Continuous Non-antiperiodic Vibratory Separator of Granular Materials

Tech ID: 34783 / UC Case 2026-461-0

ABSTRACT

Researchers at the University of California, Davis have developed a system and method to continuously separate granular material mixtures based on differences in their frictional properties using non-antiperiodic vibratory excitation.

FULL DESCRIPTION

This technology provides an apparatus and method to separate mixtures of granular materials by exploiting differences in their frictional characteristics. Unlike traditional methods that separate by size, density, or shape, it utilizes a planar surface vibrated within a non-antiperiodic motion profile and stick-slip regime to cause materials to move at different velocities, enabling friction-based separation. The system includes a product deposition unit, a vibration actuator, and control software that optimizes vibration parameters based on friction coefficient measurements. It continuously segregates mixed products into distinct friction-based streams collected at separate locations.

APPLICATIONS

- Food processing: sorting edible nuts, coffee beans, and moldy fruit removal.
- Recycling and waste management: separating rubber, plastics, and metals in e-waste.
- Mining and mineral processing: gold recovery from sand and mixed ores.
- Agricultural product quality control and sorting. Industrial material handling and quality assurance systems.

FEATURES/BENEFITS

- Separates granular materials by frictional properties that conventional size/density methods cannot resolve.
- Automates continuous operation for high-throughput processing of mixed granular streams.
- Optimizes separation performance by tuning vibration parameters.
- Distinguishes materials with similar size and density but different friction coefficients.
- Reduces dependence on chemical treatments and manual sorting.
- Enables separation of mixtures that appear identical by size, density, or shape.
- Removes contaminants and defective components in agricultural and industrial product streams.
- Sorts complex waste streams (e.g., electronic scrap) using friction-based differences.
- Improves sorting accuracy for delicate or high-value granular items (e.g., nuts, coffee beans, gold particles).

CONTACT

Andrew M. Van Court
amvancourt@ucdavis.edu
tel: .

INVENTORS

- Alkodsi, Michel
- Donis-González, Irwin R.
- Miller, Gregory H.
- Ristenpart, William
- Rubel, Mariia
- Zhang, Shelly

OTHER INFORMATION

KEYWORDS

amplitude, friction coefficient, granular materials, non-antiperiodic vibration, planar surface, stick-slip regime, vibratory separation, vibration parameter set, velocity differential, waste sorting

CATEGORIZED AS

- **Engineering**
  - Engineering

- Other
- Robotics and Automation
- **Agriculture & Animal Science**
- Devices
- Other
- Processing and Packaging

RELATED CASES

2026-461-0

University of California, Davis

Technology Transfer Office

1 Shields Avenue, Mrak Hall 4th Floor,

Davis,CA 95616

Tel:

530.754.8649

techtransfer@ucdavis.edu

https://research.ucdavis.edu/technology-transfer/

Fax:

530.754.7620