

Bioinspired Hoof Design

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Animals such as the mountain goat, klipspringer (or “rock leaper”), and other ungulates have an amazing ability to walk, run, and jump on steep rocky terrain. In addition to careful perception and control, part of their success appears to come from the design of their hooves. In this project we are studying several mechanical aspects of the hoof design and are applying those principles to a bioinspired robotic foot. Rather than copying the exact structures in the anatomy, which are quite complex, we are trying to understand what the mechanical properties are that the animal’s design is trying to achieve and then build simple feet for our robot that have similar properties. These properties include the shape of the toes that grab rock features, the compliance of the foot pads that result in a concave contact patch, the separate toes that can maintain contact at high slope angles, and the combination of hard and soft materials.