# Scientists gain understanding of self-cleaning gecko foot hair

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(Phys.org) -- Imagine the money you'd save if you bought a roll of duct tape and could use it over and over again without having to toss it in the garbage after one use. Wall-climbing robots, bioadhesives or other sticky substances can benefit greatly from a recent discovery about the self-cleaning and reuse abilities of a gecko's foot hair by a University of Akron graduate student-researcher and his partners. Their work was published in the June 13 edition of *Interface*, the Journal of the Royal Society.

The sticky yet clean attribute of this discovery is the gecko toe pad and its ability to repeatedly attach and detach to a surface.

Researchers Shihao Hu, a UA mechanical engineering student, and

biologist and recent UA graduate Stephanie Lopez-Chueng of Keiser University in Fort Lauderdale, Fla., and their team discovered that the clue to a dynamic self-cleaning mechanism in gecko setae, or microscopic foot hair, is achieved through the hyperextension of their toes.

“The analysis reveals that geckos have tiny sticky hairs on their toes called setaes, and due to the attaching and detaching mechanism caused by the rolling and peeling motion of their toes as they walk, they release the dirt particles leaving their feet clean,” Hu says. “The dynamic hyperextension effect of its natural toe peeling increases the speed of the cleaning to nearly twice as fast as previously perceived.”

Partners in the study included Hu; Lopez-Chueng; Dr. Peter Niewiarowski, interim director, UA Integrated Bioscience Ph.D. program; and Zhenhai Xia, University of North Texas, Materials Science and Engineering.

The findings, published in the article, “Dynamic Self-Cleaning in Gecko Setae via Digital Hyperextension,” show that a gecko-inspired adhesive can function under conditions where traditional adhesives do not, possibly inspiring new applications in space or water exploration tools or in common items like duct tape or other products that use sticky properties.

“Through biomimicry, a gecko-inspired adhesive can function under conditions where traditional adhesives do not, such as in a vacuum, outer space or under water,” Niewiarowski says. “More broadly, a gecko-inspired adhesive would be able to bind materials together very strongly yet also release very easily. Imagine a tape that binds things together securely like duct tape yet can also be removed and reused over and over again like a post-it note.”

Provided by University of Akron