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, diodes, RRAM). Predicted sample behavior, interpreted physical phenomena, 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 RTN 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_2 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_2 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, ASIC, and SoC Development
- Fixed-Point Computations
- SciPy, NumPy, OpenCV

Intermediate

- Python, C++, Arduino
- Vivado, Vitis
- Git, Unix 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