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## One Giant Leap for Robot-Kind

By Phil Berardelli  
 ScienceNOW Daily News  
 9 February 2009

For any robot that keeps getting stuck in the sand, help is on the way. Scientists have engineered a droid that mimics the locomotion of desert animals, allowing it to traverse loose terrain with ease. If perfected, the new design should keep the next wave of robots--earthbound and planetary explorers alike--rolling across dunes at a good clip.

Anyone who has tried to drive across stretches of soft-packed sand knows how quickly the attempt can end up hopelessly mired. Even dune buggies, jeeps, and other specialty vehicles sometimes get trapped. The reason is that the loose agglomeration of sand grains often collapses into a hole under the weight of a vehicle's wheels and provides too little traction for those wheels to roll back out. Robots, such as NASA's Mars rovers, have the same problem: If their limbs move too fast over loose soil, they risk digging themselves into the ground; too slow, and they'll get across the terrain, but it will take forever.

Researchers led by physicist Daniel Goldman of the Georgia Institute of Technology in Atlanta, found a happy medium. They noticed that the limbs of a variety of desert animals, including lizards and cockroaches, do not move across sand at a steady rate. Instead, they tread slowly when in contact with the sand, and rapidly as they move through the air to touch the sand again. That keeps the animals moving without getting mired.

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**Dune buggy.** The SandBot mimics desert animals that move rapidly across sand.

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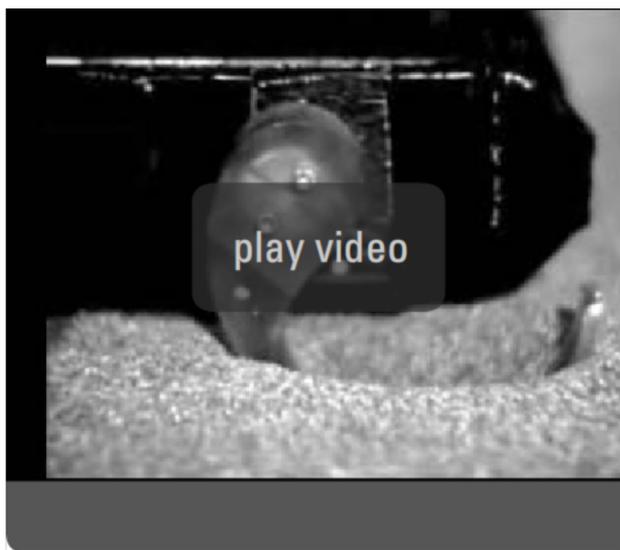
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The team applied the same concept to a six-limbed robot called SandBot. Spinning around a wheel-like axis, three of its elfin feet move slowly through the sand, while the others rotate quickly through the air to position themselves for the next step (see the [video](#)). In a year of trials, SandBot eventually traversed a track of "sand" made out of poppy seeds at a speed of about 30 centimeters per second, or at least 15 times faster than the Mars rovers. Georgia Tech physicist and team member Chen Li says the next step is to apply the technology to robots with wheels and other types of appendages.



Chen Li *et al.*

**On the move.** Watch SandBot traverse a landscape of poppy seeds.



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It's a very interesting study of alternating-tripod-gait locomotion, says planetary scientist Robert Sullivan of Cornell University, a member of NASA's Mars Exploration Rover team. And there's no doubt, he says, that a better understanding of the behavior of sand grains will rebound into even better robotic technology. But for now, the speeds demonstrated by the SandBot are considerably higher than those needed for the existing planetary rovers, he says.

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