Hayden **Cornwell**

Product Management · CAE Software · Materials Engineering · Data Analytics

Orlando, FL

hkcornwell.github.io | hkcornwell | haydencornwell

Summary

Aerospace Engineering background 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 in the engineering software industry. Recent experience with data analytics and machine learning. Interested in entrepreneurship and technology commercialization.

Hobbies: brewing beer, golf, basketball, and snowboarding.

Education

Georgia Institute of Technology — *Atlanta, GA*

Master of Science in Analytics — *Sep. 2019 - Present*

- GPA: 4.0/4.0
- Coursework: Machine Learning, Business Analytics, Data and Visual Analytics, Deep Learning

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 Analytics	Pandas, PyTorch, Scikit-learn, Hadoop, AWS, Azure, Machine Learning
Product Management	Jira, Asana
CAE Software	Abaqus, ANSYS, Simcenter 3D, Creo Simulation
CAE Analysis	Mechanical - Static/Dynamic, Failure Analysis, Transient Thermal, NVH, CFD
Computer Aided Design	Solidworks, NX, CATIA, Creo

Experience

Siemens Digital Industries Software — *Orlando, FL*

Product Manager Materials Engineering — *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

Academic Journal Trends
Orlando, FL

Individual Project — *Aug. 2020 - Dec. 2020*

- Developed an automated process to web scrape academic paper titles of a specified journal
- Performed trend analysis on common phrases and terms used in the specified industry
- Github: hkcornwell/Journal-Trends

sEMG Signal Classification

New York, NY

Group project for Computational Data Analytics - 2 members

May. 2020 - Aug. 2020

- Applied machine learning classification algorithms (Naive Bays, SVM, Gaussian Mixture, Logistic Regression, Neural Network) to forearm sEMG data to predict hand motion
- Achieved 75% accuracy in classifying 6 different hand motions
- Utilized data manipulation techniques, including exponential smoothing, PCA transformation, normalization, and standardization
- Github: hkcornwell/sEMG-signal-classification

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 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
ΛΧΑ **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