



## Arthrex – Arthroscope Electronic Focus

This project is in cooperation and partnership with Arthrex California Technology Inc located in Goleta (within biking distance of campus!). Arthrex Project Lead –John Batikian.

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 developed more than 11,000 innovative products and surgical procedures to advance minimally invasive orthopedics worldwide.

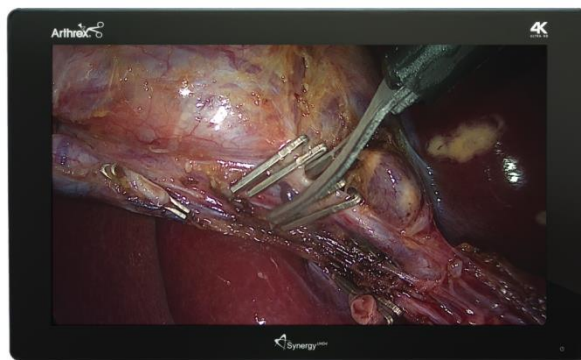
## Project Description

### **Problem Statement**

The Arthrex Synergy UHD4 Imaging Platform, in the pictures below, is the first endoscopic 4K resolution camera system on the market. The console revolutionizes endoscopic visualization and image management, by combining 4K camera heads, LED lighting, image management and integration with an intuitive tablet controller. The camera head is designed with a small ergonomic package. The camera head, shown below, is built with integrated optics, buttons for image/video capture, and a focus knob for the surgeon to adjust the focus point during a surgical procedure. The goal of this project is to develop an electronic focus algorithm and interface that will replace the manual focus knob.



AR-3210-0023  
4K Synergy<sup>UHD4</sup> Camera  
Head, autoclavable



32" UHD 4K Monitor

AR-3200-0021 Synergy<sup>UHD4</sup> Console



AR-3210-0023  
Synergy<sup>UHD4</sup> autoclavable  
Camera Head





## **Objective**

The 4K Synergy camera head optics are designed to allow the surgeon to make fine focus adjustments in the surgical scene. The focus adjustment is completed by the surgeon when the arthroscope and camera head are re-positioned. The first goal is to develop an algorithm and physical interface for a one button press auto focus as well as an intuitive interface for manually adjusting the focus. The team will be provided the development platform with the camera head optics integrated onto a piezo motor driven stage. The Synergy UHD4 camera system will also be provided for the development. The autofocus algorithm will make use of the live video output as a feedback mechanism.

Once the electronically driven focus development is completed, the second goal is to develop image processing algorithms that make use of the ability to electronically change focus.

- All in focus image still capture
- Create an estimated depth map/3d reconstruction

Students may get a chance sit in on a surgical trial before the project start and then have a chance to demo the product in a clinical trial and receive feedback from surgeons.

## **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**

- Signal and image processing
- Algorithm development
- Strong programming skills
- Embedded software

Students interested in the medical imaging industry will find this project interesting and challenging. This is an opportunity to work with industry engineers, marketing executives, and medical professionals.

## **Assets Provided by Arthrex**

- Arthrex Synergy UHD4 Camera Controller Unit
- Piezoelectric stage development kit

**Website:** [www.Arthrex.com](http://www.Arthrex.com)