and pipelining issues.

- **Simulation, Verification and Synthesis**

Created comprehensive testbenches in Verilog and used Python for simulation automation and data analysis to verify DSP functionality and performance. Synthesized, mapped, and routed HDL code using Vivado (FPGA: Xilinx Artix-7, Zybo Z7). Verified ISP algorithms by first streaming test images via HDMI from a host computer, and subsequently with a live camera connected to the FPGA.

- **Investigation of FPGA devices under electron-beam plasma exposure**

Conducted irradiation experiments on FPGA boards using electron beams (25 – 60 keV, up to 100 mA) in low-pressure oxygen atmospheres ( $10^{-6}$  – 50 Torr), generating plasma and X-rays. Applied combined thermal cycling (218–393 K) and surface charging to evaluate FPGA reliability under radiation- and plasma-induced stress.

### Institute of Microelectronics Technology, Russian Academy of Sciences

March 2023 – August 2024

Laboratory Researcher

Moscow, Russian Federation

- **Experimental Equipment Installation and Automation**

Installed experimental devices including Everbeing Cryo-station (80K – 450K) with 4 micromanipulators, Lakeshore Temperature Controller Model 336, Keithley SourceMeter 2450, Parametric Analyzer Keithley 4200A-SCS, Keysight Electrometer B2987A, Aktakom 3048, and Zurich Instruments MFIA Impedance Analyzer. Developed [applications](#) in MATLAB to automate experimental techniques: Thermally Stimulated Current, Capacitance-Voltage, Current-Voltage, Current-Time and Deep-Level Transient Spectroscopy.

- **Theoretical Investigation**

Developed theoretical understanding and studied experimental techniques for semiconductor devices (MOS, MOSFET, diode, RRAM). Predicted sample behavior, and determined measurement parameters.

- **Experimental Investigation and Data Processing**

Conducted electrical characterization experiments on microelectronic structures, processed data using MATLAB and Origin Pro, removed extraneous random telegraph noise points, and compared results with theoretical models.

### Laboratory of Modeling of Mechanical Systems and Processes

March 2023 – August 2024

Engineer / Technician

Moscow, Russian Federation

- **Engineering Design and Development**

Designed, developed, and analyzed models for a CubeSat orbital deployer and vibration fixture using SolidWorks. Created multiple prototypes, which passed random vibration simulation and dynamic analysis, and tested them on the UVE 4000 vibro-stand for mechanical environmental factors and vibration resistance.

## PUBLICATIONS & CONFERENCES

R. Aliasgari Renani, O.A. Soltanovich, M.A. Knyazev, S.V. Koveshnikov.

*Investigation of low energy electron irradiated SiO<sub>2</sub> based MOS devices by capacitance-voltage and thermally stimulated current techniques.* [Journal Paper](#), Russian Microelectronics, 2023

R. Aliasgari Renani, O.A. Soltanovich, M.A. Knyazev, S.V. Koveshnikov.

*Study of SiO<sub>2</sub> based MOS by capacitance-voltage and thermally stimulated current techniques.* [Presentation](#), p.122. The 15th International Conference Micro- And Nanoelectronics ([ICMNE 2023](#)).

R. Aliasgari Renani, O.A. Soltanovich, M.A. Knyazev, S.V. Koveshnikov.

*Investigation of electrically active defects introduced into silicon oxide by irradiation of low-energy electrons, by methods of Capacitance-Voltage characteristics and thermally-stimulated current.* [Poster](#), Second Joint Conference on Electron Beam Technologies and X-ray Optics in Microelectronics ([CALT 2023](#))

R. Aliasgari Renani, V. Vasilevskiy, V. Vologin, V. Chesnokov

*Comparative analysis of manual Verilog and Simulink-generated HDL code for image processing algorithms.* Forthcoming presentation, Yadro FPGA Systems Conference, 2025.

## TECHNICAL SKILLS

### Advanced

- Automation of Experimental Techniques
- Electrical Characterization
- Data Processing
- MATLAB, Simulink, HDL Coder
- Verilog, RTL Design
- FPGA Development
- Fixed-Point Computations
- SciPy, NumPy, OpenCV

### Intermediate

- Python, C++, Arduino
- Vivado, Vitis
- Git, Unix/Linux OS
- OriginLab
- SolidWorks
- ERDAS IMAGINE
- PCB, EasyEDA
- OpenRocket

## PROJECTS

### Model Rocket

April 2023 and 2025

- Constructed model rockets with 40 and 60 Newton-second impulses as part of a team.
- Launched three model rockets over two years at the Cosmonautics Day of MIPT.

### Model Lunar Rover

June 2023

- Collaborated on a machine capable of navigating obstacles without round wheels.
- Tested multiple prototypes, with the final design approved by the laboratory head.

### Aircraft Detection System

June 2022

- Investigated and applied algorithms to detect aircraft using photoresistors and transistors.
- Developed a system capable of rotational and translational movement to track aircraft.

### Investigation of Non-Conservative Electric Fields and Voltmeters

May 2022

- Designed an experimental setup to analyze position-dependency of voltmeter readings in parallel circuits.
- Demonstrated the non-intuitive potential differences generated by changing magnetic fields.

## AWARDS

- **Recipient:** Full State Russian Scholarship for Foreign Students, MIPT **September 2024**
- **Recipient:** Iranian State Scholarship, Isfahan University of Technology **September 2019**
- **Awardee:** Participant of the [5th and 7th Eurasian Aerospace Congress](#) **July 2023 and 2025**

## LANGUAGES

**English:** C2 (TOEFL iBT 113) | **Russian:** B1 | **German:** B1 (ÖSD) | **Farsi:** Native