

Nicholas Selby

EDUCATION

Massachusetts Institute of Technology • Ph.D. Electrical Engineering and Computer Science	2021
Massachusetts Institute of Technology • M.S. Mechanical Engineering	2018
Georgia Institute of Technology • B.S. Mechanical Engineering • Mathematics Minor • Highest Honors	2016

SELECTED EXPERIENCE

Massachusetts Institute of Technology , Cambridge, MA	<i>Research Assistant, Jan. 2018 – Sept. 2021</i>
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- Innovated in **advanced manufacturing** workforce development by building robotic education platform
- Developed novel, cloud-based “TeachBot” system with ROS and Node.js, **patent pending**
- **Published** human-subject test experiment demonstrating learning gains
- Research presentation **won First Place** at MIT research exhibition

MIT Media Lab , Cambridge, MA	<i>Research Assistant, Aug. 2016 – Dec. 2017</i>
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- Innovating in **wireless networking technologies** to enable accurate sensing using wireless signals
- Developed **patented** novel drone-mounted wireless communication relay for warehouse inventory control
- Created new signal processing techniques, **outperforming state-of-the-art by 20x**
- **Published** and demonstrated work at two subject-specific international conferences

Brown Water Laboratory , Atlanta, GA	<i>Research Assistant, Summer 2016</i>
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- Implemented **machine learning** algorithms for **public health** applications
- Developed **novel, low-cost PCB** device monitoring water quality for deployment in developing countries
- **Wrote software** for novel infant anthropometric device for deployment in USAID sites worldwide
- Deployed low cost disease vector tracking device in Mozambique using **computer vision**

Airdash, LLC , Atlanta, GA	<i>Founder, May 2015 – May 2016</i>
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- **Launched startup with \$20,000** seed funding developing high altitude wind turbines
- Created **CFD** model of turbine to optimize aerobody shapes
- **Prototyped** 7 ft. diameter scale model for **wind tunnel testing** of aerodynamics and stability
- Worked **directly with stakeholders** such as Georgia Power, the State Department, and the Kenyan government

Georgia Institute of Technology , Atlanta, GA	<i>Research Assistant, Aug. 2014 – July 2016</i>
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- Studied nonlinear acoustic waves using **MATLAB** and experimentation with **laser and transducer technology**
- **Developed novel technique** to calibrate equipment measuring integrity of structures
- **Published** and defended work at subject-specific national conference

Sandia National Laboratories , Albuquerque, NM	<i>Research Assistant, Summer 2013</i>
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- **Designed, prototyped, and demonstrated** novel fractional quantum hall effect sensor for use in quantum physics
- Simulated with **MATLAB and CAD** software and manufactured with **CNC machining**
- **Published** article in *American Institute of Physics* journal, *Review of Scientific Instruments*

Jet Propulsion Laboratory , Pasadena, CA	<i>Research Assistant, May 2013 – May 2014</i>
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- **Constructed hexacopter** drone for topographical mapping
- Compiled data on power systems for **glacial, deep-sea, volcanic, and asteroid robotics**
- Generated power system options overview analysis for **presentation and publication**

PUBLICATIONS, PATENTS, & CONFERENCE PRESENTATIONS

- NS Selby** and HH Asada. "Learning of Causal Observable Functions for Koopman-DFL Lifting Linearization of Nonlinear Controlled Systems and Its Application to Excavation Automation." *IEEE Robotics and Automation Letters*, 6 (4). 2021.
- NS Selby**, J Ng, GS Stump, G Westerman, C Traweek, and HH Asada. "TeachBot: Towards Teaching Robotics Fundamentals for Human-Robot Collaboration at Work." *Heliyon*, 7 (7). 2021.
- Z Luo, Q Zhang, **NS Selby**, Y Ma, M Singh, and F Adib. "Methods and Apparatus for Wideband Localization." U.S. Patent Nos. 10,575,277, 10,921,419, and 10,701,662. Published 2020 and 2021.
- Y Ma, **NS Selby**, and F Adib. "Full-Duplex, Bi-Directional, Analog Relay." U.S. Patent No. 10,389,429. Published 2019.
- Y Ma, **NS Selby**, and F Adib. "Minding the Billions: Ultra-wideband Localization for Deployed RFIDs." *ACM Annual International Conference on Mobile Computing and Networking*. Snowbird, UT, USA. 2017.
- Y Ma, **NS Selby**, and F Adib. "Drone Relays for Battery-Free Networks." *ACM Conference on Applications, Technologies, Architectures, and Protocols for Computer Communication*. Los Angeles, CA, USA. 2017.
- D Torello, **NS Selby**, J Kim, J Qu, and LJ Jacobs. "Determination of Absolute Material Nonlinearity with Air-Coupled Ultrasonic Receivers." *Ultrasonics*. 2017.
- NS Selby**, D Torello, JY Kim, LJ Jacobs. "Calibration of Air-Coupled Transducers for Absolute Nonlinear Ultrasonic Measurements." *Review of Progress in Quantitative Nondestructive Evaluation*. Atlanta, GA, USA. 2016.
- D Torello, **NS Selby**, J Kim, J Qu, and LJ Jacobs. "Determination of Absolute Material Nonlinearity in Aluminum and Fused Silica with Air-Coupled Ultrasonic Receivers." *Review of Progress in Quantitative Nondestructive Evaluation*. Atlanta, GA, USA. 2016.
- NS Selby**, M Crawford, L Tracy, JL Reno, and W Pan. "in-situ Biaxial Rotation at Low Temperatures in High Magnetic Fields." *Review of Scientific Instruments*, 85, 095116 (2014); doi: 10.1063/1.4896100.
- NS Selby** and N Daley. "Simulation and Optimization of Car Design." *ASME 2014 International Design & Engineering Technical Conferences & Computers & Information in Engineering Conference*. Buffalo, NY, USA. 2014.

AWARDS

- First Place** Presenter. *MIT Mechanical Engineering Research Exhibition*. 2019.
- National Science Foundation Graduate Research Fellowship Honorable Mention. *NSF*. 2016.
- Best** Oral Presentation. Undergraduate Research Symposium. *Georgia Institute of Technology*. 2016.
- Richard K. Whitehead Jr. Memorial Award. Awarded to **top three** ME seniors. *Georgia Institute of Technology*. 2016.
- President's Undergraduate Research Award. *Georgia Institute of Technology*. 2015.
- Air Products Undergraduate Research Award. *Air Products and Chemicals, Inc.* 2015.
- Best** Utility Simulation for Product Design. *American Society of Mechanical Engineers*. 2014.
- Stamps President's Scholarship. Merit-based, full cost of attendance scholarship **to top 12 of 14,000** applicants. 2012.

SKILLS

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| Programming | Python (incl. PyTorch, ROS, NumPy), C/C++ (incl. OpenCV), C#, Java, MATLAB and Simulink, HTML/CSS/JavaScript (incl. Node.js), LabVIEW |
| Prototyping | CAD, FEA, CFD, Soldering, CNC and Conventional Machining, MIG and TIG Welding, Waterjet, Laser Cutting, Plasma Cutting, 3D Printing |
| Miscellaneous | Robotics and Control, Machine Learning, Internet of Things, DFMA, Public Speaking, Teaching |