

Arthrex Capstone Proposal

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Improving Reliability through Automation on our 4K Imaging Platform

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Arthroscopy

- Minimally invasive surgical techniques
- Imaging systems used to visualize joint spaces during surgery
- Commonly used for knees, shoulders, hips, and ankles
- Synergy Vision Platform: provides advanced visualization w/ 4K resolution



Reliability

- **Consistency:** Ensures repeatable results across procedures and clinicians
- **Safety:** Reduces risk of surgical errors or harms
- **Efficiency:** Reliable systems streamline workflow and reduce downtime
- **Cost:** Reliable systems reduce maintenance/service burden and overhead
- **Trust:** Builds confidence among surgeons and patients with our brand



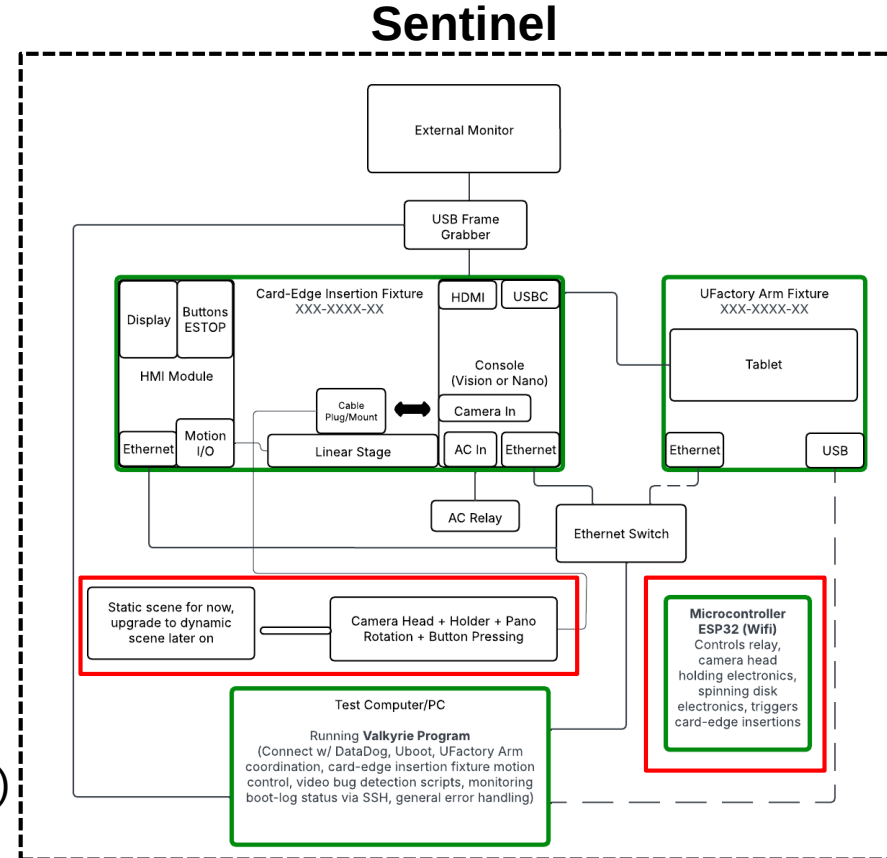
End-to-End Case Simulation

Protocol

- Turn on system power
- Plug in camera and calibrate
- Sign in and start a case
- Visualize inside anatomic models, **include motion and lighting**
- End the case, restart the system
- Target 100 cases per day (with some variability/randomness in each case)

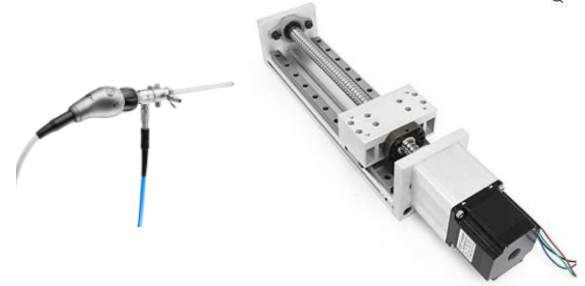
Capstone Focus

- Scene and targets
- Microcontroller/processing (ESP32 or similar)
- Custom PCB to house local electronics



Capstone Outline

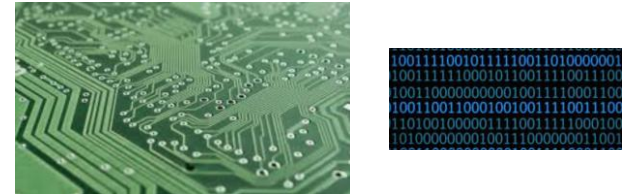
Motorized Camera: Create a fixture for the camera head that allows for insertion/retraction with anatomic models. This includes a linear motorized stage.



Auto-Exposure Fixture: Create a light-box with programmable/controlled lighting (LEDs). It should produce 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!

