Frederick **Sebastian**

ENGINEER · SCIENTIST

(480) 421-8877 | professional@fred-sebastian.com | fredericksebastian | Scholar Profile | Boston, MA

Education

Northeastern University — *Boston, MA*

PhD in Bioengineering | GPA 3.80 | *Thesis: Sex, Glaucoma, and Iris Biomechanics* — *June, 2024*

Graduate Certificate – Data Analytics Engineering

Arizona State University — *Tempe, AZ*

MS in Biomedical Engineering | GPA 4.00 | *Thesis: Design of a Soft Haptic Interface for Rehabilitation of Impaired Hand Function* — *May, 2018*

BSE in Biomedical Engineering | GPA 3.86 | *Thesis: Development of a Comfortable Myoelectric Prosthetic Socket* — *May, 2017*

Professional Experience

Northeastern University — *Boston, MA*

Research Scientist/Engineer – Laboratory for Soft Tissue Biomechanics — *Aug 2019 - Present*

- Applied inverse FEA to analyze in vivo iris biomechanics using AS-OCT images from healthy & glaucoma subjects, aiding diagnostic tool development
- Utilized data analytics and visualization techniques in R and Python to derive insights from large datasets on gender inequity in biomechanics
- Developed micro-indentation protocols for ex-vivo irides and automated the analysis using MATLAB and ABAQUS, reducing analysis time by 50%
- Optimized dynamic system responses and experimental procedures using sensor integration, directly enhancing precision in tissue biomechanics
- Performed biaxial mechanical testing on sclera, advancing collagen fiber models & linking tissue microstructure to anisotropic mechanical properties
- Taught classes of 50 students on statics and dynamics-based biomechanics projects; invited to instruct independently due to strong teaching skills

Third Pole Therapeutics — *Waltham, MA*

Systems Engineering Intern — *Jan 2023 - Jun 2023*

- Integrated and improved control algorithms for a sensor-based nitric oxide delivery system, enhancing system performance and reliability
- Implemented ISO-compliant risk assessment methods to ensure safety; validated the efficacy of device components using Python
- Contributed to testing and documentation of the device under an FDA-granted IDE, validating its safety and practical application in a feasibility study

Dartmouth College — *Hanover, NH*

Research Assistant – The Hill Lab — *Jun 2018 - Jul 2019*

- Utilized gas chromatography-mass spectrometry (GCMS) to identify and quantify volatile substances in breath samples for tuberculosis diagnosis
- Acquired machine learning and Design of Experiments (DOE) skills through collaboration with the Quantitative Biomedical Sciences department

Arizona State University — *Tempe, AZ*

Research Assistant – Bio-Inspired Mechatronics Lab — *Jun 2017 - May 2018*

- Led design, prototyping, & deployment of a soft-robotics haptic interface using 3D printing, FEM, and silicone fabrication for hand rehabilitation
- Designed and conducted experiments on stiffness perception, recruiting participants and developing product specifications based on findings

National University of Singapore — *Singapore*

Research Internship – Evolution Innovation lab — *May 2016 - Aug 2016*

- Designed & prototyped fabric actuators for Roceso Technologies' EsoGLOVE™, crucial for its launch as a leading lightweight rehabilitation device
- Characterized fabric actuators using fine-tuned force sensors and Arduino control systems

Selected Publications & Patents (2 out of 7)

- **Sebastian, F**., Vargas, A.I., Clarin, J., Hurgoi, A., & Amini, R. *Meta Data Analysis of Sex Distribution of Study Samples Reported in Summer Biomechanics, Bioengineering, & Biotransport Annual Conference Abstracts*. ASME J Biomech Eng. 2023.
- Polygerinos, P., **Sebastian, F**., Fu, Q., & Santello, M. *Soft Robotic Haptic Interface with Variable Stiffness for Rehabilitation of Sensorimotor Hand Function*. US Patent 11,446,545. 2022.

Skills & Competencies

Technical Skills

- Programming and Software – MATLAB, SOLIDWORKS, LabVIEW, R, Python, SQL, Swift, Arduino, ABAQUS, C, C++, SPSS, Minitab, Tableau, Linux
- Integration – Integrated control hardware and software for precision analysis in stress, strain, and dynamic system tests, enhancing accuracy in mechatronic applications
- Prototyping and Design – Rapid prototyping, machine shop skills, experimental design, 3D design and printing, GMP, CAPA, QM documentation, and knowledge of FDA regulatory pathways.

Leadership

- Mentored 14 graduate, 8 undergraduate, and 4 high school students during Ph.D. tenure
- Managed lab personnel, procurement, supplies, and served as safety training liaison
- Initiated and led the peer mentorship program in the Bioengineering Graduate Student Council
- Actively addressed representation and systemic biases as a member of the Bioengineering Diversity and Inclusion Council

Language Proficiency

- English, Malay, & Tamil – Native fluency
- Spanish & Indonesian – Limited fluency

Interests

- Avid Baker
  - Bringing homemade sourdough and new pastries to the office every Monday
  - Aspiring to apprentice at a local bakery
- Pen & Ink Rendering
  - Creating custom ink artwork inspired by favorite animated characters as personalized gifts