

B. Volkan Gurses

Department of Electrical Engineering
California Institute of Technology, Pasadena, CA 91125, US

e-mail: gurses@caltech.edu
web: gurses.people.caltech.edu

RESEARCH INTERESTS Silicon photonics, optoelectronics, large-scale photonic integrated circuits for free-space-based classical and quantum information processing

EDUCATION **California Institute of Technology**, Pasadena, CA

Ph.D. in Electrical Engineering Sep 2020 - Present

- Ph.D. Minor in Quantum Science and Engineering
- Advisor: Prof. Ali Hajimiri

M.S. in Electrical Engineering, GPA: 3.96 / 4.00 Sep 2020 - Jun 2022

- Advisor: Prof. Ali Hajimiri

Georgia Institute of Technology, Atlanta, GA

B.S. in Electrical Engineering, GPA: 3.94 / 4.00 Aug 2016 - May 2020

- Research Option Track

AWARDS AND HONORS

- R. David Middlebrook Graduate Fellowship, California Institute of Technology, Aug 2020
- Tau Beta Pi Fellowship, Tau Beta Pi, Apr 2020 [[News](#)] [[Ann.](#)]
- Caltech EAS Division Fellowship, California Institute of Technology, Mar 2020
- Roger P. Webb Undergraduate Research Award, Georgia Institute of Technology, Mar 2020 [[Ann.](#)]
- Eta Kappa Nu Innovation Scholarship, IEE-HKN Beta Mu Chapter, Feb 2020
- IEEE Microwave Theory and Techniques Society (MTT-S) Undergraduate/Pre-Graduate Scholarship, IEEE MTT-S, Feb 2020 [[News](#)] [[Ann.](#)]
- Radio Club of America Scholarship, Radio Club of America, Feb 2020
- American Geophysical Union Fall Meeting Travel Grant, American Geophysical Union [[Ann.](#)]
- President's Undergraduate Research Award, Georgia Institute of Technology, Dec 2017 [[Ann.](#)] and Aug 2019 [[Ann.](#)]
- Opportunity Research Scholars Program Peer Review Award, Georgia Institute of Technology, Apr 2019 [[Ann.](#)]
- European Union Contest for Young Scientists (EUCYS), EIROforum CERN Special Donated Prize, Sep 2015 [[News](#)] [[Ann.](#)]
- Turkish Scientific and Technological Research Council (TUBITAK) National Secondary School Research Contest, First Prize in Physics, May 2015 [[News](#)]

PUBLICATIONS **Google Scholar:** <https://scholar.google.com/citations?user=-J00KBgAAAAJ>

Papers in Refereed Journals

B. V. Gurses, R. Fatemi, A. Khachaturian, A. Hajimiri, "Large-Scale Crosstalk-corrected Thermo-Optic Phase Shifter Arrays in Silicon Photonics", to appear in the IEEE Journal of Selected Topics in Quantum Electronics. [[arXiv preprint](#)]

B. V. Gurses, K. T. Whitmore, and M. B. Cohen, "Ultra-sensitive broadband "AWESOME" electric field receiver for nanovolt low-frequency signals", Review of Scientific Instruments 92, 024704, (2021). <https://doi.org/10.1063/5.0031491>.

Proceedings of Refereed Conferences

B. V. Gurses, R. Fatemi, A. Khachaturian, A. Hajimiri, "288-Element Crosstalk-Corrected Thermo-Optic Phase Shifter Array with Row-Column Addressing", submitted to *Frontiers in Optics + Laser Science*, Rochester, NY, Oct. 16-20, 2022.

E. Slevin, P. Singletary, K. T. Whitmore, B. V. Gurses, N. Opalinski, L. Thompson, M. Golkowski, M. B. Cohen, "Broadband VLF/LF Transmission from an Electrically-Small Structure via Time-Varying Antenna Properties," in *Proc. of the IEEE AP-S International Symposium on Antennas and Propagation*, Montreal, Canada, Jul. 5-10, 2020.

B. V. Gurses, K. T. Whitmore, and M. B. Cohen, "Electric Field Sensor Design for Longwave Radio Reception," in *Proc. of the IEEE SoutheastCON*, Huntsville, AL, Apr. 11-14, 2019.

Patents and Patent Applications

B. V. Gurses, A. Hajimiri, "3D Programmable Neural Networks", Patent App. CIT 8829-P

B. V. Gurses, A. Hajimiri, "Apparatus and Methods for Crosstalk-Corrected Thermo-Optic Phase Shifters", Patent App. CIT 8821-P

Poster Presentations

B. V. Gurses, L. B. Wray, S. Deitke, and G. D. Durgin, "A 2.45 GHz Phased Array-Based Reader for Long-Range RFID Applications," 14th IEEE International Conference on RFID, Orlando, FL, Oct. 2020. (**Best Poster Award**)

B. V. Gurses, K. T. Whitmore, and M. B. Cohen, "Ultra-Sensitive Broadband Remote Sensing Instrument for Longwave Radio Reception," AGU Fall Meeting, San Francisco, CA, Dec. 2019.

J. W. Jiang, S. Kotapati, K. Kim, B. V. Gurses, M. Alhassoun, and G. D. Durgin, "A 24 GHz Tag for Next-Generation RFID Systems," 13th IEEE International Conference on RFID, Phoenix, AZ, Apr. 2019.

RESEARCH EXPERIENCE

California Institute of Technology, Pasadena, CA

Graduate Research Assistant, Caltech Holistic Integrated Circuits Group Sep 2020 - Present

- **Large-Scale Classical and Quantum Photonic Integrated Circuits:** Developing large-scale photonic integrated systems for applications in sensing, communications, machine learning, and quantum information processing.
- **Large-Scale Crosstalk-Corrected Thermo-Optic Phase Shifter Arrays in Silicon Photonics:** Demonstrated a novel folded row-column architecture-based 288-element thermo-optic phase shifter array (largest up-to-date) with an integrated photodiode array used to realize complete thermal crosstalk correction within the array.

Georgia Institute of Technology, Atlanta, GA

Undergraduate Researcher, Georgia Tech Electronics and Micro-Systems Lab Aug 2019 - Sep 2020

- **Reconfigurable mm-Wave/sub-THz Rat-Race Couplers:** Devised a design methodology to develop frequency-reconfigurable wideband rat-race hybrid couplers operating at >100 GHz.
- **Folded Inductor-Based Wideband Ultra-Compact Passive Structures:** Devised and demonstrated a novel folded inductor-based design methodology for ultra-compact integrated mm-Wave passive structures for multi-band 5G wireless communications.

Undergraduate Researcher, Low-Frequency Radio Group

Jan 2017 - Sep 2020

- **Ultra-Sensitive Remote Sensing Instrument:** Developed an ultra-sensitive end-to-end electric field sensing system for low-frequency (<500 kHz) radio reception. The instrument is 20 dB more sensitive than state-of-the-art and has been deployed globally to form the AWESOME network, a receiver network for low-frequency radio science research and lightning geo-location.

	<i>Undergraduate Researcher, Propagation Group</i>	Jan 2019 - May 2020
	<ul style="list-style-type: none"> • Phased Array Transceiver for Lunar Communications: Developed an end-to-end 2.4 GHz phased array transceiver for extravehicular activity communications on the lunar surface. • 24 GHz Semi-Passive RFID Tag: Developed a novel 24-GHz semi-passive RFID tag to improve the bandwidth of RFID systems for tera-scale IoT/IoE applications. 	
	<i>Undergraduate Researcher, Plasma and Dielectrics Lab</i>	Jan 2017 - May 2018
	<ul style="list-style-type: none"> • Impulse Current Generator for Next-Generation Disconnect Switches: Developed an impulse current generator to test the electrical contacts of high-speed disconnect switches. 	
INDUSTRY EXPERIENCE	Micron Technology, Inc. , Boise, ID	
	<i>HBM R&D Intern, HBM Product and R&D Team</i>	May - Jul 2020
	<ul style="list-style-type: none"> • Developed a data-visualization tool suite to extract and visualize data from DC validation tests on TSVs (through-silicon vias) of HBM (high-bandwidth memory) DRAM 3D ICs. 	
	<i>DRAM Product Engineering Intern, Data Analytics and Disposition Team</i>	May - Aug 2019
	<ul style="list-style-type: none"> • Developed a new statistical disposition program to categorize and scrap DRAM wafers and dies of varying quality based on their probe/test data. 	
TEACHING EXPERIENCE	Georgia Institute of Technology , Atlanta, GA	
	<i>Undergraduate Teaching Assistant</i>	Aug - Dec 2019
	Teaching assistant of an undergraduate/graduate-level course (ECE 3043 – Circuits, Measurements, and Microelectronics Laboratory) in the Department of Electrical and Computer Engineering.	
ACADEMIC SERVICE	Journal reviewer	
	<ul style="list-style-type: none"> • Nature Photonics • IEEE Transactions on Geoscience and Remote Sensing 	
	Journal editor	
	Georgia Institute of Technology , Atlanta, GA	
	<i>The Tower Undergraduate Research Journal, Editor-in-Chief</i>	Aug 2019 - May 2020
	Editor-in-Chief of Georgia Tech’s primary research journal for undergraduates.	
	<i>Board of Student Publications, Editor</i>	Aug 2019 - May 2020
	Editor on the Board of Student Publications overseeing the production of student-led publications.	
OUTREACH	Micron Technology, Inc. , Boise, ID	
	<i>Micron Foundation K-12 STEM Outreach Programs, Volunteer Lead</i>	May 2018 – Jul 2019
	Organized and led Micron outreach events that saw the participation of more than 500 K-12 students.	
	Georgia Institute of Technology , Atlanta, GA	
	<i>Student Activities Board for Undergrad Research, VP of Campus Relations</i>	Aug 2016 – May 2018
	Organized info sessions, lab tours, and 1-to-1 tutoring sessions to promote undergraduate research.	
AFFILIATIONS	<ul style="list-style-type: none"> • Society of Photo-optical Instrumentation Engineers (SPIE), Member • Optical Society of America (OSA), Member • Eta Kappa Nu Electrical Engineering Honor Society, Member • Tau Beta Pi Engineering Honor Society, Member • Sigma Xi Scientific Research Honor Society, Member • Institute of Electrical and Electronics Engineers (IEEE), Student Member 	<p>Dec 2020 – Present</p> <p>Dec 2020 – Present</p> <p>Nov 2019 – Present</p> <p>Nov 2019 – Present</p> <p>Sep 2019 – Present</p> <p>Sep 2016 – Present</p>