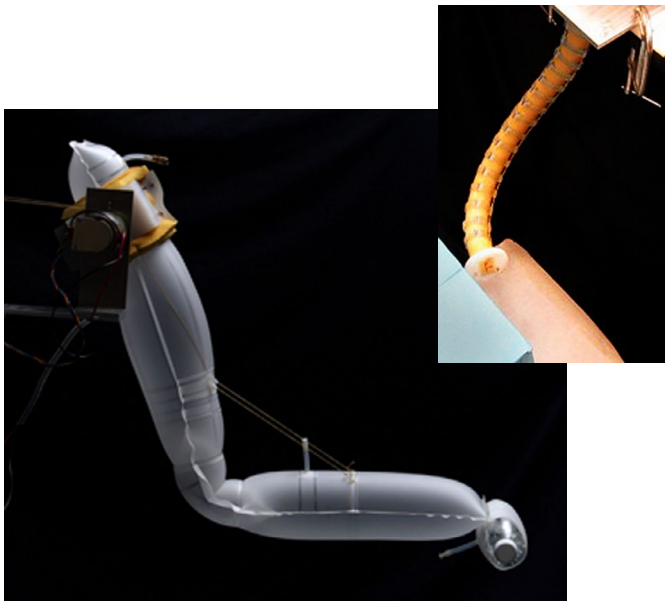


Soft Robots

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Soft robots can overcome critical safety barriers to close human-robot contact and co-existence.

Assistive robots can serve humans in domestic settings on a more regular basis; but a key component of quality care will require the ability to gently and safely manipulate people without harming them. Soft robots now in development - such as the inflatable arm (shown below) - are intended to assist people with activities of daily living (ADLs) such as feeding, dressing, grooming, and cleaning; or, with transfers between bed, wheelchair, toilet, or bathing area.



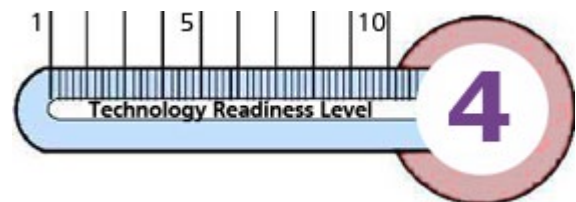
Two soft robot prototypes: a Tubot continuum manipulator (top) and an inflatable arm (bottom)

TARGET POPULATIONS:

- People with mobility issues
- The elderly living at home

BENEFITS:

- Improves safety
- Avoids or minimizes injury from impact, sharp contact, or crushing
- Distributes compliance for greater speed and agility



This technology is in early prototyping for integration.

ABOUT THE RESEARCH

Mobile soft physical interaction with humans is a relatively undeveloped area. No current humanoid robots are fully back-drivable from any contact point, for example, and those that implement soft physical interaction do so only at selected sites using localized force sensing.

The inflatable arm is comprised of an upper arm, elbow joint, lower arm, wrist joint and gripper. Objects weighing up to 500g can be manipulated by the robot within its workspace. A shoulder joint is currently being developed to enable free standing manipulation. Additional soft robot alternatives include continuum robots and variable morphology robots.

“The requirements for manipulation systems that directly touch people are quite different than those that primarily manipulate objects. For robots to be useful in performing assistive tasks, it is essential to control contact forces. Soft robots are a viable option for enabling close physical human-robot interaction.”

--Siddharth Sanan, Carnegie Mellon University

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