

# Alexander Gray Barnett

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## Education

**Vanderbilt University, Nashville, TN**

**Expected May 2020**

B.E., Mechanical Engineering; Minor: Computer Science

**Major GPA: 3.96/4.00; Cumulative GPA: 3.92/4.00**

## Work Experience

**Permobil SmartDrive R&D**

**May 2019 – Present**

*Machine Learning and Robotics Intern*

- Trained an unsupervised monocular depth and ego-motion convolutional neural network using simulation data with the goal of eliminating manual data collection, expensive mapping sensors, and significantly reducing the cost of autonomy.
- Developed an input pipeline in Tensorflow to collect spatio-temporal data from a simulated autonomous robot and create time sequences of images, segmentation masks, and camera intrinsics.
- Gained fundamental knowledge of the Linux environment, complex software projects, incremental code development and testing, GPU acceleration, and AI servers.

**NASA Jet Propulsion Laboratory**

**May 2018 – August 2018**

*Mechanical Engineering Intern, Dynamics and Aerospace Group*

- Created finite element analysis (FEA) models to characterize flight hardware response to acoustic and random vibration loads in early product design stages.
- Designed and analyzed vibro-acoustic FEA simulations of electronic components.
- Compared power spectral density predictions from FEA models of varying rigidity to experimental tests.
- Automated experimental and simulation data analysis process with Matlab.

**Advanced Robotics and Mechanism Applications Laboratory**

**January 2019 – May 2019**

*Research Assistant*

- Surface soldered, assembled, and tested electronic systems for a human-assistive collaborative robot.

**Machining Laboratory; Aerospace Propulsion Class**

**2019; 2018**

*Teaching Assistant*

## Team Experience

**Vanderbilt Aerospace Design Laboratory, NASA Student Launch Competition**

**August 2017 – Present**

*President (2019-20); Outreach Lead (2018-19); Field Engineer (2017-18)*

- Lead highly competitive 6x national championship team to design a UAV that deploys from a rocket and collects a lunar ice sample; manage systems engineering process, autonomous systems development, and system integration. (2019-20)
- Fabricated rocket body, nose cone, boat tail, and custom components; designed educational outreach events for K-12 schools in the greater Nashville area. (2017-19)

**Vanderbilt Robotics Team, NASA Robotic Mining Competition**

**September 2016 – May 2019**

*President (2018-19); Public Relations Chair (2017-18); Head of Marketing (2016-17)*

- Led 35-person team to design and build an autonomous Mars rover to mine icy regolith.
- Designed, fabricated, and assembled conveyor belt, wheels, and frame (2017); designed excavation system, managed fabrication and system integration (2018).
- Developed localization algorithm that used locational markers and an Extended Kalman Filter to find and track the robot.
- Oversaw project management and systems engineering, met budget, critical deadlines and deliverables.
- Built a formidable, competitive team from the ground up.
- Grew the budget from \$1,000 to \$20,000 and obtained six sponsors.

## Skills

- **Programming:** Python, C++, Tensorflow, OpenCV, Matlab – *Proficient*; LabVIEW, Java, C – *Familiar*
- **Design:** Creo, Autodesk Inventor – *Proficient*
- **Manufacturing:** Lathe, mill, bandsaw, grinder, shearing machine – *Proficient*; welding – *Familiar*
- **Analysis:** FEMAP, NX, NX Nastran, VA One, COMSOL Multiphysics – *Familiar*