

Background

Current industry test methods for testing the ripeness of avocados include handstaging and a fruit pressure sensor (penetrometer). Hand staging is subjective to the user and therefore not quantitative. The penetrometer not only destroys the fruit, but only samples a fraction of it. The industry needs a quantitative, non-destructive, repeatable, reliable, and efficient method of testing the ripeness of avocados. The Ripe-O-meter is our solution.

Design Specifications

- Reduce Operator Variability
 - ◆ The Ripe-O-Meter has a simple procedure for consistent results
- Increase Throughput
 - ◆ Average of <5s per avocado
- Compensate for Irregularities
 - ◆ Distributed force on bulbous end rather than at a point
- Easily Transportable
 - ◆ Lightweight and Portable, weighs 10 lbs and fits in 1 ft³

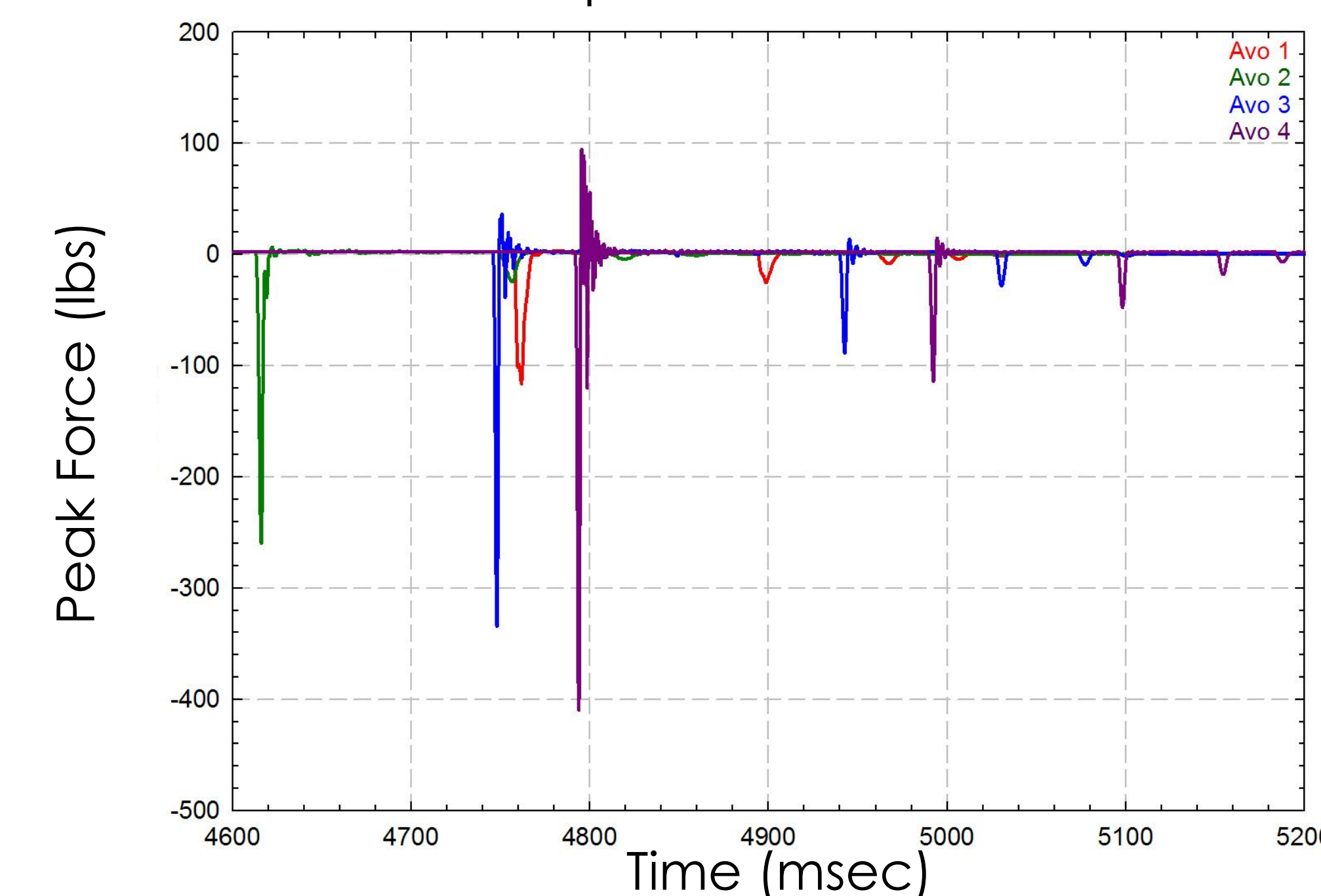
CAPEELSTONE Ripe-O-Meter



The Ripe-O-Meter utilizes the difference in peak force between dropped avocados to determine their stage. Since firmer avocados exert a larger peak force, the stages between avocados are easily discernible.

The Ripeness Indicator

Avocado Drop Test: Peak Force vs. Time



Justifying the impact response:

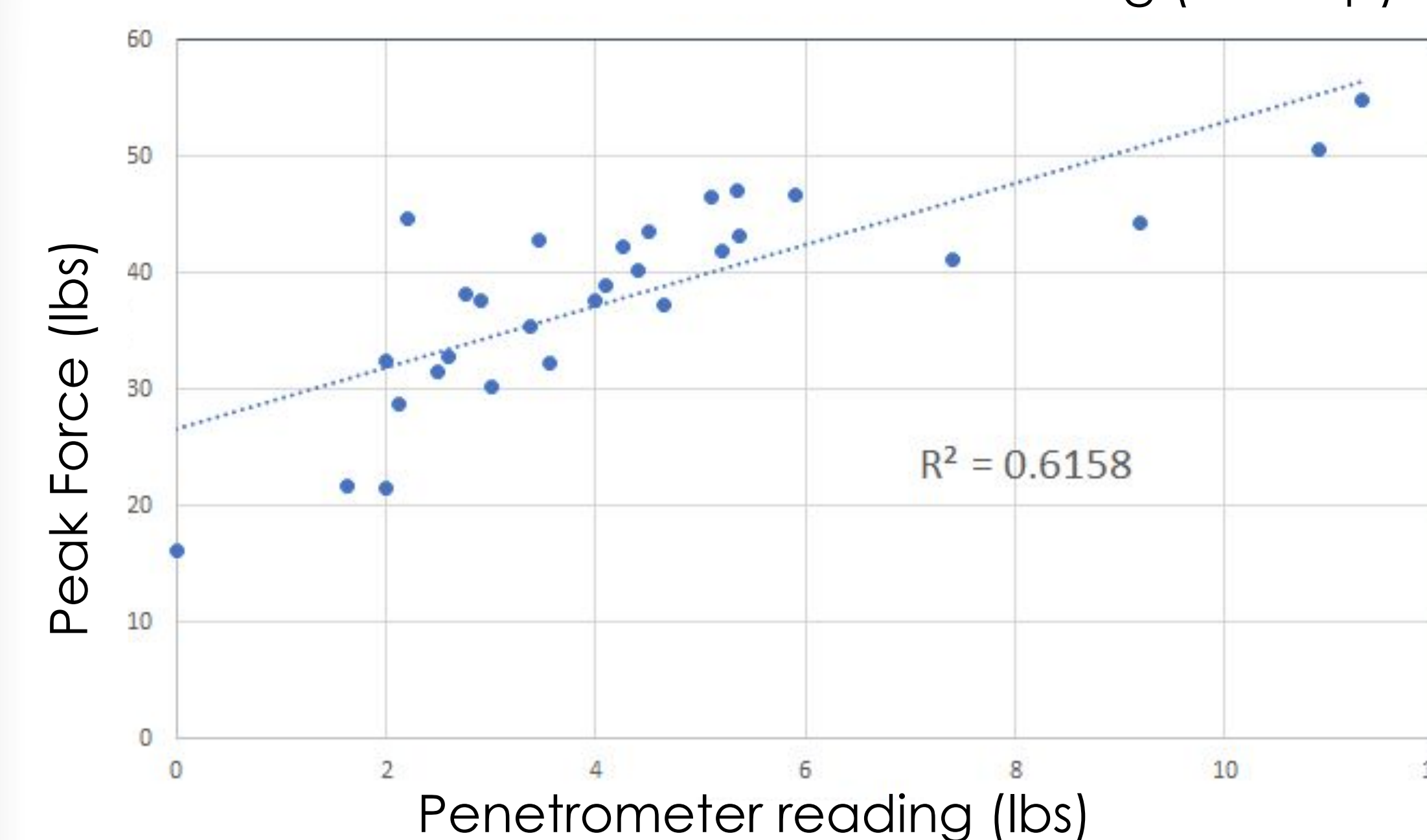
Avo 1 → Softest avocado

Avo 4 → Firmest avocado

It's clear that Avo 4 delivers the highest peak force to the load cell, while the softest avocado delivers the least.

The Correlation

Peak Force vs. Penetrometer Reading (3" drop)

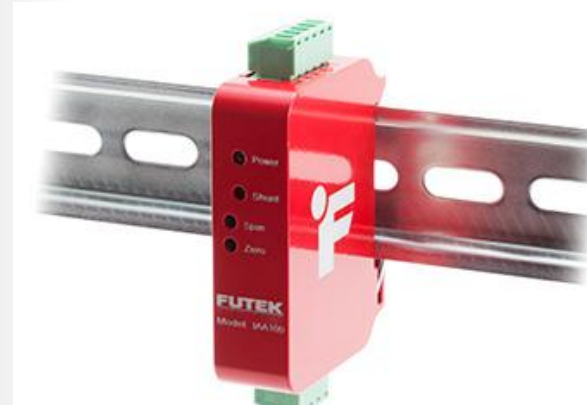


- Avocados dropped at 3 inches had optimal results
 - ◆ Peak force linearly correlates to penetrometer reading
 - ◆ Least amount of variance compared to 4", 5"
 - ◆ Low height reduces the chance of bruising

Hardware / Key Components



- Futek LCF300**
Universal Pancake Load Cell
- 100 lb load capacity
 - 150% load protection

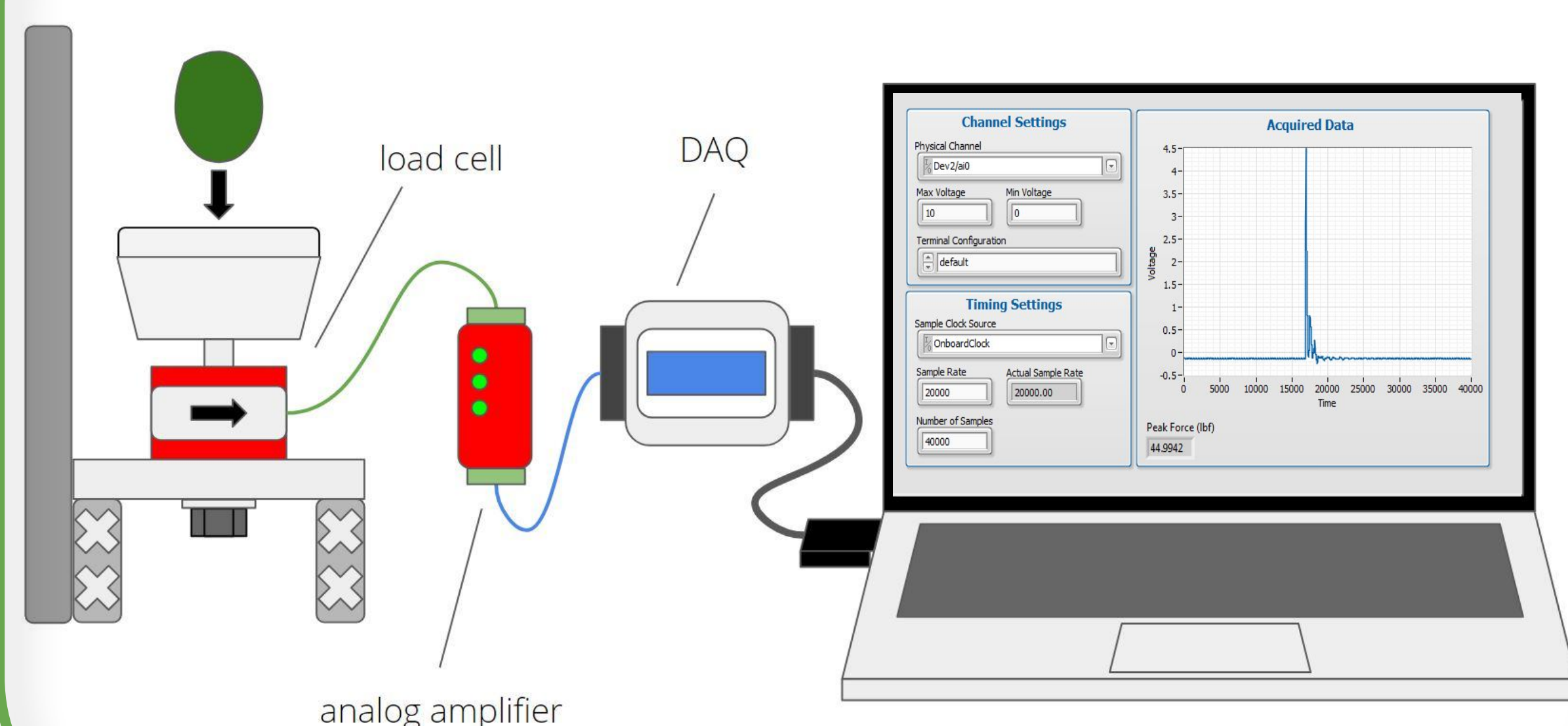


- FUTEK IAA100**
Analog Amplifier
- 0 - 10V Output
 - 25kS/s Sample Rate



- NI USB-6001**
Data Acquisition Device
- 14 bits-analog resolution
 - 20kS/s single channel sample speed

System Operation flowchart



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