Prosthetic Adapter for Agricultural Machinery
Our Story

Hugh Herr’s BiOM (MIT Lincoln Lab)
Discovery

1/10 (-National Safety Council)
Problem

Otto Bock “Michelangelo”

Fillauer “Workers Hook”
Evolution of Prosthetic Design
Learn

(Athol, MA)
Learn ottobock.

Byron Backus, CP, Clinical Specialist

Bill Hansen, President Liberating Technologies

Craig Heckathorne, MS, Research Engineer, NUPOC
Design Goals

Functional Requirements

- Force
- Speed
- Durability
- Adaptability
- Safety

Ergonomics

- Range of Motion
- Posture
- Length & Weight
- Tactility
Design - Interface

- Translationally misaligned
- Rotationally misaligned

Hard stop feedback
Design - Adapter

- Angle adjustment
- Non-permanent connection
- Simulates original control knob
Design – Use Simulation

- Bypasses wrist joint
- Prevents forearm rotation
- Limits tactile feedback
Field Test Results
Design - Terminal Device

- Vertical offset
- Terminus angle
Material Considerations

- **Terminal Device**
  - Wrist attachment
    - Stainless Steel
  - Body
    - 6061 Aluminum
    - 85 Shore-D Polyurethane
- **Terminus**
  - 6AL-4V Titanium
  - Delrin
- **Adapter**
  - UHMW-PE
  - Delrin
Feedback  (Rumford, ME)
Design Validation
Design for Manufacturability (DFM)

- GOAL: reduce tooling and production cost
Adapter Mount
Differentiation

Current Prostheses
Amputation Frequency by Industry

- Agriculture: 22%
- Construction: 17%
- Manufacturing: 23%
- Transportation & Utilities: 21%
- Mining: 6%
- Other: 11%

Current Team

Andrew Waite
M.S. M.E. ’15
Design & 3D-Modeling

Jacob Cohen B.S.M.E. ‘15
Machinist, Material Science Industry: MD&D

Jon Leydon
B.S. M.E. ’15
KIVA Systems
Hardware/Design

Danny Walsh, B.S.M.E. ‘15
Medical Device R&D Engineer Candidate for M.B.A. 2017

DePuy Synthes
COMPANIES OF Johnson & Johnson
Partners

NEXT-STEP
BIONICS & PROSTHETICS, INC.
EXPERTISE IN MOTION

ÖSSUR

TRS Inc.
Prosthetics  Design  Manufacturing  Consulting

AgrAbility
Cultivating Accessible Agriculture

ottobock.

Hanger CLINIC
Empowering Human Potential
Recent Visits

Bob Radocy, CEO

Jay Roy, CP
Product Options

Durable

Consumable
Current Plan

• **Goal:** accessibility and expediency

• **How:** IP -> Improve Prototype -> Partner

• **Channels:**

• **Prototype Refinement**

• **Target Goal:** 50 units distributed per year (~1,000 market segment size)
Help us out?

thefarmarm.org
thefarmarm@gmail.com
thefarmarm.org
Market Statistics

# of U.S. Farmers? 21 million

# of people living in US with an amputation today? 2 million

Likelihood of injury farming? 2.5 X >