Designing New Assistive Technology

Kenneth Rosenman, MD
Michigan State University

Beverly Berens, Case Manager
Michigan Easterseals

Funding USDA 2014-41590-22327

Objectives

- The results of the Engineering Design projects and use by the farmer recipients will be described.
- The presentation will describe the benefits of this program for both the students and farmers.
- Lessons learned will be shared

MICHIGAN STATE UNIVERSITY Design Day COLLEGE OF ENGINEERING

Twice a year at the end of each semesters, the MSU College of Engineering puts on a Design Day where selected engineering seniors, in groups of 4-6 , present the results of their work developing an engineering solution presented to them generally by a corporate sponsor.

MI AgrAbility has become a sponsor and the students have worked with both an engineering faculty mentor and Ned Stoller, the assistive technologist of MI AgrAbility, from 2015-2017 to design and produce six capstone project. Ned selected the projects.


SPALDING
EXIT


Pellrey Pathway Consultants
Thank You!!!
Questions?

Approach

- Identify task
- Identify problems completing the task
- Computer assisted design
- Build prototype
- Potential User evaluates the prototype
- Goal – Develop a device that can be produced by farmers across the state

Six Design Projects – Mechanical Engineering

Fall 2017
Muck Bucket Transporter - 6 students

Spring 2017
Adjustable Hand Lever - 4 students

Fall 2016
Tractor Step Bracket - 4 students

Spring 2016
Outdoor Wood Furnace Loader - 5 Students

Folding Step for a tractor - 5 students

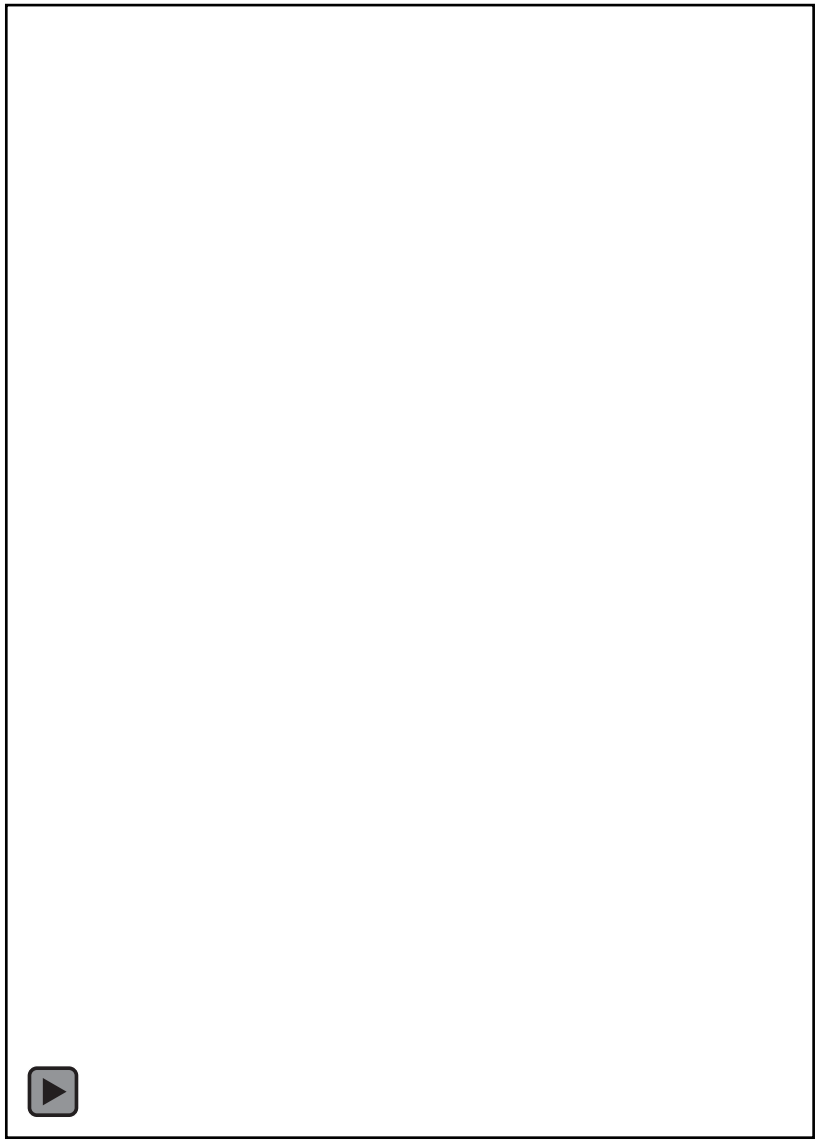
Fall 2015
Redesign of a Skid-Steer Vehicle for Ease of Access - 5 students

Fall 2017 - Muck Bucket Transporter

Task - Moving and lifting heavy buckets - horse farms require cleaning of stalls, which entails moving and lifting a bucket that can weigh as much as 60 pounds.

Problem - Workers with certain physical conditions (such as back, armor leg injuries) can find the task of moving and lifting a muck bucket to be difficult and may risk additional injuries.

Solution - Design a dolly that can secure the bucket with minimal effort, transport it through rough terrain, and then lift the bucket a minimum of 45 inches where it would be high enough to slide onto a trailer or other vehicle.



Problems

- Initial farmer decided not to participated
- Structure made from wood - “goofy”

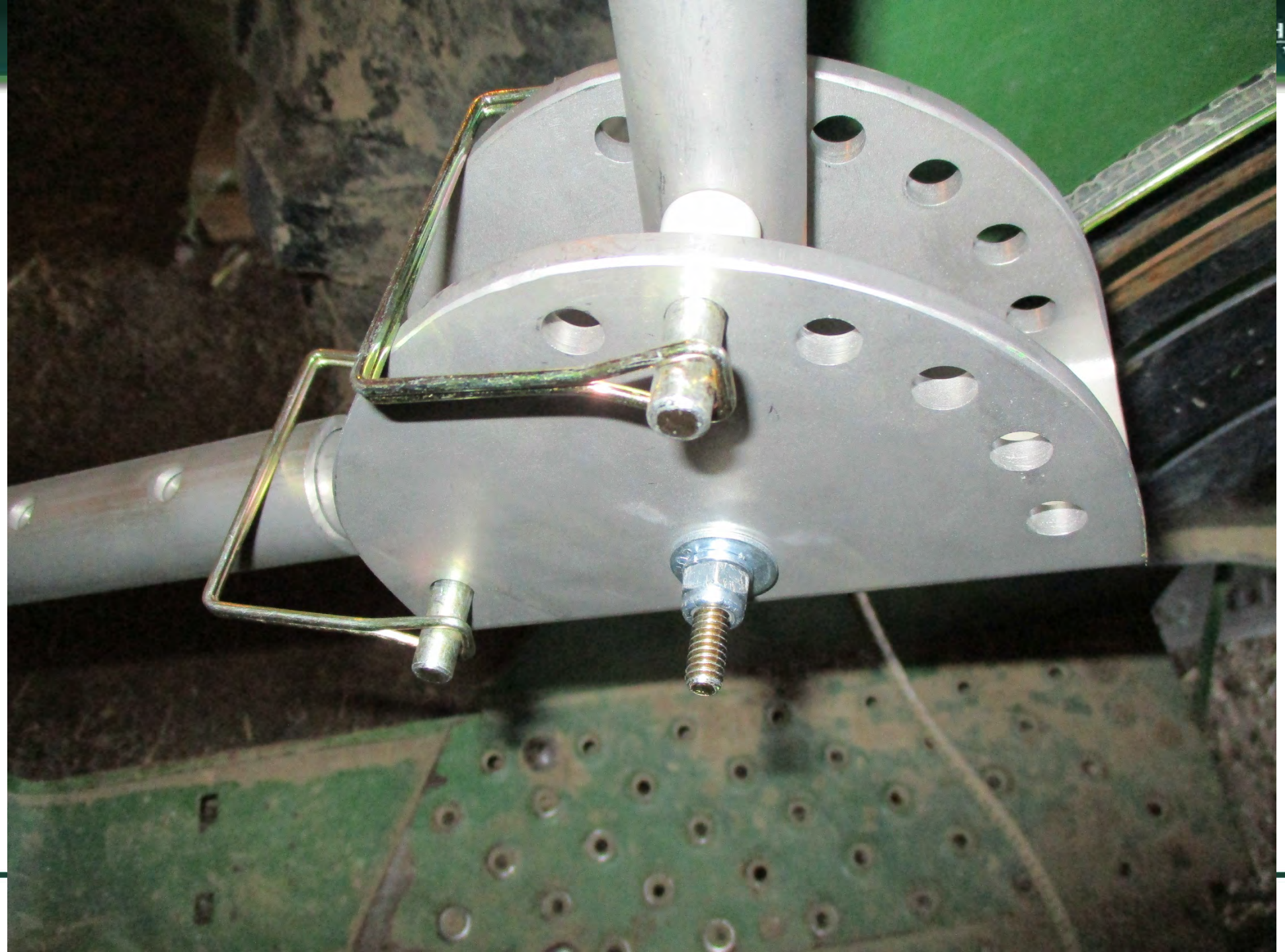
Spring 2017 - Adjustable Hand Lever

Task – Driving farm machinery

Problem – In order to actuate foot pedals safely, a considerable amount of force must be applied quickly over a relatively large range of motion. Workers with a leg impairment have a very difficult time operating foot pedals. Current hand levers require custom fitting for the specific farmworker because of the individual's arm length and strength and custom shaping of each lever for each specific tractor is required.

Solution – Develop an adjustable, easy to assemble, shaped lever that is modifiable in the field for a vegetable grower, who had lost the use of his right leg.


CAUTION
TURNER
IMPLEMENT CO.



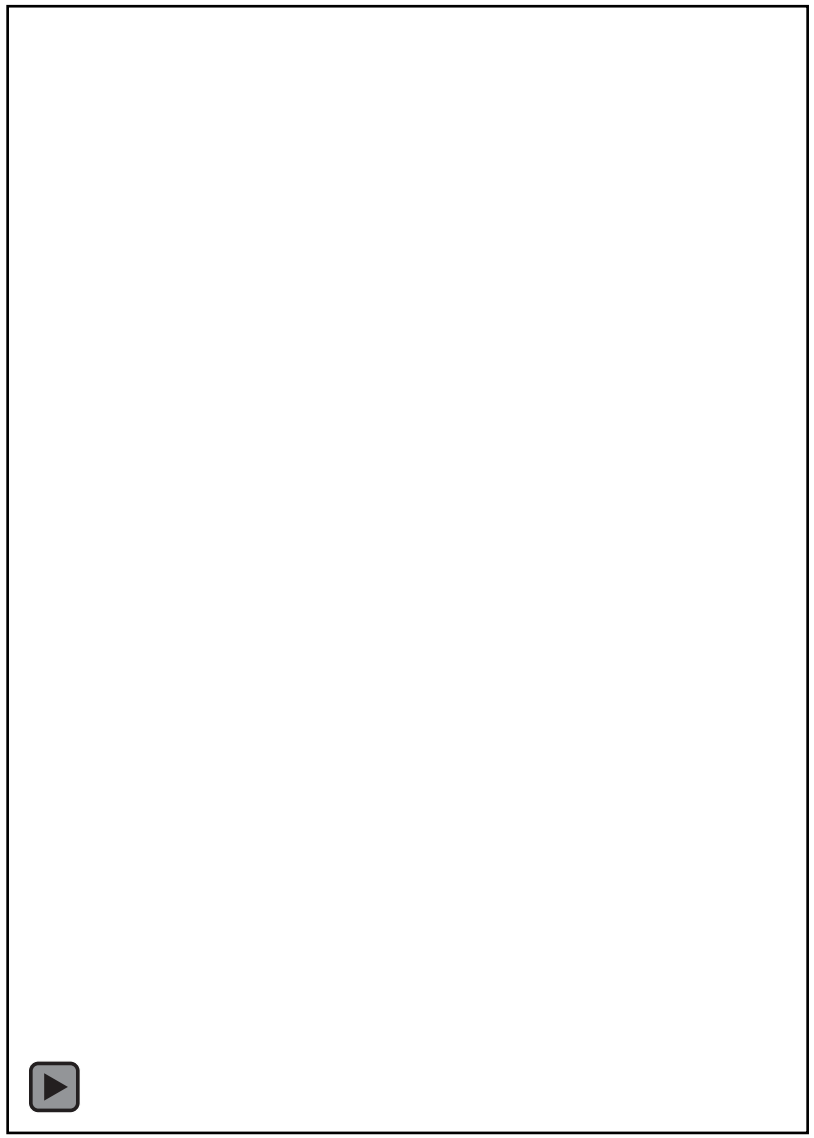
Spring 2016 - Outdoor Wood Furnace Loader

Problem: The inability to lift heavy logs

Solution: A mechanical log lifter capable of lifting 4 foot long logs, 18” in diameter for stoking the outdoor wood burner


FRONTIER
150
LET'S
GO
PENS
East Lansing
St. Patrick's Day
2013
Spartans Celebrate
With Class


FRONTIER
150



Problems

3/15/18 - He uses it all the time. Loves it but will make some modifications.

1. Mount it on a cement base as the entire structure is loose now.

2. Will change it to extend reach for both picking up a log on the ground and placing it further back into the wood burner.

3. Will add an oriface at hydraulic juncture to slow the power down to make for smoother handling. Currently, all the power is "right there" when moving wood, making the hydraulic operation too touchy, too jumpy.

Observation: Some components are far more heavy duty than necessary; others are much lighter than they should be.

Had a great experience working with the students and really enjoyed that, provided pizzas for lunch after installation.

Fall 2015 - Redesign of a Skid-Steer Vehicle for Ease of Access

Task – Climbing in a skid loader

Problem – Reaching handle

Solution – Develop a retractable handle that extends further out


CAT

Biosystems and Agricultural Engineering
Fall 2016 – Spring 2017 - Seat lift

Lessons Learned

- Computer aided design first, then prototype
- Not too simple a problem
- Find farmers within an hour of MSU
- Enjoy constructing, not just design
- Emphasis really useful for someone

Questions?

Ned Stoller
ned@disabilityworktools.com