

# Combat Food Insecurity

Children of the Corn



# Project Goal

To create a device that allows plant breeders to accurately measure stalk strength in an economically feasible and high throughput manner so they may breed for stronger stalks to prevent lodging.



# Stalk Lodging

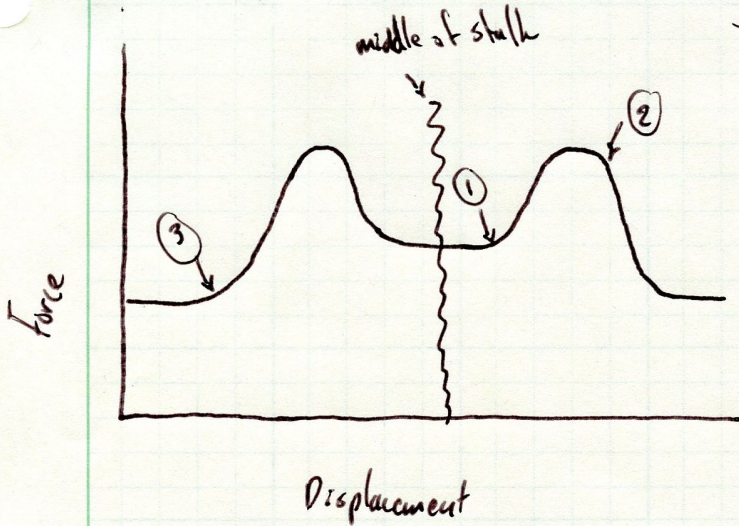
Definition:

Breakage of the stalk below the ear

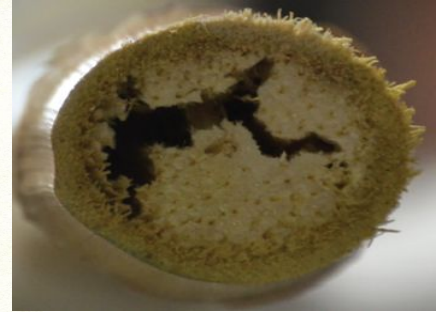
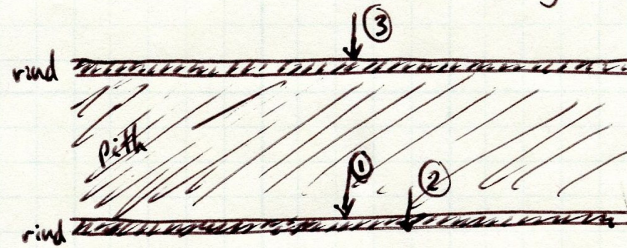


# Concept

Force - Displacement curve of needle penetrating stalk:



Side view of needle penetrating stalk:

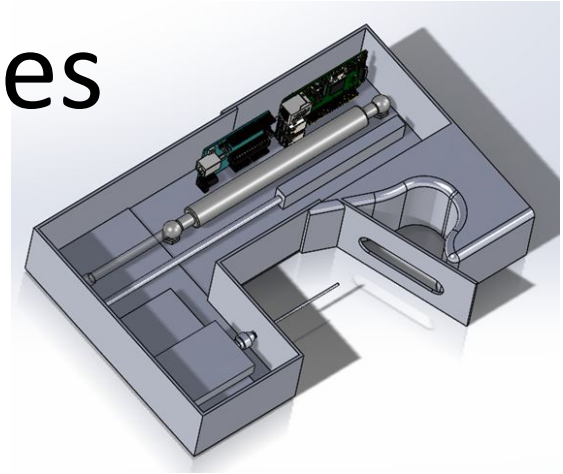
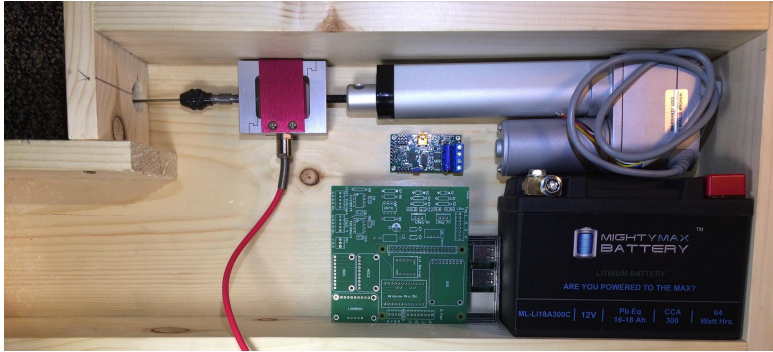


# Design Requirements

- Measure max force & distance traveled to an accuracy of +/- .01 mm
- Store and analyze collected data
- Be handheld/portable
- Analyze 100 stalks every hour
- Collect data at a rate of at least 60 Hz
- Be durable

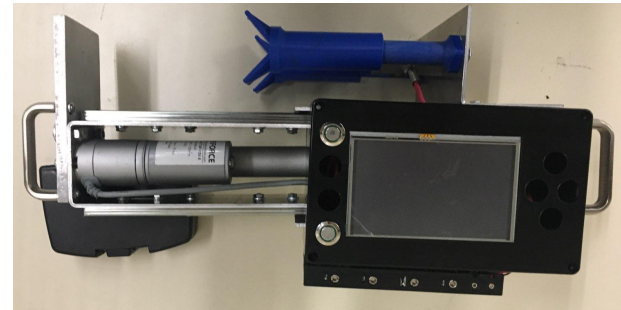
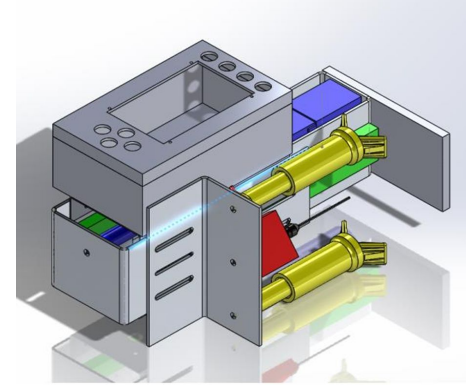


# Prototypes

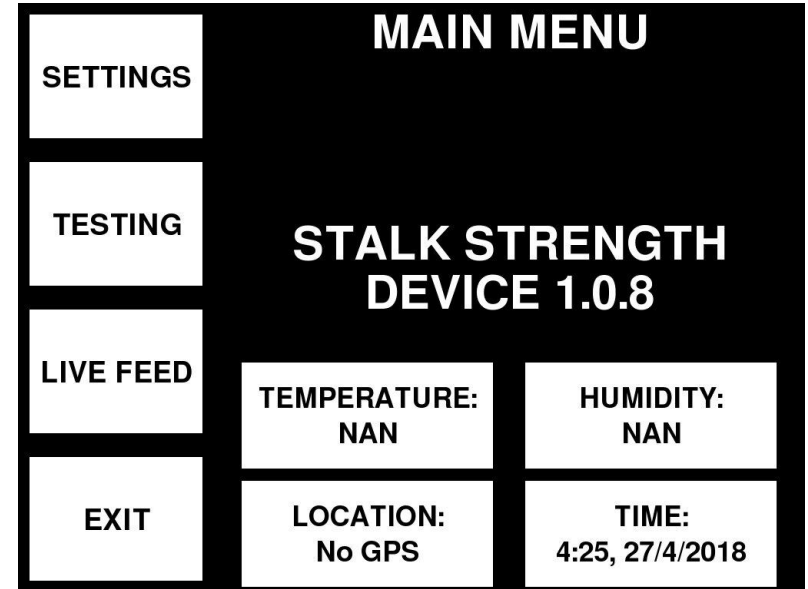
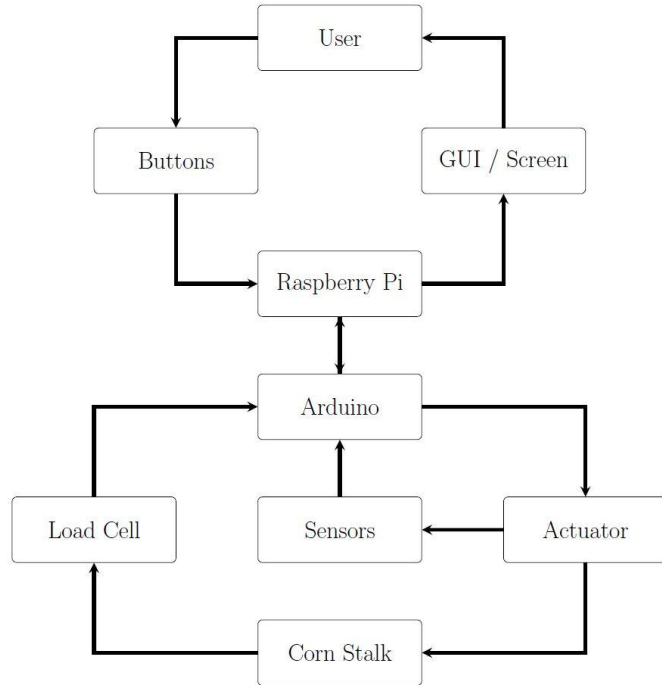


# Current Design

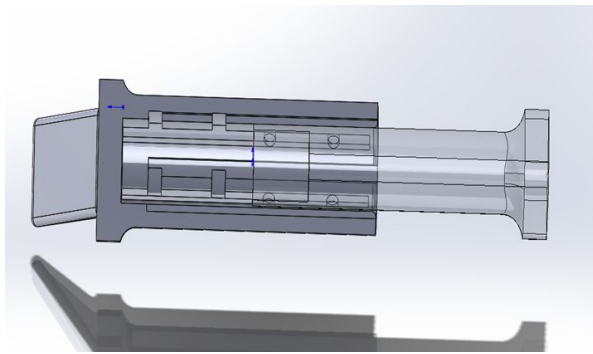
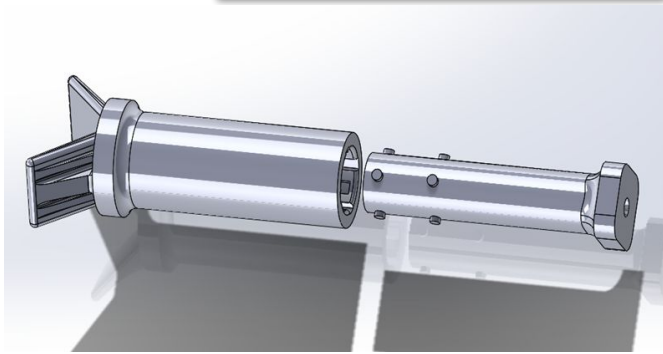
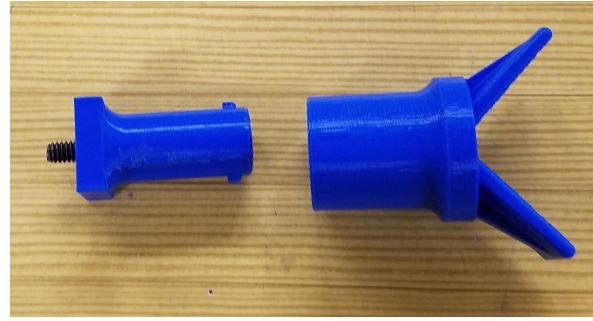
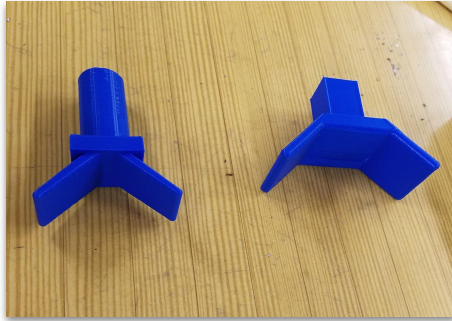
- Components Compartmentalized
- Compact
- Simplistic Design
- Partially Outsource Construction
- Rigid Design (Less Deflection)



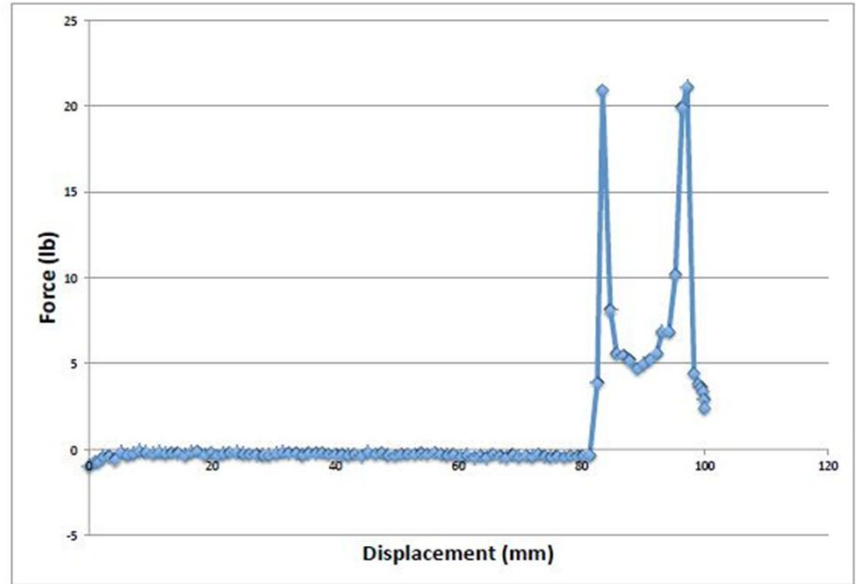
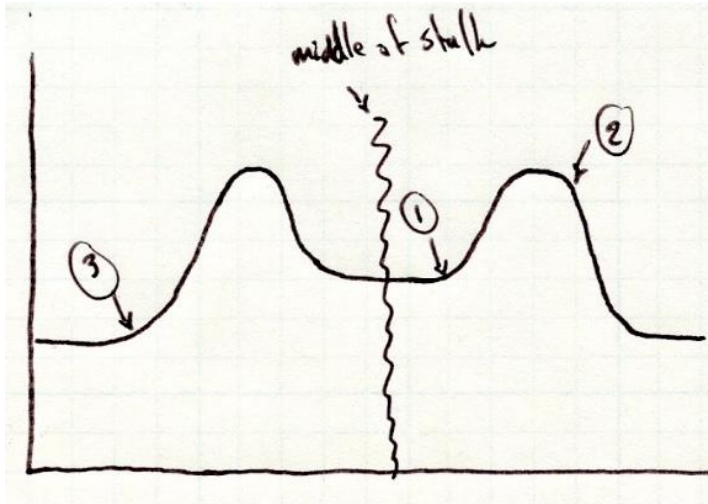
# Electronics



# Stalk Holders



# Testing



# Metrics Fulfilled

## Complete

- Store and analyze collected data
- Be portable/handheld
- Analyze 100 stalks every hour

## Incomplete

- Measure max force & distance traveled to an accuracy of  $\pm .01$  mm
- Collect data at a rate of at least 60 Hz
- Be durable



# Moving Forward

- Find a Different Load Cell
- Update the PCB
- Add Auxiliary Sensors
- Streamline the Design
- Explore a Manually-Powered Design





# Questions?

