

Cormac O'Neill

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PROFESSIONAL EXPERIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA

Graduate Research Assistant, d'Arbeloff Laboratory

September 2019 - Present

- Developing autonomous cranes for use in heavy manufacturing industries
- Designing control schemes for Cable Suspended Parallel Robots (CSPRs) to allow for dexterous manipulation
- Researching how globally valid linearization techniques via the Koopman operator framework can be leveraged for Model Predictive Control for nonlinear systems

SCHLUMBERGER

Rosharon, TX

Technology Intern, Rosharon Production Services

Summer 2018

- Selected and tested adhesives for new shaped-charge designs.
- Recommended design changes for shaped-charges to improve manufacturability
- Quantified cycle time for automated manufacturing facilities.

CALTECH MCE DEPARTMENT

Pasadena, CA

Teaching Assistant, Engineering Design Laboratory and Capstone Project (ME72) Summer 2018 – March 2019

- Gained valuable leadership and teaching experience.
- Made and gave lectures to Junior and Senior Engineering students.
- Developed an amphibious robotic competition for students' final project.

MATTEL

El Segundo, CA

Automation Engineering Intern, Global Product Development and Supply Chain

Summer 2017

- Implemented lean manufacturing techniques in automated cells.
- Identified top downtime and scrap root causes along with potential solutions.
- Quantified manufacturing efficiency using OEE metrics.
- Created purchasing plans with vendors for new capital investments.

LIGO, CALTECH

Pasadena, CA

Mechanical Engineering Team, LIGO

October 2016 – February 2018

- Experience with Finite Element Analysis software.
- Tested non-magnetic mass damper for test mass support structure.
- Investigated different epoxy resins for use in the vacuum conditions of LIGO (Laser Interferometer Gravitational-wave Observatory).

SPACE STRUCTURES LABORATORY, CALTECH

Pasadena, CA

Summer Intern, Graduate Aerospace Laboratories at CIT

Summer 2016

- Aided with research and preparation for the AAReST mission (Autonomous Assembly of a Reconfigurable Space Telescope).
- Calibrated and characterized the deformable mirrors developed for AAReST.
- Performed characterizing measurements on composite springs, aiding with their design, for the Space Solar Power Project.

EDUCATION

CALIFORNIA INSTITUTE OF TECHNOLOGY

Pasadena, CA

BSc, Major in Mechanical Engineering (3.9/4.0) w/ Minor in Aerospace

Class of 2019

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA

MS and PhD, Robotics Control and Design with a minor in Artificial Intelligence

2019 - Present

- MS and PhD awarded by the Mechanical Engineering department
- Developing automated cranes for manipulation tasks in heavy industries

PROJECTS & AWARDS

NASA Big Idea Challenge 2020

Multifunctional Expandable Lunar Lightweight Tall Tower (MELLTT), Path to Flight Award

- Developed electrical and power subsystems for a deployable composite boom for a NASA proposal
- Worked on testing and integration plans for the full concept
- Funded by NASA for an Earth-based demonstration
- Results led to a publication in the 2020 ASCEND conference
- Co-wrote a proceedings report on Economically Viable Lunar Settlements for the American Institute of Aeronautics and Astronautics

NASA RASC-AL Challenge 2023

Pale Red Dot: Homesteading Mars, First Place recipient

- Presented a technical plan for a long-duration manned mission to Mars
- Lead the concept design for a Martian manufacturing center and makerspace, along with associated in-situ resource utilization pipelines
- Results were published in a paper for the 2023 ASCEND conference

CMU Space Innovation Challenge 2019 - 2020

Graduate-level Case Competition for Commercial Space Concepts

- Gained experience on developing business cases for commercial space ventures while leveraging my technical knowledge
- Presented a roadmap for the use of a lunar mass driver to enable profitable fuel exports from the Moon
- Developed a concept for the use of inflatable spacecraft as mechanism for affordable trash disposal from LEO space stations

Caltech Robotics Team 2015 - 2019

Mechanical Lead, First Place RoboSub 2016

- In charge of the overall mechanical design of the vehicle while collaborating with electrical and programming sub teams.
- Acted as project manager for all the teams working on the mechanical subsystems for the vehicle.
- Developed and fabricated a high-pressure pneumatic system and electronics-mounting package for the robot.
- Gained experience in design, machining, testing and failure analysis.

Lester Lees Aeronautics Fellow

Recipient of Named Scholarship for Summer Research

- Awarded to a student participating in aeronautics research at Caltech.
- Received for my work in the Space Structures Laboratory.

PUBLICATIONS

- C. O'Neill and H. H. Asada, "Horizontal Insertion of a Ring Onto a Shaft Using a Gantry Crane With Minimal Sensors," in *IEEE Robotics and Automation Letters*, vol. 7, no. 3, pp. 7271-7278, July 2022, doi: 10.1109/LRA.2022.3182808.
- C. O'Neill and H. H. Asada, "Safe Tumbling of Heavy Objects Using a Two-Cable Crane," in *IEEE Robotics and Automation Letters*, vol. 6, no. 2, pp. 1082-1089, April 2021, doi: 10.1109/LRA.2021.3056029.
- Victoria M. O'Leary, et al. "Pale Red Dot: a Large, Robust Architecture for Human Settlements on Mars," AIAA 2023-4776. *ASCEND 2023*. October 2023.
- Todd, Jessica & Lordos, George & Browder, Becca & Martell, Benjamin & O'Neill, Cormac. (2020). Ensuring Economically Viable Lunar Settlements: *ASCENDxCo-Lab Proceedings Report*.
- George C. Lordos, et al. "Autonomously Deployable Tower Infrastructure for Exploration and Communication in Lunar Permanently Shadowed Regions," AIAA 2020-4109. *ASCEND 2020*. November 2020.

ADDITIONAL SKILLS

- Experience in Python, Matlab, C, SolidWorks and ANSYS.
- Experience machining parts using manual and CNC equipment, as well as using additive manufacturing.