

HAMZA AL HALABI

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BIOMEDICAL ENGINEERING | PRODUCT DEVELOPMENT, RESEARCH & DATA SYSTEMS

Biomedical engineering student with single-cell genomics, laboratory data analysis and medical-device prototyping experience. Ran 88 samples through the full 10x Genomics Flex v2 protocol and analyzed the sequencing data with Cell Ranger. Created an Excel/VBA mass-spectrometry workflow that automated analysis tables, t-tests and volcano plots.

EDUCATION

Bachelor of Science, Biomedical Engineering | University of Cincinnati, Cincinnati, OH | Expected 2028

TECHNICAL SKILLS

Product development: user needs, requirements definition, human factors, FMEA, benchmarking, verification planning, reverse engineering, regulatory-pathway awareness

CAD & prototyping: SolidWorks, Siemens NX, Fusion 360, Blender, FDM/SLA printing, mold design, silicone casting

Programming & analysis: Python, MATLAB, R, C/C++, JavaScript, HTML/CSS, Arduino, Processing, Excel/VBA, Linux/HPC

Laboratory & electronics: high-resolution mass spectrometry, PBMC isolation, Illumina sequencing analysis, 10x Genomics Flex v2 single-cell sequencing, custom probe preparation, ECG acquisition, KiCad, LTspice

PROFESSIONAL EXPERIENCE

Biomedical Engineering Co-op | Live Well Collaborative, Cincinnati, OH | Aug 2026 - Present

- Train an airway sound-detection model on public respiratory-audio data; contribute to a separate endotracheal-tube location and external-visualization project using nonclinical silicone surrogates.
- Conduct market research and consumer interviews on upper-limb prosthesis use; develop repeatable benchmarking for packaging and household tasks.

Research Student II | Cincinnati Children's Research Foundation, Cincinnati, OH | Aug 2025 - May 2026

- Spent about half the placement on 10x Genomics Flex v2: prepared the protocol, samples and custom probes; ran 88 samples through the full protocol for a mouse study, with sequencing on Illumina instruments.
- Performed the Flex v2 data analysis with Cell Ranger on Linux/HPC systems.
- Created an Excel/VBA workflow for mass-spectrometry data, with human samples as the main use and additional support for the mouse-study samples. Automated analysis tables, t-tests and volcano plots.
- Prepared samples and operated, maintained and calibrated a Thermo Fisher Velos Pro mass spectrometer for preclinical research.

Project Lead | EnableUC, University of Cincinnati | Aug 2024 - May 2025

- Led early development of a closed-loop PLA recycling and refilamentation workflow; used rheology with UC's RheOhio Lab to inform material and process decisions.

Clinical Research Assistant | interim Translational Research Institute (iTRI), Hamad Medical Corporation, Qatar | May 2021 - Jul 2024

- Processed 50+ endocrine research samples, including PBMC isolation; analyzed Illumina data, maintained study records and sample inventories, and trained four incoming colleagues.

SELECTED BIOMEDICAL PRODUCT & RESEARCH PROJECTS

Pediatric Arch Support | Medical Device Design, University of Cincinnati | Summer 2026

- Coordinated clinical contact and contributed research and system analysis for a team arch-support concept for children ages 5-7 with symptomatic flat feet.
- Contributed to concept selection, risk analysis and a draft verification plan for an adjustable sewn sleeve with a gel insert.

Endotracheal-Tube Location & External Visualization | Live Well Collaborative | 2026

- Designed feature-matched split molds in Blender from anatomical references, adding clamping and demolding features; cast two-part silicone tracheal surrogates for prototype testing.
- Tested ETT location and external-visualization prototypes on silicone tracheal surrogates in nonclinical bench work.

Pediatric Hospital Equipment Concept | Live Well Collaborative | 2026

Disassembled and studied existing pediatric care equipment and crib configurations; applied reverse engineering and 3D CAD to explore mechanisms, interfaces, fit, and clearance for an early hospital-compatible rocking accessory. Considered safety and regulatory requirements as design inputs.

Assistive Product Integration & Prosthesis Benchmarking | Live Well Collaborative | 2026

- Designed and conducted consumer interviews and market research on how upper-limb prosthesis users integrate products into everyday tasks.
- Developed packaging and household-task benchmarks for upper-limb prosthesis users; used interviews, literature review and human-factors analysis to identify barriers and adaptations.

ECG Acquisition & Visualization System | Individual BME 2081C Build | Summer 2026

- Soldered and tested a Ninetales biosignal board; adapted Arduino sampling at approximately 100 Hz and verified serial communication with a Processing/Java monitor.
- Wrote the Processing/Java monitor with a scrolling trace, threshold-based beat detection and beat-interval heart-rate estimate. Added a status display and audio cue for the educational prototype.

Wearable TENS Systems Analysis | University of Cincinnati | 2025

Mapped transcutaneous electrical nerve stimulation across human, mechanical, electrical, biological, and chemical domains. Contributed literature review and interaction mapping to a team wearable-garment concept focused on usability and interface barriers.

SOFTWARE, DATA & TECHNICAL COMMUNICATION

LungScope Respiratory-Audio Research Prototype | AI-Assisted Data Engineering | 2026

- Defined requirements and reviewed AI-assisted code for respiratory-audio data preparation, subject-level splitting and source-record tracking.
- Prepared train/validation/test splits from 5,881 eligible SPRSound recordings across 854 known subjects; checked that no subject or duplicate audio appeared in two splits.
- Kept recordings with unknown subject identity out of supervised splits. Resolved a conflicting duplicate while preserving source aliases and annotations.

JobHub | AI-Assisted Application Development | 2026 - Present

- Set product direction and reviewed code for a Cloudflare Workers job-search app; an AI coding assistant wrote much of the implementation.
- Directed account-scoped data access, a two-database design and budgeted job collectors.
- Defined a bounded language-model layer for job-search workflows.

3D Assembly Visualization | AI-Assisted Blender Prototypes

Directed reference-based F1 front-end and suspension models; reviewed proportions, mechanical interfaces, collisions and moving-part clearances in digital assemblies.

SELECTED PUBLICATIONS

Peer-reviewed article: Co-author; contributed sample collection and processing. *Metabolically Healthy Obesity Is Characterized by a Distinct Proteome Signature*. International Journal of Molecular Sciences, 2025; 26(5):2262. DOI: 10.3390/ijms26052262.

Preprint: Co-author; contributed sample collection and processing. *Comprehensive Analysis of Serum Metabolites and Whole Blood Cell Transcriptome Reveals the Dysregulated Metabolic Pathways in Metabolically Healthy Obesity*. Research Square, 2024. DOI: 10.21203/rs.3.rs-5216460/v1.

LEADERSHIP & ROBOTICS

Resident Advisor | University of Cincinnati | Aug 2025 - Present

Supported approximately 60 residents through safety rounds, conflict response and resource referrals; planned events with more than 100 cumulative attendees.

Qatar national-team participant, FIRST Global Challenge: Geneva, Switzerland (2022) and Singapore (2023). Competed in FIRST Tech Challenge, contributing to robot design and game strategy.