# Gabriel E. Marcano

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## Education

PhD Candidate in Computer Science and Engineering, UC San Diego — Oct. 2020 - Present
B.S. in Software Engineering, Rochester Institute of Technology — May 2015

## Experience and Projects

### UC San Diego, PhD Candidate (2020-Present)

**Intermittent Computing and Energy Harvesting,** Lead student researcher

- Analyzed and simulated power management policies to maximize work done with intermittent computing.
- Mentored Early Research Scholars Program undergraduates and developed novel timing primitive for intermittent computing systems.
- Designed a number of custom circuit boards, from sensing utilities to intermittent computing prototypes.
- Benchmarked feasibility of using COTS energy harvesting chips with soil microbial fuel cells (sMFCs).

**Repurposing Discarded Smartphones to Reduce Carbon Emissions**, Embedded systems and Linux specialist

- Built custom Linux OS images for Android Pixel 6A and Fold phones to enable use as a cluster.

**Compressing ResNets for FPGAs**, Developer and tester

- Converted experiments from Pytorch to Keras to compare results with different neural network libraries.

### The MITRE Corporation, Computer Science Engineer, Sr. (2017-2020)

**Volatile organic compound detector using Quantum Dots-Polymer Nanocomposite (QDPN) deposits**, Lead control software developer

- Developed primary collection control algorithm in Python for photodiode based collector.

**Autonomous UAS platform**, Camera and control systems developer and integrator

- Ported Linux kernel drivers for Sony 4K camera sensor from one Nvidia TX2 carrier to another.
- Developed control framework in C++ to manage UAS higher-level decision making.

**Sensor fusion on vehicle platform**, Camera integration developer

- Developed software in C++ to pipe HD-SDI camera data to ROS through V4L2.

**Neuromorphic camera research**, Assistant investigator

- Helped characterize neuromorphic camera performance.
- Developed software in C++ to capture data, and experimented with noise suppression filtering.

**Low-power computing performance field study**, Lead SoC platforms investigator

- Benchmarked system performance of Nvidia Tegra platforms for deep learning applications.
- Profiled power consumption of Nvidia Tegra platforms under different levels of load.

### The MITRE Corporation, Computer Science Engineer (2015-2017)

**Prototype array camera research**, Lead software developer

- Designed control and real-time acquisition software in C++.
- Helped design remote API control for a custom high-speed FPGA-enabled array camera.

**Stand-off portable CBRNE detector prototype**, Lead software developer

- Integrated and tested system, composed of COTS components.
- Developed real-time low-level microcontroller software in C controlling high-power flash.

## Skills

**Programming languages:**

Modern C++, Rust, C, Python, and Java. Experience with ARM, RISC-V, and AVR assembly.

**Languages:**

Fluent in Spanish and English.

## Honors

ASPLOS 2023 Distinguished Paper Award. — 2023
ENSsys 2021 Organizer's Choice Demo Award. — 2021
Sloan Scholar Fellow. — 2020
Two MITRE Trailblazer awards for contributions to important MITRE projects. — 2019

## Conference Publications

Junkyard Computing: Repurposing Discarded Smartphones to Minimize Carbon
Jennifer Switzer, **Gabriel Marcano**, Ryan Kastner, and Pat Pannuto
2023. In Proceedings of the 28th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Volume 2 (ASPLOS 2023). Association for Computing Machinery, New York, NY, USA, 400–412.

Early Characterization of Soil Microbial Fuel Cells,
**Gabriel Marcano**, Colleen Josephson and Pat Pannuto
*2022 IEEE International Symposium on Circuits and Systems (ISCAS)*, Austin, TX, USA, 2022, pp. 1362-1366.

## Workshop Publications

Hardware to Enable Large-Scale Deployment and Observation of Soil Microbial Fuel Cells
John Madden, **Gabriel Marcano**, Stephen Taylor, Pat Pannuto, and Colleen Josephson.
2023. In Proceedings of the 20th ACM Conference on Embedded Networked Sensor Systems (SenSys '22). Association for Computing Machinery, New York, NY, USA, 906–912.

Soil Power? Can Microbial Fuel Cells Power Non-Trivial Sensors?
**Gabriel Marcano** and Pat Pannuto.
2021. In Proceedings of the 1st ACM Workshop on No Power and Low Power Internet-of-Things (LP-IoT'21). Association for Computing Machinery, New York, NY, USA, 8–13.

## Journal Publications

Tailor: Altering Skip Connections for Resource-Efficient Inference
Olivia Weng, **Gabriel Marcano**, Vladimir Loncar, Alireza Khodamoradi, Abarajithan G, Nojan Sheybani, Andres Meza, Farinaz Koushanfar, Kristof Denolf, Javier Mauricio Duarte, and Ryan Kastner
2024. ACM Trans. Reconfigurable Technol. Syst. 17, 1, Article 11 (March 2024), 23 pages.

## Article Publications

The Future of Clean Computing May Be Dirty
Colleen Josephson, Weitao Shuai, **Gabriel Marcano**, Pat Pannuto, Josiah Hester, and George Wells.
2022. GetMobile: Mobile Comp. and Comm. 26, 3 (September 2022), 9–15.

## Poster/Demo Publications

Adapting Skip Connections for Resource-Efficient FPGA Inference
Olivia Weng, **Gabriel Marcano**, Vladimir Loncar, Alireza Khodamoradi, Nojan Sheybani, Farinaz Koushanfar, Kristof Denolf, Javier Mauricio Duarte, and Ryan Kastner.
2023. In Proceedings of the 2023 ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA '23). Association for Computing Machinery, New York, NY, USA, 229.

Powering an E-Ink Display from Soil Bacteria
**Gabriel Marcano** and Pat Pannuto.
2021. In Proceedings of the 19th ACM Conference on Embedded Networked Sensor Systems (SenSys '21). Association for Computing Machinery, New York, NY, USA, 590–591.