



# CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

<b>Name(s)</b> <b>Rohan Chaudri; Arya Krishnan; Chloe Retika</b>	<b>Project Number</b> <b>J0306</b>
<b>Project Title</b> <b>Grasping the Future: A Fully Functional, Affordable, Electromechanically Controlled Bionic Hand</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of our project is to create an easily operated, lightweight, affordable prosthetic hand. We believe with better designs and modern 3D printing technology, it would be possible to achieve the construction of this bionic hand.</p> <p><b>Methods/Materials</b> We used a 3D printed hand model, fishing wires to act as flexor tendons, and elastic bands to act as extensor tendons. Five servos were programmed to act as forearm muscles, and received signals from an Arduino microprocessor connected to a breadboard. A six volt battery pack provides power to the microprocessor and motors. After experimenting with various programs and designs, we decided to implement pushbuttons placed on the breadboard to control various hand gestures performed in day to day use.</p> <p><b>Results</b> In the end, we were able to complete our set goals. We created an easily controlled, lightweight, and cost-effective prosthesis. We settled on a design that used a wooden plank as a forearm where the servo motors, breadboard, Arduino microprocessor, and external battery pack were mounted on. All servos were set at a 0 degree resting position, where all fingers were fully extended. The thumb servo rotated a total of 160 degrees when fully contracted. The index and middle servos rotated 180 degrees when fully contracted. The ring and pinky servos rotated 170 degrees when fully contracted.</p> <p><b>Conclusions/Discussion</b> This hand has the potential to help millions of amputees worldwide who are in need of a low-cost, functional prosthetic. In the future, we plan to incorporate the technology of myoelectricity in our project, essentially allowing the hand to be controlled neurologically.</p>	
<b>Summary Statement</b> Our project is an electromechanically controlled prosthetic that is lightweight, easily operated, and a fraction of the cost of equally functional prosthetics.	
<b>Help Received</b> We designed, built, and tested our model entirely by ourselves. Our coach, Sanjib Homchaudhuri, made sure we were working on time and meeting our deadlines.	