## Contact

www.linkedin.com/in/conorrcullinane (LinkedIn)

## Top Skills

Cell Culture
Biomedical Engineering
Comet Assay

## Honors-Awards

Presidential Scholar
Commendable Service Award
Most Promising Senior in Aeronautical Engineering
Most Promising Junior in Aeronautical Engineering
The National Honor Society of Phi Kappa Phi Induction

# Conor Cullinane, PhD

President & CEO, Co-Founder at Pirouette Medical, Inc.
Portsmouth, New Hampshire, United States

## Experience

### Pirouette Medical Inc.

President & CEO, Co-Founder
January 2017 - Present (7 years)
Cambridge, MA

Bringing to market robust drug-delivery medical devices.

### NASA - National Aeronautics and Space Administration

4 years 1 month

#### NASA Space Technology Research Fellow

August 2014 - May 2018 (3 years 10 months)
Harvard Medical School & MIT & Johnson Space Center

I am engaged in research, in advanced suit development which aims to increase the mobility and agility of crewmember-spacesuit systems through human-centered design processes as they relate to planetary spacesuits. As the United States attempts to explore deep space, advanced planetary suits become a necessity. In order to develop suits that provide life support while integrating with the crewmember in a synergistic way, tools are necessary to redirect the design process to be driven by human biomechanics and injury prevention.

Educational Outreach:
Each semester, I work with undergraduates from MIT to provide them an opportunity to engage in a self-driven research program that has significant real-world value. I also travel to deliver engaging talks at middle schools, high schools, and colleges. Each year, I host a table at the Cambridge Science Festival, conducting fun spacesuit activities to spread inspiration for science and engineering, ensuring future expansion of this field.

#### Mentored Research Program Apprentice

May 2014 - August 2014 (4 months)
Johnson Space Center - Houston, TX

The mentored research program is administered by NSBRI with a summer Apprenticeship that provides the opportunity to join ongoing projects at NASA centers. Students are matched with investigators and get hands-on experience

with NASA hardware while contributing to ongoing projects. During the summer experience, students participate in the Space Life Sciences Summer Institute, where seminars are given by experts, including astronauts.

Duties:
During my summer apprenticeship, I worked with Richard Rhodes from the Advanced Suit Development lab. I worked to obtain Mark III characterizations. Specifically, I determined the kinematic motion profile of the human operator wearing the MIII during typical planetary extravehicular tasks (walking, walking backwards, kneel and recover, turning right and left).

Accomplishments:
The subject was asked to walk both forward and backward through a motion capture environment. After repeating the ambulation in both direction multiple times while unsuited, the subject was suited. After reaching nominal pressure (4.3psid), the subject performed the forward and backward walking again. The endpoints of interest were step length [m], stride length [m], dynamic base [m], cadence [steps/min], and speed [m/s].

My analysis found that the suit diminished subject mobility and stability through a decrease in speed, stride length, and step length and increase in dynamic base (all statistically significant). When pooling suited conditions, the dynamic base increased, which is a physical limitation in the hip brief assembly.
While walking forwards, the suited configuration had a reduction in cadence; however; when walking backwards the suited configuration had an increase in cadence. This may be a function of the interaction between the natural hip biomechanics with the operational motion envelope of the hip brief assembly of the suit.

## Harvard Medical School & Massachusetts Institute of Technology
4 years 10 months

### PHD Candidate
August 2013 - May 2018 (4 years 10 months)
Cambridge, MA

The Harvard-MIT Program in Health Sciences and Technology (HST) brings together the Massachusetts Institute of Technology (MIT), Harvard Medical School (HMS), Harvard University, and Boston area teaching hospitals in a unique collaboration that integrates science, medicine and engineering to solve problems in human health. At MIT, the Institute for Medical Engineering and Science (IMES) provides a robust home for HST.

### Graduate Resident Tutor
August 2015 - April 2018 (2 years 9 months)
Baker House

The job of the Graduate Resident Tutor (GRT) is to foster a supportive, safe, and positive living environment and to build a community atmosphere among undergraduates in MIT residence halls.

Duties and Related Skills:
-Establish continuing personal connections with residents on the floor and within the building and a community in which residents are able to socialize, study and sleep in an environment that is respectful of individual differences and conducive to the educational process.
-Be aware of, and respond to, the academic and personal problems of residents, which include making referrals to the appropriate MIT resources.
-Work to identify and solve problem situations in the living area including roommate conflicts, personal problems and emergencies.
-Be routinely visible and available to residents.
-Offer support and guidance to first year students by connecting them to other residents, the MIT Community and the larger community.
-Draw upon student interests (academic and/or extracurricular) to make a meaningful contribution to residential life.
-Regularly assess the needs of residents by talking with them individually and in groups, responding to current issues in their lives and recognizing unaddressed needs.
-Provide study breaks and/or opportunities for their community to gather
-Be knowledgeable and educate residents on MIT policies and procedures.

The above information was taken from the GRT Job description.

### Associate Editor - Encyclopedia of Bioastronautics
September 2014 - April 2018 (3 years 8 months)
Cambridge, MA

A major reference work, the Encyclopedia of Bioastronautics, is being prepared to mark the current transition in human space exploration from the ISS to a return to the moon and to the horizon destination Mars. To be published by Springer in 2017, this comprehensive work will serve to introduce the key areas of space biomedicine. The Encyclopedia is aimed at the non-specialist and consists of about 80 articles by leading experts, divided into pertinent sections.

Duties:

The associate editor (AE) reports directly to the editors in chief (EIC) and is tasked with developing the content outline, breaking up the field of Bioastronautics into the pertinent sections. This is accomplished through an in-depth literature review, cataloging the chapters and contents of existing bioastronautics references books. With an understanding of currently available information, the AE can shape the sections and articles of the Encyclopedia of Bioastronautics to expand upon and complement the available literature. The AE interfaces with contributors to ensure proper content development, outlining aims and scope, to maintain the highest level of merit and that each article complements the others. Finally, the AE reviews each article and clears it for review by the EICs.

Accomplishments:
As AE, I have successfully coordinated the content development, author assignments, article submissions, and article review. The sections include the space environment, life support systems, physiological effects of space flight, space radiation, behavioral health and performance, careers and education, astrobiology, space biology facilities, future human exploration challenges, space medicine, space flight analogs, human space flight mishaps and incidents, highlights of human spaceflight, and astronaut perspectives.

### Commemorative Air Force
**Flight Engineer**
May 2014 - May 2016 (2 years 1 month)
Gulf Coast Wing - Houston, TX

The CAF was founded to acquire, restore and preserve combat aircraft for the education and enjoyment of present and future generations of Americans. Along with the cockpit duties, the Flight Engineers (FEs) for Texas Raiders (TR) also have maintenance responsibilities consistent with the requirements of a Maintenance Colonel. The FE's are therefore responsible for TR's maintenance.

### Massachusetts General Hospital
**Radiation Oncology Research Assistant**
May 2013 - May 2014 (1 year 1 month)
Boston, MA

My research aimed to develop a post processing image analysis pipeline for Time Lapse Microscopy (TLM) to automate scoring. The automation can allow TLM to be clinically relevant, where assay results are needed quickly. TLM takes images of live cells at regular time points over a given period. With TLM,

cells are observed as they progress through the cell cycle, and pedigrees are built as they divide. Each cell morphology is recorded, such as mitotic division and giant cell formation, at each time point. Instead of only obtaining endpoint information about the percentage of cell death, the death process can be observed, such as apoptosis, necrosis, and mitotic catastrophe. In April – 2014, I had the opportunity to conduct experiments with Dr. Held at the National Space Radiation Lab at Brookhaven National Lab. These experiments were designed to characterize a Bragg peak profile in live cells exposed to Carbon heavy ions.

I have had the opportunity to utilize preexisting skills as well as develop new skills because of the variety of work I see. Notably, I have developed tissue culture experience, as well as learned a number of assay techniques including Micro Nuclei, and the Comet Assay. I used these assays while investigating bystander effect in human cancer cells as it related to treatment techniques and deep space countermeasures.

### roCKeT Division

**Co-Founder, Lead Design Engineer**

September 2012 - May 2013 (9 months)

Applied Aerodynamics Laboratory - Clarkson University

Duties/Accomplishments:

Under-actuation is a term that describes how a rocket does not have enough control or “actuation” to match and account for every degree of freedom of the rocket’s motion. In order to properly actuate the system, an active stabilization technique was applied using on-board thrusters near the nose cone of the rocket. These thrusters were part of a closed loop system that senses and corrects for attitude deviations. The application of this technology was directed toward large-scale model rocketry. As the project’s lead engineer, I built a small team that I personally attracted, interviewed, hired, and managed throughout the project.

Educational Outreach: After proposing the project, raising funds, building a team, designing the system, requisitioning and manufacturing the hardware, assembling the test-bed, and analyzing the solution, the project culminated in a public launch. Ahead of the launch, my team and I visited local middle school and high school science students, talking to them about rocket flight dynamics, tailored to each grade level, and expected performance at the upcoming launch. On launch day, I arranged for the students from the local schools to attend, where they competed in egg drop and paper glider competitions,

toured research labs, built/launched model rockets, and watched the launch of the 7.125' tall research rocket. The launch attracted hundreds from Clarkson and the local community, becoming one of the most successful outreach events at Clarkson.

### Clarkson University
Research Assistant
September 2011 - May 2013 (1 year 9 months)
Laboratory for Intelligent Automation

I worked with Dr. Kevin Fite on the successful completion of my Honors Program Thesis where I developed a vibrotactile feedback system to improve an amputee's fine control of a prosthetic limb. Amputees command the limb in an open-loop manner without the haptic and proprioceptive cues provided in the absence of amputation. My research sought to fill that gap by developing and experimentally evaluating a haptic feedback display intended for use with an actively-powered lower-extremity prosthesis.

Accomplishments:
The research progressed through designing the haptic feedback display, determining the appropriate information to convey, and experimentally characterizing the ability of such feedback to improve limb control. The feedback utilized the tactile sense to augment or completely replace visual cues already conveyed to the user to avoid sensory overload. Measured haptic and proprioceptive information provided by on-board sensors was conveyed to the amputee user through a vibrotactile display integrated within the socket interface of the prosthesis. The user was trained to interpret the information provided by the haptic display, and control experiments were conducted with and without the vibrotactile feedback to evaluate the display's effectiveness in enhancing amputee-limb interaction. Preliminary experimental results with an able-bodied user showed an 18.8% improvement in prosthetic control ability.

## Education

### Massachusetts Institute of Technology
Doctor of Philosophy (PhD), Bioastronautics Training Program - Medical Engineering Medical Physics · (2013 - 2017)

### Harvard Medical School
Medicine · (2013 - 2017)

### Y Combinator

· (April 2021 - September 2021)

### Clarkson University

Bachelor's degree, Aerospace, Aeronautical and Astronautical Engineering · (2009 - 2013)

### University of New Hampshire

Summer Courses