## Introduction

- The KU BREAK program enables engineering capstone design projects that provide custom rehabilitation and assistive devices to Kansans.
- Financial support is provided by the General and Age-Related Disabilities Engineering program of the National Science Foundation.
- Projects aid both individuals and support agencies with technology to enable people with disabilities.
- Projects only address areas where there is no commercially available solution.
- Designs are generally made available in the public domain to aid others with similar disabilities.

## Significance

- All projects are intended to have a substantial impact on the quality of life and/or independence of the people they benefit.
  - Projects directed to support agencies, resulting devices and systems can help many people they serve.
  - Projects for individuals typically target unique needs associated with their specific disabilities
- The program educates students about rehabilitation engineering and provides direct experience with people with disabilities.

## How the Program Works

### Program Promotion
- Present the program at state conferences.
- Assistive technologies
- People with disabilities and caregivers
- The KU BREAK website!

### Project Solicitations
- Search out all agencies in Kansas that assist people with disabilities.
- Develop & maintain an email list of contact.
  - Contacts found on the internet
  - Direct/personal contacts from conferences
  - Prior agencies that have proposed a project!
- Send project solicitation emails/reminders in July and August.

### Project Execution
- **Project Selection/Assignment Process**
  - Two or more projects selected for design-build from all those proposed
  - Capstone Design Student Teams Assigned
  - Program director acts as technical advisor for each BREAK project
- **Students meet with liaison and beneficiary**
  - Understand the abilities and disabilities of the person
  - Determine the scope of the design project
- **Conceptual Design Review (Oct/Nov)**
  - Primary design concept(s) presented
  - Feedback from liaison and/or beneficiary
- **Detail Design Review (Dec/Jan)**
  - Final review of design/analysis details
  - Typically a gateway to major parts/materials purchases
- **Device/System Fabrication/Testing (Feb/Mar)**
- **Final Design Presentation (Apr/May)**
  - Presentation of fabrication procedures and test results
  - Transfer of device/system to beneficiary
  - Often includes a User/Maintenance Manual
  - Design documents made public (primarily website)

## Example Project: Bagging Buddy

### Project Background
- Cottonwood Industries (Lawrence, KS) employs many people with disabilities.
- Many of the jobs include packaging/fulfillment.
- Several people with limited/no use of one hand had difficulty placing items in a bag.

### Design Approach
- Students eventually chose a basic metal frame with magnetic clips (Figure 1).
- The design is simple, easy to use and robust.
- Suitable for large and small bags (Figure 2).
- People with use of only one hand now bag items at similar speeds to those using two.

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**Figure 1.** CAD model, left showing toggle clips (blue and red), and additional clips for large bags. Toggle clips allow initial fixation of the bag by slipping it under the clip and then bumping the clip closed against the frame.

**Figure 2.** The Bagging Buddy: Left is a large loading strap and the bag/clamp configuration for it. Right is a small bag clamped vertically for small parts.