Frederick **Sebastian**

Engineer · Scientist

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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*

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, supporting strategic insights for diagnostic tool development and clinical decision-making
- Used data analytics & visualization in R & Python to extract insights from complex datasets, informing strategic healthcare recommendations
- 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 & optimized control algorithms for a sensor-based nitric oxide system, ensuring reliability and aligning enhancements with strategic goals
- Conducted risk assessment and QA testing per ISO standards, providing insights for executive decisions on safety and efficacy
- 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 robotic haptic interface using 3D printing, FEM & silicone fabrication, shaping strategic product strategy
- Conducted user testing and data analysis on stiffness perception, informing product specs & enhancing customer-focused decisions

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 9)

- **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, Python, R, SQL, Tableau; proficient in data analysis, visualization, and statistical modeling for engineering insights
- Integration – Integrated control hardware and software for precision analysis in stress, strain, and dynamic system tests, enhancing accuracy in mechatronic applications
- Prototyping and Design – Experimental design, 3D printing, machine shop, silicone and fabric-based prototyping; documentation for GMP, CAPA, QM, and FDA regulatory pathways

Leadership

- Mentored 14 graduate, 8 undergraduate, and 4 high school students; led training and onboarding for lab and safety protocols
- Founded the peer mentorship program in the Bioengineering Graduate Student Council
- Managed lab operations, procurement, and coordination with safety officers
- Promoted equity and inclusion as a member of the Bioengineering Diversity and Inclusion Council

Language Proficiency

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

Interests

- Avid Baker
  - Weekly sourdough and pastry experiments
  - Aspiring bakery apprentice
- Pen & Ink Rendering
  - Creating custom ink artwork inspired by favorite animated characters as personalized gifts