Hayden **Cornwell**

Aerospace Engineer · Advanced Materials Expert · Data Scientist

New York, NY

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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: Dyamics, 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 Siemen's 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
Omaha, NE

Solutions Engineer
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
Hawthorne, CA

Engineering Associate
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
Somerville, MA

Head of Lab
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
El Segundo, CA

Graduate Engineering Intern
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
Marlborough, MA

Engineering Intern
Jan. 2015 - Jun. 2015

- Designed unmanned aerial system for surveying broadcast towers

Bell Helicopter
Fort Worth, TX

Systems Engineering Intern
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
China Lake, CA

Engineering Intern
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
Irvine, CA

Project Coordinator
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
Omaha, NE

Solutions Engineer
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
Cambridge, MA

Graduate Researcher
Sep. 2015 - Jun. 2017

- Introduced new fabrication methods for introducing CNTs into aerospace grade CF to increase fiber interfacial sheer 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
Cambridge, MA

Undergraduate Researcher
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
Cambridge, MA

Undergraduate Researcher
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: haydencornwell1993/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: haydencornwell1993/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 do determine optimal flight path
- Manufactured carbon fiber frame of 30 foot wingspan glider
- Video Link: 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

MIT Varsity Baseball — 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

ΛXA Fraternity — 2014 House Manager

Graduate Teaching Assistant — Experimental Projects I & II

Sports Technology Course — Team Lead for Adidas project on bending rate dependent stiffness of shoe soles