Dennies Bor

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Professional Summary

Computational scientist specializing in numerical modeling, high-performance computing, and infrastructure resilience analysis. Expertise in developing physics-based simulations, econometric models, and spatial algorithms. Strong background in scientific computing (Python, Pyomo, IPOPT), parallel computing workflows, and cloud-based HPC infrastructure.

Technical Skills

- **Computational Physics:** Numerical methods (Euler, RK4, SOR), finite difference methods, particle dynamics, PDEs, electromagnetic field simulations.
- **Signal Processing:** Frequency-domain analysis, matched filters, coherence estimation, Welch PSD, spectral methods.
- **Econometric Modeling:** Input-Output models, Computable General Equilibrium (CGE), nonlinear optimization (Pyomo, IPOPT), uncertainty quantification.
- **Remote Sensing & Computer Vision:** Hyperspectral imaging, multispectral analysis, satellite image processing, deep learning for object detection (YOLO, CNNs), LiDAR processing.
- **Geospatial Computing:** GIS algorithms, spatial analysis (GDAL, geopandas, rasterio), web mapping (Cesium, Leaflet), point cloud processing.
- **Scientific Programming:** Python (NumPy, SciPy, Matplotlib, Pandas, TensorFlow, PyTorch), Go, React, MATLAB, parallel computing, cloud HPC (AWS EC2).
- **DevOps & Infrastructure:** Docker, GitHub Actions (CI/CD), Nginx, systemd, AWS deployment, REST APIs.

Education

- **George Mason University** — Fairfax, VA, USA
  PhD in Earth Systems and Geoinformation Sciences (Advisor: Dr. Edward Oughton) — *Sep 2023 – Present*

  Relevant Coursework: *Computational Physics, Applied Electromagnetics, Atmospheric Physics, Earth Image Processing, Spatial Computing, Hyperspectral Imaging, GIS Algorithms*
  GPA: *3.96*

- **Technical University of Kenya** — Nairobi, Kenya
  BEng in Aeronautical Engineering (First Class Honors) — *Sep 2013 – May 2019*

Research Experience

- **Graduate Research Assistant** — George Mason University, VA, USA
  Computational Modeling, Spatial Analysis, Infrastructure Resilience — *May 2022 – Present*
  - Develop computational models integrating numerical simulations, econometric analysis, and geospatial processing to quantify infrastructure resilience and socio-economic impacts of natural hazards.

- **Engineering Intern** — Broglio Space Center, Malindi, Kenya
  Satellite Operations, RF Systems — *Aug 2018 – Nov 2018*
  - Supported satellite tracking, telemetry processing, and RF communication systems for Earth observation missions.
  - Assisted in ground station operations and real-time data acquisition for geospatial applications.

Selected Publications & Preprints

- **A Reproducible Method for Mapping Electricity Transmission Infrastructure for Space Weather Risk Assessment:** arXiv:2412.1768 — Interactive Dashboard: denniesbor.github.io/spw-geophy-io
- **A Physics-Engineering-Economic Model Coupling Approach for Estimating Socio-economic Impacts of Space Weather:** arXiv:2412.18032 — Code: github.com/denniesbor/spw-geophy-io

Professional Development

- **National Center for Atmospheric Research** — Boulder, CO, USA
  Early Career Faculty Innovators Program — *2023 – 2025*

- **African Institute of Mathematical Sciences** — Cape Town, South Africa
  Africa Data Science Intensive Program — *2022*

REFERENCES

Available upon request.