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Francis Azari

Virginia Commonwealth University

Forrest Baber

Virginia Commonwealth University

Saswat Mishra

Virginia Commonwealth University

Karan Patel

Virginia Commonwealth University

Juan Soto

Virginia Commonwealth University

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Lower Body Exoskeleton Powered by Epidermal Electronics Systems

Advisor: Dr. Woon-Hong Yeo, **Team Members:** Francis Azari, Forrest Baber, Saswat Mishra, Karan Patel, and Juan Soto
Mechanical and Nuclear Engineering, School of Engineering, Virginia Commonwealth University

Motivation

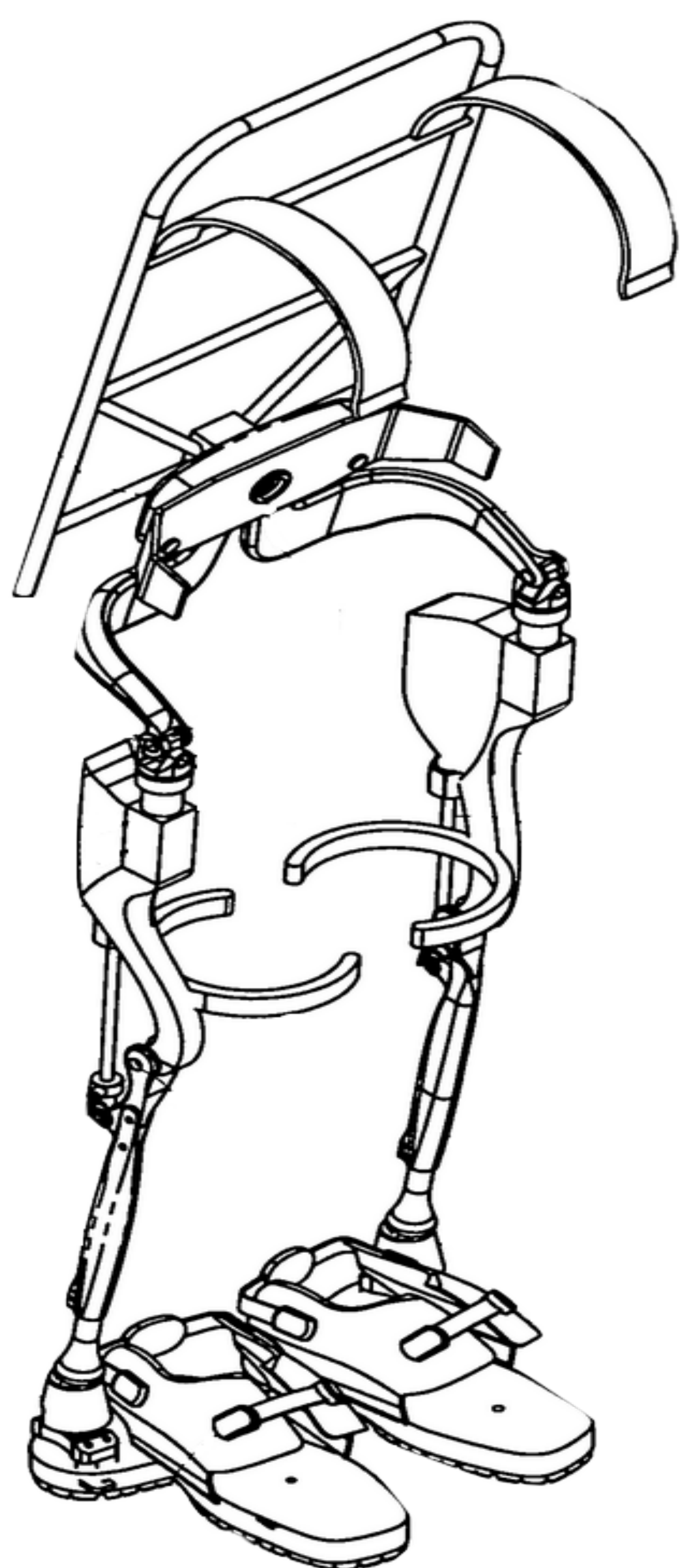
- Exoskeletons can potentially be used for therapeutic purposes, as well as load carrying with a reduction of energy consumption while walking.
- Stretchable electronics provide an easy-to-use platform for powering the exoskeleton.

Method

- By flexing the brachioradial and flexor carpi radialis muscles in the forearm, signals are transmitted by the epidermal electronic system
- The solenoids respond to this input by opening or closing, based on forearm flexion
- This results in the hydraulic cylinder, powered by a pump, to extend or contract

Our Vision

Original Concept

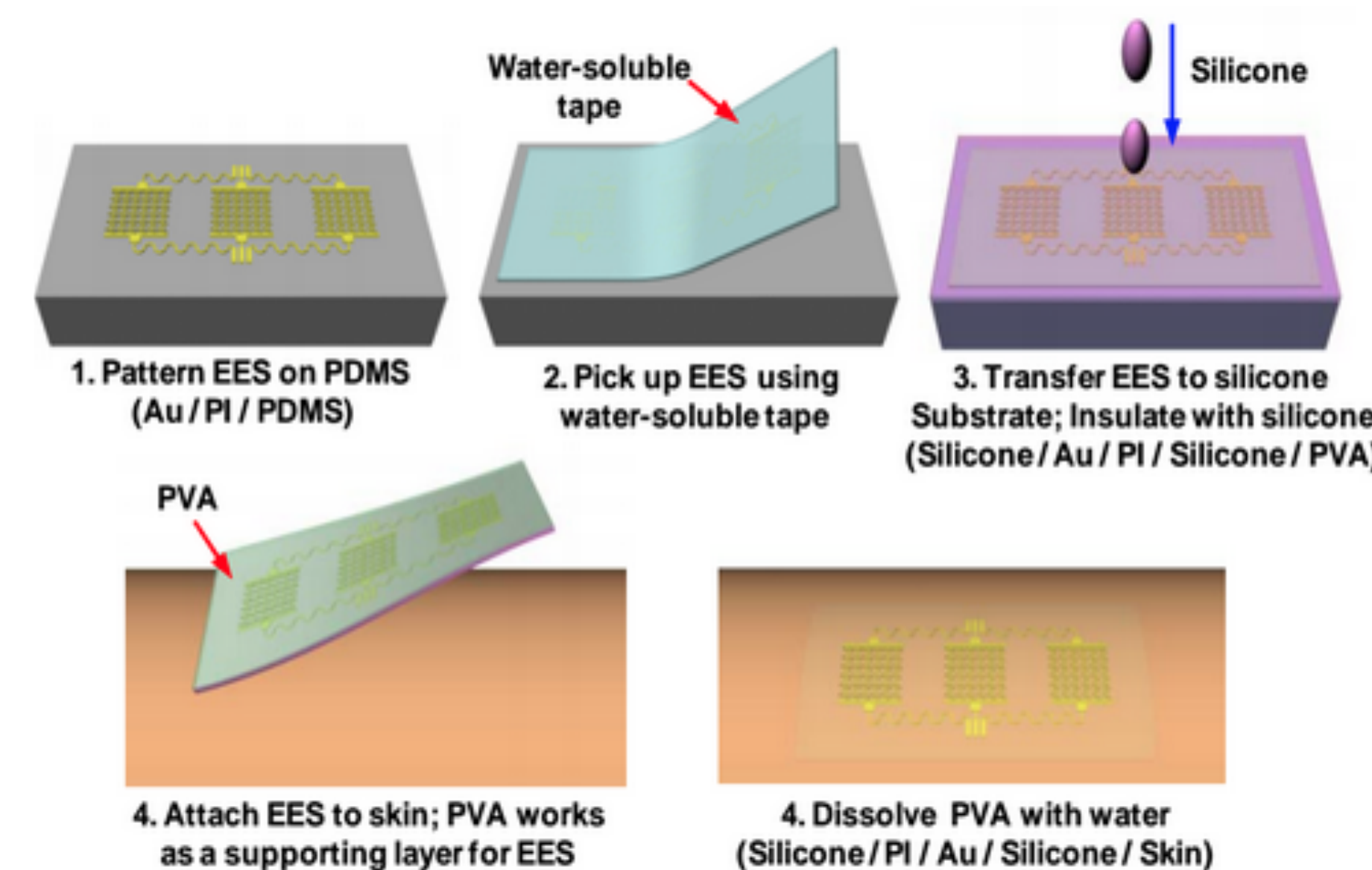
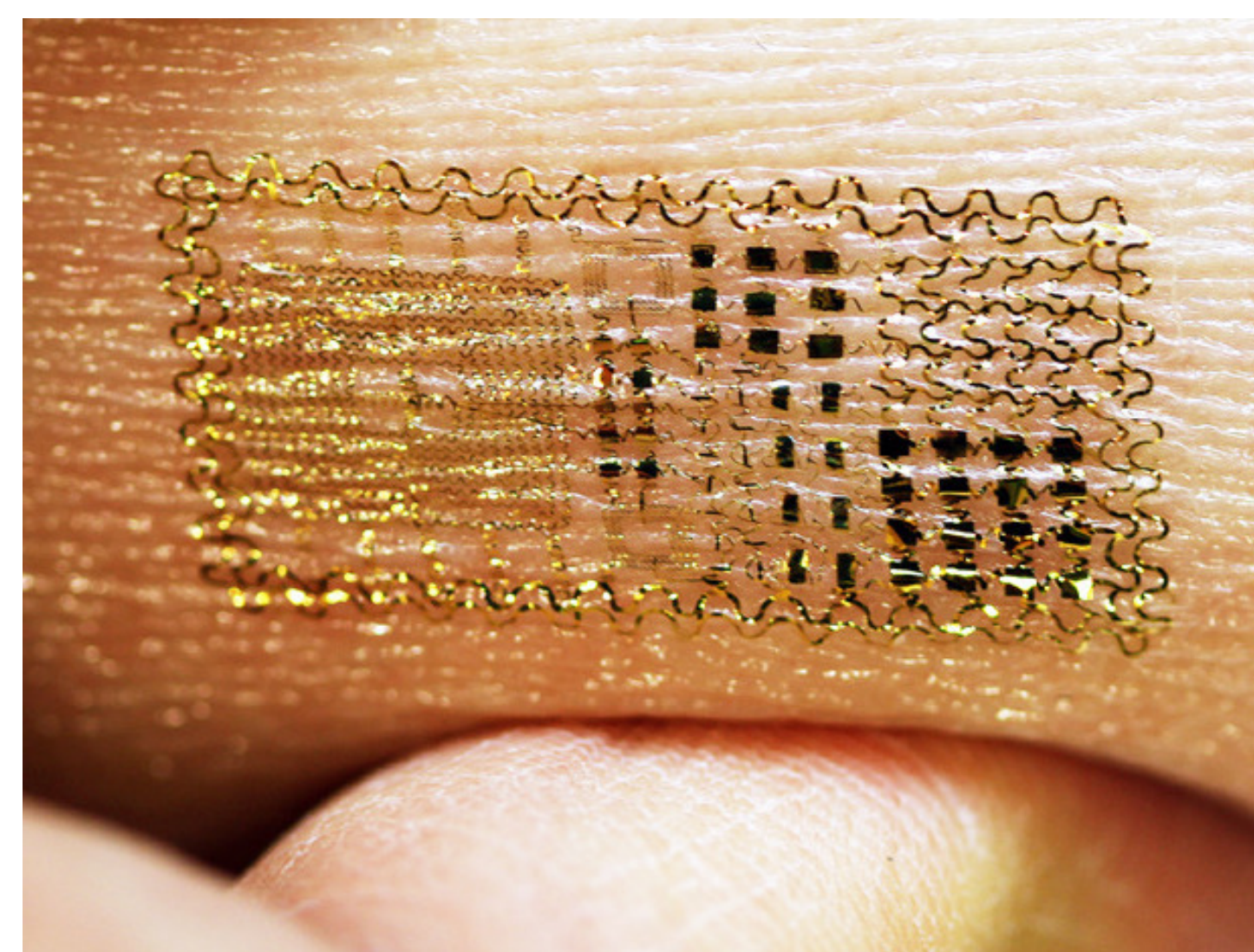


Final Design

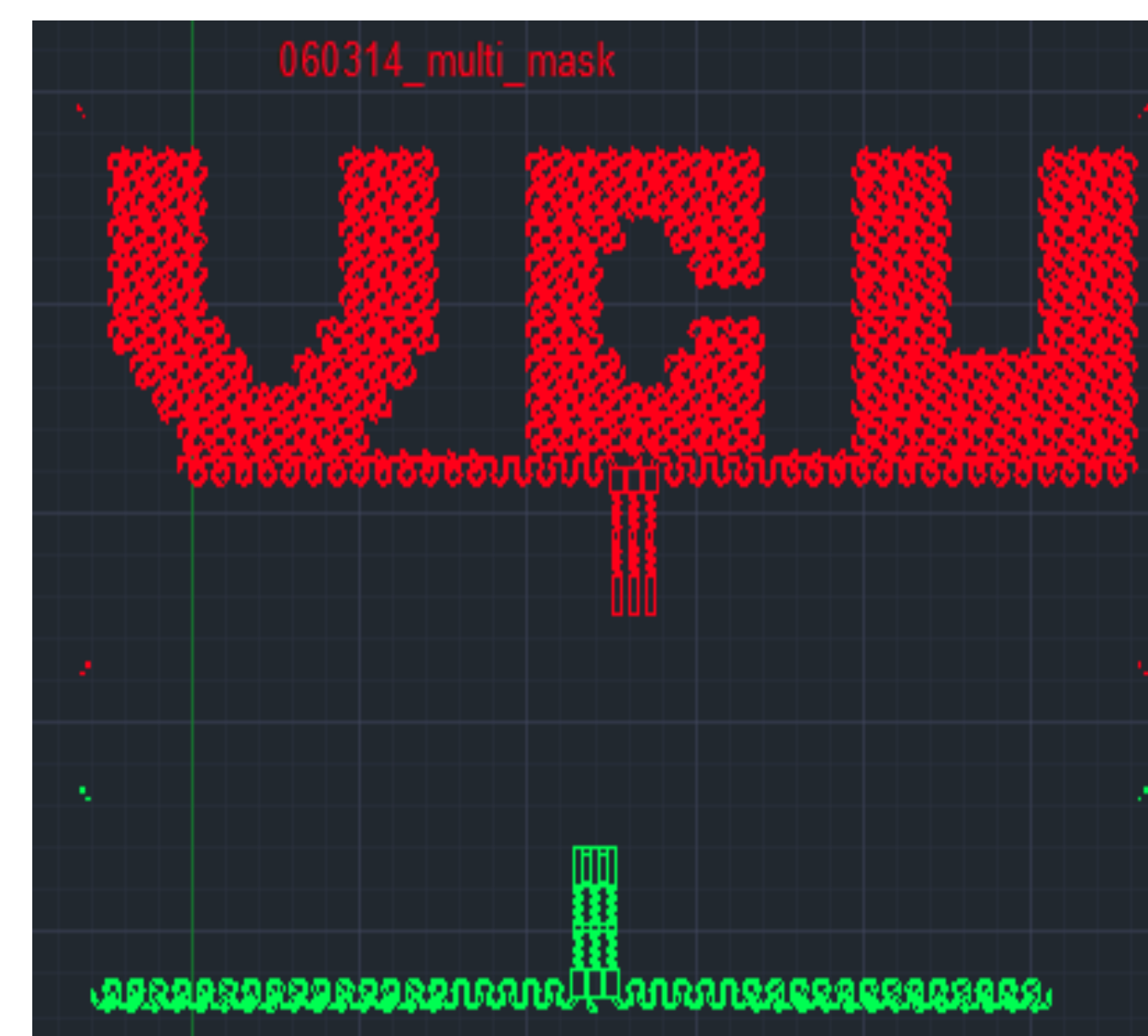


Exoskeleton Components

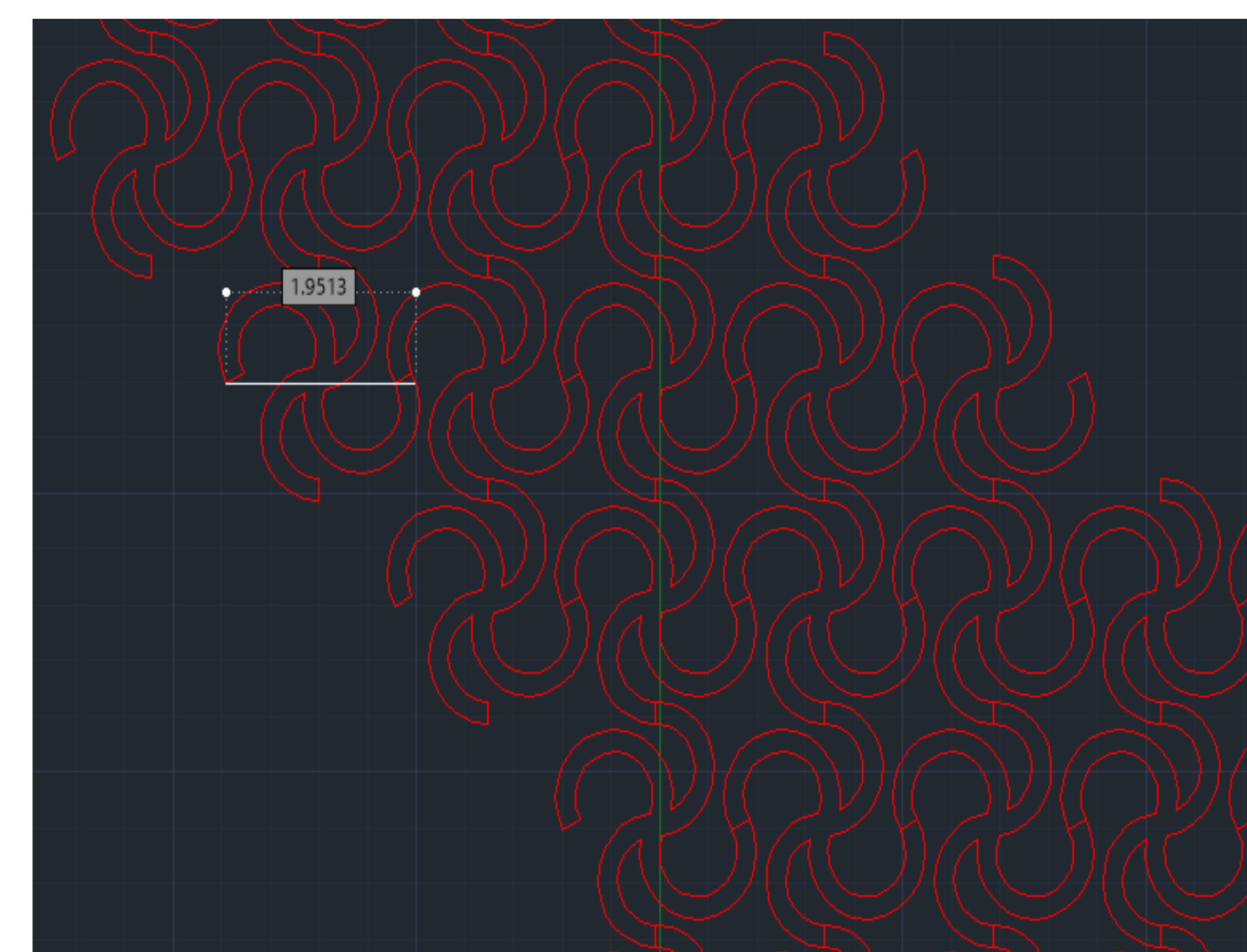
Flexibility of EES Serpentine Design



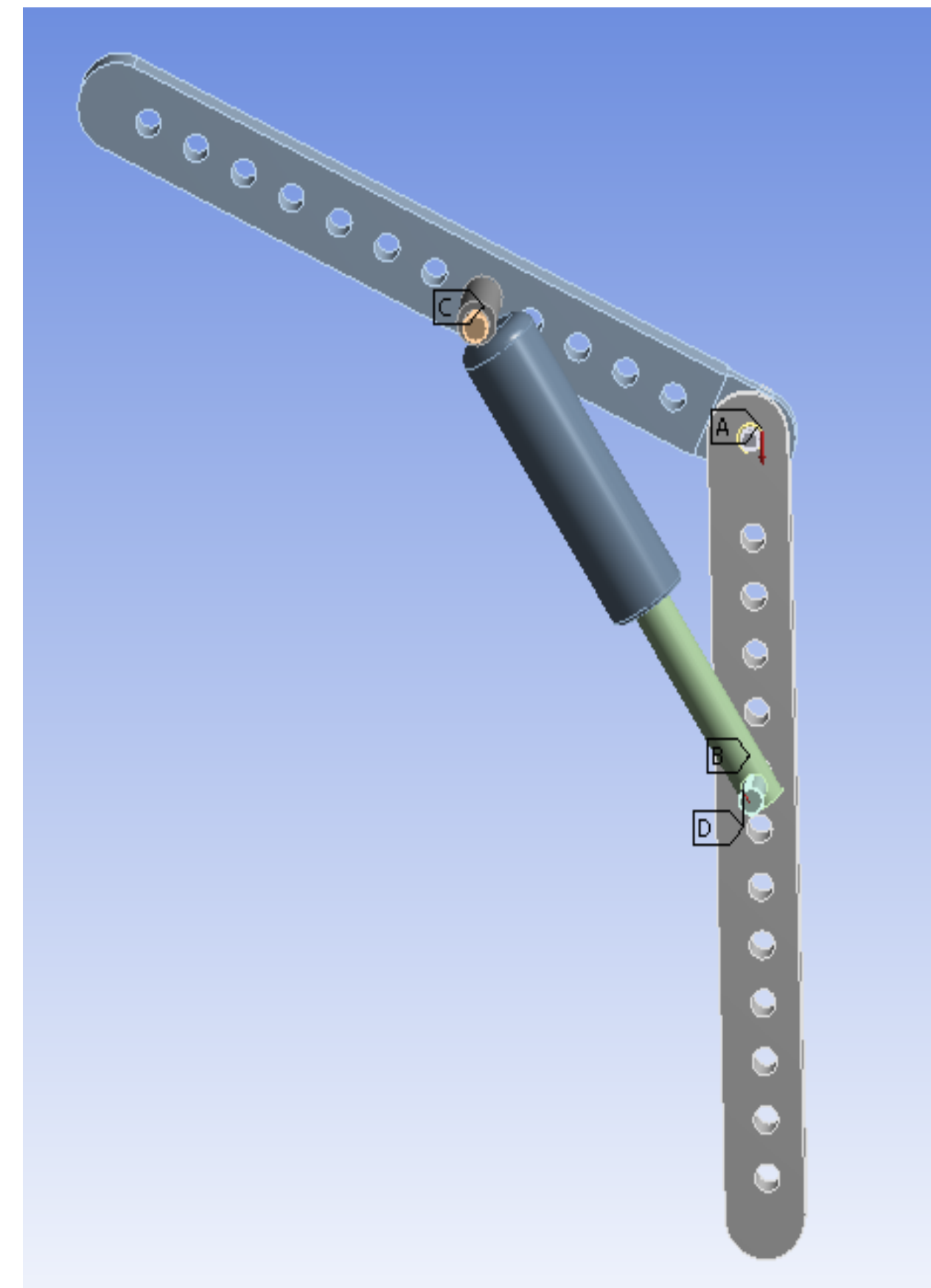
Auto-CAD Mapped Design



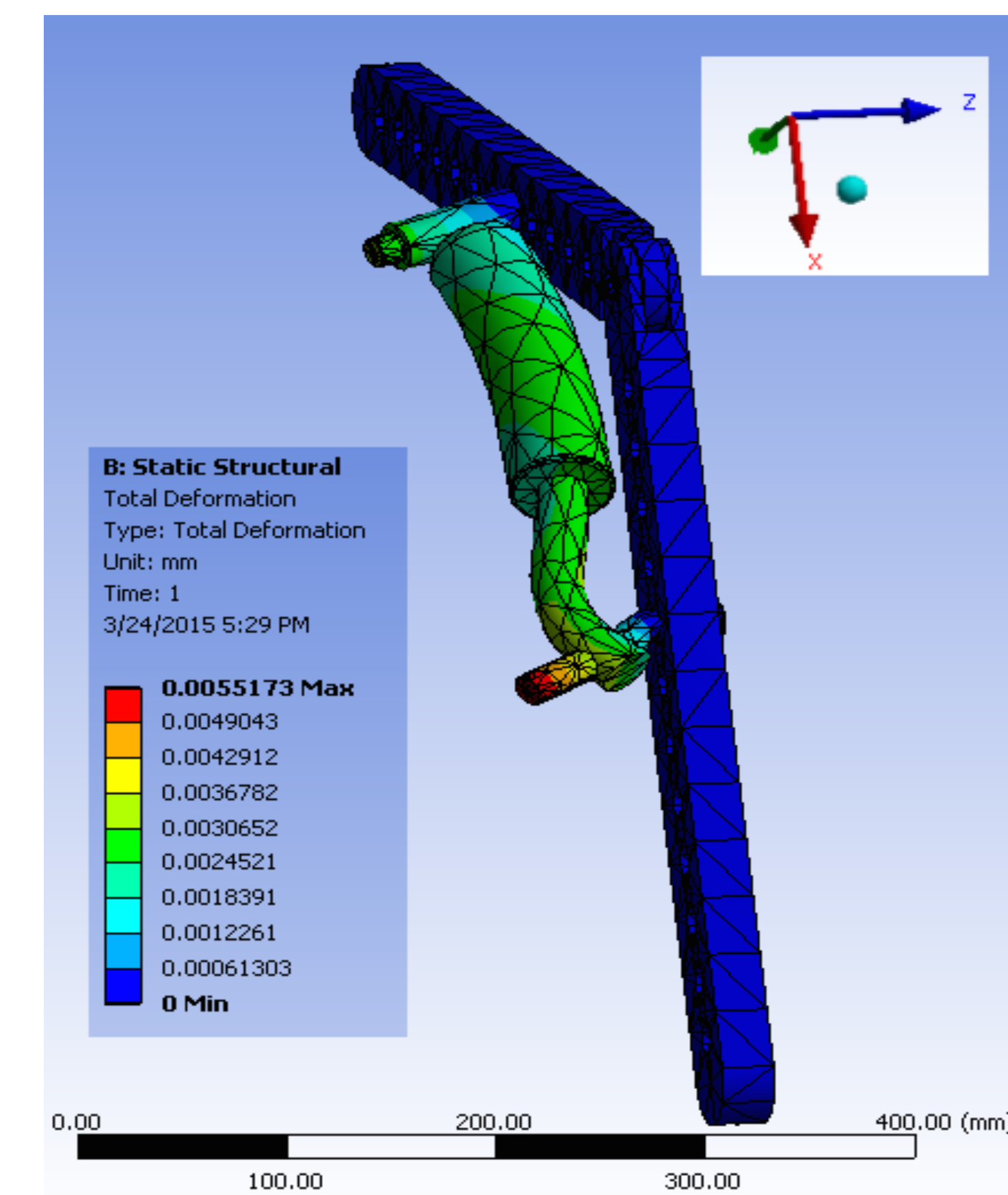
Magnified View of Serpentine Structure



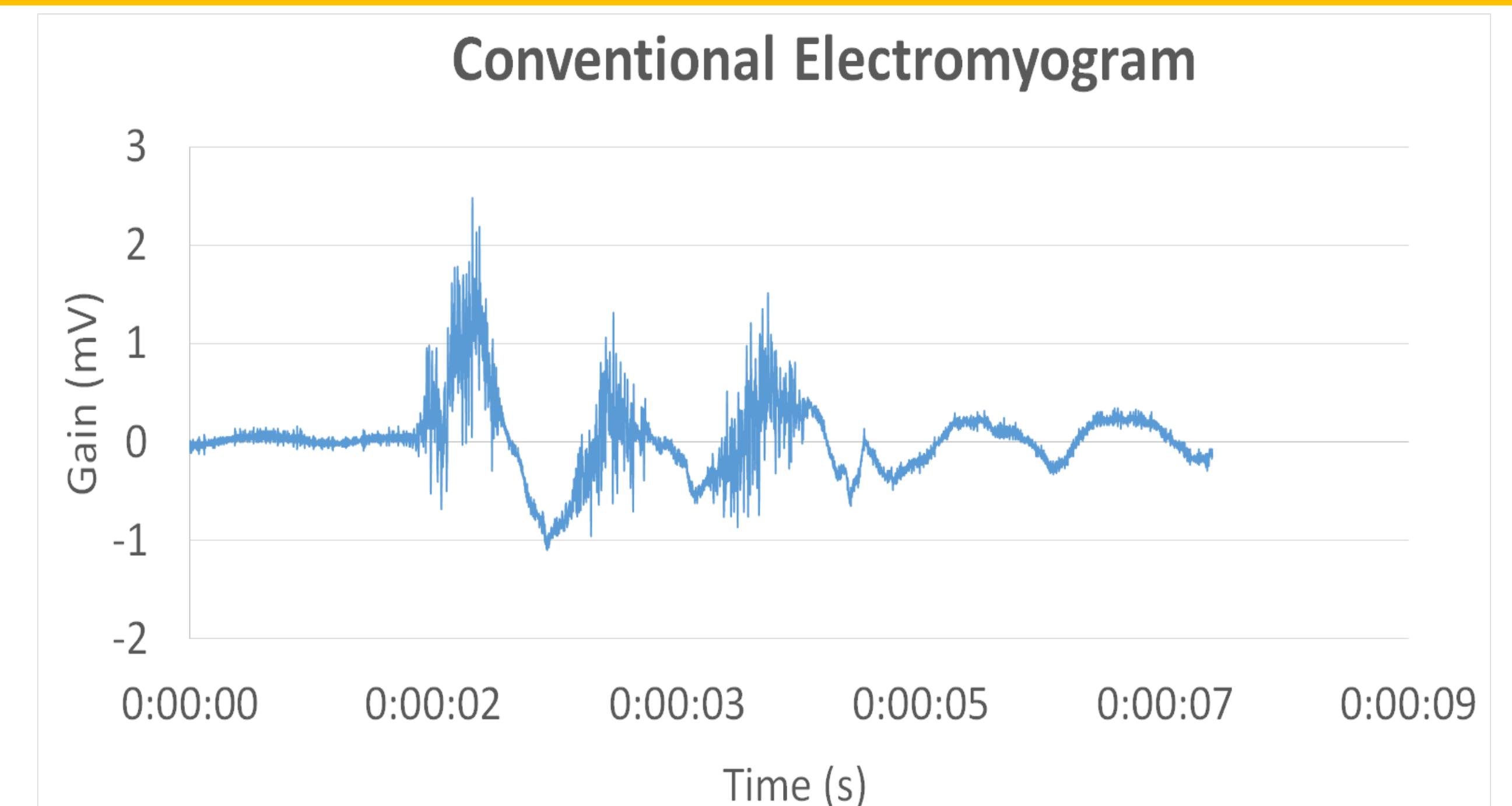
Pre-Processing Image of Frame



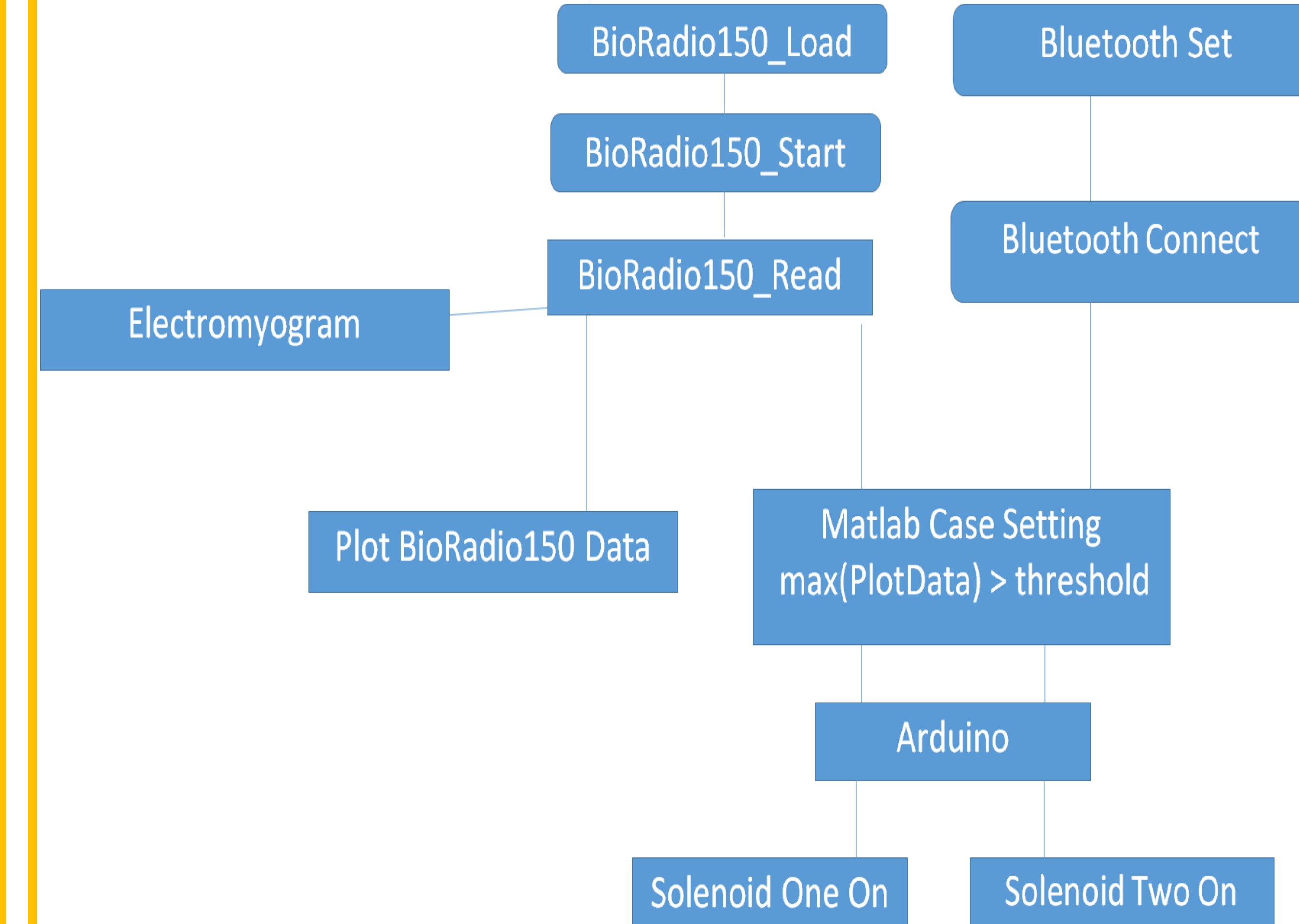
Post Processing, Maximum Load Until Failure



Synergistically Utilizing Two Systems



Logic Flow Chart



Conclusions

- Hydraulic powered leg exoskeletons provides support and improvements to the human bodies' shortcomings.
- EES provides a minimalistic support platform to trigger the exoskeletons motions.
- Multipurpose sensors have the potential to be coded for a multitude of specific functions.

Contact: Dr. Woon-Hong Yeo, Assistant Professor, VCU.
Email: whyeo@vcu.edu, website: www.people.vcu.edu/~whyeo