

Ege Ozemek

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EDUCATION

Duke University — Pratt School of Engineering

B.S. in Biomedical Engineering · GPA 3.40

Durham, NC

Expected May 2027

BME Design Fellow · FOCUS Program · Defne–Muhtar Kent Education Foundation Scholar · President, Duke Turkish Student Association

Relevant Coursework: Medical Instrumentation, Signals & Systems, Biomaterials, Quantitative Physiology & Biostatistics, Molecular Biology, Computational Methods in Engineering, Fundamentals of Electrical & Computer Engineering, Differential Equations, Data Analytics for Business

EXPERIENCE

BME Design Fellow — Duke University (Palmeri Lab)

May 2026 – Present

mHealth tympanometer for the R33 clinical study — embedded firmware & clinical data platform

- Designed and shipped standalone OLED display firmware (2.42" SSD1309) on an nRF52833 running Zephyr RTOS, implementing 10 device UI states over SPI and resolving hardware pin conflicts to fit the mechanical layout.
- Built and deployed a Flask/SQLite review platform on Duke's VCM infrastructure, enabling audiologists to classify 1,060 tympanograms by Jerger type.
- Engineered a NumPy/SciPy ETL pipeline with 4th-order Butterworth filtering and reverse-engineered a cross-arm database join to pair 536 device and commercial subjects across mismatched identifier schemes.
- Reduced clinical image storage **97% (2.4 GB → 79 MB)** by compressing 887 paired images into JPEG BLOBs embedded in SQLite for single-file deployment.

Research & Technical Intern — Canon Medical Systems

Jul 2025

- Benchmarked flat-panel X-ray detectors (Siemens, GE, Philips, Samsung) on DQE, spatial, and contrast-resolution metrics; analyzed charge-trapping in a-Si/CsI detectors for image-quality optimization.
- Delivered a 45-minute technical seminar on X-ray physics (bremsstrahlung, collimation, dose optimization) to 20+ engineers and clinical specialists.

Biomedical Engineering Intern — Turkish Ministry of Health

May – Jun 2025

- Calibrated and serviced 30+ X-ray, CT, and angiography systems across 8 hospitals to maintain imaging accuracy and uptime.
- Co-designed and 3D-printed a low-compression mammography prototype, iterating device geometry across 5 revisions to improve patient comfort.

Undergraduate Researcher — Collective for Psychiatric Neuroengineering, Duke

Aug 2025 – Present

- Fabricated multi-channel neural electrode arrays for in-vivo murine recordings via precision micro-assembly under stereomicroscopy.
- Designed electrode geometries for targeted brain regions and calibrated micro-wire lengths for stereotactic implantation accuracy.

PROJECTS

Cardiac Pacemaker (VVIR) — closed-loop embedded system

- Designed and built a closed-loop VVIR pacemaker (analog ECG sensing chain, real-time firmware, MOSFET stimulation circuit); demonstrated live capture and inhibition on an ex vivo frog heart preparation.
- Implemented rate-adaptive pacing with an ADXL335 accelerometer, mapping 3-axis motion magnitude onto a 60–120 bpm range in embedded C on an Arduino Nano Every.
- Built the sensing front-end (INA128 instrumentation amplifier, band-pass filter, interrupt-driven comparator R-wave detection at 200 Hz) and characterized myocardial strength–duration response to set stimulation thresholds.

Self-Aligning Eye-Drop Device — assistive human-factors design

- Identified an unaddressed aiming problem in a handheld squeeze eye-dropper for elderly users (hand tremor, low vision) and conceived a magnetic self-alignment mechanism that docks the dropper to a lensless eyeglass frame to auto-position it over each eye.
- Modeling the docking geometry in CAD and iterating magnet-strength configurations toward a working MVP.

MRI Brain Tumor Segmentation — frequency-domain pipeline

- Developed a 2D FFT-based MRI tumor segmentation pipeline, tuning frequency filters across 50+ annotated scans and evaluating with Dice and IoU metrics.

CAR-T Tumor–Immune Dynamics — computational model

- Built an ODE model of CAR-T expansion and tumor cytotoxicity; ran parameter sweeps across antigen-expression and dosing conditions to evaluate therapy efficacy.

SKILLS

Languages: Python, C/C++, MATLAB, SQL

Embedded & Hardware: Zephyr RTOS, nRF Connect SDK (nRF52833), Arduino, SPI, PCB design (KiCad), CAD (Onshape), 3D printing, soldering

Software & Data: Flask, SQLite, NumPy, SciPy, Git, signal processing, ETL pipelines, matplotlib

Domain: Medical device prototyping, embedded firmware, ECG/EEG/EMG acquisition, human factors, design iteration & bench testing, biomaterials