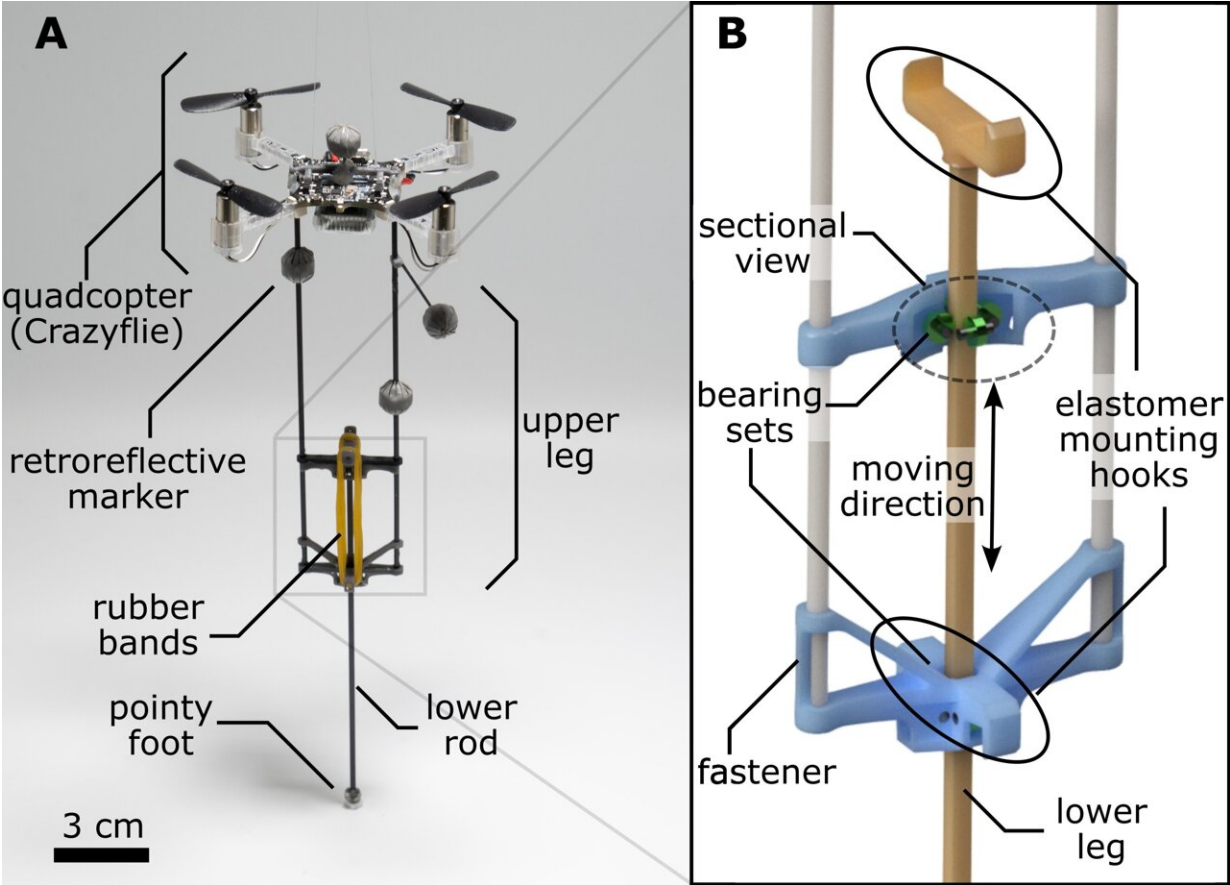


# Adding a telescopic leg beneath a quadcopter to create a hopping drone

April 11 2024, by Bob Yirka



Hopping robot prototype. Credit: Songnan Bai, Runze Ding, Song Li, and Bingxuan Pu

A team of biomedical, mechanical, and aerospace engineers from City University of Hong Kong and Hong Kong University of Science and Technology has developed a hopping robot by attaching a spring-loaded telescopic leg to the underside of a quadcopter. Their paper is [published](#) in the journal *Science Robotics*.

Quadcopters have become widely popular over the past several years for [recreational use](#) by the general public, a means of surveillance, and as a [research tool](#)—they allow for unprecedented aerial viewing and sometimes for carrying payloads.

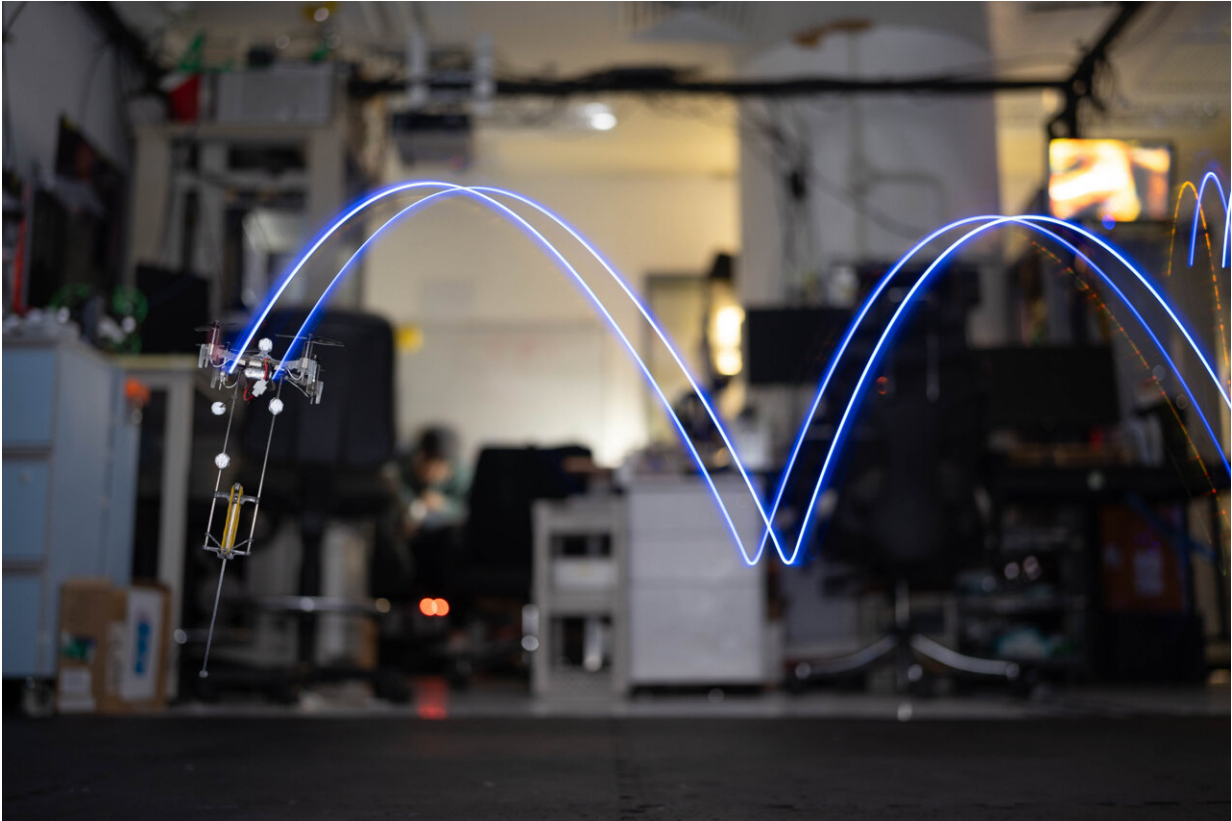
Two features of the flying robots that are notably in need of improvement are [flight time](#) and payload capacity. In this new study, the researchers working in Hong Kong have devised a means to overcome both problems.

The approach they developed involved adding a spring-loaded telescopic leg (essentially a pogo stick) beneath a standard [quadcopter](#), allowing it to hop when necessary. To allow the leg to work properly, the researchers also added stabilizing capabilities.

Adding the hopping ability reduced battery drain, allowing for longer flight times. It also allowed the quadcopter to lift much heavier loads because it did not have to keep them aloft.

The researchers found that the robot could hop around as desired, moving easily from one location to another. It could also take flight mid-hop and then fly as a normal quadcopter. Testing showed that in addition to clean vertical hops, the robot was capable of hopping on uneven ground and could even hop horizontally, which meant the leg could be used as a bumper of sorts, preventing damage if the robot ran into a wall

or other structure.



A rear-curtain sync photograph showing an aerial hopping trajectory of the robot. Credit: Songnan Bai, Runze Ding, Song Li, and Bingxuan Pu

The researchers describe their robot as being the size of a bird with a low weight, approximately 35 grams. Among possible applications, they suggest it could be used to monitor wildlife, for example, hopping among branches high in the trees. It could also be used in [disaster areas](#), helping in assessments and finding survivors, or as farm monitors, hopping from plant to plant testing soil and moisture levels.

**More information:** Songnan Bai et al, An agile monopedal hopping

quadcopter with synergistic hybrid locomotion, *Science Robotics* (2024).  
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