Combat Food Insecurity

Children of the Corn

University of Idaho
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Problem Statement:

To create a device that will measure the stalk strength of a corn plant

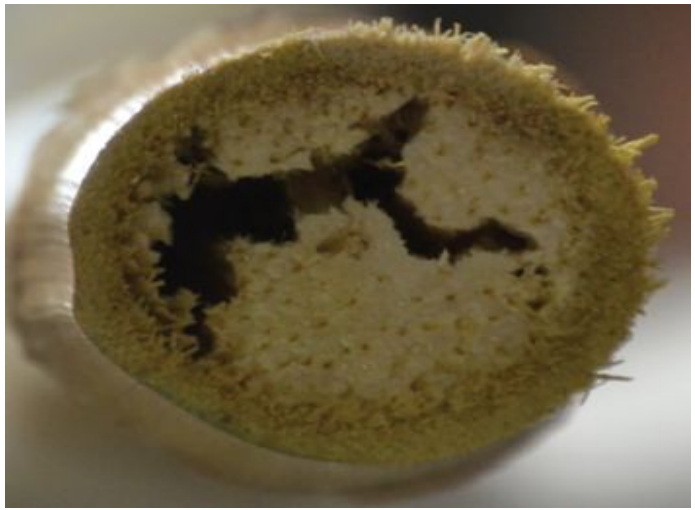
Background

Stalk Lodging

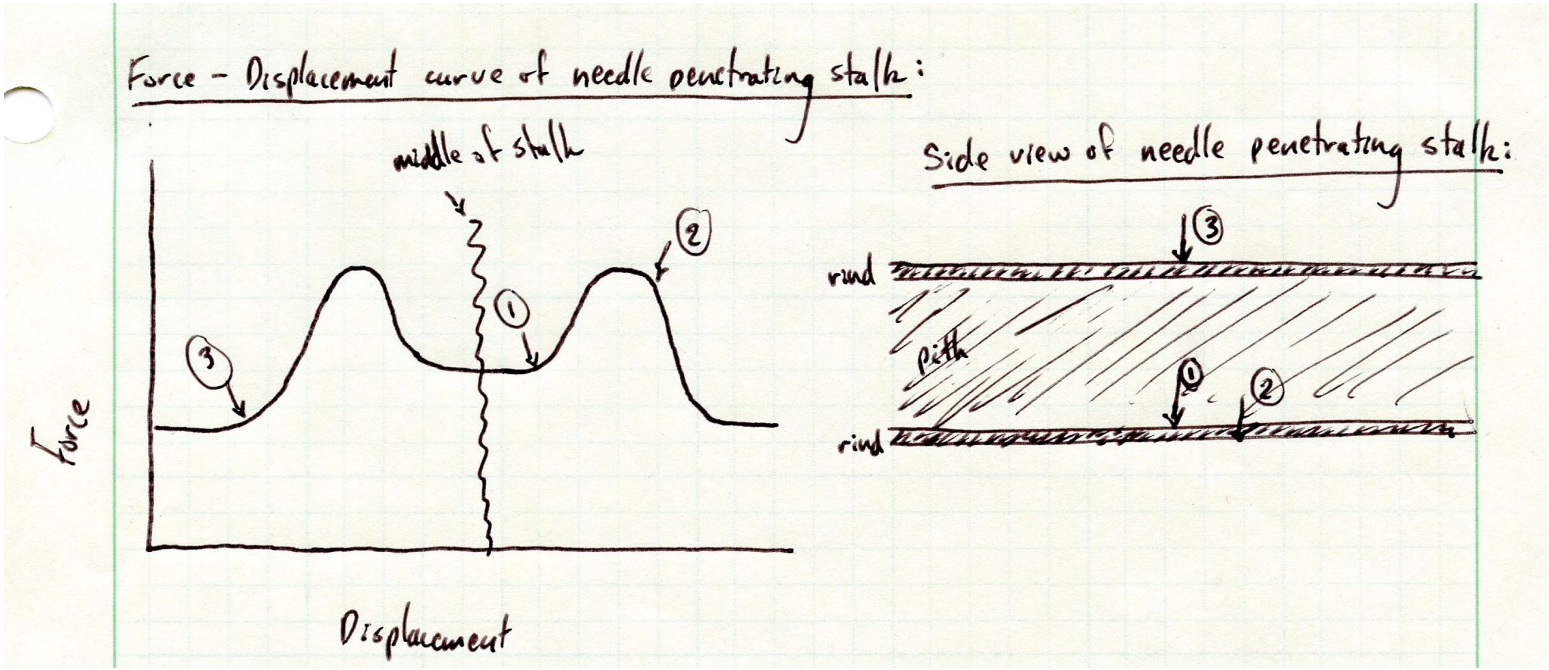
Definition:

Breakage of the stalk below the ear

Structure of Corn



Concept


Force - Displacement curve of needle penetrating stalk:
middle of stalk
Force
Displacement
Side view of needle penetrating stalk:
rind
pith
rind

Viable Designs

Offset Actuator Design

Pros

- Relatively Lightweight and small
- Constant, adjustable rate/force with linear feedback
- Able to be controlled with button reachable while holding.

Cons

- Case is multiple sheet metal parts
- Case sliding together could deflect or bind
- Needle is always exposed

Estimated Cost: $1100

Hand-Powered Design

Pros

- Lightweight
- Small
- Simple to operate

Estimated Cost: $900

Cons

- Two hands to operate
- Long
- Poor consistency of force
- Tiring to do ~800 times a day

Actuator-Driven Design

Pros

- Constant speed and force
- On-board position feedback
- Button-operated

Estimated Cost: $1000

Cons

- Heavy
- Unwieldy Case
- May be difficult to hold case and use screen simultaneously
- Exposed parts
- Mounting

Electronics

Current Design

- Arduino Mini Pro interfaces with sensors
- PCB is square
- PCB uses through-hole components

Ideas for Improvement

- Raspberry Pi 3 will interface with sensors using GPIO pins
- PCB will be width of Pi, elongated
- PCB will use surface-mount components

Questions?