Nathan Dunkelberger

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Education

Rice University, Houston TX — May 2022
PhD in **Mechanical Engineering**
MS in **Mechanical Engineering** (May 2019)
Advisor: Dr. Marcia O'Malley
Overall GPA – 3.95

Texas A&M University, College Station, TX — May 2017
Bachelors of Science in **Mechanical Engineering**
Overall GPA – 3.81

Spain Study Abroad, Ciudad Real, Spain — Summer 2015

- Studied two mechanical engineering courses in Spain, visiting nine cities and two countries
- Stayed with a host family from Spain and was introduced to many local experiences

Experience

Integration of Functional Electrical Stimulation and Exoskeletons, Houston, TX — Summer 2017-Present

- Performed pilot tests verifying the potential benefits of combining the two rehabilitation techniques
- Worked in collaboration with Cleveland State University

Control Development for Cruise Automation, San Francisco, CA — Summer 2019

- Developed a control system for autonomous vehicle component
- Worked with the Hardware R&D team creating the next generation of self-driving vehicle hardware

Multi-sensory Haptic Communication Device Design, Houston, TX — Summer 2017-Spring 2019

- Designed a device for Haptic communication consisting of 3 haptic modalities
- Developed a user interface and test setup for many user studies
- Performed subject tests using our device where subjects understood language in 100 minutes of training
- Developed scripts to analyze and visualize collected data to present in weekly meetings

AggiE-Challenge Exoskeleton for Stroke Rehabilitation, College Station, TX — Fall 2016-Spring 2017

- Developed an innovative exoskeleton to improve stroke rehabilitation as an undergraduate research assistant
- Participated in a team developing an augmented reality environment to better engage the user
- Participated in a team electromechanically integrating the exoskeleton
- Developed written and visual representations of work for internal presentations

Mechanical Engineering Senior Design Project, College Station, TX — Fall 2016-Spring 2017

- Developed a system to mark pipes in the manufacturing process given input parameters as a part of a team of four senior mechanical engineers
- Worked in close contact with a representative from Tenaris, building communication and project management skills

Biomechanical Environments Lab Research, College Station, TX — Spring 2016-Spring 2017

- Assisted in development of an adaptable load frame for biomechanical testing
- Conducted research on a novel Total Knee Replacement product as an undergraduate research assistant
- Mentored an undergraduate for the development of a device for physiological testing
- Disseminated knowledge via website, conferences, and internal laboratory presentations

Temp-Regulating Shower Valve Mechatronics Project, College Station, TX — Fall 2016

- Designed a shower valve which regulated water temperature given two input valves
- Utilized used a real-time PID controller with an Arduino to regulate temperature

Undergraduate Summer Research Grant, College Station, TX — Summer 2016

- Improved a modular simulation device for physiological testing as an undergraduate research assistant
- Developed and carried out protocol to validate and improve the simulator
- Mentored underrepresented high school students and supervised their experience with research

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- Produced draft of an article for submission to peer-reviewed Journal of Biomechanical Engineering
- Gained a deeper understanding of professional development and graduate school through seminars

AggiE-Challenge Research, College Station, TX — Fall 2015-Spring 2016

- Participated in a team of 5 interdisciplinary engineering undergraduate students
- Conducted research in 3D printing cancer-mimicking models with the goal of improving the accuracy of medical testing
- Presented findings as a poster at Texas A&M's Engineering Project Showcase

Formula SAE Racecar Modeling Project, College Station, TX — Spring 2015

- Used dynamic models to predict the behavior of a racecar
- Produced graphs showing the relationship between displacement, velocity, and acceleration for several points of interest of the racecar with varying degrees of freedom on different vehicle paths

Club Z! Tutoring, Houston, TX — Summer 2014

- Tutored two students in algebra and geometry to prepare for the next year of classes
- Gained one on one communication skills

Halliburton High School Summer Externship, Houston, TX — Summer 2013

- Worked with several different departments on daily activities and projects
- Participated in company meetings and projects

National Oilwell Varco High School Summer Externship, Houston, TX — Summer 2012

- Learned about daily activities of many different employees
- Completed company workshops
- Worked in several different parts of a company warehouse

Relevant Coursework

- Analysis & Control of Nonlinear Systems
- Algorithmic Robotics
- Robotics
- Dynamics & Modeling of Mechatronic Systems
- ML from Sensor Data
- Mechatronics

Awards and Leadership

Texas Space Grant Consortium Fellow, NASA — Fall 2018, 2019, 2020
1st Place SCI Poster, Mission Connect Symposium — Fall 2019
Honorable Mention, NSF GRFP — Spring 2018
Treasurer, Percussion Studio — Fall 2015-Spring 2017
International Engineering Certificate, Texas A&M University — Summer 2016
Deans Award, Mechanical Engineering — Fall 2013-Fall 2017
2nd Place Undergraduate Research Poster, Student Research Week — Spring 2016
1st Place Research Video, AggiE-Challenge Research Video Contest — Fall 2015
Eagle Scout, Boy Scouts of America — 2013

Poster Presentations and Publications

- ***Nathan Dunkelberger****, Eric Schearer, et al.* "A review of methods for achieving upper limb movement following spinal cord injury through hybrid muscle stimulation and robotic assistance", Experimental Neurology. (2020)
- ***Nathan Dunkelberger****, Sullivan, Jennifer, et al.* "A Multi-sensory Approach to Present Phonemes as Language through a Wearable Haptic Device", IEEE Transactions on Haptics. (2020)
- ***Nathan Dunkelberger****, Derek Wolf, et al.* "Combining Functional Electrical Stimulation and a Powered Exoskeleton to Control Elbow Flexion", Mission Connect Annual Symposium. (2019)
- *Sullivan, Jennifer,* ***Nathan Dunkelberger****, et al.* "Multi-Sensory Stimuli Improve Distinguishability of Cutaneous Haptic Cues", IEEE Transactions on Haptics. (2019)
- ***Nathan Dunkelberger****, Sullivan, Jennifer, et al.* "Conveying Language Through Haptics: A Multi-sensory Approach", International Symposium on Wearable Computing ISWC. (2018) Singapore
- ***Nathan Dunkelberger****, Joshua Bradley, et al.* "Improving Perception Accuracy with Multi-sensory Haptic Cue Delivery" Eurohaptics, (2018) Pisa, Italy

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- ***Nathan Dunkelberger****, Joshua Bradley, et al.* "Improving Perception Accuracy with MISSIVE: A novel, compact, wearable device for rendering multi-modal haptic sensations" Haptics Symposium, (2018) San Francisco, California
- *Derek Wolf,* ***Nathan Dunkelberger****, et al.* "Combining Functional Electrical Stimulation and a Powered Exoskeleton to Control Elbow Flexion" International Symposium on Wearable and Rehabilitation Robotics, Houston, Texas
- ***Nathan Dunkelberger****, Amanda Bass*. "Orthopedic Robots: Dog's Best Friend" *Texas A&M Explorations,* Volume 9 (2017) College Station, Texas
- *Rana Soltani, Amin Zeiaee,* ***Nathan Dunkelberger****, et al.* "Dynamics and Controls of an Upper Limb Exoskeleton" Texas A&M Engineering Project Showcase (2017) College Station, Texas
- ***Nathan Dunkelberger****, William Nelson, David Ramos, et al.* "Automated Pipe Marking System" Texas A&M Engineering Project Showcase (2017) College Station, Texas
- ***Nathan Dunkelberger****, Steve Zambrano, W. Brian Saunders, et al.* "Evolution and Performance Validation of the Joint Motion Simulator (JMS)" Pathways Research Symposium (2016) Prairie View, Texas
- ***Nathan Dunkelberger****, Steve Zambrano, W. Brian Saunders, et al.* "Evolution and Performance Validation of the Physiologically Relevant Instrument for Mechanical Evaluation (PRIME)" MEEN Kickoff Poster Competition (2016) College Station, Texas
- ***Nathan Dunkelberger****, Steve Zambrano, W. Brian Saunders, et al.* "Evolution and Performance Validation of the Physiologically Relevant Instrument for Mechanical Evaluation (PRIME)" College of Engineering Research Symposium (2016) College Station, Texas
- *Zachary Lawson, Sarah Chaudhri,* ***Nathan Dunkelberger****, et al.* "In Vitro Mechanical Studies of Implantable Truss Technology for Total Knee Arthroplasty Designs" Student Research Week Symposium (2016) College Station, Texas
- *Kedar Balakrishna, Sarah Dang,* ***Nathan Dunkelberger****, et al.* "Development of 3D-Printed Vascularized Tumor Models" Texas A&M Engineering Project Showcase (2016) College Station, Texas

Software, Coding, and other Skills

- Proficient SolidWorks
- Proficient C++
- Proficient Matlab
- Proficient Python
- Proficient 3D printing
- Proficient Microcontrollers
- Proficient C#
- Proficient Labview
- Basic Spanish
- Basic Simulink
- Basic Machining
- Proficient Unity