**PROJECT SUMMARY**

Digital Hand Dynamics was tasked to develop an improved mechanical thumb that is capable of achieving most of the degrees of freedom of a human thumb. Through research and development, it was determined that this was possible to achieve at a low cost with implementation of micro servomotors.

Previously, the mechanical hand used a pull-pull system that had been found inadequate due to the constant maintenance required and development of slack in the strings used. As a result, a tensioning system was developed, using springs, for the fingers and removed from the thumb completely.

Digital Hand Dynamics engineers set out to design and fabricate a final design using PLA printed material and micro servomotors. These servomotors were altered by removing the controllers and placing the components on a PCB that was designed and fabricated to be placed on the back of the mechanical hand.

**TECHNICAL APPROACH**

Only STL files of the existing open source InMoov model were available so Digital Hand Dynamics reverse engineered the files to create their own resources. A kinematic study was conducted to determine the thumb section lengths to achieve the desired range of motion. The actuation mechanism was designed in accordance to the thumb section lengths and the size limitation of the sections. No cost effective rotary servos were available in the sizes desired. Off the shelf micro servos had to be heavily modified to accommodate the size constraints and the servomotor controllers had to be removed and redesigned due to spacing concerns. A new PCB was designed to accommodate all the servomotor controllers and to create a simplified control junction.