

# Robotic Magnetic Gripper

Specialized robot to handle magnetic materials

Conventional robotic grippers and electromagnets used to manipulate magnetic materials are often mechanically complex, power-intensive, and poorly suited for space-constrained or low-power environments such as asteroid mining operations.

Researchers at Virginia Commonwealth University have developed a robotic magnetic gripper end-effector that uses linear Halbach arrays within a compact, mechanically simple, low-power design to extract and handle magnetic samples, enabling efficient collection of magnetic alloys and other precious metals in space and industrial

## The Technology

The robotic magnetic gripper uses arranged magnets to securely handle magnetic samples with a simple, durable mechanism that operates on low power. The invention supports efficient collection and handling of magnetic materials in settings such as space resource extraction and industrial manufacturing, addressing growing needs for automated manipulation of specialized metals. By replacing bulkier solutions with a streamlined design, it enables more reliable operation in constrained or remote environments. This technology opens new possibilities for automated magnetic material handling in both space and terrestrial applications where efficiency, robustness, and energy conservation are critical.

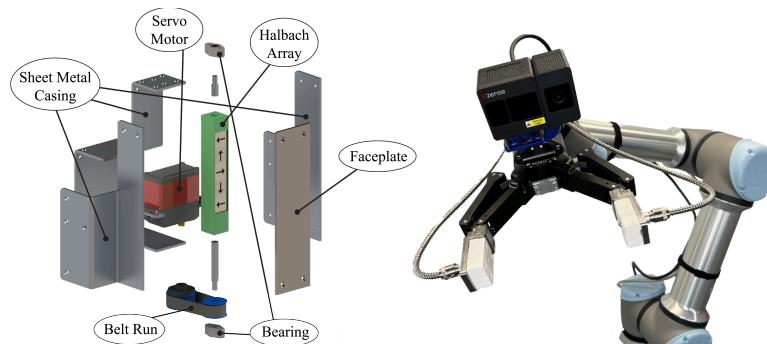


Figure 1. Robotic magnetic gripper design and effector combined with robotic base.

## Benefits

- Mechanical simplicity and robustness
- Low power & cost requirements
- Tunable for specific arrays and array placement

## Applications

- Extraction of magnetic alloys and metals from asteroids
- Handling of magnetic materials in industrial processes
- Metal additive manufacturing

## IP Status:

Provisional patent application filed

## License Status:

This technology is available for licensing to industry for further development and commercialization

## Category:

Engineering and Physical Science - Devices and Methods

## VCU Tech #:

HAD-24-041

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