Alexandra Gallyas-Sanhueza

✉ ag753@cornell.edu

Research Interests

● signal processing ● wireless communication systems ● algorithms ● optimization and statistics ● ASIC design ●

I am a third-year Ph.D. student at Cornell University. I work on baseband algorithms for wireless multi-antenna communication systems. More broadly, I am interested in applying statistical techniques to model signals corrupted by noise or distortions, and then using such models to design efficient algorithms that recover the signal of interest.

Education

Aug 2018 – Present: **Ph.D. student, Electrical and Computer Engineering**. *Cornell University*. Ithaca, NY.
Baseband algorithms for terahertz communication systems. Advisor: Prof. Christoph Studer.
2009 – 2015: **Electrical Engineering**. *Pontificia Universidad Católica de Chile*. Santiago, Chile.
$5^1/_2$ years program. Maximum Distinction. GPA: A+. Ranking: 39 among 607 students (Top 6.5%).

Fellowships and Awards

2019. U.S. Winner, Qualcomm Innovation Fellowship.
2019. Travel Grant, IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC).
2015. Maximum distinction in Electrical Engineering, Pontificia Universidad Católica de Chile.
2015. Top 10% in the Bachelor's Degree Exam, Pontificia Universidad Católica de Chile.
2013-2014. Undergraduate research scholarship, Pontificia Universidad Católica de Chile.

Programming Languages

MATLAB, Python, Verilog, LaTeX.

Review of Journal Papers

2020. IEEE Transactions on Wireless Communications.
2020. Springer Journal of Signal Processing Systems.
2020. IEEE Open Journal of Circuits and Systems.

Review of Conference Papers

2020. IEEE International Workshop on Signal Processing Advances for Wireless Communications (SPAWC).
2020. IEEE International Workshop on Signal Processing Systems (SiPS).

Experience

Feb 2017 – Aug 2018: **Visiting scientist**. *Wilson Synchrotron Laboratory, Cornell University*. Ithaca, NY.
Designed Printed Circuit Boards (PCBs) for particle accelerator instrumentation: mixed signals and digital electronic design, and FPGA programming. Maintained and repaired beam position sensors at the Cornell-Electron-Storage-Ring (CESR).
Jun 2016 – Oct 2016: **PCB design**. *CorSolutions LLC*. Ithaca, NY.
Designed and assembled a PCB for sensing and controlling fluid delivery. Freelance part time job.

Research

Oct 2015 – Dec 2015: **ATLAS upgrade**. *Pontificia Universidad Católica de Chile*. Santiago, Chile.
Tested readout electronics for scintillation muon detectors to be used in ATLAS, the biggest detector of the Large Hadron Collider (LHC). Designed and assembled a PCB for interfacing with an FPGA. Trained lab staff in FPGA programming.
Aug 2013 – June 2015: **Application of multiple sampling and cryogenic operation for noise reduction in astronomical CCDs**. *Pontificia Universidad Católica de Chile*. Santiago, Chile.
Implemented a voltage reference and a temperature sensor in an analog application specific integrated circuit (ASIC). Supported the team with the design process using Synopsys analog design tools. Characterized transistors using a semiconductor parameter analyzer.

Internships

Mar 2015 – May 2015: **ATLAS upgrade**. *Universidad Técnica Federico Santa María*. Valparaíso, Chile.
Calibrated muon detectors. Wired an array of 120 detectors. Soldered PCBs. Programmed an FPGA to process the detector's data and interface with a computer using RS232 protocol.
Jan 2014 – Mar 2014: **Undergraduate research internship**. *Cornell University*. Ithaca, NY.
Designed a transimpedance amplifier for an optical receiver, with 3 GHz bandwidth, $5 \, k\Omega$ gain, 15 mW power consumption.

Teaching Assistant, School of Engineering, Pontificia Universidad Católica de Chile

Spring 2014: **Electrical Measurements Laboratory**. Introductory course to laboratory methods and use of equipment.
Fall 2012: **Electromagnetic Theory**. At the level of "Fundamentals of Engineering Electromagnetics" by Cheng (1998).
Fall 2012: **Signals and Systems**. At the level of "Signals and Systems" by Oppenheim et al. (1998).
Spring 2012: **Electricity and Magnetism**. At the level of "Physics" by Halliday & Resnick (2001).

Volunteering

2019: **Bits over the air**. *CATALYST academy program*. Cornell University, Ithaca, NY. Assisted students from under-represented minorities in building a wireless communication system, with the purpose of exposing them to a hands-on experience in engineering.
2019: **Electrical engineering workshop**. *Expanding Your Horizons (EYH) program*. Cornell University, Ithaca, NY. Helped 7th to 9th grade girls during an interactive workshop, to encourage them into mathematics and science majors.
2010: **High school physics teaching**. *BelénUC educational program*. Pontificia Universidad Católica de Chile, Santiago, Chile. Prepared low income students to be competitive in the national university admission system (PSU) in physics.
Mar 2010: **Post earthquake and tsunami emergency response**. *TECHO*. Pichilemu, Chile. Built an emergency cabin.

Languages

English: 2015 TOEFL iBT score: 101/120.   **Spanish**: Native.   **German**: Basic.

Publications

[1] A. Gallyas-Sanhueza, S. H. Mirfarshbafan, R. Ghods, and C. Studer, "Sparsity-adaptive beamspace channel estimation for 1-bit mmWave massive MIMO systems," *21st IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, May 2020.

[2] S. H. Mirfarshbafan, A. Gallyas-Sanhueza, R. Ghods, and C. Studer, "Beamspace channel estimation for massive MIMO mmWave systems: Algorithm and VLSI design," *IEEE Transactions on Circuits and Systems I: Regular Papers*, Sep. 2020.

[3] R. Ghods, A. Gallyas-Sanhueza, S. H. Mirfarshbafan, and C. Studer, "BEACHES: Beamspace channel estimation for multi-antenna mmWave systems and beyond," *20th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, Jul. 2019.

[4] O. Castañeda, M. Bobbett, A. Gallyas-Sanhueza, and C. Studer, "PPAC: A versatile in-memory accelerator for matrix-vector-product-like operations," *30th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP)*, Jul. 2019.

[5] C. Alessandri, D. Guzman, A. Abusleme, D. Avila, E. Alvarez, H. Campillo, A. Gallyas-Sanhueza, C. Oberli, and M. Guarini, "Theoretical framework and simulation results for implementing weighted multiple sampling in scientific CCDs," *Scientific Detectors Workshop*, 2013, to appear.

Patents

[1] C. Studer, R. Ghods, A. Gallyas-Sanhueza, and S. H. Mirfarshbafan, "Circuit and method for enabling channel denoising in a wireless communication apparatus," U.S. Patent 10 608 686, Mar. 31, 2020.