

The future is Robots powered by Popcorn

Description



The Future Is Robots Powered By Popcorn

If you want to build a bipedal Robot than can do backflips, youâ€™re probably going to need traditional motors and batteries, but thatâ€™s not where Robots begin and end.

Weâ€™ve seen dead simple Robots powered by mere moisture and by lasers, but now thereâ€™s an even more novel power source taking shape: popcorn.

Popcorn kernels are a natural, edible, and inexpensive material that has the potential to rapidly expand with high force upon application of heat. Although this transition is irreversible, it carries potential for several robotic applications. As kernels can change from regular to (larger) irregular shapes, we examine the change in inter-granular friction and propose their use as granular fluids in jamming actuators, without the need for a vacuum pump. Furthermore, as a proof-of-concept, we also demonstrate the use of popcorn-driven actuation in soft, compliant, and rigidlink grippers. Serving as a first introduction of popcorn into robotics, we hope this paper will inspire novel mechanisms for multi-functional designs.

The concept, spearhead by a team out of Cornell University led by Steven Ceron, makes use of popcornâ€™s characteristic ability to turn heat into mechanical force by its signature pop.

Researchers found that certain kinds of popcorn kernels can increase to more than 15 times their original volume when popped, which allows them to function reasonably well as a single-use power source for cleverly designed robots.

In a video demonstrating the possibilities, the researchers demonstrate three different bots: one that grips a ball when heated by a wire, one that lifts a weight when placed inside a microwave, and one that closes a mechanical claw when exposed to hot air:

Using popcorn for any of these purposes obviously has its downsides, the main one being that popcorn cannot be unpopped.

But the upsides include its incredibly low price and its biodegradability, which could come in hand for robot designs that are intended to decompose after use.

Regardless of any immediately practical uses, the engineering behind this delicious new field of robotics is incredibly clever and a terrific step towards the ultimate goal of mechanical engineering: [Robots you can eat](#).

Here's what the researchers suggest that popcorn might be useful for in a robotics context:

- **Jamming actuator.** ["Jamming" actuators are compliant actuators full of a granular fluid \(coffee grounds, for example\)](#) that will bind against itself and turn rigid when compressed, most often by applying a vacuum. If you use popcorn kernels as your granular fluid, popping them will turn the actuator rigid. It's irreversible, but effective: In one experiment, the researchers were able to use a jamming actuator filled with 36 kernels of popcorn to lift a 100-gram weight as it popped.
- **Elastomer actuator.** An elastomer actuator is a hollow tube made out of an elastic material that's constrained in one direction, such that if the tube is expanded, it will bend. Usually, these soft actuators are inflated with air, but you can do it with popcorn, too, and the researchers were able to use a trio of these actuators to make a sort of three-fingered hand that could grip a ball.
- **Origami actuator.** Like elastomer actuators, origami actuators are constrained in one dimension to curl as they expand, but the origami structure allows this constraint to be built into the structure of the actuator as it's folded. The researchers used recycled Newman's Own Organic Popcorn bags to make their origami actuators, and 80 grams of popped kernels were able to hold up a 4 kg kettlebell.
- **Rigid-link gripper.** Popcorn can be used indirectly as a power source by putting unpopped kernels in a flexible container in between two plates with wires attached to them. As the popcorn pops, the plates are forced apart, pulling on the wires. This can be used to actuate whatever you want, including a gripper.

Source: [IEEE Spectrum](#)

Category

1. Culture
2. Experiment
3. Factual
4. Fun
5. Information
6. Products

- 7. Science
- 8. Technology

Tags

- 1. Experiment
- 2. Future
- 3. Laser
- 4. Popcorn
- 5. Robot
- 6. Robotics
- 7. Robots
- 8. Science

Date Created

July 16, 2018

Author

sephra

default watermark