



# Hayden Cornwell

AEROSPACE ENGINEER · ADVANCED MATERIALS EXPERT · DATA SCIENTIST

New York, NY

+1 (949) 554-8305 | hayden.k.cornwell@gmail.com | hkornwell.github.io | hkornwell | haydencornwell

## Summary

Aerospace Engineer with a focus in advanced materials in graduate research. Expertise in micro-mechanics and computer aided engineering for design and analysis. Experience in product management and go-to-market strategy. Recent experience with data analytics and machine learning. Interested in entrepreneurship and technology commercialization.

Hobbies: brew beer, make hot-sauce, golf, pick-up basketball

## Education

### Georgia Institute of Technology

Atlanta, GA

MASTER OF SCIENCE IN ANALYTICS

Sep. 2019 - Present

- GPA: 4.0/4.0
- Coursework: Analytics Modeling, Business for Analytics, Computational Data Analysis, Data and Visual Analytics

### Massachusetts Institute of Technology

Cambridge, MA

MASTER OF SCIENCE IN AEROSPACE ENGINEERING

Sep. 2015 - Jun. 2017

- GPA: 4.6/5.0
- Coursework: Numerical Methods for Partial Diff. Eq., Plates and Shells, Elasticity, Structural Dynamics

### Massachusetts Institute of Technology

Cambridge, MA

BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING

Sep. 2011 - Jun. 2015

- GPA: 4.6/5.0
- Coursework: Dynamics, Aerodynamics, Propulsion Systems, Computational Methods, Automatic Control

## Skills

### Programming

Python, R, Matlab, SQL, Java, Javascript, D3, LaTeX

### Data Analysis

Pandas, scikit-learn, Hadoop, Apache Spark, AWS, Microsoft Azure, Machine Learning (Regression, Classification, Clustering)

### Product Management

Jira, Asana

### Finite Element Analysis

Abaqus, ANSYS, Simcenter 3D (NX NASTRAN), Multimech

### Computational Fluid Dynamics

Fluent, CFX, XFOIL, AVL

### Computer Aided Design

Solidworks, NX, CATIA

## Experience

### Siemens

New York, NY

APPLICATION ENGINEER ADVANCED

Nov. 2019 - Present

- Following acquisition of Multimechanics, maintained same role within Siemens STS product management group
- Collaborated with the RTD team and product development to bring applications in material characterization to production within Simcenter 3D Materials Engineering
- Developed minimum viable products for emerging industries (semiconductors, additive manufacturing, and high temperature composites, etc.) from customer and prospect feedback
- Supported sales executives and portfolio development leads via technical demos to customers, leading software trials, creating of sales enablement materials, and performing webinars

## Multimechanics

SOLUTIONS ENGINEER

Omaha, NE

Oct. 2017 - Nov. 2019

- Managed over 15 proof-of-concept projects for sales prospects to demonstrate value of the Multimech software
- Performed 8 webinars to showcase new capabilities and applications in order to target and penetrate industries
- Validated over 50 microstructure models of advanced materials (carbon fiber reinforced polymers, graphite composites, ceramic matrix composites, injection molding materials, foams, etc) against experimental data
- Designed 3 applications that streamline the pre-processing for Multimech models
- Lead over 100 sales calls with potential customers

## Space Exploration Technologies

ENGINEERING ASSOCIATE

Hawthorne, CA

Jun. 2017 - Sep. 2017

- Designed 4 tooling structures for the composites manufacturing group to increase quality and productivity of the payload fairing

## De-Ice Technologies

HEAD OF LAB

Somerville, MA

Oct. 2015 - May. 2017

- Performed with proof-of-concept lab tests to evaluate material performance and feasibility
- Advised engineering internships designing mechanical systems with CAD and performing electromagnetic simulations
- Competed at start-up pitch competitions and met with investors and industry leaders

## The Aerospace Corporation

GRADUATE ENGINEERING INTERN

El Segundo, CA

Jun. 2015 - Aug. 2015

- Performed buckling and modal analysis of ULA Atlas boattail for 18 load scenarios
- Verified reliability of out-of-autoclave composite honeycomb sandwich panel after impact

## American Tower

ENGINEERING INTERN

Marlborough, MA

Jan. 2015 - Jun. 2015

- Designed unmanned aerial system for surveying broadcast towers

## Bell Helicopter

SYSTEMS ENGINEERING INTERN

Fort Worth, TX

May. 2014 - Aug. 2014

- Managed aircraft certifications and required decals for the 505 JRX flight test vehicle 1
- Designed 5 additive manufactured support structures

## NAVAIR

ENGINEERING INTERN

China Lake, CA

May. 2013 - Aug. 2013

- Conceived, designed, and fabricated prototype of water-proof unmanned aerial system quad-copter for surveillance at the irregular warfare technology office

## Sabritec High Powered Connectors

PROJECT COORDINATOR

Irvine, CA

May. 2012 - Aug. 2012

- Coordinated production of 3 sets of high-powered cables for a cold-fusion chamber at Lawrence Livermore National Laboratory

# Research

## Multimechanics

SOLUTIONS ENGINEER

Omaha, NE

Oct. 2017 - Nov. 2019

- Investigated numerical approaches to represent multiple microstructure failure mechanisms
- Achieved validation of material model for unidirectional carbon fiber reinforced polymer material with 99% accuracy

## Nano-Engineering Composite Structures Lab

GRADUATE RESEARCHER

Cambridge, MA

Sep. 2015 - Jun. 2017

- Introduced new fabrication methods for introducing CNTs into aerospace grade CF to increase fiber interfacial shear strength
- Performed model correlation study using CFD to capture CNT growth distribution in reactor
- Designed micromechanical testing procedures for single fiber strength and interfacial shear strength testing

## MIT Department of Aeronautics and Astronautics

UNDERGRADUATE RESEARCHER

Cambridge, MA

Jan. 2015 - Jun. 2017

- Experimentally tested span-wise flexible wingsail through a parametric study of trailing wing pivot points
- Validated aerodynamic models on flow separation on trailing wing via improved wingsail design

## Institute for Soldier Nanotechnologies

UNDERGRADUATE RESEARCHER

Cambridge, MA

Jan. 2013 - Mar. 2013

- Built geometry and mesh of helmet and human head creating separate groups with respect to anatomical properties
- Ran preliminary models for projectile impact on helmet observing the distribution of forces within human head

# Projects

## Reducing CO2 Emissions through Freight Traffic Analytics

New York, NY

GROUP PROJECT FOR DATA AND VISUALIZATION ANALYTICS - 5 MEMBERS

Jan. 2020 - Apr. 2020

- Optimized freight routes for entire shipping network on east coast of the U.S. to reduce CO2 emissions
- Reduced 95M (12GB) rows of AIS shipping data to a 3325 row (800kB) graph of the shipping network
- Implemented Hub-Spoke model utilizing DBSCAN clustering algorithm to create array of theoretical shipping networks
- Developed data pipeline starting at PostgreSQL eventually feeding into an interactive visualization using Dash
- Github: [hkcornwell/CO2\\_Shipping\\_Optimization](#)

## FEA Convergence Diagnostic

New York, NY

INDIVIDUAL PROJECT

Oct. 2019 - Jan. 2020

- Automated work flow for determining if an FEA model will converge prior to the simulation being ran
- Utilized fractional factorial design to create minimal test cases to diagnose parameter influence
- Automate data cleaning process of individual log files to create test case summary
- Analysis of baseline metrics of tests and Support Vector Machine to determine if the case will converge based on input parameters
- Github: [hkcornwell/Convergence-Diagnostic](#)

## Red Bull Flugtag

Boston, MA

GROUP PROJECT FOR RED BULL COMPETITION - 5 MEMBERS

Apr. 2015 - Jun. 2016

- Competed in the Red Bull Flugtag Portland 2015 and Boston 2016
- Raised 6K to design and manufactured a human carrying glider launched off a barge
- Performed aerodynamic analysis and developed Matlab flight simulation to determine optimal flight path
- Manufactured carbon fiber frame of 30 foot wingspan glider
- Video Link: [https://www.youtube.com/watch?v=qWCvZ\\_AOBKg](https://www.youtube.com/watch?v=qWCvZ_AOBKg)

## Span-wise Flexible Wingsail

Cambridge, MA

GROUP PROJECT FOR SENIOR YEAR CAPSTONE - 2 MEMBERS

Sep. 2014 - May. 2015

- Designed a wingsail with a flexible trailing edge that can twist according to a torsion beam's stiffness
- Successfully demonstrated a flexible wingsail can naturally adapt to rapidly changing wind speeds and effectively reduce the rolling risk of high-performance catamarans
- Manufactured a scaled down 6 foot wing to prove the concept
- Admiral Luis De Florez Prize: Awarded for "original thinking or ingenuity"

## Publications

- 2019 **Multiscale Simulation of Unidirectional Carbon Fiber Reinforced Polymer Strength**, TechConnect Briefs  
2019, ISBN: 978-0-9988782-8-7
- 2018 **Modeling Failure in Fiber-Reinforced Composite Tubes using TRUE Multiscale technology**, TechConnect  
Briefs 2019, ISBN: 978-0-9975117-8-9
- 2018 **Interlaminar Shear Reinforcement of Aerospace Laminates with Radially-aligned Carbon Nanotubes**, AIAA  
2018, DOI:10.2514/6.2018-0907
- 2017 **Tensile and interfacial properties of radially aligned CNT grown carbon fibers**, MIT Aero/Astro,  
<http://hdl.handle.net/1721.1/112417>
- 2014 **Effects of Spanwise Flexibility on Lift and Rolling Moment of a Wingsail**, MIT Aero/Astro,  
<http://hdl.handle.net/1721.1/92344>

## PATENTS

- 2015 **Wingsail with adaptable flexible flap**, US9511835B2

## Presentations

### CONFERENCES

- 2019 **SAMPE 2019**, Multiscale Simulation of Unidirectional Carbon Fiber Reinforced Polymer Strength Charlotte, NC
- 2019 **NAFEMS World Congress 2019**, Multiscale Simulation of Unidirectional Carbon Fiber Reinforced Polymer Strength Quebec City, Canada
- 2019 **TechConnect 2019**, Multiscale Simulation of Unidirectional Carbon Fiber Reinforced Polymer Strength Boston, MA
- 2019 **JEC 2019**, Multiscale Simulation of Unidirectional Carbon Fiber Reinforced Polymer Strength Paris, France
- 2018 **CAMX 2018**, Modeling Failure in Fiber-reinforced Composite Tubes using Multiscale Technology Dallas, TX
- 2018 **SAMPE 2018**, Modeling Failure in Fiber-reinforced Composite Tubes using Multiscale Technology Long Beach, CA
- 2018 **TechConnect 2018**, Modeling Failure in Fiber-reinforced Composite Tubes using Multiscale Technology Anaheim, CA

### WEBINARS

- 2019 **MultiMech 19.0 Release Webinar**,  
<https://multimechanics.com/technical-library/multimech-19-0-release-webinar/>
- 2019 **How Fortify and MultiMechanics Are Making Additive Manufacturing More Predictable**,  
<https://multimechanics.com/technical-library/how-fortify-and-multimechanics-are-making-additive-manufacturing-more-predictable/>
- 2019 **Accurately Characterizing Manufacturing Defects in Composite Parts Using MultiMech**,  
<https://multimechanics.com/technical-library/accurately-characterizing-manufacturing-defects/>
- 2018 **Joint Solvay-ANSYS-Multimechanics Webinar**,  
<https://multimechanics.com/technical-library/solvay-webinar/>
- 2018 **MultiMech 18.1 Webinar**, <https://multimechanics.com/technical-library/multimech-18-1-webinar/>
- 2018 **MultiMech 18.0 for ANSYS**, <https://multimechanics.com/technical-library/multimech-18-0-for-ansys-2/>
- 2018 **MultiMech 18.0 Webinar**, <https://multimechanics.com/technical-library/multimech-18-0-webinar/>
- 2018 **MultiMech 18.0 for Abaqus**, <https://multimechanics.com/technical-library/multimech-18-0-for-abaqus-2/>

## Leadership

---

<b>MIT Varsity Baseball</b>	Team Captain, First Team All-NEWMAC, First Team CoSIDA Academic All-American, Second Team ECAC DIII New England All-Star, Career Games Played Record, Career Doubles Record
<b>ΛΧΑ Fraternity</b>	2014 House Manager
<b>Graduate Teaching Assistant</b>	Experimental Projects I & II
<b>Sports Technology Course</b>	Team Lead for Adidas project on bending rate dependent stiffness of shoe soles