Arthrex – Developing an Automated Platform for Surgical Image Artifact Identification

This project is in cooperation and partnership with Arthrex California Technology Inc located in Goleta (within biking distance of campus!). The team will have Arthrex engineers Zachary Dominguez, John Batikian, Nystha Baishya, and Jason Metzner for support.

Project Description

Background:
Arthrex designs surgical camera systems which enable surgeons to extend their vision into our bodies, in order to deliver clinical care. Maintaining a high quality, consistent, uninterrupted video feed is essential to ensure the highest reliability is achieved. Moreover, with advancing technology, our systems have grown richer in features and capabilities which increase the number of possible failure modes exponentially. We've been successful in creating automation that covers this very large test footprint, and one area for growth is the scene that the camera visualizes (color, lighting, motion). Controlling these environmental variables and using them to challenge how our system responds may reveal design deficiencies or bugs.

The Challenge:
Design and develop a suite of tools that can be used to automate and test our imaging platforms with different environments and scenes.

Project Outline:
Motorized Camera: Create a fixture for the camera head that allows for insertion/retraction with anatomic models. This includes a linear motorized stage.
Auto-Exposure Fixture: Create a light-box with programmable/controlled lighting (LEDs). It should produces various scenes to challenge the auto-exposure routines and stepping/responsiveness.
Circuit Board and Firmware: Create a custom PCB for an ESP32 (or similar), motor drivers, and peripheral circuitry needed to achieve the motorized camera and light-box fixtures, as well as some other components needed for other system functions.
Integration: Collaborate with Arthrex on integration into the greater Sentinel setup!

Student Requirements
Team participant will be required to;
- Sign non-disclosure forms with Arthrex to limit outside disclosure of proprietary information related to supplied camera system.
- Sign agreements that provide Arthrex with access to any intellectual property developed during the project.

Ideal Student Qualifications
- Inventiveness (enjoys building prototypes – a focus on hardware development and electronics with some firmware)
- Background in Electrical Engineering principles
- Familiarity or interest in robotics, embedded systems, and product reliability

Team members will gain an insight into test fixture/script development and making a real impact on product development and reliability improvements in the medical device industry worldwide. This is an opportunity to collaborate with industry engineers, marketing executives, and medical professionals.

Assets Provided by Arthrex
- Arthrex Synergy Camera Controller Unit
- Surgical Instruments and Accessories
- Mentorship and support from experienced engineers

Company Background
Arthrex is a global medical device company and leader in new product development and medical education in orthopedics. With a corporate mission of helping surgeons treat their patients better, Arthrex has pioneered the field of arthroscopy and develops innovative products and surgical procedures to advance minimally invasive orthopedics worldwide.

Website: www.Arthrex.com and www.synergy.arthrex.com