DAVID BENJAMIN GOMEZ

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PROFILE

Aerospace engineer-turned-data scientist specializing in machine learning (ML) and natural language processing (NLP) with a passion for developing data-driven solutions to societal issues and public health research.

EDUCATION

Georgia Institute of Technology   **Atlanta, Georgia**
- Master's of Science in Computer Science (ML)   GPA: 3.8 / 4.0 Highest Honors   *Aug 2022 – Dec 2024*
- Master's of Science in Aerospace Engineering   GPA: 3.7 / 4.0 Highest Honors   *Aug 2018 – May 2020*
- Bachelor's of Science in Aerospace Engineering   GPA: 3.6 / 4.0 Highest Honors   *Aug 2015 – May 2018*

Georgia Southwestern State University   **Americus, Georgia**
- Regents' Engineering Pathway Program (REPP)   GPA: 3.9 / 4.0   *Aug 2013 – May 2015*

RESEARCH EXPERIENCE

Social Dynamics and Well-Being Laboratory (SocWeB) | Georgia Institute of Technology   **Atlanta, Georgia**
Graduate Research Assistant   *Aug 2022 – May 2024*
- Conceptualized and addressed research questions at the intersection of social media and mental health using machine learning, deep learning, and natural language processing techniques (see RELEVANT PROJECTS)

Space Systems Design Laboratory (SSDL) | Georgia Institute of Technology   **Atlanta, Georgia**
Graduate Research Assistant   *Aug 2021 – May 2022*
- Conducted reliability analyses of CubeSats in Python using Kaplan-Meier curves and time-to-failure distributions

High-Power Electric Propulsion Laboratory (HPEPL) | Georgia Institute of Technology   **Atlanta, Georgia**
Graduate Research Assistant & NASA Space Technology Research Fellow (NSTRF)   *Aug 2018 – May 2020*
- NSTRF Proposal: Development of a highly throttleable, bipropellant (Xe-Kr) Hall thruster and investigations into the newly discovered oscillation modes in magnetically shielded thrusters
- Conducted 1D simulations of Hall thrusters in MATLAB to assess performance of an elongated ionization chamber

High-Power Electric Propulsion Laboratory (HPEPL) | Georgia Institute of Technology   **Atlanta, Georgia**
Undergraduate Research Assistant   *May 2017 – May 2018*
- Built the propellant delivery system for HPEPL's primary EP testing facility with Swagelok hardware integrating digital mass flow controllers, solenoid values, and solid-state relays
- Developed a LabVIEW application integrating a DryCal flowmeter to automate the mass flow calibration procedure

INDUSTRY EXPERIENCE

Busek Space Propulsion and Systems   **Natick, Massachusetts**
Research and Development Engineer   *Aug 2020 – Aug 2021*
- Supported laboratory testing and data acquisition of electric propulsion (EP) devices for spaceflight qualification
- Developed a custom LabVIEW application to automate the acquisition Hall-effect thruster magnetic field profiles, integrating stepper motors and B-field probes, reducing labor and time costs by half

NASA Jet Propulsion Laboratory (JPL)   **Pasadena, California**
Electric Propulsion Intern (x3)   *May – Aug 2018, 2019, 2020*
- Developed an uncertainty analysis procedure for EP thrust stands using linear regression and prediction intervals
- Built a custom LabVIEW application for JPL's primary EP testing facility that synchronized the control and data acquisition of 20 devices improving the latency and sampling rate by 1 and 3 orders of magnitude, respectively

AWARDS

- Georgia Tech Highest Honors (2015-2024)
- NASA Space Technology Research Fellowship (2019)
- Outstanding Undergraduate Researcher Award (2018)
- Peach Belt Conference Honor Role (2013- 2015)
- Highest Average in AP Physics (2013)
- Highest Average in Accelerated Math III (2013)

SKILLS / FRAMEWORKS

- **Python**: NumPy, Pandas, Seaborn, Matplotlib, Plotly, Scikit-Learn, Keras, TensorFlow, PyTorch, Transformers
- **Other**: SQL, R, STATA, LabVIEW, MATLAB, LaTeX, Git/GitHub, HuggingFace

RELEVANT PROJECTS

Disclosure Patterns of Suicidality on Social Media
Independent Research for Social Dynamics and Well-Being Laboratory   *May 2023 – Dec 2023*
- Applied natural language processing and multivariate timeseries k-means clustering in Python to suicide-related tweets collected from X (formerly Twitter) APIs to identify temporal response patterns to suicide disclosures
- Performed imbalanced text classification via logistic regression, support vector machines, and multilayer perceptrons to predict, using pre-disclosure data, which pattern a user would exhibit with the best model achieving an F1 of 0.64

Identifying Linguistic Characteristics that Differentiate Mental Health Forums on Reddit
Team Leader for Course Project in Deep Learning   *Jan 2023 – May 2023*
- Trained/fined-tuned text classifiers (LSTM, DistilBERT, and RoBERTa) in Python to perform multiclass classification assigning Reddit posts to one of three mental health-related subreddits, with the best model achieving an F1 of 0.83
- Conducted model interpretability via SHAP to identify the linguistic tokens that differentiate the three subreddits

Affective Desensitization to Public Mass Shootings on Social Media
Team Leader for Course Project in Social Computing   *Jan 2022 – May 2022*
- Applied multiple linear regression and hypothesis testing in Python to data collected from X with features derived from the Valence-Dominance-Arousal lexicon to find evidence of American desensitization to public mass shootings
- Controlled for confounding variables via backward feature selection and examined for collinearity with VIF analysis

Improving the Gun Ownership Proxy for Firearm Research
Personal Project turned Publication   *Jan 2020 – Dec 2020*
- Applied multiple nonlinear regression and a cross-validated deep neural network in Python to develop two new proxy measures of state-level gun ownership, improving state-of-the-art performance from $R^2 = 0.61$ to 0.94
- Conducted model diagnostics via residual symmetries, prediction intervals, and Cook's distance for outlier influence

Challenging the Inevitability of Suicide
Team Leader for Course Project in Accident Causation and System Safety   *Aug 2019 – Dec 2019*
- Applied simple linear regression and hypothesis testing in STATA to suicide data collected from CDC APIs to argue that measures to reduce firearm suicide rates (i.e., gun regulations) do not exacerbate suicide rates by other means

PUBLICATIONS

- **Gomez, D. B.**, Xu, Z., & Saleh, J. H. (2020). From regression analysis to deep learning: development of improved proxy measures of state-level household gun ownership. *Patterns*, *1*(9)
- Geng, F., **Gomez, D. B.**, Guan, Y., & Saleh, J. H. (2019). Monte-Carlo value analysis of High-Throughput Satellites: Value levers, tradeoffs, and implications for operators and investors. *Plos one*, *14*(9)
- Geng, F., **Gomez D. B.**, Guan, Y., & Saleh, J. H. (2019) Understanding High-Throughput Satellites: market disruptions, technology, and value analysis. *International Astronautical Federation (IAC),* E3(3)

TEACHING

Georgia Institute of Technology | School of Aerospace Engineering   **Atlanta, Georgia**
Graduate Teaching Assistant   *Seasonal 2018 – 2023*
- Spring 2023:   AE 3610 Experiments in Fluids and Solid Mechanics
- Fall 2022:   AE 2610 Introduction to Experimental Methods in Aerospace Engineering
- Summer 2022:   AE 4803 Accident Causation and System Safety
- Fall 2021:   AE 2220 Dynamics
- Spring 2019:   AE 4361 Spaceflight Dynamics
- Fall 2018:   AE 3610 Experiments in Fluids and Solid Mechanics

Georgia Southwestern State University | School of Computer Science   **Americus, Georgia**
Supplementary Teaching Assistant   *Jan 2018 – May 2018*
- Spring 2018:   CSCI 1301 Introduction to Computer Programming

REFERENECS

Mitchell L.R. Walker, Ph.D. | (404) 385-2757 | mitchell.walker@coe.gatech.edu
School Chair & Professor of Aerospace Engineering, Georgia Institute of Technology

Robert B. Lobbia, Ph.D. | (818) 354-0278 | robert.b.lobbia@jpl.nasa.gov
Senior Staff Engineer, NASA Jet Propulsion Laboratory