

Troy Kelly Jr.

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Professional Summary

PhD candidate in Biomedical Engineering at the University of Florida with a foundation in Computer Engineering and hands-on research experience spanning musculoskeletal biomechanics, neuromuscular analysis, and sports performance. My work centers around carpometacarpal osteoarthritis (CMC OA), where I apply motion capture, intramuscular electromyography, ultrasound imaging, and computational modeling to understand how joint disease affects hand function and pain perception. With a background in computer engineering and business consulting, I bring a uniquely interdisciplinary perspective to solving complex biomedical problems. I aim to translate biomechanical research into clinically meaningful tools that improve patient outcomes and quality of life.

Education

Doctor of Philosophy, Biomedical Engineering
Musculoskeletal Biomechanics Lab
University of Florida (In Progress)

August 2023 – May 2027

Master of Science, Biomedical Engineering
Musculoskeletal Biomechanics Lab
University of Florida

August 2023 – Dec 2025

Bachelor of Science, Computer Engineering
Digital Logic Design Concentration
Florida Polytechnic University (GPA: 3.69 – Cum Laude)

August 2016 – May 2020

Skills and Qualifications

Research Tools

- OpenSim
- ImageJ
- Electromyography (EMG) Instrumentation
- Ultrasound Imaging
- Quantitative Sensory Testing (QST)
- Vicon Motion Capture

Programming & Software

- Python – Programming Language
- SQL - Programming Language
- MedCalc – Statistical Software
- MATLAB – Programming Language
- SolidWorks – 3D Design Software
- MultiSIM – Circuit Design Software
- WordPress – Content Management System Software

Project Management

- Project Management Professional Certification (PMP)

IT & Cloud Certifications

- Microsoft Azure Administrator – Computer Application (AZ-104 Certified – MCSA)
- Microsoft Identity and Access Administrator (SC-300 Certified – MCSA)
- Microsoft Teams – Client Suite (MS-700 Certified – MCSA)
- Microsoft Office – Client Suite
- Anaplan – Business Planning Software (Anaplan Fellow: Level 1 & 2 Certified)

Relevant Graduate Courses

- Statistical Methods
- BME & Physiology
- Engineering Applications in Musculoskeletal Pain
- Bench to Bedside: Clinical Translation
- Human-Centered AI for Wellness
- Computational Methods in Musculoskeletal Biomechanics
- Biomechanic Instrumentation
- Nursing Science in Health
- Disparities and Vulnerable Populations
- Clinical Correlation

Work & Research Experience

Research Assistant | **University of Florida**

08/2023 – Present

PI: Dr. Jennifer Nichols (Musculoskeletal Biomechanics Lab)

- Conducted comprehensive data collection and data analysis on hand function, strength, and anthropometrics across diverse demographic backgrounds for 750+ individuals.
- Collected and analyzed IRB-approved data using ultrasound imaging, motion capture, force measurements, and quantitative sensory testing to investigate carpometacarpal osteoarthritis (CMC OA).
- Developed and utilized OpenSim models to address research questions related to pitching mechanics in baseball players.
- Contributed to undergraduate instruction in Senior Design 1 (BME4882) and Biomedical Fundamentals (BME3060) courses during the Fall 2024 and Fall 2025 semesters where I instructed 180+ students.

Research Assistant | **University of Florida**

01/2025 – Present

Artificial Intelligence Powered Athletics

- Designed and developed an experimental protocol to evaluate the relationship between kinematic variables and basketball shooting accuracy across biological sex in NCAA basketball players.
- Collaborated with NCAA baseball team to analyze player metrics, to enhance pitching performance strategies.
- Obtained athlete consent to make NCAA athlete data accessible for research in the UF AI-powered Athletics Databank, supporting data driven research on NCAA athletes.

Anaplan Analyst | **TruEd Consulting**

08/2022 – 05/2023

- Building multi-dimensional models to support the budgeting, planning, and forecasting needs of our clients.
- Participating in the delivery of end-to-end client engagements.
- Supporting clients through the creation of Resource Planning, Enrollment Planning, and Workforce Planning models.
- Managing project teams and assisting with providing clients proof of concepts to fit the needs of their organization.

Computer Networks Administrator | **Inspired Technologies**

06/2020 – 08/2022

- Solely managed day to day operations of three client offices, including support of a hybrid configuration. This includes coordinating internal resources for the successful completion of projects.
- Performed remote & onsite technical support for customers' IT networks, server, desktop & laptop systems
- Experience implementing, migrating, managing, and administering tools in a corporate environment
- Responsible for providing consultations to clients, while also participating in clientele project planning, handling client relationships, and performing risk management tasks.
- Responsible for managing Windows Servers, Active Directory, DNS, TCP/IP, Remote Desktop, Cisco Switches, Ubiquiti, Exchange, Office365, Domain Management, Hyper-V, Vmware, ESX, MS Office Suite, network topology, network printers, scanners, hardware and software installation, OS installation.

Computer Networks Engineer/Administrator Intern | **CareerSource Polk**

10/2019 – 05/2020

- Solely organized and supported the company's computer systems
- Troubleshooted network issues and aimed to manage the server of the company and their operating systems

Summer Undergraduate Research Fellowship | **The Mayo Clinic**

05/2019 – 08/2019

PI: Dr. Mostafa Fatemi & Dr. Azra Alizad

- Performed research tasks with use of ultrasound technologies for the discovery of new practical alternatives for the field of medicine using ultrasound technology
- Worked with software such as MATLAB and MedCalc which allowed for the honing of programming skills
- Gained experience with ultrasound equipment, such as Verasonics Products

Undergraduate Research Assistant | **Florida Polytechnic University**

05/2018 – 10/2019

PI: Dr. Robert L. Green

- Synthesized and structurally characterized a novel phosphor material with self-activated photoluminescent properties.
- Explored the effects of post-synthesis treatment on the crystalline structures of rare-earth free anti-perovskite phosphors and its contributions to photoluminescence properties.
- Creating crystalline defects through post-synthesis treatments and ion substitutions to produce color-tunable oxyfluoride phosphors that can be excited under UV lighting and potentially be used in LED and fluorescent lighting.
- Obtained data from X-ray Diffractometer and NPD to determine structural changes through Rietveld refinement.

Undergraduate Research Venture | **Florida Polytechnic University**

09/2018 – 05/2019

PI: Dr. Muhammad Ullah

- Explored carbon nanotubes as a new promising alternative for VLSI Interconnects.
- Studied relevant literature on the topic of interconnects to ensure that carbon nanotubes would be better than other alternatives that may be up for discussion
- Analyzed the different types of carbon nanotubes and which would be better based on properties as a VLSI interconnect.

Undergraduate Research Venture | **Florida Polytechnic University**

09/2018 – 05/2019

Student Led

- Explored the use of a prospective wearable technological device that would assist in the advancement of orthopedics.
- The study led to the prospective idea of a device that would allow for sustaining and developing healthy strong bones in adults, children, and the elderly.
- The device would also provide features not commonly seen in wearable technology, such as features for those who may have some form of a disability.

Undergraduate Lab Technician | **Florida Polytechnic University**

09/2017 – 05/2019

PI: Dr. Scott Wallen

- Explored the idea of creating a circular economy paradigm, allowing laboratory experiments to be designed in a way that products (waste) from one experiment could be used as the starting material for a following experiment.
- The first experiment worked in terms of producing a working LCD power circuit using a FeCl_3 etchant, while the other experiment working in the case of Zn metal being added to a CuCl_2 solution to examine the limiting reagents in a single displacement reaction. Both experiments are complimentary of one another in that the wastes from one could be used as a starting material for the other.

Summer Internship Field Engineer | **Bahamas Power & Light**

06/2017 – 08/2017

- Performed field electrical engineering and instrumentation duties
- Responsible for maintaining machines and to ensure pivotal technology was used for successful plant operation
- Serviced Heavy Fuel Oil Separators and Lube Oil Separators

Manuscripts Published

1. Integlia, R., Mottahead, B., **Kelly Jr, T.F.**, (2020), “*Advancement in Orthopedics Through an Accessible Wearable Device*”. In: Ahram, T. (eds) *Advances in Human Factors in Wearable Technologies and Game Design*. AHFE 2019. *Advances in Intelligent Systems and Computing*, vol 973. Springer, Cham. https://doi.org/10.1007/978-3-030-20476-1_6.
2. **Kelly Jr, T.F.**, Santos, J., Ullah, M., (2019). “*Exploring Carbon Nanotubes for VLSI Interconnects*”. IEEE Xplore. IEEE 62nd International Midwest Symposium on Circuits and Systems (MWSCAS), 2019, pp. 1122-1126, doi: 10.1109/MWSCAS.2019.8885390.
3. Wallen, S., Dhau, J., Green, R., Wemple, L., Collins, B., **Kelly Jr, T. F.**, (2020), “*Maker Chemistry: Exploring Redox Reactions in Introductory Laboratory through Light-Emitting Diode Printed Circuit Board Fabrication*”. *Journal of Chemical Education* 2020 97 (2), 490-496 DOI: 10.1021/acs.jchemed.8b01061.
4. Rosen, D., Husmann, D., Mynderse, L., **Kelly Jr, T.F.**, Alizad, A., Fatemi, M., (2021), “*Detrusor overactivity assessment using ultrasound bladder vibrometry*”. *Physiological Measurement*. 29;42(10):105012.
5. Diaz, M. T., Benoit, A. R., Kearney, K. M., **Kelly, T. F., Jr**, Lindbeck, E. M., Tappan, I., Bowers, W. S., Durai, L., Nunag, J. B., Officer, M. B., Harley, J. B., & Nichols, J. A. (2025). “*A hand biomechanics dataset of kinematics, kinetics, electromyography, and imaging in healthy adults*”. *bioRxiv : the preprint server for biology*, 2025.08.21.671503. <https://doi.org/10.1101/2025.08.21.671503>
6. Diaz, M. T., Benoit, A. R., Kearney, K. M., **Kelly Jr, T. F.**, Lindbeck, E. M., Tappan, I., Bowers, W. S., Durai, L., Nunag, J. B., Officer, M. B., Harley, J. B., & Nichols, J. A. (2025). “*A hand biomechanics dataset of kinematics, kinetics, electromyography, and imaging in healthy adults*”. *Sci Data*. <https://doi.org/10.1038/s41597-026-06939-4>

Manuscripts in Progress

1. **Kelly Jr, T. F.**, Wilkins, C., Boyer, K., Nichols, J. A., (**in progress**). “*A Machine Learning Approach to Exploring the Evolution of Player Archetypes within the NBA*”.
2. Kodiganti, S., **Kelly Jr, T. F.**, Nichols, J. A., (**in review**). “*Evaluating the Effects of Physiological and Kinematic Factors on Basketball Shooting Accuracy*”.
3. **Kelly Jr, T. F.**, Pierre, V., Avdeev, M., Green, R. L., (**in progress**). “*Synthesis and Structural Photoluminescence Characterization of the Hexagonal Anti-Perovskite $\text{Na}_{2-x}\text{Ca}_{1+x}\text{V}_{1-x}\text{Ge}_x\text{O}_4\text{F}$* ”.

Conference Presentations

Podium

Kelly Jr, T. F., Nowak, B. J., Nichols, J. A. (2026). *“The effects of carpometacarpal osteoarthritis (CMC OA) on neuromuscular coordination”*. 10th World Congress of Biomechanics, Vancouver, Canada

Kelly Jr, T. F., Vasilopoulos, T., Cruz-Almeida, Y., Nichols, J. A. (2026). *“Uncovering Pressure Pain Threshold Phenotypes in Carpometacarpal Osteoarthritis”*. Osteoarthritis Research Society International, West Palm Beach, Florida, USA

Kelly Jr, T. F., J., Nichols, J. A. (2026). *“Quantifying human performance through data”*. University of Florida Center for Engineering Human Performance & Wellness, Gainesville, Florida, USA

Kelly Jr, T. F., Nichols, J. A. (2025). *“The impact of carpometacarpal osteoarthritis (CMC OA) on thumb-tip force, movement-evoked pain, and self-reported disability”*. American Society of Biomechanics Conference, Pittsburgh, Pennsylvania, USA

Poster

Kelly Jr, T. F., Vasilopoulos, T., Cruz-Almeida, Y., Nichols, J. A., (2026). *“Uncovering Pressure Pain Threshold Phenotypes in Carpometacarpal Osteoarthritis”*. Osteoarthritis Research Society International, West Palm Beach, Florida, USA

Kodiganti, S., **Kelly Jr, T. F.,** Nichols, J. A., (2026). *“Evaluating the Effects of Physiological and Kinematic Factors on Basketball Shooting Accuracy”*. University of Florida Undergraduate Research Symposium, Gainesville, Florida, USA

Bowers, W., **Kelly Jr, T. F.,** Nichols, J. A., (2026). *“Differences in Hand Muscle Activation Strategies During Functional Tasks in Relation to Pain and CMC OA”*. University of Florida Undergraduate Research Symposium, Gainesville, Florida, USA

Makkar, P., **Kelly Jr, T. F.,** Nichols, J. A., (2025). *“A machine learning model for biomechanical analysis of pitch speed and injury risk in youth baseball pitchers”*. University of Florida Undergraduate Research Symposium, Gainesville, Florida, USA

Kelly Jr, T. F., Diaz, M. T., Harley, J. B., Nichols, J. A., (2024). *“Exploring the intersection of hand pain and activities of daily living across demographics”*. Biomedical Engineering Society Conference, Baltimore, Maryland, USA

Kelly Jr, T. F., Diaz, M. T., Harley, J. B., Nichols, J. A., (2024). *“Understanding Hand Pain: The interplay of activity levels across demographics”*. University of Florida Pruitt Research Day, Gainesville, Florida, USA

Kelly Jr, T. F., Diaz, M. T., Harley, J. B., Nichols, J. A., (2024). *“Exploring Relationships Between Hand Strength, Pain Perception, and Daily Function”*. University of Florida Pain Research Day, Gainesville, Florida, USA

Rendina, A., Makkar, P., **Kelly Jr, T. F.,** Barron, S., Nichols, J. A., (2024). *“Pipeline for Evaluating Forearm Flexor Strength Influence on Baseball Pitching Biomechanics”*. University of Florida Undergraduate Research Symposium, Gainesville, Florida, USA

Kelly Jr, T. F., Fatemi, M., Alizad, A., Zhang, X., Webb, J., (2019). “*Lamb Wave Speed as a Promising Non-Invasive Biomarker for Assessing Bladder Function*”. Kidney, Urologic, and Hematologic Diseases Summer Undergraduate Research Conference, Nashville, Tennessee, USA

Kelly Jr, T. F., Green, R. L., (2019). “*Synthesis and Structural Characterization of $\text{Na}_{2+x}\text{Ca}_{1-x}\text{M}_x\text{VO}_4\text{F}$ ($\text{M} = \text{Eu}, \text{Sm}$)*”. American Chemical Society, Orlando, Florida, USA

Kelly Jr, T. F., Santos, J., Ullah, M., (2019). “*Exploring Carbon Nanotubes for VLSI Interconnects*”. IEEE 62nd International Midwest Symposium on Circuits and Systems, Dallas, Texas, USA

Kelly Jr, T. F., Wallen, S. L., Rittenhouse, C., Wemple, L.B., Collins, B., Biryukova, M., Biryukov, I., (2018) “*Implementing Circular Economy Paradigm for Sustainable Introductory Laboratories*”. Green Chemistry, Engineering, and Technologies, Florida Polytechnic University, Lakeland, Florida, USA

Kelly Jr, T. F., Clarke, Charisma., Leadon, T., Wimbush, K., (2019). “*STEAM Concepts to Enlighten Adolescents*”, National Society of Black Engineers Fall Regional Conference, Grand Hyatt, Tampa Bay, Florida, USA

Lab Equipment Used

- Vicon Motion Capture System
- Intramuscular EMG
- Ultrasound Machine (Supersonic Imagine Mach 30)
- Quantitative Sensory Testing Equipment
- Ultraviolet-Visible Spectrophotometer
- Soldering Iron
- Solder
- Precision Balance
- Rigaku X-Ray Diffractometer
- Fluorescence Spectrophotometer

Leadership Experience

National Society of Black Engineers (UF) | **Graduate Student Chair** 2025 – 2026

- Worked to re-establish NSBE for graduate students on campus after a period of inactivity.
- Organized professional development, networking, and mentorship events for graduate engineering students.
- Led outreach initiatives to strengthen community among Black graduate students in STEM.

Biomedical Engineering Graduate Student Council (UF) | **Inclusive Excellence Chair** 2025 – 2026

- Served as liaison between the Biomedical Engineering Graduate Student Council and BME Inclusive Excellence initiatives.
- Communicated student needs and supported departmental inclusion initiatives.
- Coordinated outreach and engagement efforts between graduate students and faculty/staff.

Biomedical Engineering Inclusive Excellence (UF) | **Treasurer** 2024 – 2025

- Managed budgeting and allocation of funds for student programming and community engagement initiatives.
- Coordinated funding requests and collaborated with university offices to secure resources for student activities.
- Helped organize professional development, mentorship, and inclusion-focused events for BME students.

National Society of Black Engineers (FPU) | **President/APEX & Membership Chair** 2016 – 2020

- Worked to retain and get new members into the chapter.
- Noting another opportunity for leadership as the APEX Chair, made sure all members had their “APEX GPA’s” verified.
- As president, I spoke on behalf of the chapter, while serving as a liaison between our chapter executive board and regional chairperson. Also, superintended the activities of the chapter executive board while presenting and prosing ideas for the betterment of the direction of the chapter.

National Society of Black Engineers | **Region 3 International Committee** 2018 – 2019

- Worked along with members of the region three international committee to cultivate ideas to get our society’s professional engineers more involved while retaining their interests in the organization.
- Extended invitations to international NSBE chapters (chapters outside of the USA) to get their chapters more involved while also trying to expose universities outside of the USA to the culture of NSBE.
- Composing newsletters to inform international members of jobs, internships, and scholarship opportunities available to them.

Professional Organizations & Volunteer Work

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| • BME Graduate Student Council Inclusive Excellence Liaison | 2025 – 2026 |
| • BME Inclusive Excellence (Treasurer) | 2024 – 2025 |
| • National Society of Black Engineers (NSBE) (FL Poly President) | 2018 – 2020 |
| • Rotary Club of Florida Polytechnic University (Member and Volunteer) | 2017 – 2020 |
| • American Chemical Society (Member) | 2019 – 2020 |
| • Association of Computing Machinery (ACM) (Inaugural Secretary) | 2016 – 2017 |
| • National Society of Black Engineers (UF Graduate Student Representative) | 2025 – 2026 |

Service & Outreach

- Judge, University of Florida Undergraduate Pruitt Research Day (2026)
- Judge, University of Florida Dream Team Engineering, Dream Tank Competition (2025)
- Volunteer, BME STEM Day (2025, 2026)
- Volunteer, National Biomechanics Day (2024, 2025, 2026)
- Presenter/Exhibitor, UF AI Symposium (2025)

Honors and Awards

University of Florida HWCOE Dean's Research Award
American Society of Biomechanics Travel Award
University of Florida Intellectual Property for Innovators
Anaplan For All Fellowship Program
Mayo Clinic's Summer Undergraduate Research Fellowship
Provost List Spring 2018
Provost List Spring 2017
National Honors for Outstanding BGCSE Results 2016
Governor General's Youth Award Bronze Medalist
Governor General's Youth Award Silver Medalist
Governor General's Youth Award Swim Safety Certified
2X Elmira College Bahamian Essay Competition National Finalist
Maritime Achievement award