ALEXANDER ABULNAGA

41 Olden street, Princeton, New Jersey, 08540 | alex.abulnaga@princeton.edu | alexabulnaga.com

EDUCATION

- PhD, Department of Electrical Engineering, Princeton University 2020 - Present
- MA in Electrical Engineering, Princeton University 2020
- BASc in Electrical Engineering, Minor in Commerce, University of British Columbia 2018

PUBLICATIONS

- Huang D.*, **Abulnaga A.***, et al. "Hybrid III-V diamond photonic platform for quantum nodes based on neutral silicon vacancy centers in diamond" arXiv preprint arXiv:2012.15018

CONFERENCE PRESENTATIONS

- **Abulnaga A.**, Huang D., Welinski S., Zhang Z., Stevenson P., Rose B., and de Leon N. (2019) Nanophotonics for telecom quantum networks based on neutral silicon vacancy centers in diamond. Tenth International School and Conference on Spintronics and Quantum Information Technology; 2019 Jun 24-27; Chicago, IL (Poster Presentation)

RESEARCH EXPERIENCE

Princeton University

Graduate Student, Supervised by Nathalie de Leon *Sept 2018 to present*

- Developing an integrated semiconductor-on-diamond nanophotonic platform for use in quantum communication network experiments based on defects in diamond
- Design of nanophotonic devices using eigenmode (MPB) and FDTD (Meep, Lumerical) simulations
- Nanofabrication using standard lithographic (optical, e-beam) and etching (RIE, chemical) techniques
- Characterization of fabricated devices using microscopy techniques such as SEM, confocal, and custom built transmission setups
- Spectroscopy of single quantum defects in diamond

University of British Columbia

Undergraduate Research Assistant, Supervised by John Madden *Sept 2017 to Jan 2018*

- Designed a synthetic skin with shear and normal force sensing capabilities for use in robotics applications
- Utilized a capacitance-sensing architecture comprised of a silicone rubber structure with flexible electrodes
- Fabricated 16 unique test samples and characterized the impacts of varying device physical characteristics on sensitivity, force localizability, and tactility

University of Pennsylvania

Undergraduate Research Assistant, Supervised by Jorge Santiago-Avilles *May 2017 to Aug 2017*

- Designed and performed an electrospinning procedure to synthesize piezoelectric nanofibers for use in a novel non-invasive ear surgery procedure
- Characterized the topologic and piezoelectric properties of the samples using atomic force microscopy

INDUSTRY EXPERIENCE

Arista Networks **Santa Clara, CA, USA**

Hardware Engineering Intern *Jan 2017 to May 2017*

- Designed the I/O connectivity of a new ethernet switch board for use in a large-scale datacenter
- Produced schematics detailing the connections between the I/O ports and the ASIC, SCD, and main CPLD
- Implemented shift register functionality onto three CPLDs using Verilog to minimize the number of SCD ports used in communicating with the I/O ports
- Designed three compensation circuits to resolve power rail instability issues observed on a board during testing

John Deere – Hitachi Specialty Products **Aldergrove, BC. CAN**

Manufacturing Engineering Co-op *May 2016 to Dec 2016*

- Designed a diesel flushing system to clean fuel lines in machines, resolving ongoing failure during initial machine startup
- Designed the control circuits to power two pumps, programmed the pump motor drivers, and used NX to design a custom cart to fit the system into a compact and mobile tool
- Communicated with technicians to identify and resolve assembly line issues by creating and updating assembly instruction manuals

TEACHING AND MENTORING EXPERIENCE

Assistant in Instruction

ELE 308 - Electronic and Photonic Devices *Sep 2019 to Feb 2020*

- Led a lab section where students met weekly to fabricate semiconductor devices including MOSFETs and solar cells in an instructional clean room
- Lab responsibilities included guiding students as they performed various silicon fabrication processes including wafer doping, oxide growth, lithography, and wet etching
- Other responsibilities included writing problems and solutions, hosting office hours, and grading

AWARDS

- Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship – Doctoral 2020 - Present
- Gordon Y.S. Wu Fellowship in Engineering 2018 - Present
- UBC Applied Science Rising Stars Award 2018
- Association of Professional Engineers and Geoscientists (APEG) Achievement Award in Engineering 2018
- Quan Memorial Scholarship 2018
- Fluor Canada Ltd. Award in Electrical Engineering 2017
- Donald J. Evans Scholarship in Engineering 2017
- Trek Excellence Scholarship 2014-15, 2017
- Charles and Jane Banks Scholarship 2015