



Computer Science Capstone

LIGHT
DOSE

TENSEGRITY
Medical

BENEFITS

- Join a multi-disciplinary team!
- Work alongside local professionals including engineers in the start-up space!
- Maximize **gamification** skills!
- Explore remote & long-distance **communication** and **cybersecurity**!
- Excell in **data analytics**!
- Expand into **predictive modeling**, early prevention & diagnosis!
- Design **health informatics** that make a difference!
- Begin your professional experience in the medical start-up space and strengthen your resume & portfolio!

DEVICE DESCRIPTION:

We are developing a rechargeable, reusable, non-invasive medical device that monitors and mitigates catastrophic health events while modulating biological healing processes and gathering biometrics for machine learning and AI-driven communication.

This device is uniquely positioned for acquisition by the DoD for active warfare and invaluable to first responders, search & rescue teams, and the broader medical community. A scaled-down version would be essential in AED first aid kits, pre/post-surgical procedures, rehab, and at-home use for treatment protocols. It has the potential to save lives, mitigate emergencies, and decrease dependency on unnecessary medical intervention.

DEVICE REQUIREMENTS:

The device uses red and infrared LEDs with pulse modulation supported by a blood flow/oxygen sensor. Focus will be on **data capture** and **wireless transmission**, meaningful **data analysis**, **app** building for IOS + Andriod, integration with **wearables**, patient motivation through **gamification & Character AI**, **cybersecurity with HIPPA**, and training with LLM for **machine learning**.

PROFESSIONAL OPPORTUNITIES

Gain experience working with patents under the guidance of former Gore lawyer and Intellectual Property expert, David Johns, and CEOs of disruptive technology companies. Be a part of Brand Storytelling and interact with stakeholders while helping to shape the future of paid internships, market validation studies, and clinical/field trial training.

KNOWLEDGE, SKILLS, AND EXPERTISE REQUIRED:

Skills You'll Want to Have and Expand

- **Programming:** Proficiency in languages like Python, C++, or Java for developing algorithms, machine learning models, and software interfaces.
- **Software Development:** Familiar with open-source, source control, merging, documenting, and collaborating with code in a component-oriented architecture and design mindset with the ability to explain why you chose your particular roadmap for the development.
- **Problem Solving:** Ability to break problems down into manageable software requirements and tasks with the overall goal of developing a wireframe and executing it into MVP for testing.
- **Data Analysis:** Ability to process, analyze, and interpret large datasets, particularly in biometric data, and integrate the overall vision for the project into meaningful data.
- **AI:** Willing to seek out, investigate, and qualify whether existing AI tools and/or platforms would best serve the project and why.
- **Machine Learning:** Experience in developing and training machine learning models, including the use of libraries like TensorFlow or PyTorch.
- **Embedded Systems:** Understanding of microcontroller programming and embedded system design for integrating sensors and controlling device functions.
- **Bluetooth Communication:** Ability to develop Bluetooth communication protocols to ensure seamless data transfer between the device and external systems.
- **Software Development:** Experience in software development for both mobile and desktop applications, including user interface (UI) and user experience (UX) design.
- **Cybersecurity:** Knowledge of cybersecurity principles to protect sensitive health data, including encryption, authentication, and compliance with regulations like HIPAA.
- **Circuit Design:** Willingness to engage with Electrical Engineering to understand design and optimization in electronic circuits, particularly for power efficiency and sensor integration.
- **Prototyping:** Willingness to engage with Mechanical Engineering to understand hands-on experiences with prototyping tools and techniques, including 3D printing and PCB design.
- **Project Management:** Ability to manage tasks, timelines, and resources efficiently, with a focus on teamwork and collaboration across multiple disciplines.

Knowledge You'll Want to Possess and Gain!

- **Data Storage:** Understanding cloud storage solutions, data management, and the ability to select appropriate storage mechanisms for secure and efficient data handling and defend your reasoning.
- **Human-Computer Interaction (HCI):** Desire to gain knowledge of HCI principles to design intuitive and effective interfaces for patient and healthcare provider interactions, including gamification, *Character AI*, etc.
- **Wireless Communication:** Familiarity with wireless communication standards, particularly Bluetooth, for integrating devices within a medical setting and the systems at play in medical facilities.
- **Regulatory Compliance:** Awareness of regulatory requirements for medical devices, particularly those related to data security and patient privacy.
- **Biomedical Engineering Principles:** Curiosity in understanding basic biomedical engineering concepts, particularly in photobiomodulation and cardiovascular monitoring, to better comprehend the overall project and propel it into the future of innovation!
- **Sensor Technology:** Willingness to cultivate in-depth knowledge of sensors, particularly PPG (photoplethysmography) sensors, and their applications in monitoring blood flow and oxygen saturation in order to better understand the overall device functionality.

Expertise You'll Be Seeking!

- **Machine Learning Applications in Healthcare:** Expertise in applying machine learning to healthcare data for predictive analytics and personalized interventions.
- **Integration of Wearable Technology:** Desire to build the bridge for integrating wearable technology with medical devices, focusing on user comfort, durability, and reliability.
- **Medical Device Design:** Seeking to develop a deep understanding of the principles and best practices for designing medical devices, including considerations for safety, efficacy, and patient outcomes.
- **Multidisciplinary Collaboration:** Ability to work effectively in multidisciplinary teams, coordinating with professionals from engineering, healthcare, and business backgrounds.
- **Innovation in Medical Technology:** A mindset for innovation, with the ability to think creatively and apply cutting-edge technologies to solve complex medical challenges.

PROJECT REQUIREMENTS:

A Willingness to Think Outside the Box, Push Innovation and Discover New Uses for Integrative Technologies in the Medical Start-Up Space!

- Biomedical Data Storage and Transmission: You **MUST** be willing to research, choose, justify, and deploy the appropriate HIPAA-compliant safety measures for data. Including keeping in mind that at-home users and medical professionals will need you to choose cloud storage solutions, data management, and the ability to select appropriate storage mechanisms for secure and efficient data handling for their well-being.
- Curiosity and Willingness to Explore: It will be **super helpful** and to your **advantage** to put your curiosity to work in exploring the latest in AI development tools! Leveraging services like *Super Intelligent*, being investigative of the progress with companies like *Inflection.ai*, and shifting your mindset into your future career-building focus will help you think like you're already earning the big bucks!
- Stretch Your Entrepreneurial Muscles: **Start NOW** thinking and making decisions like you are working in a business so that you understand the overall impact you can make with your Computer Science skills! Be willing to engage in the brand story, post your progress and reasoning on LinkedIn, be prepared to present your ideas and roadmap to mentors and advisory boards, and get ready to boost your resume and hire-ability!
- And finally...no extra equipment is required besides your brilliant mind, willingness to grow, and readiness to build a solution-focused team!

DELIVERABLES

First and Foremost, We Gotta Have a Wireframe and Its Testability by Spring!

- This is a REAL medical device that needs to be ready for full functionality by Spring of 2025. Everything described above needs to be tested successfully with real data. That includes a well thought out wireframe and app for optimizing user engagement, medical professional adoption, and continued funding by the BioScience Roadmap in PHX!
- Must include a complete and clear **User Manual** in video form for configuring and operating the software that is in laymans terms for everyone. Along with a report detailing the design and implementation of the product in a complete, clear, and professional manner. This document should provide a strong basis for future development and funding of the product.