Shoulder and Leg Prosthetic With a Dynamic Magnetic Shoulder

Rowland, Raquel (School: Wildwood High School)
Martinez, Brandon (School: Wildwood High School)

Current dog prosthetics for the foreleg and shoulder are rigid and limiting for canines. These prosthetics do not allow the animal to lay down, sit properly, or traverse harsh terrain without the danger of mechanical seizure and possible injury. To directly face the problems with current foreleg and shoulder prosthetics, the first prototype was simply a pendulum, which would demonstrate a prosthetic with the most amount of freedom. The flaws were then analyzed and drafting for a new prosthetic prototype was made. This prosthetics included permanent magnets and stators to solve the whiplash of previous models. These new prototype models would represent a spring shoulder prosthetic that could be printed in one piece to reduce the amount of work during designing, fabrication, and installation. The other prototype will apply electromagnets to the prosthetic shoulder design. This prosthetic will feature sensors and electromagnets arranged in a radial pattern. This way we could most effectively reduce large peaks, or whiplash in the shoulder's movement. Both of these prosthetics were made to have fewer complex mechanisms to improve on the weight, material cost and the chance for mechanical seizure. From what we have made, we have drawn the conclusion that these prototypes are viable for use on a dog. Future field-testing will be conducted to both analyze the different walk cycles for a dog with and without a forelimb.