ZACHARIAS CHEN

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EDUCATION

Duke University Durham, NC
Mechanical Engineering B.S, Computer Science minor *8/21 - 5/25*

- **GPA**: 3.98/4.00
- **Coursework**: Aircraft performance and Design, Intro to Robotics, Robotics Studio, Intro to Computer Vision

WORK EXPERIENCE

Medtronic *New Haven, CT*
Development Engineer Intern *6/24 – 8/24*

- **Decomposed Hugo RAS system requirements** for operator latency, which reduced testing burden by 72-78%, through designing transfer functions and authoring system requirements to ensure surgical precision and patient safety
- Authored design verification protocol for system-level control functionalities that include 11 system requirements through utilization of risk-based design verification and assessment of total body of evidence
- Authored workflow documents for creating design verification protocols and decompositions as a means of process improvement for the development engineering team

Pirouette Medical *Portsmouth, NH*
Mechanical Design Intern *5/23 – 8/23*

- Increased company completion of epinephrine autoinjector **design verification** by 40% by reviewing requirements, designing experiments, designing and manufacturing fixtures, testing, analyzing data, and making design change
- Designed test fixtures for CNC milling, injection molding, and SLA printing
- Improved operations by creating assembly fixtures, ordering equipment and software, and improving quality control

Brain Tool Labs *Durham, NC*
Undergraduate Researcher *1/22 - Present*

- Developing a 20 KHz – 3 MHz sensing array to distill acoustic information contained in energy-based surgeries and provide intuitive feedback to surgeons
- Developed a 2D to 3D optical coherence tomography **image segmentation pipeline** that classifies sarcoma tumors and generates a 3mm x 3mm point cloud of the tumor for autonomous laser resection
- Won a $2500 grant for developing an **optical phantom** that mimics the properties of healthy and cancerous brain tissue under the wavelengths used in the OCT. Will be used to characterize autonomous laser resection results

Johns Hopkins Applied Physics Lab *Laurel, MD*
Mechanical Engineering Intern *8/20 - 5/21*

- Researched Capacitive Deionization (CDI) against the current state of art technologies like reverse osmosis, established relationships between electro-chemical properties of materials vs CDI efficiency, ran technoeconomic analysis in Simulink
- Proposed a hybrid desalination pipeline featuring CDI and reverse osmosis to compensate for the shortcomings of both
- Presented possible application spaces in the US base on technoeconomic analysis

EXTRA CURRICULARS/ PROJECTS

Duke Aero
Incoming Payload Lead (2024-2025)

- Researched, designed, prototyping, machined, and integrated a 6U **CubeSat** for 2024 SAC competition
- Features landing legs, recovery deployment system, expandable solar panels, variable reefing mechanism, live video, grid fins, and docking system as demonstrations of technology for potential colonization missions

Duke Math Department
Help Room Teaching Assistant + SAGE Peer Facilitator

- Lead the Linear and Multivariable Calculus math help rooms with 2 other Tas
- Lead two weekly SAGE discussion groups to help facilitate student learning through review slides and additional content

Augmentative Transportation Device for post-Pulmonary Surgery Patients in Wheelchairs

- Worked with Duke Hospital to develop (entire **design process)** an augmentative storage device that could safely and easily help nurses transport patients in wheelchairs with their chest tubes, drainage containers, and foley catheters
- Won 3rd in PDMA Carolinas' Student Competition for deploying a product. Awarded $250 in funding to continue the project

Achilles: Bipedal Robot

- Designed, manufactured, and programmed a ~12 in tall **bipedal robot** capable of walking and dancing
- Features two legs with 4 bar linkages for high and ankle actuation, as well as a hip joint for dancing. Actuation through Lx16a Servos controlled by a Raspberry Pi.

SKILLS AND INTERESTS

- **Experienced:** SolidWorks, Fusion 360, CNC Milling, FDM and SLA 3D printing, rapid prototyping, design verification, GDT, laser cutting, Java, python, C, MIPS assembly, Splunk
- **Knowledgeable:** Matlab, LabView, FEA (manual and computer aided), image processing, robotics, HTML, CSS, Javascript
- **Learning:** Ansys (edx course), CFD, piezoelectric development, machine learning (pytorch)