Nicolas Martin Guerra

nmg64@cornell.edu • (305) 878-2679 • nicolas-guerra.github.io

Education

PhD, Applied Mathematics Expected: May 2028
Cornell University | Ithaca, NY, USA

BS/MS, Applied Mathematics with specialization in Industrial Engineering June 2023
Northwestern University | Evanston, IL, USA
GPA: 3.93/4.00, *Cum Laude*

***Relevant Courses*:** Statistical Learning for Data Analysis, Optimization Methods in Data Science, Machine Learning, Service Engineering and Management, Financial Engineering, Partial Differential Equations, Linear Algebra, Probability, Stochastic Processes

Relevant Experience

Graduate Research Assistant August 2023 – Present
Yunan Yang Research Group | Ithaca, NY

- Currently developing a deep neural network with over 9 million parameters to solve the Calderón inverse problem using operator learning via a virtual machine
- Developed a MATLAB program to mimic the Dirichlet-to-Neumann operator to generate over seven thousand samples of synthetic current, voltage, and electrical conductivity data

Research Assistant January 2020 – June 2023
Ulmer Research Group | Evanston, IL

- Engineered a program in MATLAB to quantify roughness of telescopic mirrors by reading in experimental data and using Fourier transform
- Employed image filtering and machine learning programs in Python to detect exoplanets 163 light-years away using principal component analysis
- Managed over 100 GB of space-imaging data ensuring efficient data-accessing measures and organization

Tutor Aide September 2022 – June 2023
America Reads @ McGaw YMCA | Evanston, IL

- Assisted elementary school children in reading, writing, and math to help them excel in school
- Facilitated students in completing and thoroughly understanding their homework assignments

Engineering Analysis IV Grader September 2022 – December 2022
Northwestern University | Evanston, IL

- Evaluated assignments and exams for a foundational differential equations course with over 100 students
- Provided constructive feedback on every assignment and addressed any uncertainties students had

Undergraduate Researcher January 2022 – June 2022
Petia M. Vlahovska Research Group | Evanston, IL

- Examined Quincke rotor dynamics with a time-dependent electric field to further the research of fluid dynamics

- Unraveled a complicated physical system of differential equations, similar to the Lorenz equations, using eigenvalue stability analysis to understand its chaotic dynamics
- Modeled a simulation of the system's behavior using MATLAB in order to gain a deeper understanding of its dynamics

Instructor June 2019 – August 2019
iD Tech | Miami, FL
- Educated elementary and middle school students on programming fundamentals in Java and Lua
- Tailored my curriculum to align with each student's preferred learning style

Publications and Written Works

Ulmer, M.P., Dugard, J.H., Quispe, D., Buchholz, D.B., Stagon, S.P., Chung, Y.W., Cao, J., Kritikos, K., **Guerra, N.**, Stahl, M.T. and Shiri, R., 2022, August. A concept for a deployable normal incidence EUV mirror based on shape memory alloy sheets. In *Space Telescopes and Instrumentation 2022: Ultraviolet to Gamma Ray* (Vol. 12181, pp. 776-784). SPIE.

Ulmer, M.P., Jalilvand, M., Marks, N.A., Buchholz, D.B., Fujishima, B., **Guerra, N.**, Cao, J., Chung, Y.W., Baturalp, T.B., Coverstone, V.L. and Stagon, S.P., 2020, December. The prospects for applying magnetic smart materials combined with shape memory alloys to produce correctable and deployable space telescopes. In *Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation IV* (Vol. 11451, pp. 393-404). SPIE.

Grants and Scholarships Received

Cornell Fellowship August 2023 – May 2024

Illinois Space Grant Consortium (ISGC) Scholarship September 2021 – June 2022
Consortium part of NASA's National Space Grant College and Fellowship Program

ISGC Summer Research Program June 2021 – September 2021
- Utilized image subtraction programs to detect transient phenomena such as supernovae and gamma-ray bursts in Python
- Enhanced the speed and accuracy of image processing procedures by 40%

Summer Undergraduate Research Grant June 2021 – July 2021
Northwestern University
- Automated image subtraction and filtering techniques and programs to detect variable stellar sources in Python
- Explored and implemented approaches to efficiently handle and analyze large remote Hubble datasets within the codebase

ISGC Summer Research Program June 2020 – September 2020
- Developed a program in MATLAB to model ray trace of light hitting imperfect mirrors using vector calculus
- Facilitated weekly meetings to review progress, address any challenges that arose, and brainstorm potential solutions

ISGC Scholarship September 2020 – June 2021
Consortium part of NASA's National Space Grant College and Fellowship Program

Recognitions

Cornell Graduate School Dean's Scholar August 2023
Scholars who have demonstrated a strong commitment to academic excellence and advancing aspects of diversity, access, equity, inclusion, and belonging in the academy and other communities

Co-Winner of Northwestern's Applied Mathematics Outstanding Graduate Award June 2022
Recognition for outstanding achievement given by the advisors of the applied mathematics department

Presentations

Oral Presentations

Guerra, N., Eberlin, S., Ulmer, M.P. (2021, August). *Search for Transient Phenomena.* Annual ISGC Summer Research Presentations. Zoom

Guerra, N., Ulmer, M.P. (2020, August). *Power Spectral Density.* Annual ISGC Summer Research Presentations. Zoom

Skills

Professional

- Expertise in MATLAB, Python (PyTorch, Numpy, Pandas), R/RStudio, SQL, and Microsoft Excel
- Familiarity with Java, C, Github, Docker, and AWS
- Knowledgeable in mathematical physics, machine learning, data regression and statistical analysis, data management, high performance and parallel computing, computer programming

Language

- Spanish: Native fluency
- Vietnamese: Basic proficiency