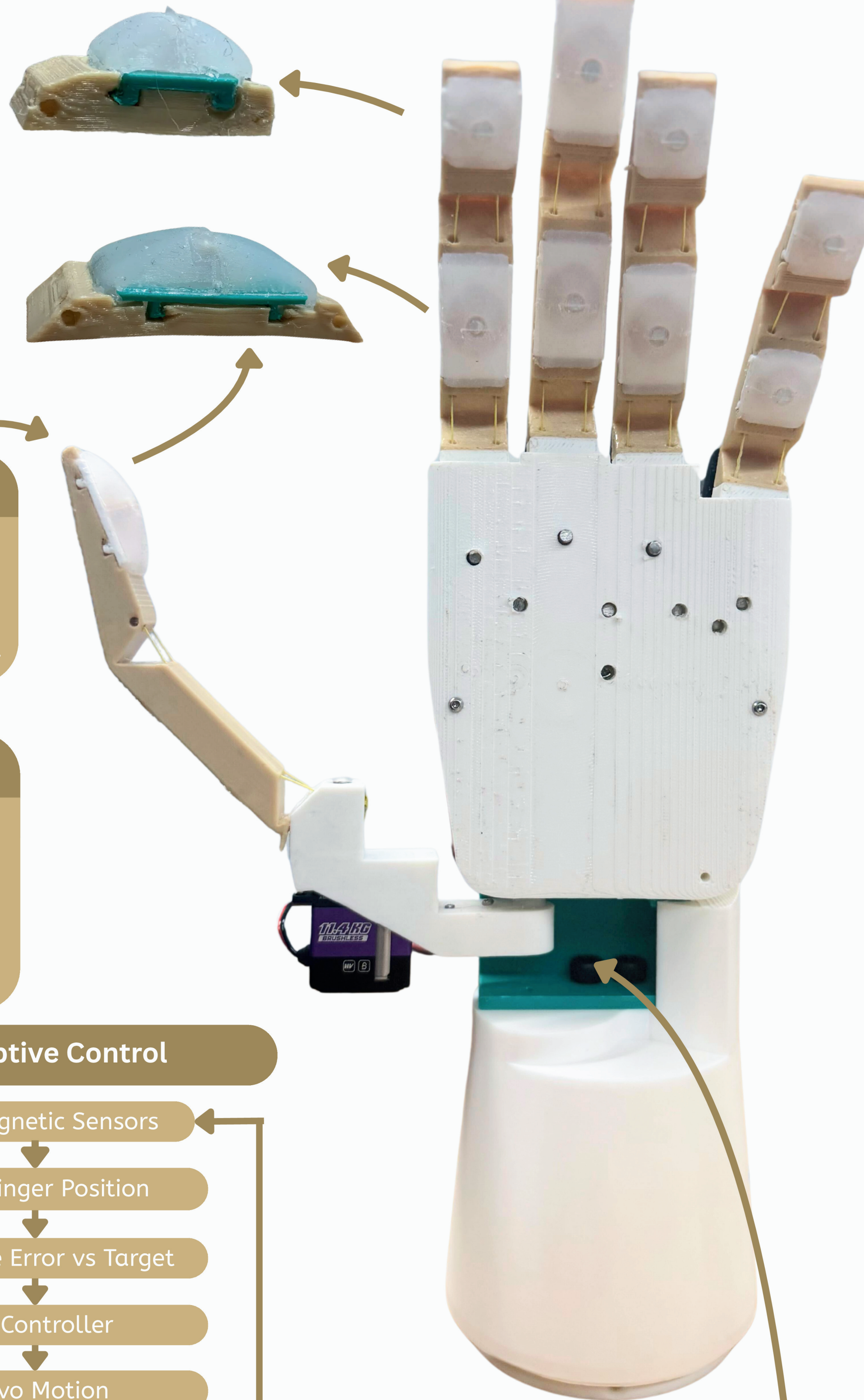


## Abstract & Motivation

Traditional rigid prostheses exhibit high abandonment rates due to limited anthropomorphism and compliance, prompting a shift toward soft robotics. Inspired by biological systems, these approaches use compliant materials to enable adaptable, flexible motion. This work presents a semi-rigid prosthetic-ready robotic hand, featuring fingers fabricated from flexible polylactic acid (PLA) to enhance grasping performance. Soft Hall effect sensors embedded in the fingers provide force feedback. Future work will focus on system integration to achieve a fully functional robotic hand.



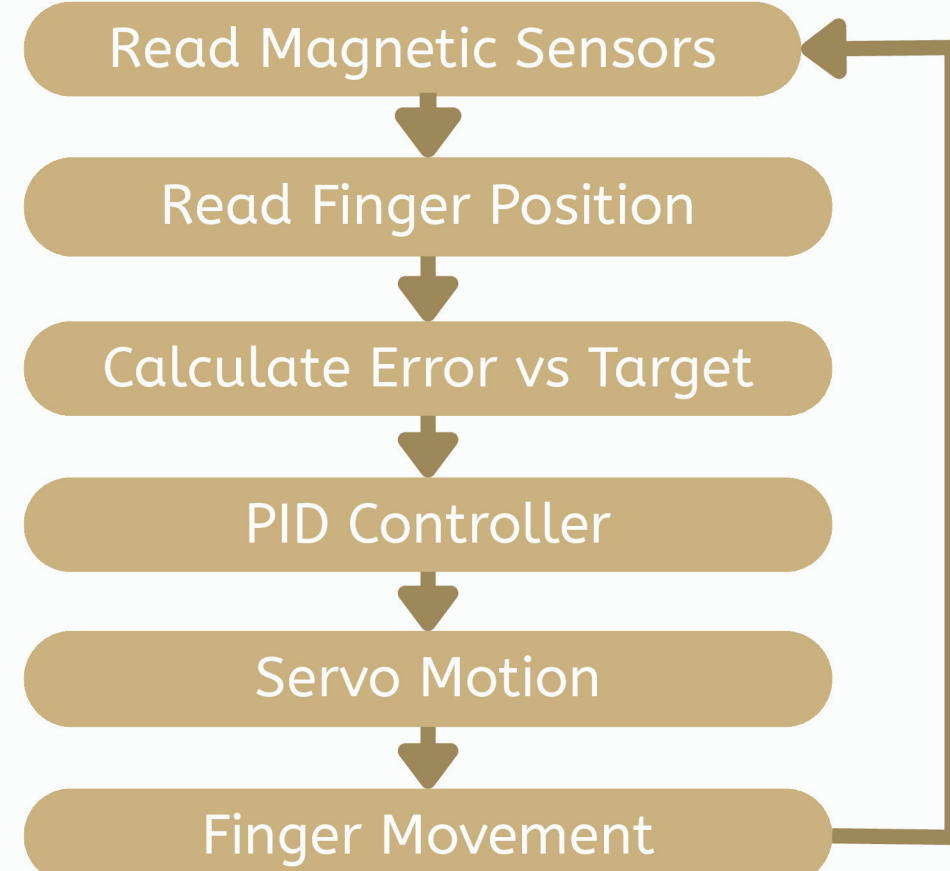
## Soft Sensors

- DragonSkin silicone was selected due to its ability to deform repeatably and its high flexibility.
- Tendons are routed at an angle to account for a hall effect sensor magnet and PCB while minimizing torque and friction.

## Modularity

- A modular design allows parts to be repaired separately, allowing for easier and faster repairs.
- The sensors mount on the finger through rigid clasp structures
- The fingers attach onto the palm through a rigid insert held in place by gear shafts used to adduct and abduct

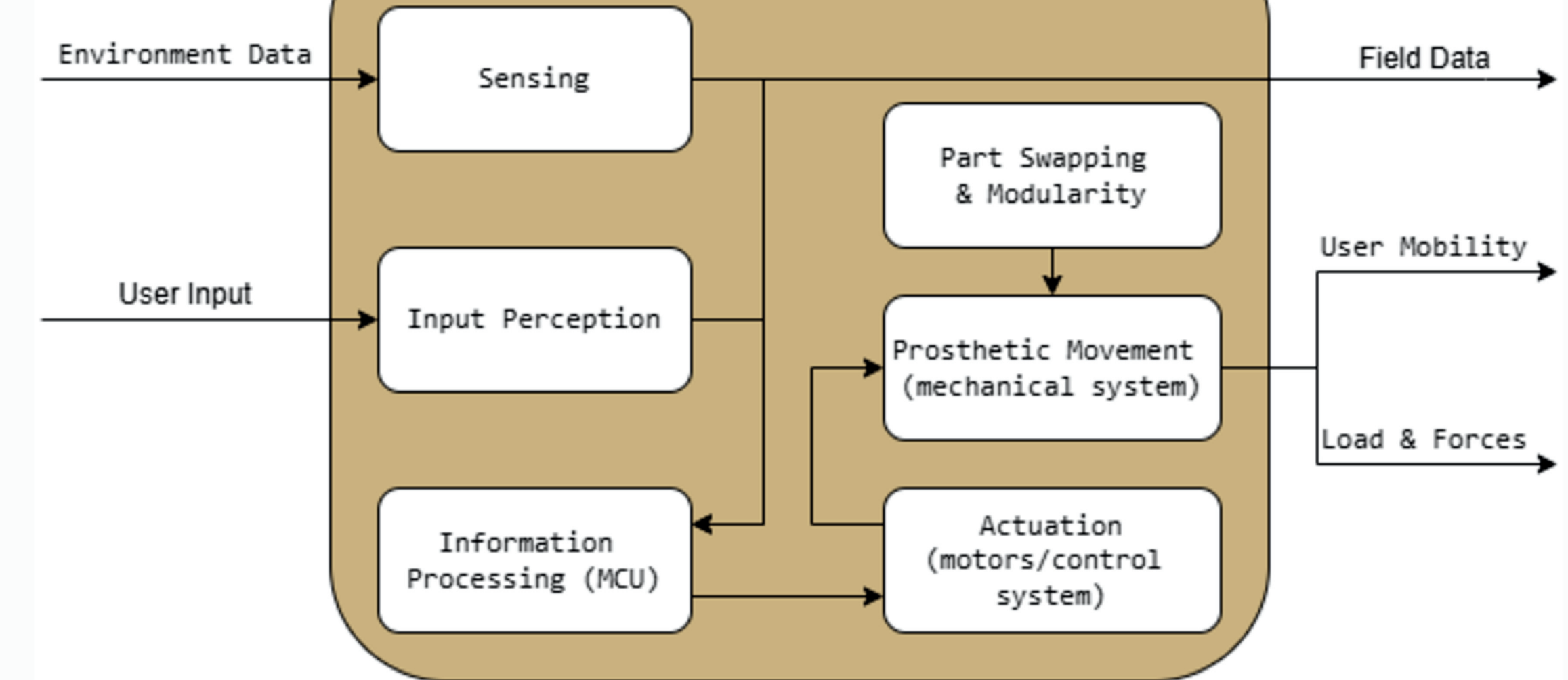
## Adaptive Control



## Adduction and Abduction

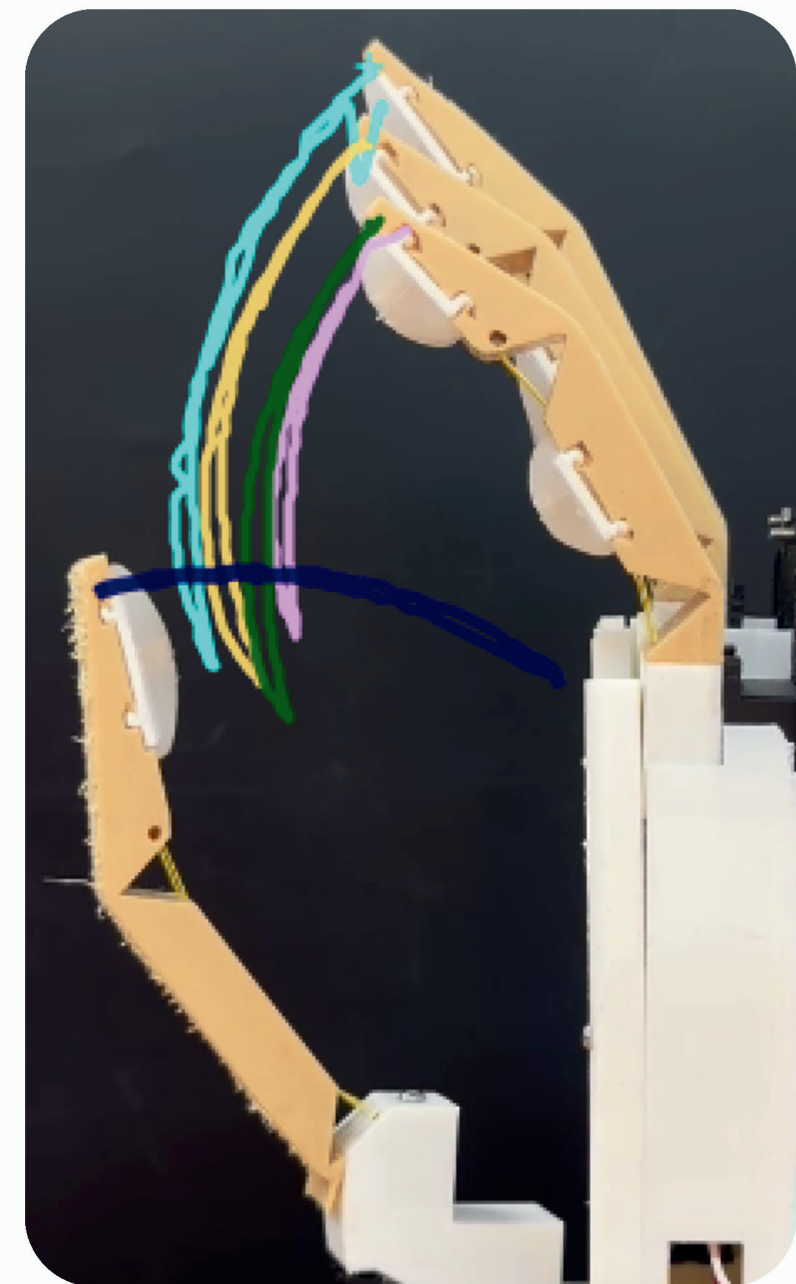
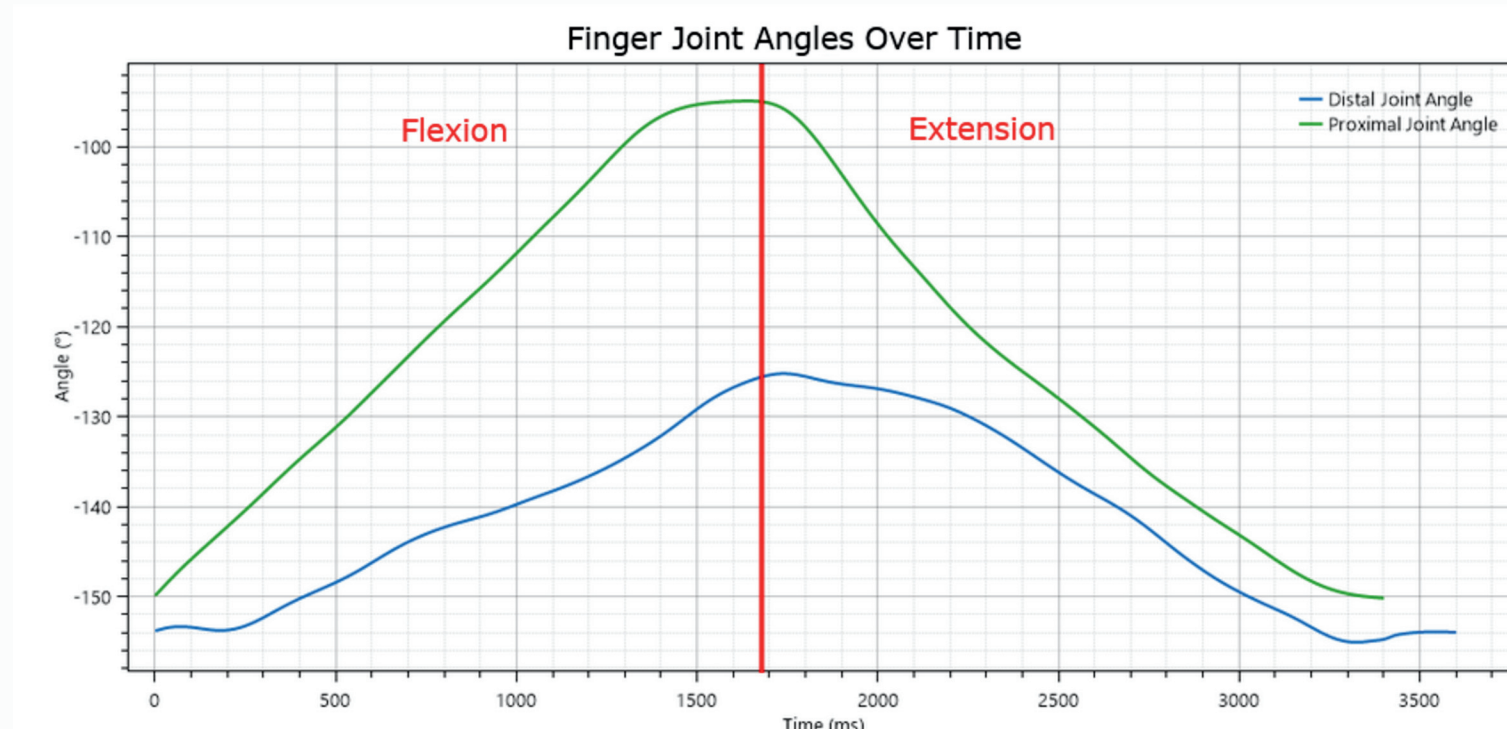
Palm housing the fingers, thumb opposition motor, and adduction/abduction gears

## ROBOTIC SYSTEM



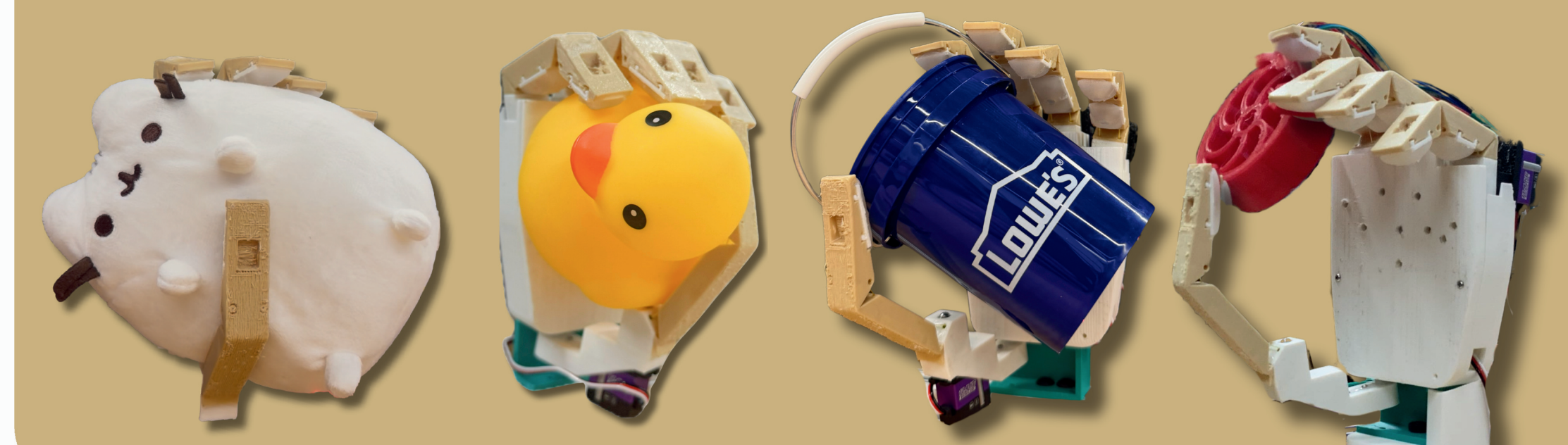
## Range of Motion

Each finger has 2 phalanges optimizing movement, the proximal phalanx bends first to adapt anthropomorphic movement. There are 10 DOF



## Adaptive Grasping

A tendon-driven architecture combined with silicone sensors provide compliance and force detection allowing the hand to conform to objects and surfaces in an anthropomorphic manner.



## Thumb & Wrist

The thumb directly connects to servo allowing opposition. The wrist serves as a bracket to support the thumb and to allow for a variety of modular applications