

The background is a dark navy blue. It is decorated with several large, overlapping, semi-transparent geometric shapes in various colors: bright green, cyan, magenta, orange, and red. These shapes are arranged in a way that creates a sense of depth and movement, with some appearing to be layered on top of others.

Tensile Strength Tester

Team 5 — Point Break

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Overview

- › Added touch screen interface for ease of use
 - › Upgraded clamps to G-clamps
 - › Upgraded 5kg load cell to 20kg for extra durability
 - › Removed drawer sliders due to excess friction
 - › Replaced pulling rope with vinyl-wrapped steel cable
 - › Added a pulley for more uniform force application
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- › Emphasis on stressing the material instead of the user

Data Collection Procedure

1

Attach material between clamps

The included G-clamps make attaching the sample quick and easy

2

Press "start" on touch screen

Other options can be used to calibrate the attached scale or export testing data

3

Follow system instructions

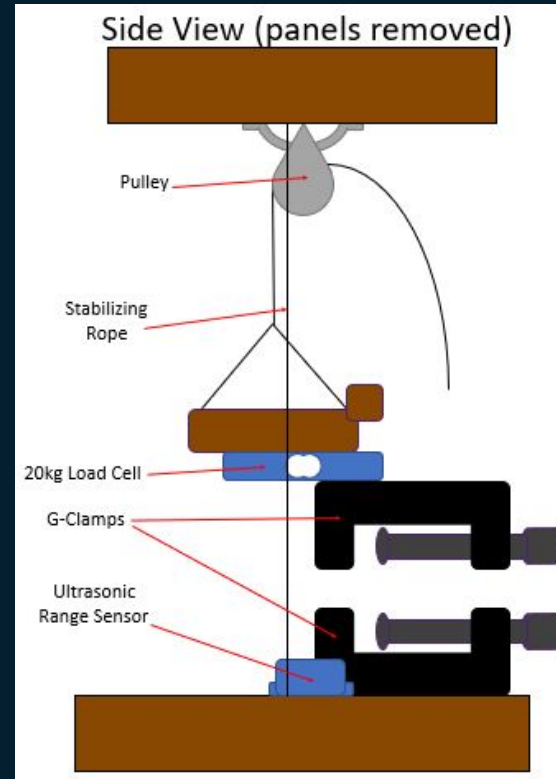
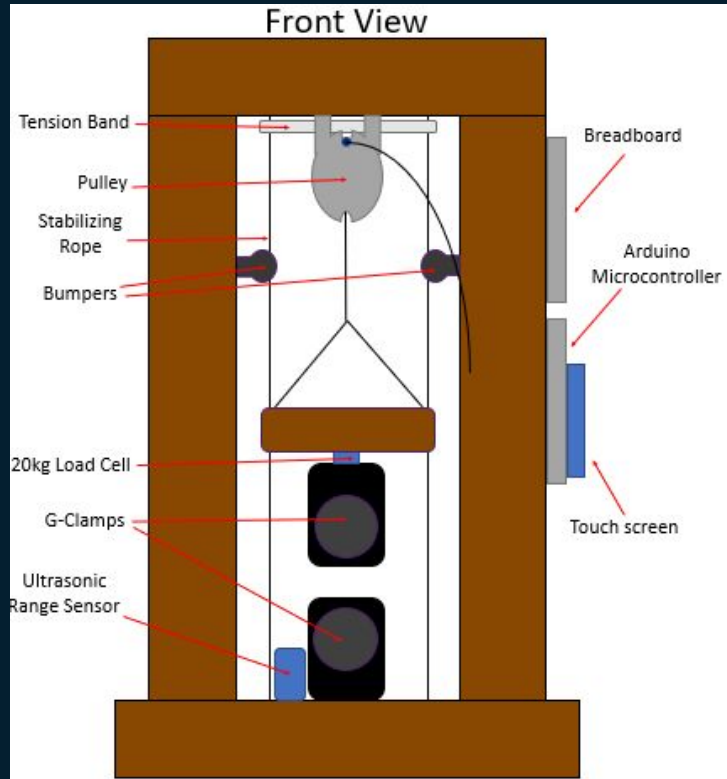
Begin pulling sample when the touch screen indicates

Touch Screen User Interface

<div>Start</div> <div>Calibrate</div> <div>Export</div> <div>Reset</div>	<div>Current Weight:</div> <div>1.450 kg</div> <div><div>+</div><div>-</div></div> <div>Done</div> <div>Cancel</div>	<div>Exported successfully!</div> <div>Please remove the SD card.</div> <div>Touch anywhere to terminate program...</div>
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- › Creates an easily-readable interface to allow the user to use the system without requiring an Arduino installation

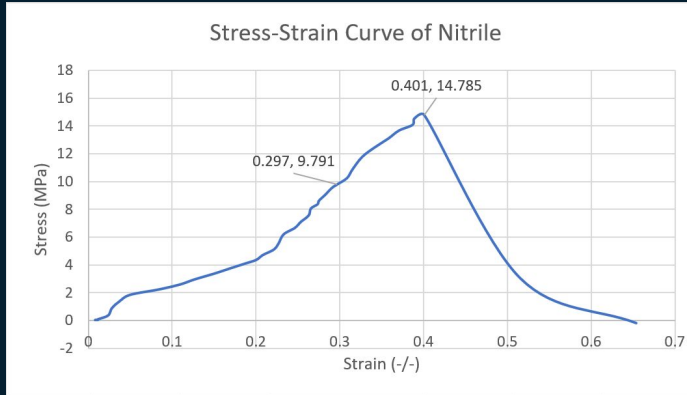
Physical Design Model



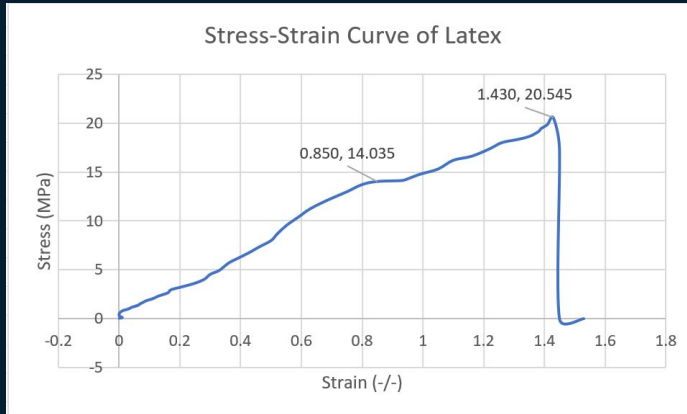
System Data

		Our System	Known Value	Error
Ultimate Tensile Strength	Latex	20.5 ± 0.1 MPa	18 - 36 MPa, avg 20 MPa	2.5%
	Nitrile	14.8 ± 0.1 MPa	14 - 30 MPa, avg 16 MPa	7.5%
Young's Modulus	Latex	1.35 ± 0.2 MPa	1.2 ± 0.1 MPa	12.5%
	Nitrile	2.13 ± 0.2 MPa	2.4 ± 0.2 MPa	11.25%

Stress-Strain Curves



Nitrile



Latex

Individual Contributions

Brii

- › Software implementation
- › UI design

Alex

- › Circuit design
- › Hardware implementation

Omar

- › Clamp design
- › Calibrated load cell
- › Assisted in hardware implementation

Project Budget

- | | |
|---|--------|
| > Arduino Mega 2560 | > \$40 |
| > 2.8" Touch Screen w/
SD card mount | > \$16 |
| > microSD Card +
Converter | > \$14 |
| > Load Cell 20kg | > \$4 |
| > 50lb Fishing Line | > \$13 |
| > Various Hardware | |

TOTAL \$87

The background is a dark navy blue. On the left side, there is a vertical rectangular area with a blue gradient, containing white line art of interlocking gears and hexagons. On the right side, there are several overlapping, semi-transparent geometric shapes in shades of purple, blue, green, and orange, arranged in a dynamic, angular pattern.

THANKS!

Any questions?