MIKHAIL SMIRNOV

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TECHNICAL SKILLS

Programming Languages: MATLAB, Python, Java, C, C++, Verilog/VHDL, Rust.
Circuit Design Tools: OrCAD PSpice, LTspice, NI Multisim, KiCAD.
Other Tools: Wolfram Mathematica, GNU Radio, Simulink, Vivado Design Suite.

EXPERIENCE

Graduate Research Assistant, June 2022 – Present
Network and Innovation Laboratory, New York Institute of Technology– New York, NY
- Collaborated on NSF-funded project, "Soil Sensing with Drones and Radar Systems" in developing a wireless Software-Defined Radio (SDR)-based system that utilizes Surface Acoustic Wave (SAW) sensors to measure various soil properties.
- Co-authored a survey paper publication on wireless soil sensing technologies in IEEE Access.
- Modeled digital signal processes via MATLAB, Simulink, and GNU Radio to test and configure various SDR devices for radar use.
- Leading a team on preparing a survey paper on Ground Penetrating Radar applications for further research and development.

Embedded Systems Prototype Engineer/Project Manager October 2023 – December 2024
Entrepreneurship and Technology Innovation Center, New York Tech – New York, NY
- Designed and built a hardware prototype composed of RFID tags, RFID readers, microcontrollers and sensors for a low-power wearable sensor network based on the requirements set by the NASA patent.
- Developed a memory-efficient algorithm in C to perform read/write operations to and from RFID tags.
- Designed, assembled, and tested custom PCBs for RFID devices based on Arduino hardware.
- Consulted on hardware design for a NASA prototype that demonstrates digital and analog reconstruction of 12-lead ECG signals.
- Provided oversight and managed the day-to-day operations of the ETIC lab by maintaining laboratory equipment, advising staff and clients, and conducted presentations for potential clients of various startups and organizations.
- Supervised students on various engineering projects (i.e. a voice-controlled robotic vehicle, and a swerve drivetrain simulation).

Computational Sciences Summer Undergraduate Laboratory Intern (SULI), June 2021 – August 2021
Brookhaven National Laboratory (BNL), US Department of Energy, Long Island, NY
- Simulated and mathematically modeled charge diffusion in Electron-Multiplying Charge-Coupled Devices (EMCCDs) to deepen current knowledge of soft inelastic X-ray scattering for BNL's National Synchrotron Light Source II.
- Created a numerical integration program using C++ ROOT to solve for charge distribution over a 5x5 pixel EMCCD grid.
- Summarized and presented findings in a BNL report for BNL's Soft Inelastic X-ray Scattering (SIX) beamline group and SULI interns.

Undergraduate Mathematics Research Assistant, January 2020 – May 2021
Department of Mathematics, New York Institute of Technology, New York, NY
- Developed a mathematical model for the fluid mechanics of pleated filter membranes for optimal performance.
- Programmed a numerical differential equation solver using MATLAB to simulate the 2D flow through a pleated filter.
- Co-authored an MDPI Fluids journal publication and presented the findings in various talks and conferences.

Undergraduate Physics Research Assistant, May 2019 – May 2020
Department of Physics, New York Institute of Technology, New York, NY
- Utilized Wolfram Mathematica to solve for energy eigenvalues of hadrons' gauge fields for the theory of holographic duality.
- Modeled both experimental Regge Trajectory data and theoretical energy eigenvalues in hadrons.

PROJECTS

RAPID: Acquisition and curation of time-sensitive field data from severely flooded neighborhoods in New York City from tropical storm Ophelia for environmental sustainability study November 2023 – Present
- Implementing a process for curating and compressing large multimodal flooding datasets based on an NSF RAPID grant.
- Developing algorithms based on compressed sensing that accurately reconstruct 3D point cloud data via L1 convex optimization.
- Writing and reporting my findings in master's thesis that investigates various methods of compression for 3D topographic lidar point cloud data using compressed sensing.

Path Planning for E-Trucks and E-Tricycles for Emission Reduction in Last Mile Delivery Project, April 2023 – Present
- Developing and collaborating on a model and path-planning genetic algorithm in MATLAB, which optimizes routes of E-trucks and E-tricycles in last-mile delivery to reduce carbon emissions.
- Performing large-scale simulations on NYIT's High Performance Computing (HPC) Cluster to examine the performance of the proposed algorithm under a collection of varying scenarios and parameters.
- Co-authoring a paper that presents the results of this current research work.

FPGA Verilog Implementation of 24-bit RISC-V Processor May 2024

- Collaborated with a team of students to design and implement a 24-bit CPU in Verilog using Vivado Design Suite that includes a custom 24-bit instruction set, program counter, memory module, and memory-mapped peripherals.
- Created an ALU, register file, and memory using Block RAMs that reads/writes to 24-bit instruction memory and data memory.
- Wrote testbenches to simulate fetching and decoding of instruction opcodes from memory and ALU execution.

PUBLICATIONS

A Survey of Wireless Soil Sensing Technologies,
Y. Xu, M. Smirnov, M.C. Kohler, Z. Dong, R.K. Amineh, F. Li, R. Rojas-Cessa, *IEEE Access*, DOI: 10.1109/ACCESS.2024.3352006.

Modeling of the Effects of Pleat Packing Density and Cartridge Geometry on the Performance of Pleated Membrane Filters,
D. Persaud, M. Smirnov, D. Fong, P. Sanaei, *MDPI Fluids*, 6(6), 209 (2021).

CONFERENCE TALKS

Wearable RFID Sensor Tags Yield Extended Operational Times, NASA Assistive Technologies Startup Summit, (Carlyle Tower, Alexandria, VA), (December 2024)

On Optimizing the Performance of Pleated Membrane Filters, 2021 Society for Industrial and Applied Mathematics Annual Meeting (SIAM AN21), (July 2021).

Optimizing Pleated Filter Performance Based on Variable Pleat Packing Density, 2021 Society for Industrial and Applied Mathematics Annual Meeting (SIAM AN21), (July 2021).

Mathematical Modeling of Flow and Fouling in Pleated Membrane Filters, The 7th International Micro and Nano Flows Conference (MNF 2021), (Imperial College London, May 2021).

Optimizing the Pleat Packing Density in a Pleated Filter Cartridge, The 7th International Micro and Nano Flows Conference (MNF 2021), (Imperial College London, May 2021).

Examining Pleated Membrane Filter Performance Based on Pleat Packing Density and Cartridge Geometry, The Symposium of University Research and Creative Expression (SOURCE 2021), (New York Institute of Technology, April 2021).

Investigating the Effects of Pleat Packing Density on a Pleated Membrane Filter, 14th Northeast Complex Fluids and Soft Matter Workshop (NCS14), (New Jersey Institute of Technology, January 2021).

On Optimization of Pleat Packing Density in a Pleated Membrane Filter, 73rd Annual Meeting of the American Physical Society, Division of Fluid Dynamics, (November 2020).

HONORS AND AWARDS

- NASA T2X Certificate of Excellence 2024
- Graduate Scholar Award 2023, 2024
- Eugene Odin Mathematics Award 2022
- B.S. in Electrical and Computer Engineering Dean's Award 2022
- Dr. Heskia Heskiaoff Academic Achievement Award 2022
- Presidential Honor List 2018, 2019, 2021, 2022
- Presidential Scholarship 2018 –2022
- Edward Guiliano Global Fellowship 2020

PROFESSIONAL SOCIETIES

- Institute of Electrical and Electronics Engineers (IEEE)
- Society for Industrial and Applied Mathematics (SIAM)
- American Physical Society (APS) (Former)

EDUCATION

New York Institute of Technology (NYIT)

- M.S. in Electrical and Computer Engineering (Expected graduation: May 2025, GPA: 3.96)
- B.S. in Electrical and Computer Engineering (2022, *Summa Cum Laude*, GPA 3.93)
- Minor in Mathematics