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New 'Soft' Robot: Shape-Changing and Versatile

Researchers from Stanford and UC Santa Barbara have created a novel robot that blends traditional and soft robotics. This human-scale pneumatic robot can change shape and move independently once inflated, without needing a constant power or air source. Unlike conventional robots with heavy, energy-intensive linear actuators, this design is lightweight, flexible, and durable. Its structure consists of inflatable tubes forming a adaptable truss that can reshape by relocating its joints.

This innovation combines the strengths of soft, collective, and truss-based robots while addressing their individual limitations. The result is a robot that's safe around humans and versatile in various environments. It's particularly suited for space exploration and search-and-rescue missions, as it can compress for transport and expand when deployed. The robot's ability to change shape allows it to navigate difficult terrain effectively.
This development represents a significant step towards more practical and adaptable robots for real-world applications.

Video

Stage of Development
A human-scale 3D robot capable of punctuated rolling locomotion and manipulation has been demonstrated. Future developments will include enabling dynamic activities such as jumping.
Stanford News article

Applications

- Space exploration
- Search and Rescue

- Education
- Other complex tasks

Advantages

- Robust and safe around humans
- Operates untethered from external power/air source
- Shape-changing and adaptable
- Lightweight
- Compresses to small size
- Modular, can be manually reconfigured

Publications

- Nathan S. Usevitch, Zachary M. Hammond, Mac Schwager, Allison M. Okamura, Elliot W. Hawkes, and Sean Follmer. An Untethered Isoperimetric Soft Robot *Science Robotics* 18 Mar 2020: Vol. 5, Issue 40 DOI: 10.1126/scirobotics.aaz0492

Patents

- Published Application: 20210078164
- Issued: 11,794,334 (USA)

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