

Blaine Costello, Ph.D.

NANOMATERIALS | SIMULATOR DEVELOPMENT | AUTOMATION

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Summary

- Forward-thinking multidisciplinary problem solver with a broad range of experience in topics ranging from microelectronics, software development, automation, and embedded systems, leading to a holistic and systems-level approach to identifying and engineering optimal solutions.
- Experienced and self-motivated with excellent time management skills and a track record of providing quality mentorship and team leadership in complex technical projects while also conducting rigorous and high-impact scientific research.
- Efficient collaborator in both technical and non-technical contexts with entrepreneurial experience, capable of facilitating communication between engineering teams, business development teams, customers, and the general public.

Education

Georgia Institute of Technology

PH.D. IN ELECTRICAL ENGINEERING (GPA: 3.54)

Atlanta, GA

2020 - 2022

M.S. IN ELECTRICAL ENGINEERING (GPA: 3.54)

2016 - 2020

B.S. IN COMPUTER ENGINEERING (GPA: 3.57)

2013 - 2016

Experience

Knowledgeable of current state-of-the-art technologies and materials illustrated by recent findings of possible negative capacitance effects in a broader range of materials than previously considered, thus providing strong guidance for future research into such effects ^[1].

Innovative and results-driven research style proven by the development, implementation, and validation of a novel algorithm for the approximation of energy density in simulated composite materials leading to more efficient calculation of simulated energy storage characteristics ^[2].

Strong project management and quantitative analysis skills demonstrated as the sole developer of a novel 3-D simulator of composite materials based on a pre-defined set required inputs and outputs resulting in the creation of a generalized tool for identifying possible next-generation composite materials for energy storage applications ^[3].

Close attention to detail evidenced by the successful design and execution of novel fabrication processes utilizing a class-100,000 cleanroom facility with a strong emphasis on lab safety ^[4].

Undergraduate Research Assistant: Intelligent Robotics & Emergent Automation Lab (IREAL)

Atlanta, GA

GEORGIA INSTITUTE OF TECHNOLOGY - DEPARTMENT OF MECHANICAL ENGINEERING

Jan 2015 - Aug 2016

- Aptitude for the development of abstract robotic systems as evidenced by the successful design, fabrication, programming, and testing of a modular distributed system of cooperative ground robots resulting in a publication presented at the IEEE International Conference on Automation Science and Engineering (CASE) in 2016 ^[5].
- Proclivity for applying creative solutions in rigorous technical projects as showcased by the design, specification, and cost projection analysis for a novel, power-independent, autonomous agricultural monitoring platform.

Research Engineering Intern: Autonomous Airdrop & Landing Systems

Atlanta, GA

EARTHLY DYNAMICS - RESEARCH & DEVELOPMENT

May 2011 - Jan 2015

- Flexibility in multidisciplinary engineering projects demonstrated by contributing to the high-precision fabrication of prototypes for a novel robotic helicopter landing gear system, resulting in a DARPA grant of roughly \$1M for continued project development.
- Experienced in the innovation of human-centric engineering through contributions to the ideation and testing of a novel humanitarian aid delivery system resulting in a method of delivery that eliminates the risk of human casualty from large-payload airdrop delivery of emergency supplies ^[6].
- Strong proficiency writing technical documentation obtained through the creation of user manuals designed for training new employees on rapid prototyping equipment, resulting in more efficient onboarding of new engineers.

Leadership

Interdisciplinary Cohort Leader: Grand Challenges Scholars Program

Atlanta, GA

GEORGIA INSTITUTE OF TECHNOLOGY

Fall 2021 - Spring 2022

- Strong organizational skills exercised through the development and adherence to curriculum consisting of weekly or fortnightly lectures with clearly defined expectations and periodic deliverables.
- Quality mentorship at the individual and team level provided to students during the problem discovery phase, resulting in engaging discussions about technological and humanitarian issues and their root causes.

Professional Tutor: Physics, Math, Chemistry, Programming, Engineering

Atlanta, GA

SELF-EMPLOYED

2018 - 2021

- Developed affinity for communicating complex technical concepts at all levels by working directly with high school students and undergraduates to provide tutoring and mentorship in a wide range of STEM topics including calculus, algebra, statistics, discrete math, various programming languages, chemistry, physics, technical writing, computer aided design, etc.
- Exercised organizational skills by planning and administering short modular lessons and practice problems based on individual student needs.
- Demonstrated results-driven approach by actively tracking individual student progress with periodic assessments to identify specific strengths and weaknesses.
- Cultivated a safe-space for learning by ensuring that students recognize their failures as an integral part of their learning process, and encouraging success through positive-reinforcement.

Team Facilitator: Grand Challenges Living and Learning Community

Atlanta, GA

GEORGIA INSTITUTE OF TECHNOLOGY

2016 - 2018

- Developed foundational mentorship and leadership skills through the advisement of undergraduate teams attempting to solve grand challenges faced by humankind, resulting in funding awarded to one team for their proposal of a low-cost water quality testing kit for communities impacted by industrial contaminants.
- Learned team dynamics and leadership from a psychological perspective through attending workshops focused on cultivating positive team dynamics, inclusivity, and a safe space for ideas.

Personal Projects

Decentralized Anonymous Peer-Review Ecosystem: Python, Solidity, EVM

- Cultivated understanding of blockchain ecosystem architecture obtained from self-study resulting in the UML design of smart-contract system for decentralized peer-review system based on crowd-sourcing through decentralized distributed financial incentives.
- Practiced development skills using Solidity and other new tools through the ongoing implementation, testing, and integration of secure and functional code using OpenZeppelin.

Autonomous Cryptocurrency Trading Bots: Python, Bash, Linux

- Demonstrated fundamental understanding of market dynamics by devising, implementing, and testing both high- and low-frequency trading strategies using Python.
- Strong programming ability as evidenced by use of Python and Bash for the creation of a custom cloud architecture for local control of cloud-based trading bots with a GUI front-end.
- Deep understanding of Linux computing environments obtained from creating and managing in-house Linux server for remote deployment and control of cryptocurrency trading bots.

PROFICIENCIES: Python, Matlab, C/C++, Java, Unix CLI, Bash, CUDA, MOAB, Golang, Git, LaTeX, Assembly, REST API, SQL, SolidWorks.

ACTIVELY LEARNING: Solidity, Javascript, Golang, Jupyter, PyTorch, Scikit-Learn, OpenAI, Unreal Engine 5, OpenSCAD, GPT-3.

Publications

- [1] B. Costello and J. A. Davis, "Energy Storage Limits and Variations in Metal-Insulator Nanocomposites Exhibiting Internal Negative Capacitance and Exotic Interphase Properties," <In-Progress>, 2022.
- [2] B. Costello and J. A. Davis, "Breakdown Field Strength Variations and Energy Density Limits of Nanoparticle Composite Materials," *IEEE Transactions on Nanotechnology*, vol. 19, pp. 811-819, 2020.
- [3] B. Costello, J.A. Davis. "Quasi-Electrostatic Simulation of Energy Density Limits and Variability in Nanoparticle (NP) Composite Materials," *Tech-Connect World Innovation Conference & Expo*, Boston, Massachusetts, 2019.
- [4] Z.M. Karimi, D. Brown, E. Woods, B. Costello, W. Henderson, J. Davis. "Characterization and Simulation of Permittivity Enhancements of Si O₂/Si₃N₄ Nanolaminate Layers," *IEEE Nanotechnology Materials and Devices Conference*, Portland, Oregon, 2018.
- [5] B. Costello, E. Davies, L. Strickland, J. Rogers. "A Novel Distributed Ground Robotic System for Cooperative Manipulation of Payloads of Any Size," CASE 2016, *IEEE International Conference on Automation Science and Engineering*, Fort Worth, Texas, 2016.
- [6] T. Herrmann, M. Costello, C. Montalvo, B. Costello, "Design, Simulation, and Experimental Testing of Humanitarian Aid Airdrop Micro Packages," *AIAA Atmospheric Flight Mechanics Conference*, Minneapolis, Minnesota, 2012.

References

Dr. Jeffrey A. Davis, Associate Professor of Electrical and Computer Engineering
Georgia Institute of Technology, Atlanta, GA
Dr. Azad J. Naeemi, Professor of Electrical and Computer Engineering
Georgia Institute of Technology, Atlanta, GA
Dr. Muhannad S. Bakir, Professor of Electrical and Computer Engineering
Georgia Institute of Technology, Atlanta, GA
Dr. Jonathan D. Rogers, Lockheed Martin Associate Professor of Avionics Integration
Georgia Institute of Technology, Atlanta, GA

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