

# 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 TOOLS** – C, C++, Python, R, MATLAB, SQL, HTML, LabVIEW, Arduino, Swift, Processing, Linux, LaTeX
- **MODELING AND PROTOTYPING** – SolidWorks, Abaqus, FEA, DOE, Tableau, 3D printing, machine shop, sensor systems, silicone/fabric prototyping
- **COMPLIANCE AND DOCUMENTATION** – GMP, CAPA, Quality Management Systems, 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