Curriculum Vitae

Frederick (Tzujie) Huang
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Education

B. S., *with Distinction*, in Biomedical Engineering 2025
The University of North Carolina at Chapel Hill, Chapel Hill, NC
B. S., *magna cum laude*, in Biomedical Engineering 2025
North Carolina State University, Raleigh, NC

Professional Experience

Biomaterials Research Associate 2025-Present
Department of Comprehensive Dentistry, School of Dentistry, UT Health San Antonio
Teaching Assistant 2024-2025
Lampe Joint Department of Biomedical Engineering, UNC-Chapel Hill & NC State University
Process Intern 2024-2025
Lampe Joint Department of Biomedical Engineering, UNC-Chapel Hill & NC State University
Engineering Intern 2024-2025
Physical Medicine and Rehabilitation, UNC Health
Research Assistant 2023-2024
Division of Pharmacoengineering and Molecular Pharmaceutics, Eshelman School of Pharmacy, UNC-Chapel Hill
Research Assistant 2022-2023
Department of Applied Physical Sciences, UNC-Chapel Hill
Music Instructor 2021-2025
Musical Empowerment, UNC-Chapel Hill

Projects

Anki Remote Controller | *Xtensa, RF Communications* August 2025
- Built a 5 button wireless device for professional school students navigating Anki's review software.
- Implemented and deployed 200+ lines of code for secure, rapid pairing with personal devices.

Reaction Time Datalogger | *C++, PlatformIO, RealTerm* May 2025
- Investigated reaction times (RTs) across audio, visual, and tactile stimuli, utilizing AVR family microcontrollers for signal acquisition and processing.

Biospecimen QA/QC in Omic Processing | *LC/MALDI-TOF, LipidSearch 5.0* May 2025
- Studied biospecimen degradation during extraction processes, building SOPs for sample preparation.
- Reduced lipid breakdown in biospecimen processing by up to 22.9% among 1740+ measured samples.

Re-imagining Treatments for Pectus Carinatum | *Medical Device Prototyping* May 2025
- Developed a chest brace in collaboration with UNC Health PM&R for pectus carinatum patients to give providers real-time feedback following ISO 14971 and 13485 standards.
- Altered patient Haller index by an average of 0.2, projecting a 30% decrease in treatment time.

Non-Primary Weight Bearing Bone Development | *HR-pQCT, Technical Writing* April 2025
- Experimental proposal to map stress/strain distributions in the distal tibia and ulna for healthy, sedentary, pre-menopausal patients under non-cyclic loading using HR-pQCT based finite element modeling.
- Projected real, cortical, and trabecular thickness of ulna to increase by 1.6, 37, and 4.7%.

Scaffold Manufacturing for Valvular Cells | *Technical Writing* April 2025

- Design proposal for an electrospun polycaprolactone scaffold manufactured for seeding with up to $3 * 10^9$ valvular endothelial/interstitial cells.

Sourcing Insulin Analogs from c. geographus | ***PyMOL, DeepMind, Chimera*** December 2024

- Researched venom properties of fish-hunting cone snails *in silico* to engineer rapid pharmacokinetic properties into a 57 amino acid long ultra stable single-chain insulin analog.
- Tested 15+ candidate molecules for suitable receptor interactions.

Developing Mouse Osteoblast Cell Lines | ***Cell Culture and Passaging, BSL2*** February 2024

- Cultured and passaged 7F2 mouse osteoblast cells lines for junior lab students.
- Sustained at least 92.6% cell viability across 8 batches containing at least $1 * 10^6$ cells.

Finite Element Modeling in Biological Systems | ***MATLAB*** May 2024

- Modeled transient diffusion across drug-releasing patches and IL-6 releasing mammary duct platforms.
- Demonstrated as a proof-of-concept from Kutys-Polacheck et al. 2020.

Alcohol Oxidation through Light Mediated Reactions | ***Organic Synthesis, HNMR*** May 2023

- Synthesized low-cost and nontoxic pyrylium salt catalysts operating under mild conditions for drug discovery applications.
- Characterization with HNMR and cyclic voltammetry.

Presentations

Poster (with S. Mathur, K.S. Paye, M.N. Cole, M.J. Gilbert, M.K. Hederick)

- "The Brace Check—Novel Data Collection for Monitoring Pectus Carinatum", Lampe Joint Department of Biomedical Engineering Senior Design Symposium, Raleigh, NC, April 2025.

Poster

- "Quality Management in Lipidomic Extractions to Develop a Lipidomic Integrity Number", UNC-Chapel Hill Undergraduate Research Symposium, Chapel Hill, NC, April 2025.

Teaching Experience

Course Name and Number	Enrollment	Type	Year
BMME 209 Materials Science of Biomaterials	37	Ugrad	2024-2025
Music Theory and Classical Performance	2	Tutor	2022-2024

Honors & Awards

IPEP Distinguished Scholar, *School of Medicine, University of North Carolina at Chapel Hill* 2025
Abrams Scholar, *College of Engineering, North Carolina State University* 2024
College Division I National Champion, *USA Ultimate* 2023
College Division I National Champion, *USA Ultimate* 2022
Dean's List, *University of North Carolina at Chapel Hill* 2021
College Division I National Champion, *USA Ultimate* 2021
AP Scholar with Distinction, *College Board* 2021

Volunteer Experience

Music Instructor 1/2022 - 1/2025
Musical Empowerment @ UNC-Chapel Hill Chapel Hill, NC

- Led chapter efforts to teach one-on-one lessons for violin/viola to K-12 students from 250+ families in Chapel Hill-Carrboro School System.

Executive Officer 5/2022 - 5/2025
UNC Mens Ultimate Blue—Darkside Chapel Hill, NC

- Contracted sponsor agreements with local businesses and managed a $60,000+ budget from 2023-2025.
- Synthesized efforts with a local organization, Triangle Ultimate, and St. Augustine's University club sports to establish the US's first active HBCU ultimate frisbee team.

Technical Skills

- Prototyping: Additive and Subtractive Manufacturing, CAD, Microcontrollers, Oscilloscope, PCB Design, FEA.
- Languages: MATLAB, Python, AVR C, LaTeX
- Software: PyMOL, ImageJ, Onshape, Fusion, AutoCAD, LipidSearch, BLAST, FASTA, AutoDock Vina, NI MAX, LabChart, Chimera, ClusPro, Office Suite
- Laboratory: Aseptic Technique, Cell Culture and Passaging, TEM, Sterilization