

# Team 11

## (Experimental Results)

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### Activity Report

## 1 RESEARCH QUESTION

The primary goal to improve our uniaxial tensiometer system is to increase system accuracy by adding a stepper motor to obtain an accurate distance. To demonstrate the accuracy of our system, we tested our system on two different types of material (latex and nitrile) and compared the values of Young's modulus and ultimate tensile strength computed from the stress-strain curve to known values for these materials.

## 2 EXPERIMENTAL RESULTS

- 1) Stress-strain curve for latex glove (See Figure 1)
- 2) Stress-strain curve for nitrile glove (See Figure 2).
- 3) Table summarizing key metrics (Young's Modulus and Ultimate Tensile Strength) derived from stress-strain curves compared to known values from the original research paper (See Table 1).

## 3 DATA ANALYSIS

Our Ultimate Tensile Strength measurements were a big improvement over the base system.

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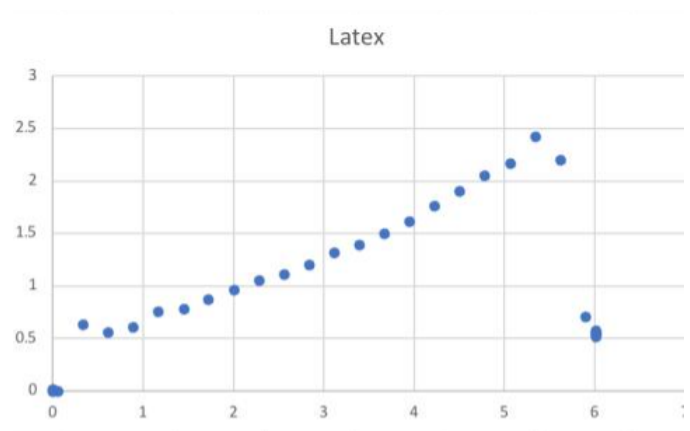


Figure 1. Stress-strain curve derived from our system for Latex glove sample

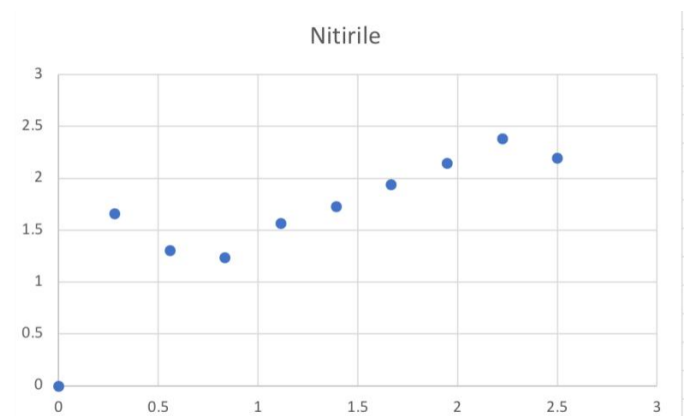


Figure 2. Stress-strain curve derived from our system for nitrile glove sample

Metric	Sample	# Trials	Our System	Known Value	Error (Percent)
Young's Modulus	Latex Glove	1	1.8917 MPa	$740 \pm 10$ kPa	155
..	Nitrile Glove	1	5.92	$2.4 \pm 0.2$ MPa	146.66
Ultimate Tensile Strength	Latex Glove	1	2.422	$3.3 \pm 0.1$ MPa	24
..	Nitrile Glove	1	2.38	$4.4 \pm 0.1$ MPa	45.9

Table 1  
Summary of experimental results from Trial 1

One explanation for higher inaccuracy of the Young's Modulus compared to our Ultimate Tensile Strength results is the lack of linear data points in the beginning of both curves, which is what we used to calculate.