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Irfan Zobayed

EDUCATION

Rice University — **Houston, TX**
Ph.D. Candidate in Mechanical Engineering – *Advisor: Dr. Daniel J. Preston* — Anticipated: May 2026

M.S. in Biomedical Engineering *(GPA: 4.00)* — August 2021 to May 2022
Cornell University – Ithaca, NY – Graduate, Masters — *Teaching Assistant Fellowship Recipient*

B.S. in Biomedical Engineering & Minor in Computer Science *(GPA: 3.93)* — August 2016 to December 2019
The University of Texas at Dallas – Richardson, TX – Undergraduate — *Academic Excellence Scholarship Recipient*

AWARDS & CERTIFICATIONS

BME Graduate Teaching Assistant of the Year — Cornell University, May 2022
Six Sigma Black Belt Certification — Cornell University, December 2021
Research Assistant Fellow, Biomedical Engineering — UT Dallas, August 2020 to August 2021

PUBLICATIONS & CONFERENCES

[1] *Singh, PM*; **Zobayed, I***; Sati, I; and Tadesse, Y (2022). Comprehensive comparison of fabrication, characterization, and control techniques for TCP, fishing line, and SMA muscle smart actuators [publication in preparation for Advanced Robotics].*

[2] ***Zobayed, I**; Deng, EW; Sati, I; and Tadesse, Y (2022). iGrab Duo: A Novel 3-D Printed Portable Hand Orthotic Exoskeleton for Hand Rehabilitation and Assistance, [publication in preparation for IEEE Robotics and Automation Letters].*

[3] *Miles, Drew; **Zobayed, I**; Deng, EW; and Tadesse, Y (2022). A Soft Orthotic Finger 3-D Printed with Embedded Sensors Actuated by SMA smart actuators, [publication in preparation for Smart Material & Structures].*

[4] ***Zobayed, I**; Miles, D; and Tadesse, Y (2022). A 3D-printed soft orthotic hand actuated with twisted and coiled polymer muscles triggered by electromyography signals. ACTA IMEKO, vol. 11, no. 3, article 9, September 2022.*

[5] ***Zobayed, I**; Miles, D; and Tadesse, Y (2021). iGrab Duo: Novel 3D printed Soft Orthotic Hand Triggered by EMG signals. Technical Committee on Measurement and Control of Robotics IEEE, "Robotics for Risky Interventions and Environmental Surveillance". October 8. Galveston, TX [virtual].*

[6] *Jilani, H; **Zobayed, I**; and Tadesse, Y (2021). Comprehensive comparison of fabrication, characterization, and control techniques for TCP, fishing line, and SMA muscle smart actuators. Biomedical Engineering Society (BMES) Annual Meeting, (undergraduate poster). October 6-9. Orlando, FL [virtual].*

[7] ***Zobayed, I** and Tadesse, Y (2021). iGrab: Mechanical characterization of 4-ply and 6-ply TCP muscle actuators for Hand Orthotic Exoskeleton. Biomedical Engineering Society (BMES) Annual Meeting (poster). October 6-9. Orlando, FL [virtual].*

[8] ***Zobayed, I**; Pickle, NT; and Fey, NP (2018). Quantification of the deep squat motion for automated musculoskeletal injury risk assessment. Biomedical Engineering Society (BMES) Annual Meeting (poster). October 17-20. Atlanta, GA.*

ACADEMIC EXPERIENCE

Graduate Research Assistant | PI Lab (Dr. Daniel J. Preston) | Houston, TX — **July 2022 – Present**

- *Ph.D. Candidate* in Preston Innovation (PI) Lab – research focuses include soft materials and actuators, textile-based wearable devices, energy efficiency, fluid mechanics, thermodynamics and heat transfer, and interfacial phenomena.
- Key Words: *robotics, soft robotics, biomechanics, fluids, textiles, manufacturing, energy*

Controls Research Assistant | Antaki Lab (Dr. James Francis Antaki) | Ithaca, NY — **Nov. 2021 – June 2022**

- Re-engineer controller for PediFlow heart-assist system for infants – following AGILE method, developed PID system with NI LabVIEW FPGA board, NI CompactRIO GPIO modules, and NI BNC modules for high sample rate data acquisition.

Lead Robotics Research Assistant | HBS Lab (Dr. Yonas Tadesse) | Richardson, TX — **May 2020 – July 2022**

- *Research Assistant Fellowship* – lead two key research projects in Humanoid Biorobotics and Smart Systems (HBS) Lab
- Assisted in writing proposals to key communities such as NSF, NIH, US Army, and NASA.
  PROJECT 1: iGrab Duo project team. A 3-D printed, soft robotic portable hand orthotic device actuated by silver-coated nylon twisted coiled & polymer (TCP) muscles. Actuation triggered by EMG data processed in deep learning convoluted neural network. Integration of microscale sensors for analytical feedback to track patient improvement and user safety from clinical perspective. Inspired by need to regain locomotive motor functions in the hand for stroke and spinal cord injury patients. IRB approved for pilot-study with a working protocol for future clinical trials.

PROJECT 2: Smart Muscle Fabrication team, where various smart actuators are compared for their key mechanical characteristic, including strain, life cycle, and various tensile properties that affect performance – key muscle data includes TCP muscles, fishing line muscles, and shape-memory alloy (SMA) muscles.

- Key Words: *robotics, orthotics, exoskeleton, smart materials, deep learning, artificial biomechanics, stroke, mechatronics*

Undergraduate Research Assistant | Dr. Nicholas Fey's Lab | Richardson, TX **Jan. 2017 – Oct. 2018**

- *Research & poster accepted to BMES 2018 conference.* Performed inverse kinematics on Vicon-3D data points; developed automated MATLAB script to compute biomechanical calculations for time-variant joint angles to predict injury risk.

TEACHING EXPERIENCE

Teaching Assistant | University of Texas at Dallas | Richardson, TX **Aug. 2019 – May 2021**

- *MECH 472 Thermal Systems Designs* – provide instructional assistance for thermal systems to students when requested.

Design Lab Assistant | Cornell University Bioengineering | Ithaca, NY **Aug. 2021 – May 2022**

- Supervise engineering teams (graduate & undergraduate) in the integration of electrical and mechanical components for biotechnology device manufacturing – includes leading 3D Printing & Machine Shop training/supervision and creating workshops designed to teach instrumentation & data acquisition via MATLAB and NI Modules. *(2 semesters)*

Technical Manager & Client | UT Design | Richardson, TX **May 2021 – Dec. 2021**

- Team mentor and manager for senior design capstone team of six mechanical, electrical, and biomedical engineering undergraduate students who designed a portable cost-effective hand orthotic device for clinical trials. *(2 semesters)*

Teaching Assistant | University of Texas at Dallas | Richardson, TX **Aug. 2019 – May 2021**

- *BMEN 4310 Feedback Systems* – graded weekly HW, quizzes, and exams based on various types of systems, ranging from liner/non-linear to sensitivity control and stabilization of numerical simulation and controller design. *(2 semesters)*
- *BMEN 4110 Feedback Laboratory & Systems* – supervised students in weekly lab sessions for building feedback loops (PID) in LabVIEW & MATLAB, specifically for temperature sensor data and glucose insulin models. *(2 semesters)*
- *ECS 1100 Introduction to Engineering and Computer Science* – mentored first-year students by teaching basic study skills, problem solving, teamwork, and other skills to succeed as an engineering major. *(2 semesters)*

PROFESSIONAL EXPERIENCE

Biomedical Engineer | Touchdown MedTech | Ithaca, NY **Aug. 2021 – May 2022**

- (*Team Leader – Graduate Capstone*) develop automated, portable method to detect E. coli bacteria in chlorinated water within 8 hours – goal is to be able to identify drinkable water when working in the field; 2nd Place in design competition.

CEO & Founder | Turtle Tutors LLC | Dallas, TX **June 2020 – April 2021**

- *Big Idea Competition Semifinalist & Social Impact Fellowship Finalist.* Online affordable tutoring platform for STEM & ELA subjects. Teaching methods are tailored to individual learning styles, where emphasis is placed on learning from mistakes. Self-developed curriculum with +10k questions, uploaded to practice problem set generator web application.
- Sold company in April of 2021 after preliminary goals were met.

Biomedical Engineer | DesignPlex Biomedical | Fort Worth, TX **May 2019 – March 2021**

- Manufacture medical devices for cardiovascular systems – mechanical and electrical design for prototypes and IP.
- *(Patent pending)* Developed automated method of liposuction and fat-cell filtering for breast reconstruction surgery. Created device that takes fat solution through cannula during liposuction and automatically filters fat cells from excess blood cells and waste, controlled through LabVIEW, NI DAQ, and Arduino; designed w/ SolidWorks.
- Integrated system for an artificial heart life-test fixture to mimic the anatomy, physiology, and environment of a human.
- Constructed multiple verification test protocols, including pneumatic, leakage, pressure, thermal, crimp tools, and mass-flow testing for Class II/III medical devices to be used in clinical trials.

Eye-Controlled Wheelchair | UT Design | Richardson, TX **Aug. 2018 – May 2019**

- (*Team Leader – Senior Capstone*) Developed a wheelchair controlled via only pupil tracking for individuals with no motor functions. Inspired by patient with cerebral palsy; patient given freedom to move with no assistance *(link to video demo).*

Smart Helmet | Junior Design Project | Richardson, TX **March 2018 – May 2018**

- Developed helmet accurately detects severity and location of concussion-like head trauma w/ $50 budget. Inspired by need for improved head safety to prevent long-term chronic injuries in high-contact activities, such as American football.

EXTRACURRICULAR

Coach & Trainer | Self-Contracted Tennis Pro | Texas **May 2017 – Present**

- Provide 1-on-1 tennis instruction to players of recreational to national/collegiate levels – sponsored by Diadem Sports.

Founder & President | UTD Club Tennis | Richardson, TX **Jan. 2016 – Aug. 2019**

- *Won UTD Club of the Year 2019.* First UTD team to USTA National tournament. Finished top 50 overall in the nation.