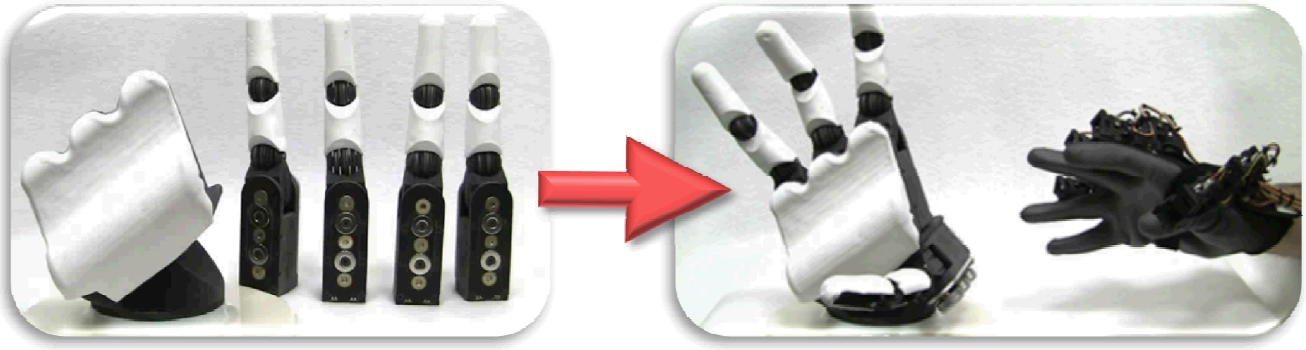
CAM HAND

SAND2012-1788P

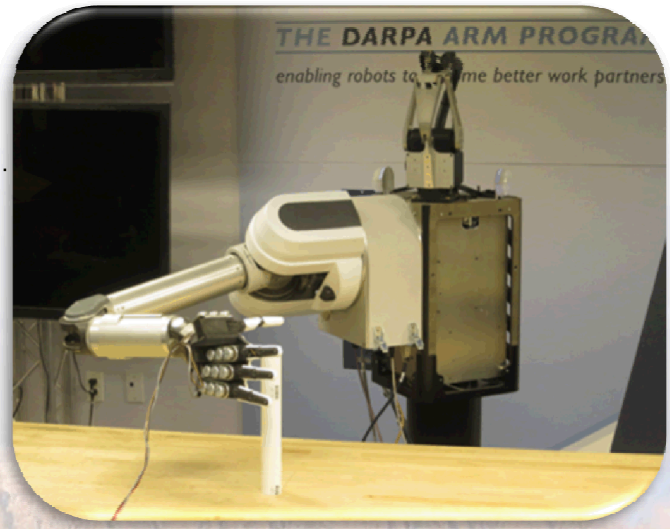
Sandia National Laboratories has designed and developed the Cheap Agile Modular (CAM) HAND for the DARPA sponsored Autonomous Robotic Manipulation (ARM) Program. The CAM HAND is a low-cost robotic hand designed to perform highly dexterous tasks in a variety of hazardous environments.

System Design

The CAMHAND consists of a hand frame that supports a set of identical finger modules that magnetically attach and detach from the hand frame. The finger modules are 3 degree of freedom fingers, and a four finger arrangements of the modules enable the highly dexterous and useful task of finger gating while also maintaining form closure.



The finger modules consist of several sensor systems including strain gauges, accelerometers, tactile sensors, and hall effect sensors that enable the hand to perform complex manipulation tasks. In addition the hand is supported by several imaging systems to support function and performance.
Control of the hand can be realized through autonomous software, semi-autonomous collaboration with high-level human input, and low-level human control via teleoperation.



Potential Applications:

- Counter-IED
- Countermine
- Explosive Ordnance Disposal
- Search and Rescue
- Casualty Care
- Extreme Environments

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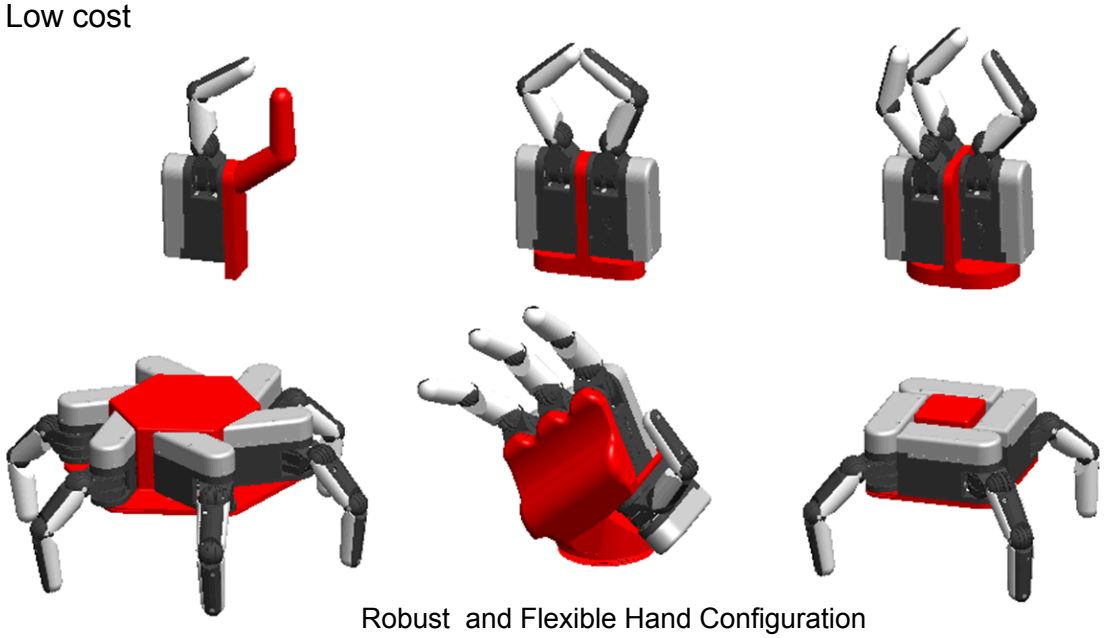
Benefits:

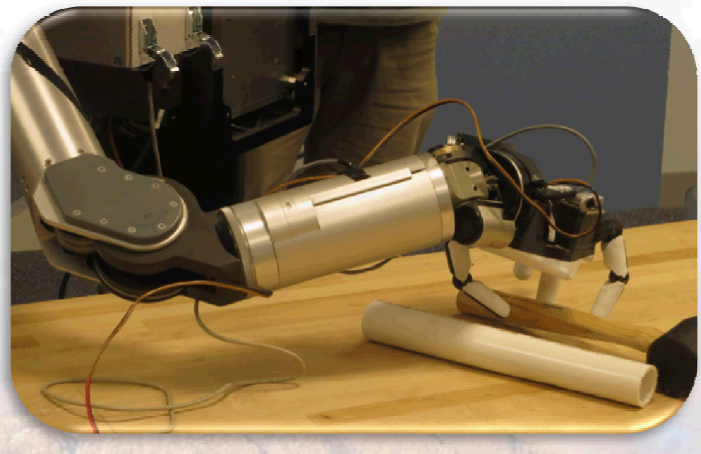
- ❖ Robust design allows operators to detach and reattach fingers as needed
- ❖ Reduced down time as one finger can be repaired at a time instead of the entire hand
- ❖ Flexible hand design supports a wide variety of kinematic topologies
- ❖ Incremental cost model allows users to purchase a custom number of finger modules
- ❖ Incremental upgrade model allows operators to upgrade one module at a time
- ❖ Specialized finger modules can be supported with the hand frame
- ❖ Low cost



Robust and Flexible Hand Configuration

Advanced Manipulation Enabled by Robust Design:

- ❖ Grasping and picking up objects
- ❖ Sorting objects
- ❖ Drilling holes
- ❖ Throwing objects
- ❖ Sliding objects
- ❖ Inserting objects
- ❖ Turning wheels, knobs, levers
- ❖ Holding objects
- ❖ Assembling objects from part kits
- ❖ Removing objects from small spaces



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