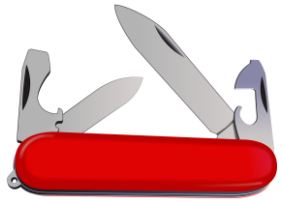
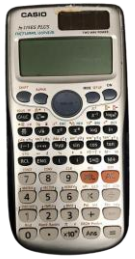
What tools are in your AgrAbility truck?

Kyle Haney

Ned Stoller

Site Visit "Go Bag"





AgrAbility

Common Items For Your Vehicle

AgrAbility

Common Items For Your Vehicle

AgrAbility

Common Items For Your Vehicle

AgrAbility

Common Items For Your Vehicle

AgrAbility

Common Items For Your Vehicle

AgrAbility

Common Items For Your Vehicle

AgrAbility

Common Items For Your Vehicle

Common Items For Your Vehicle

Unique Items In Our Vehicles

AgrAbility

Unique Items In Our Vehicles

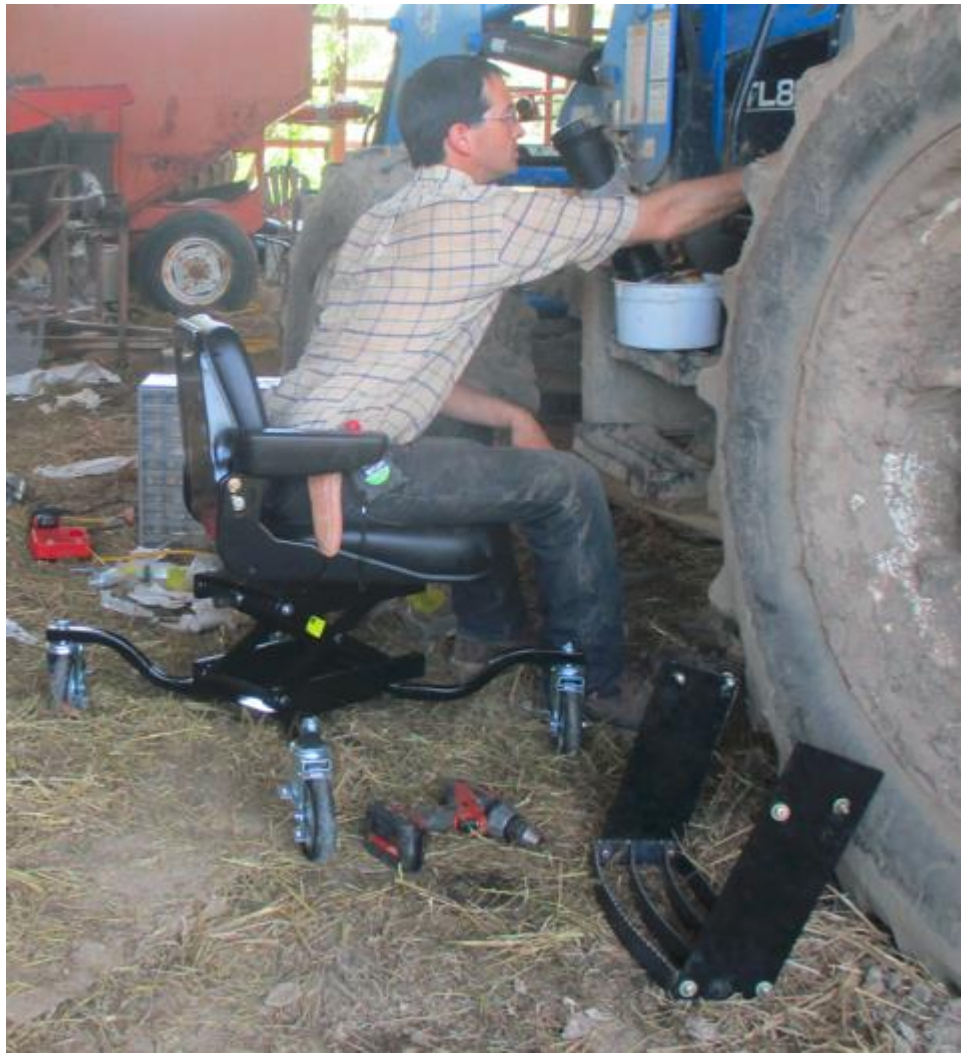
AgrAbility

Unique Items In Our Vehicles

AgrAbility

Unique Items In Our Vehicles

Unique Items In Our Vehicles: Use my recommendations



AgrAbility

Unique Items In Our Vehicles: Use my recommendations

AgrAbility

Unique Items In Our Vehicles

AgrAbility

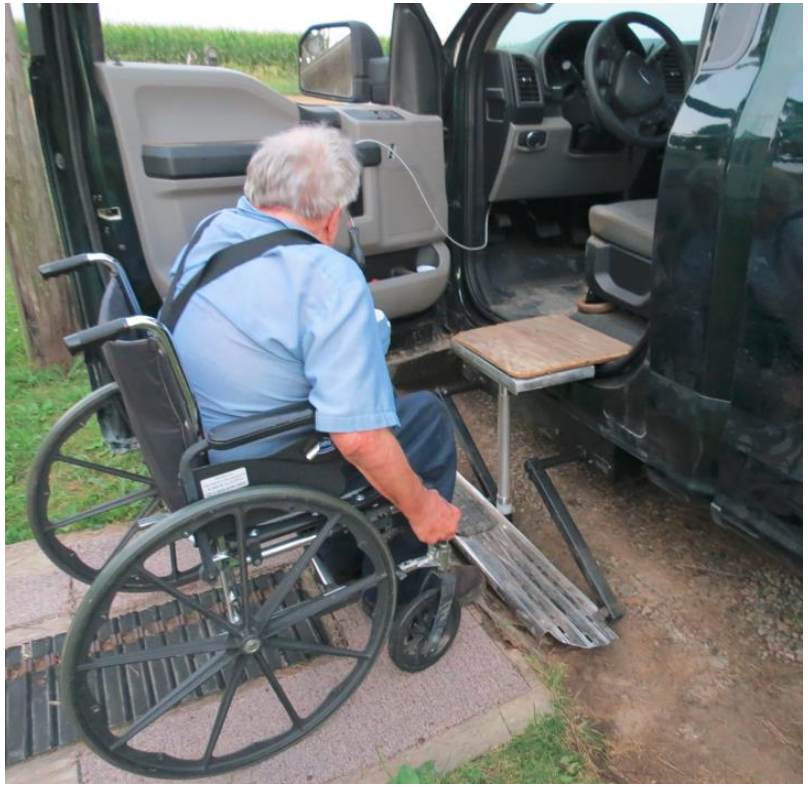
How To Fund Tools

- Donations
  - Companies
  - Private Individuals – word of mouth or advertise in the classifieds of a local paper
- Charging for Installations
- Fundraisers
  - Sell food items
  - Go Fund Me
  - Golf Tournament
  - ETC…
- Federal Surplus
- State Surplus
- University Surplus
- Salary Savings

AgrAbility

How To Fund Tools: farmer to farmer

How To Fund Tools: farmer to farmer



How To Fund Tools: Garage sales, Craigslist, Auctions

AgrAbility

How To Fund Tools: Capstone projects

Design of a Remote Control Gate Opener

Team #1

Brad Chapman, Joseph Gusumano, Maria Martin, Jeffrey Masten-Davies, Ryan Qamar

PROBLEM STATEMENT

- We were contracted by AgrAbility to develop a low-cost farm gate-opener that would would improve mobility of disabled farmers
- It needed to be easily manufacturable, if possible using a commercial garage door opener.
- It needed to be highly versatile with the capability of opening/closing gates from 50-200 lbs and 10-16 ft and with minimal structural modifications to the gate.

PROPOSED ALTERNATIVES

Concept 1: Linear Actuator

- Based on converting a garage door opener into a linear actuator
- Advantages:
  - Completely enclosed and safe
  - Low profile and durable
- Disadvantages
  - Complex and challenging fabrication

Concepts 2 and 3: Ball-screw system

- Both are variants on a ball-screw opener
- Advantages:
  - Easy installation
- Disadvantages:
  - Screw can be easily damaged causing critical failure
  - Icing issues in winter

Concept 4: Linkage system

- Based on the core system used with handicap-accessible doors
- Advantages
  - Easy installation with few components
  - Bar system adds flexibility and versatility
- Disadvantages
  - Bar system is exposed
  - Only works in one direction

Concept 5: Mounted Opener System

- Based on the geometric equations of triangles
- Advantages:
  - Easy installation without modifications to the gate
  - Little to no fabrication required
- Disadvantages
  - Potential damage by ice and animals

Decision Matrix

Design	Cost	Installation & Manufacturability	Availability	Maintenance	Safety	Overall
Linear Actuator	3	2	4	2	1	12
Ball-Screw Opener	3	3	3	2	2	13
Linkage System	2.5	3	4	2	1	12.5
Mounted Opener	2.5	1	2	2	1	8.5

BENCHMARKING AND SOLUTION ANALYSIS

- Commercial Benchmark: Mighty Mule 360
  - Lift capacity: 150 lbs
  - Maximum gate length: 16 ft
  - Cost: $329.00
- Mounted Opener System:
  - Lift capacity: 400 lbs
  - Maximum gate length: 16 ft
  - Cost: $200-250
- Optional improvements:
  - $50-100 for a stronger garage door system would increase capacity
  - Added cost brings smartphone-connected functionality

PHYSICAL ANALYSIS AND VALIDATION

COST ANALYSIS

Benchmark & Final Breakdown

- Benchmark: $400, cost of Mighty Mule 360 Gate Opener
- Cost Goal: $250 or less as set by sponsor

- Final cost: ~$218.00 depending on site-specific requirements:
  - Garage Door Opener: $131.00
  - Wooden Post: $10.00
  - Connecting Rod: $23.00
  - Plastic Tote Shielding: $8.00
  - PVC Pipe Shielding: $10.00
  - Miscellaneous Hardware: ~36.00

SUSTAINABILITY

- Materials
  - Minimal materials were required, minimizing environmental impact
  - The main material is easily recyclable steel
  - A small section of the gate is a recyclable plastic tote housing
- Environmental Impacts
  - Preventing the free-roam of livestock around open waterways reduces the likelihood of pollution
- Impact on Public Safety
  - Securing livestock in penns reduces the possibility of harm to people and property in residential areas

INSTALLATION

- Phase 1
  - Pre-drill hole to insert post at appropriate location.
  - Place post in hole, secure post such that it does not rotate, sink, or bend.
  - Fill hole with cement.
- Phase 2
  - Assemble motor and track before attaching to gate.
  - Attach motor/track to gate using U-Bolts.
  - Attach Arm to post and to cart.
  - Seal all hardware using adhesive.
- Phase 3
  - Attach PVC to rail to protect from snow and ice.
  - Perform validation to ensure track moves freely and gate opens up fully

ACKNOWLEDGEMENTS

- Dr. Ron Averill, Academic Advisor
- Ned Stoller, Industrial Advisor from AgrAbility
- Caleb Brown, Customer
- AgrAbility

What do you have in your AgrAbility vehicle?

AgrAbility

THANKS!

kyle.haney25@uga.edu
stollerned@postpro.net

AgrAbility