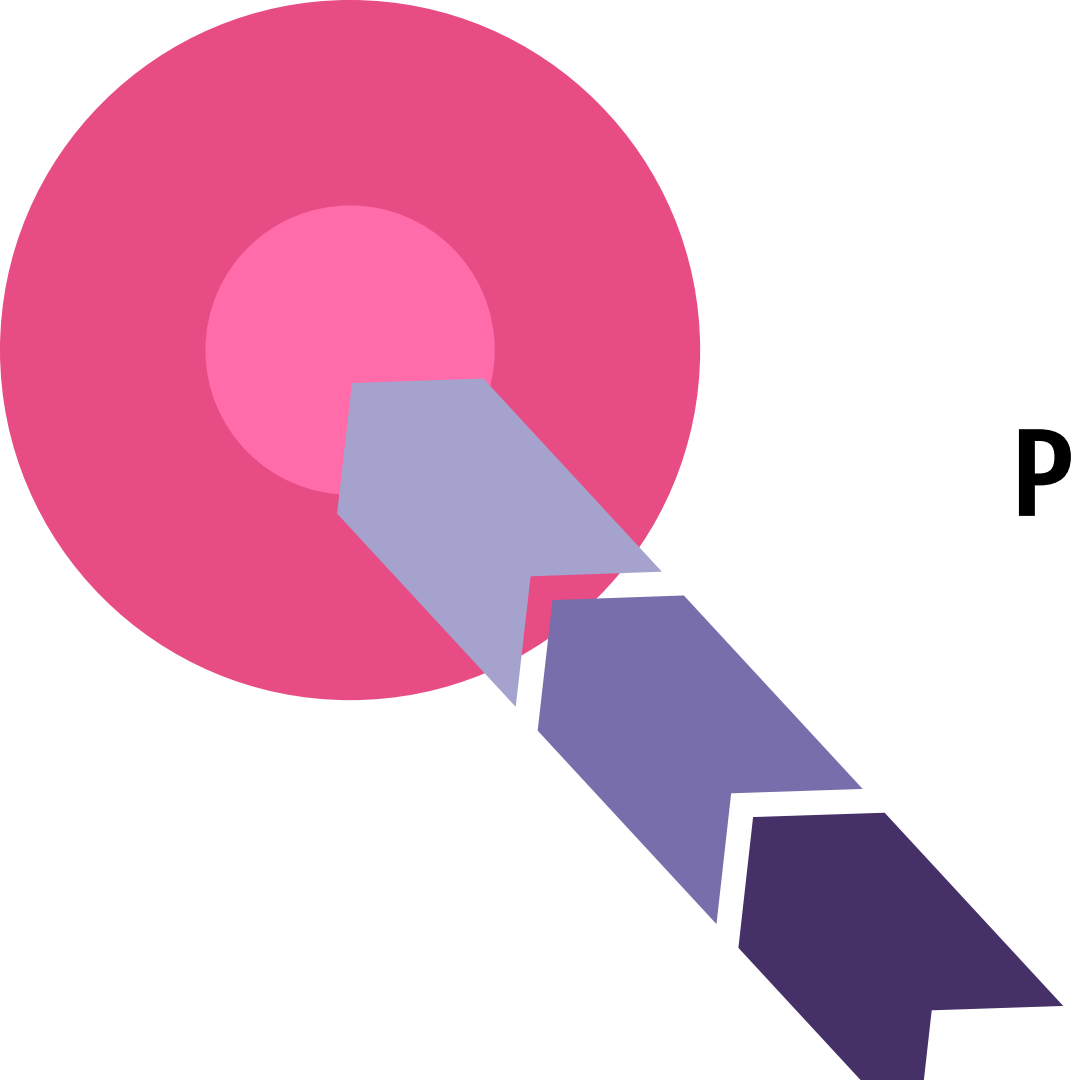
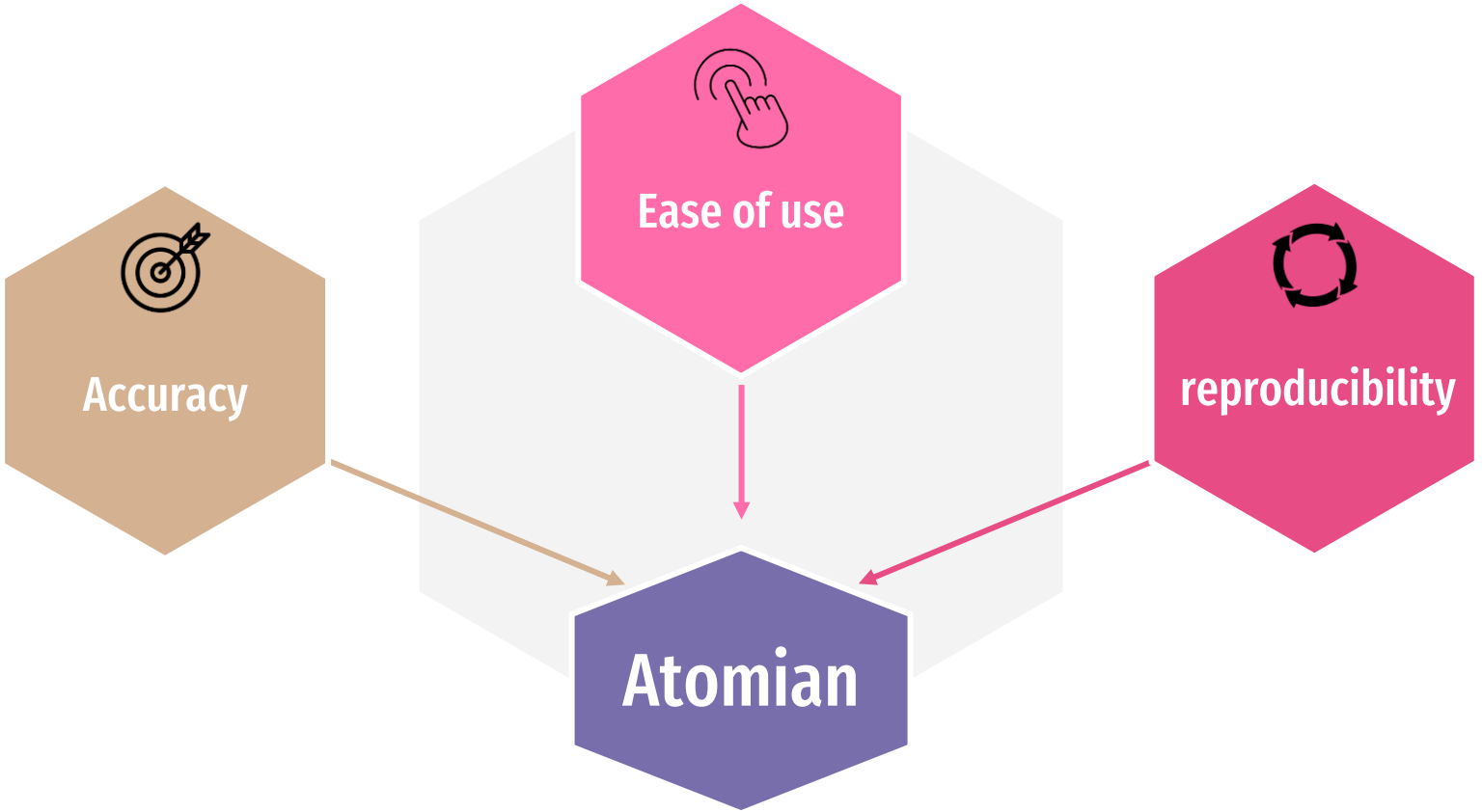


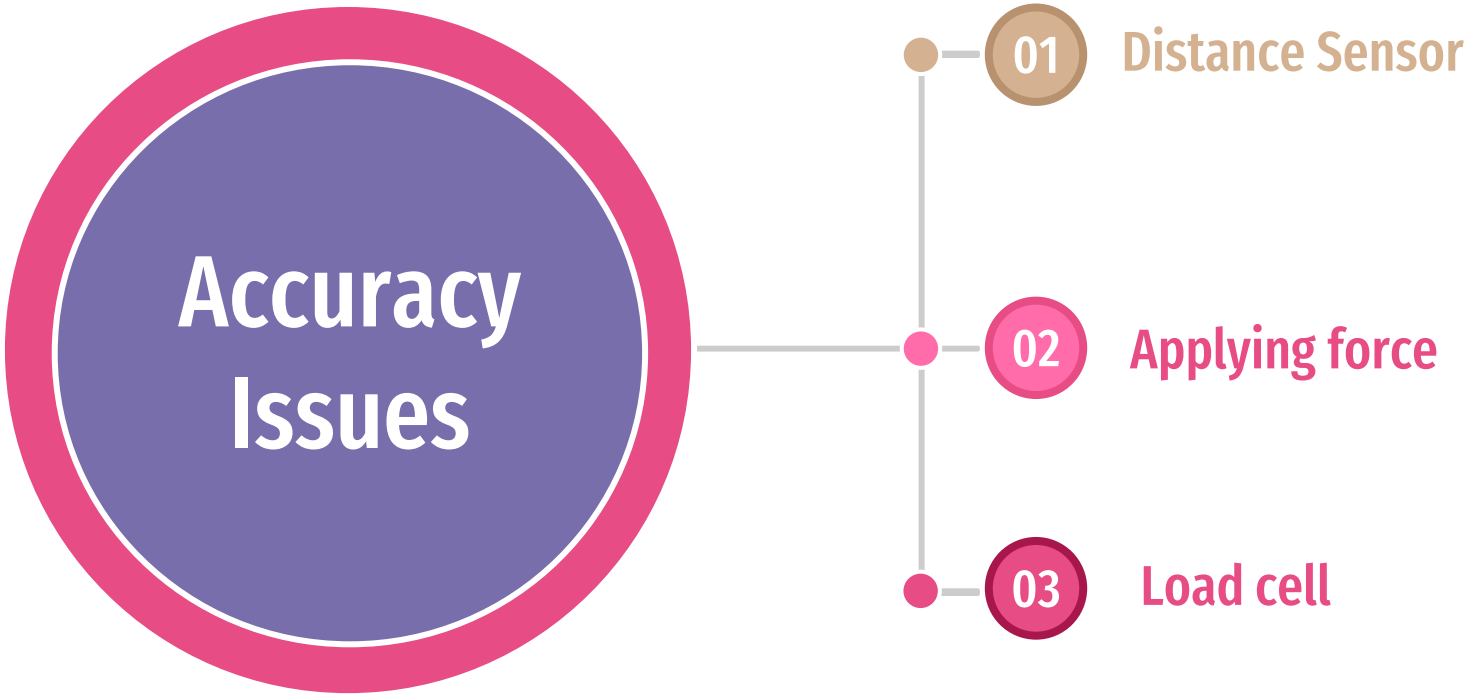
Project Goals

Team 3

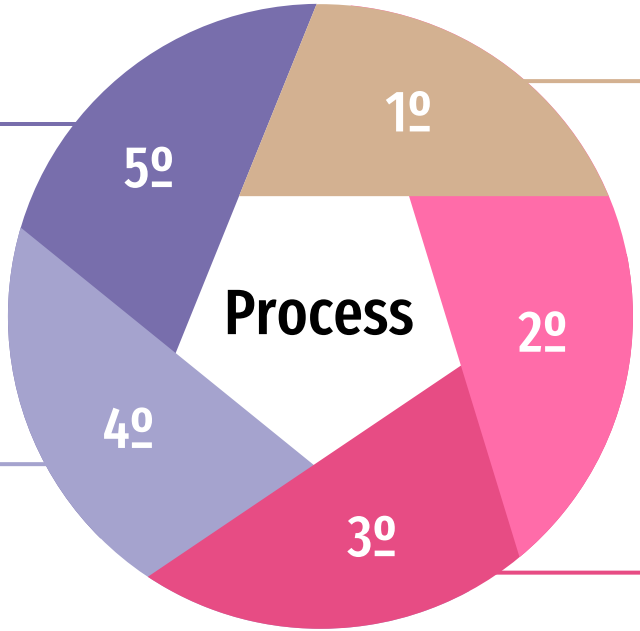
Project Goals



Identifying The Old System Issues



Old system Data collection proccess



Arduino IDE

The user must have the IDE installed in order to access the data.

Calibration

The Calibration factor had to be hard coded for every load cell

Start up

The user had to be prepared to start the experiment once the code was imported

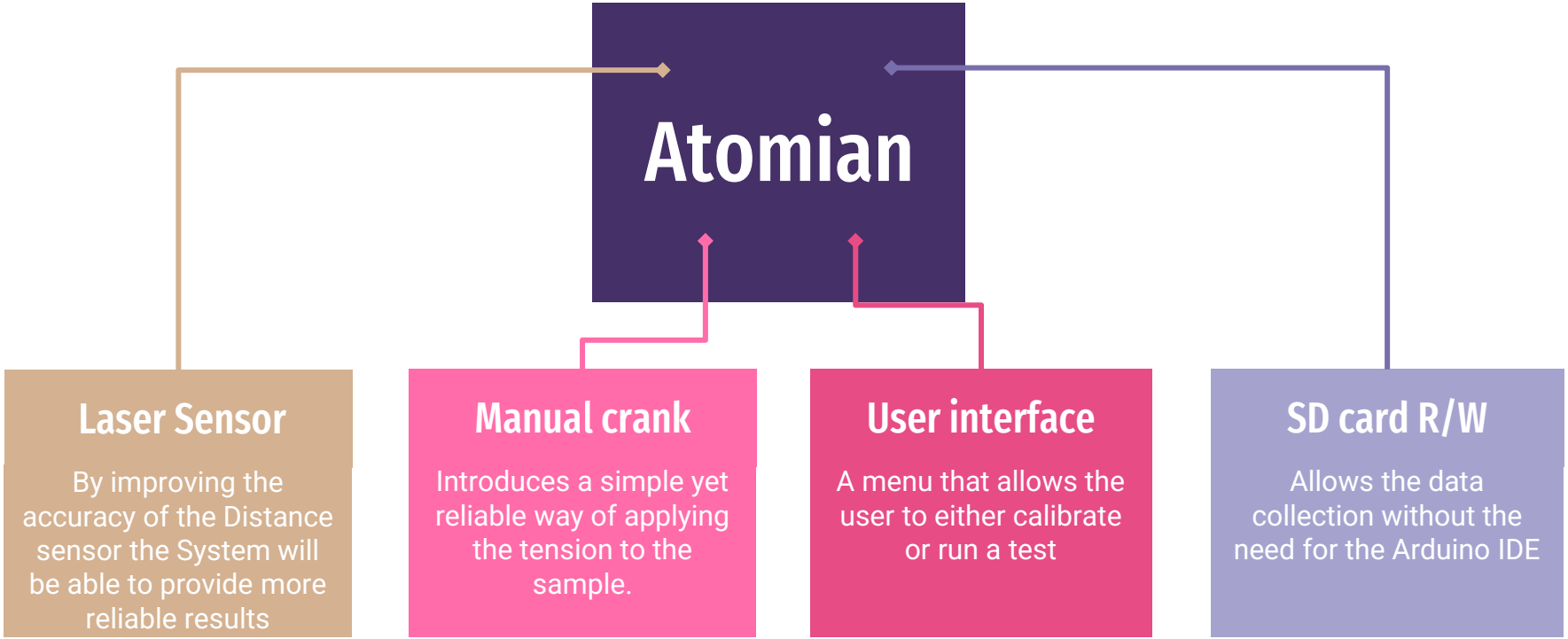
Spreedsheet tool

The user had to download a new tool for the Arduino IDE in order to beable to import the data into csv file

Data anlysis

The user had to manually handle the data analysis through excel and forming the Distance-weight data to Stress-Strain

Proposed Solution



Project Software

Software Features

User Friendly UI

The interface allows for an easy navigation

01

Live-plotting

Displays the curve using the data being collected to prove some form of indication to the results.

02

Quick Calibration

A 3-step calibration process that allows calibration through any weight

03

04

Simple Data Exporting

The data will be saved in a .txt file that can be opened as .csv file

05

Stress-Strain curve

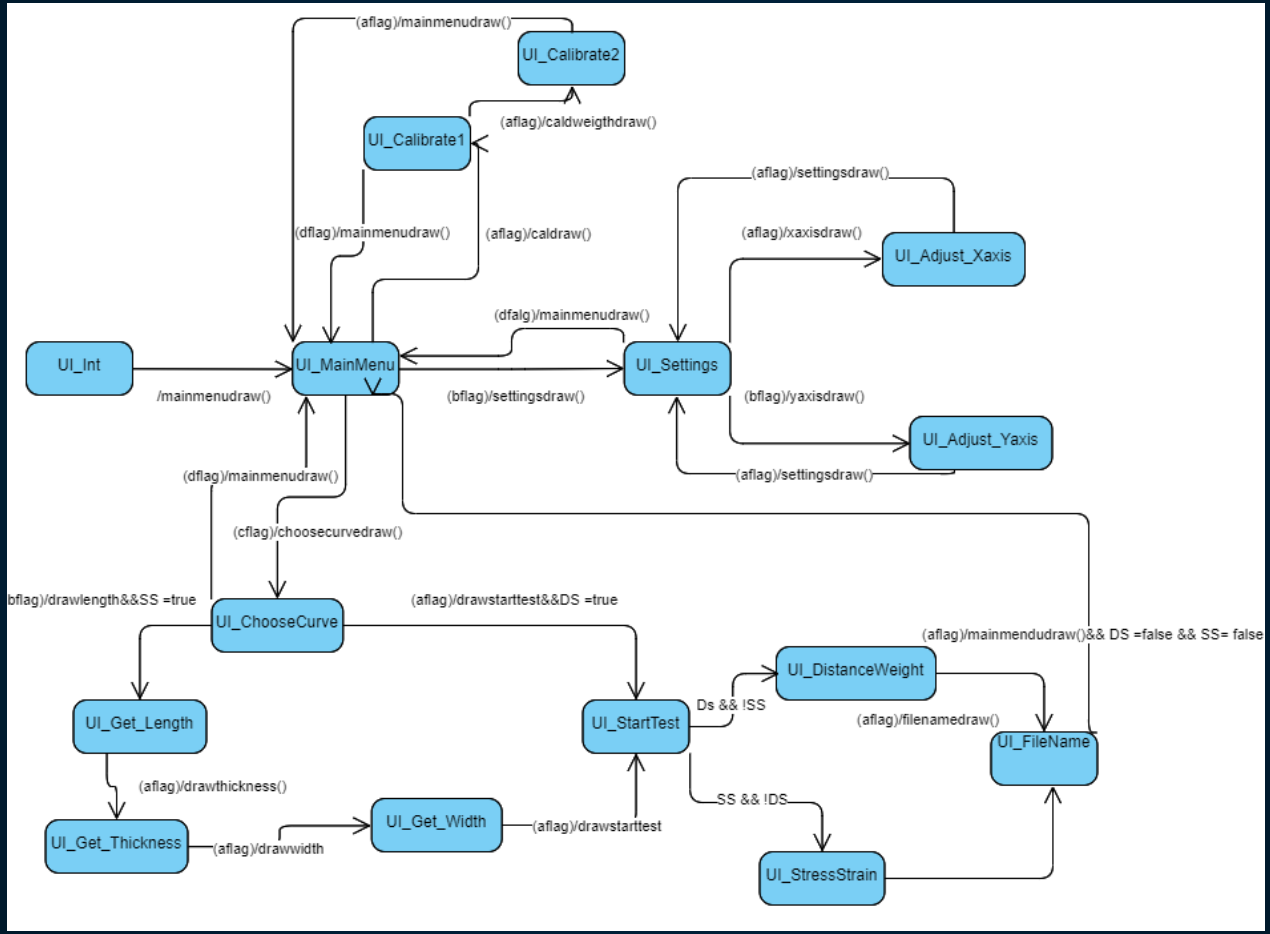
Utilizing the Software ability to take inputs allows for a quick generation for the values

06

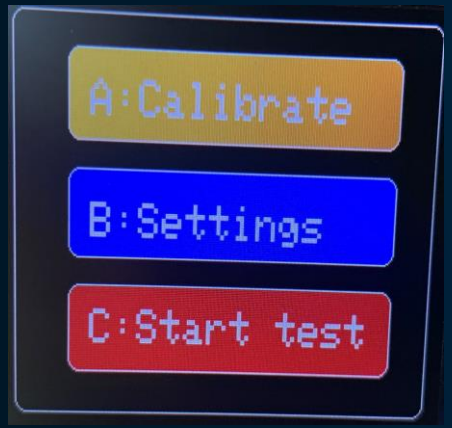
Easy to improve

The software allows for more improvements and extension for some features.

State machine

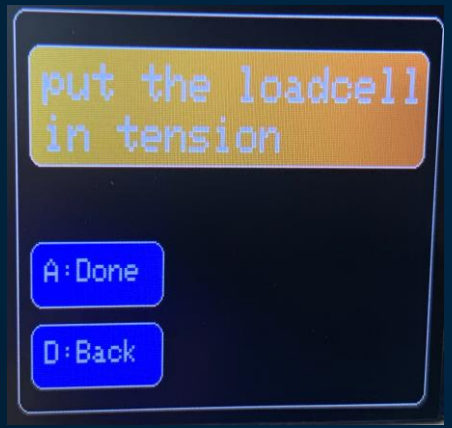


Calibration process



Main menu

Select the calibration option by pressing A



Tare menu

Following the instruction simply pull the Reel And then press A

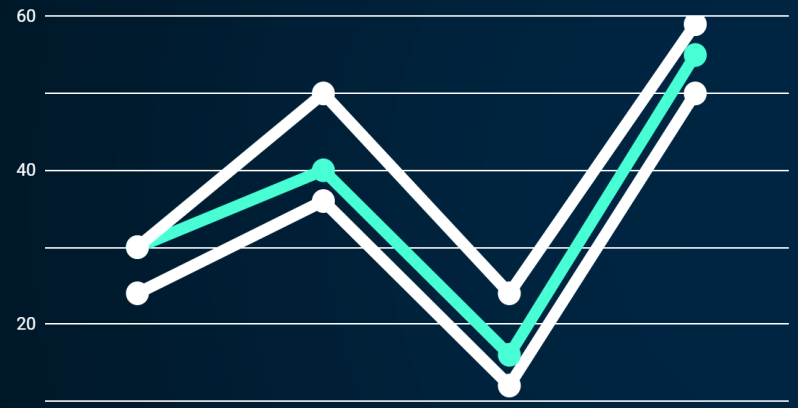
Calibrate

Put the weight and then enter the value in grams then press A

Done!

The value is now saved

Live plot



Drawing The background

The plot function start by drawing the background using pre-set Axis values.

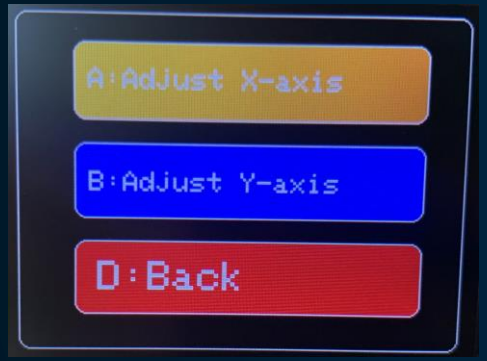
Drawing The points

- The function utilizes transformations to compare the input value to reference axis value.
- Then it compare it to the previous value in order to figure out the position of the dot
- The final step is drawing the line between this point and the previous one.

Usable on any TFT screen

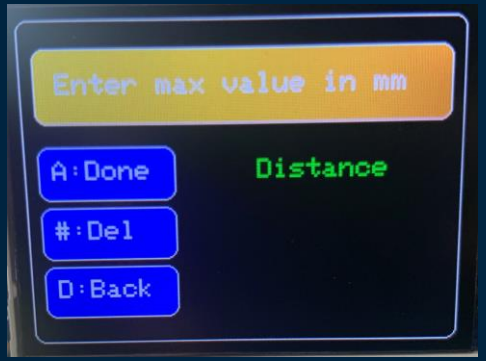
The function can be used on any screen if it uses the Adafruit graphics library

Settings menu



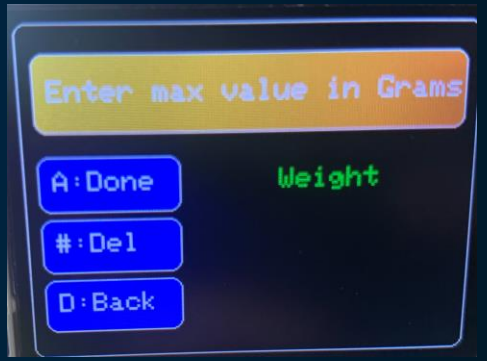
Settings menu

Select which Axis you would like to change



X-axis

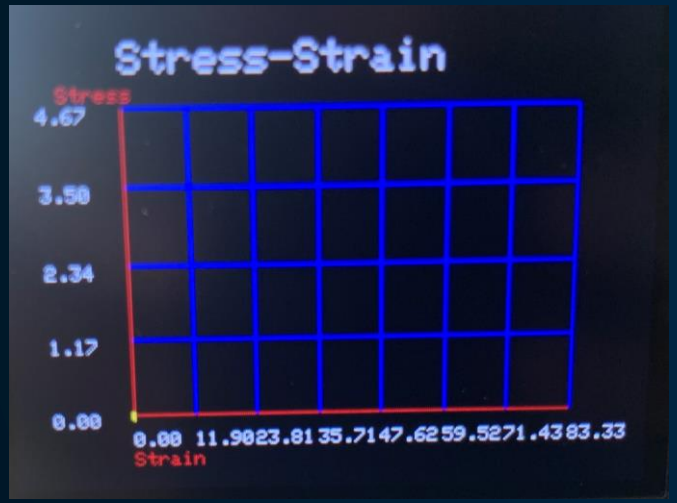
Enter the expected max value for the Distance

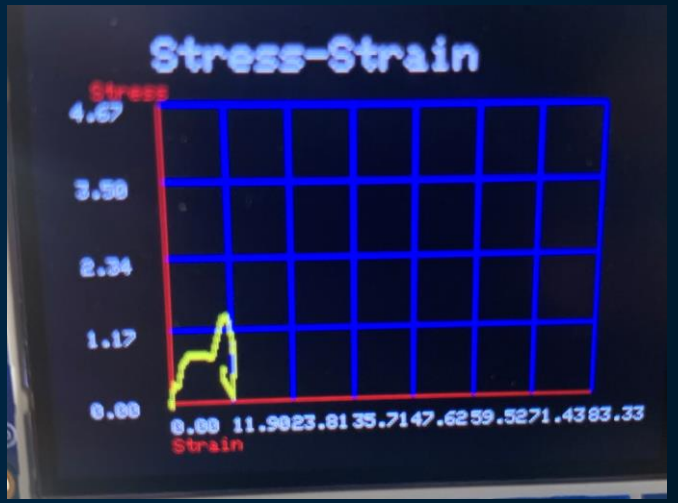


Y-axis

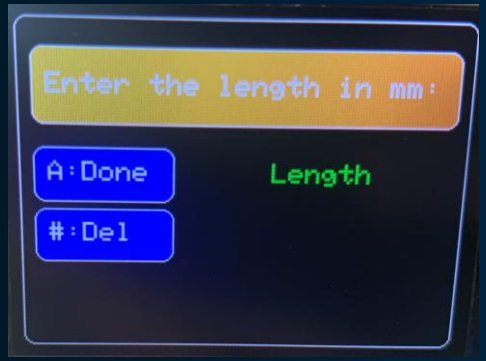
Enter the expected max value for the weight

Live plot example



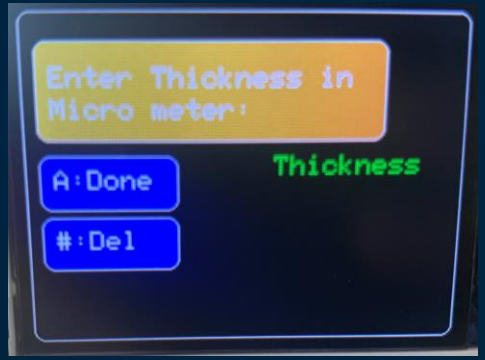


Stress-Strain menus



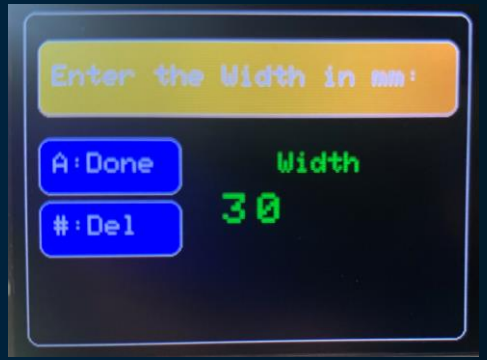
Length menu

Enter the length of the sample in mm



Thickness menu

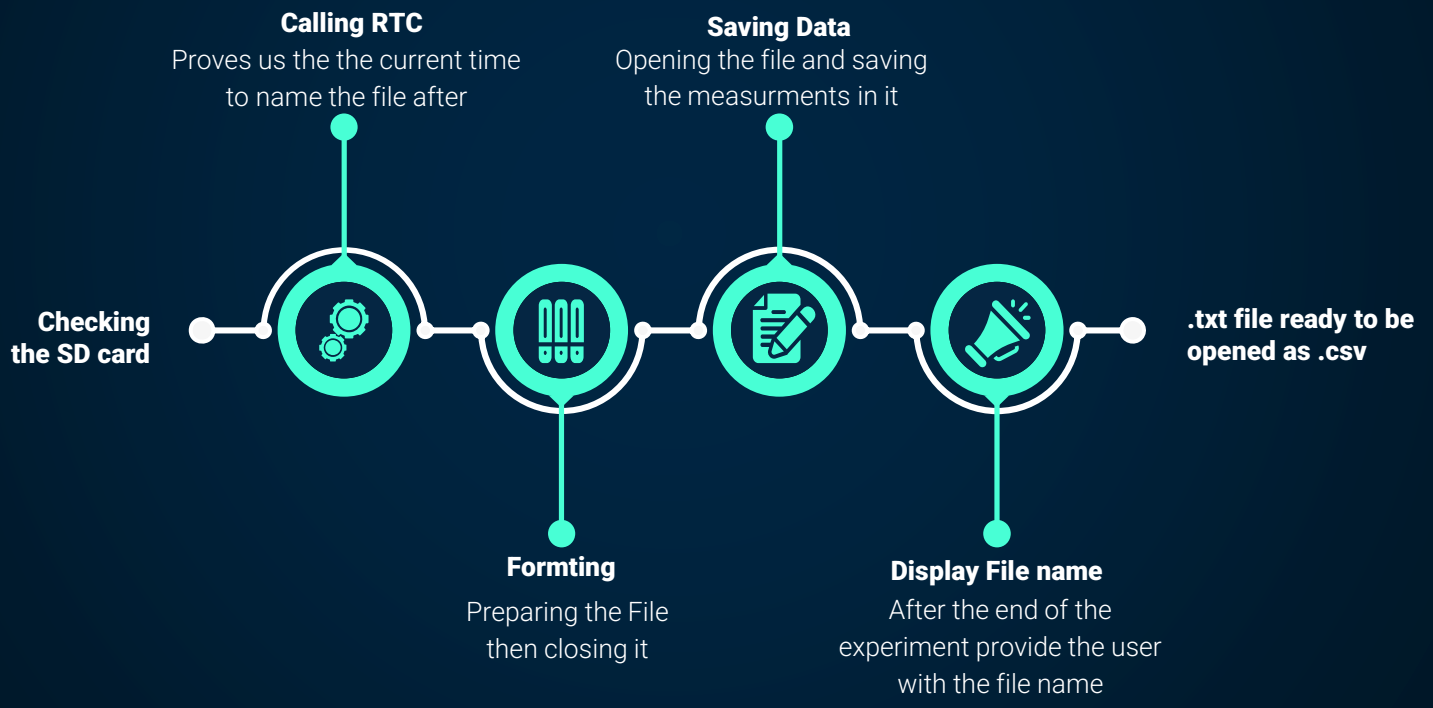
Enter the Thickness of the sample in micrometer

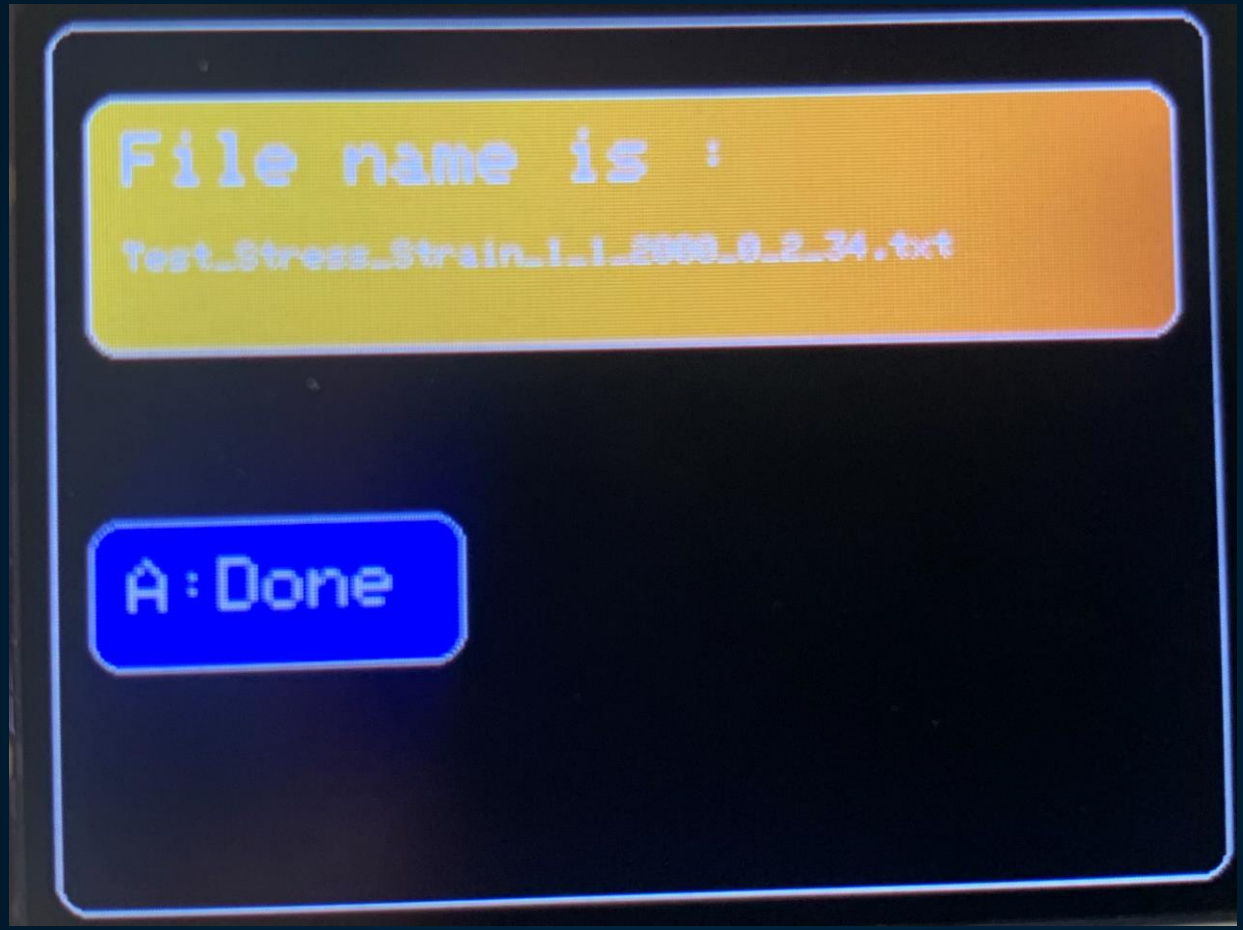


Width menu

Enter the width of the sample in mm

Saving Data with SD card




File name is :
Test_Stress_Strain_1_1_2000_0_2_34.txt
A:Done

Why A Lazer Range Sensor instead of other possiblitys?

01

Manual

The range sensor has less of a chance to have a technological error

02

Accuracy

The range sensor has a smaller deviation from the actual measured distance

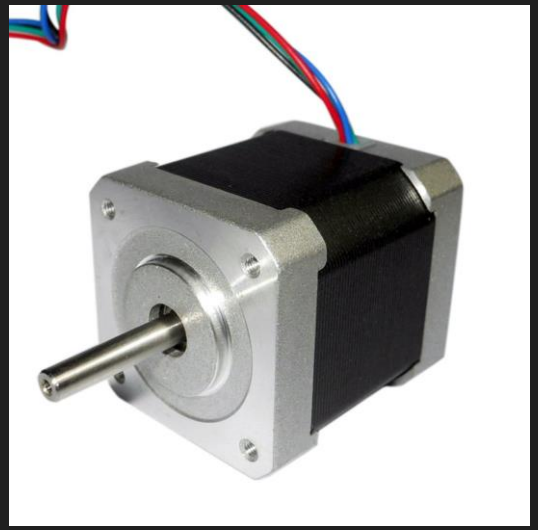
03

Instilation

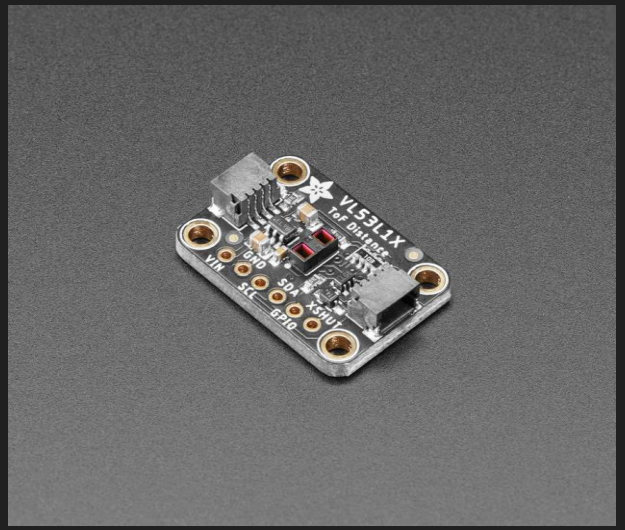
Less coding required compared to other options

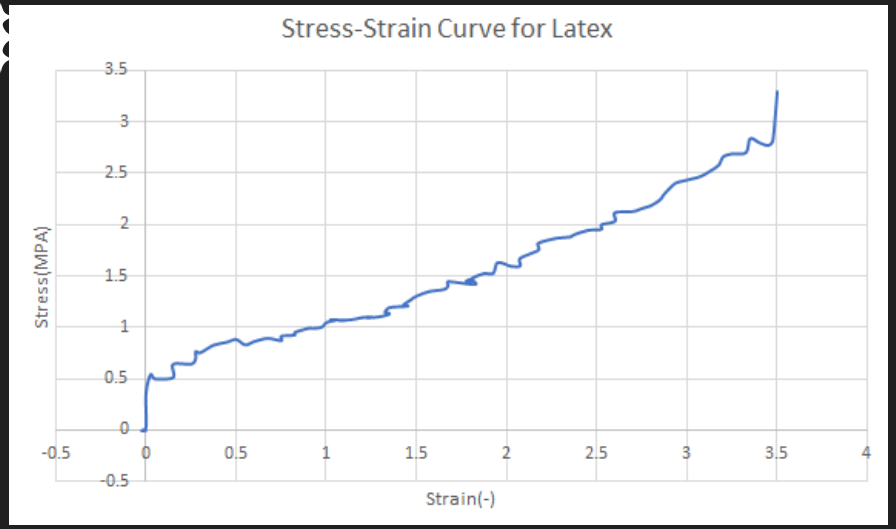
Why Not A Motor

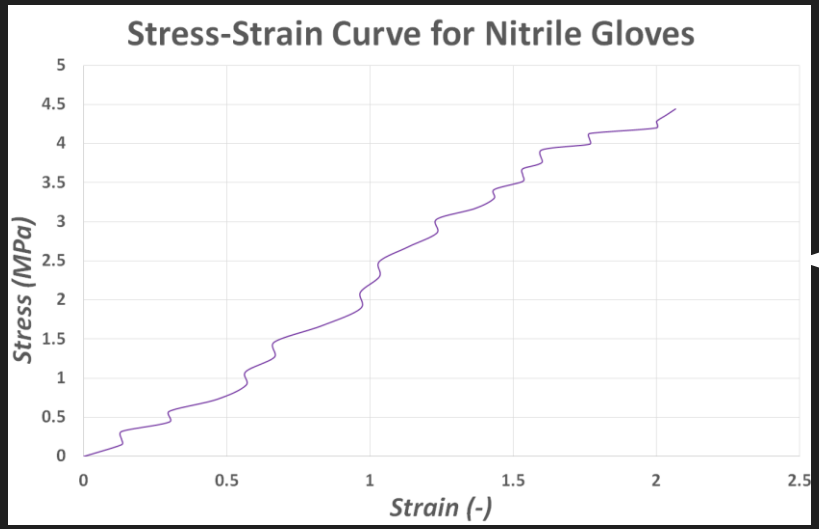
Stepper Motor vs Lazer Sensor



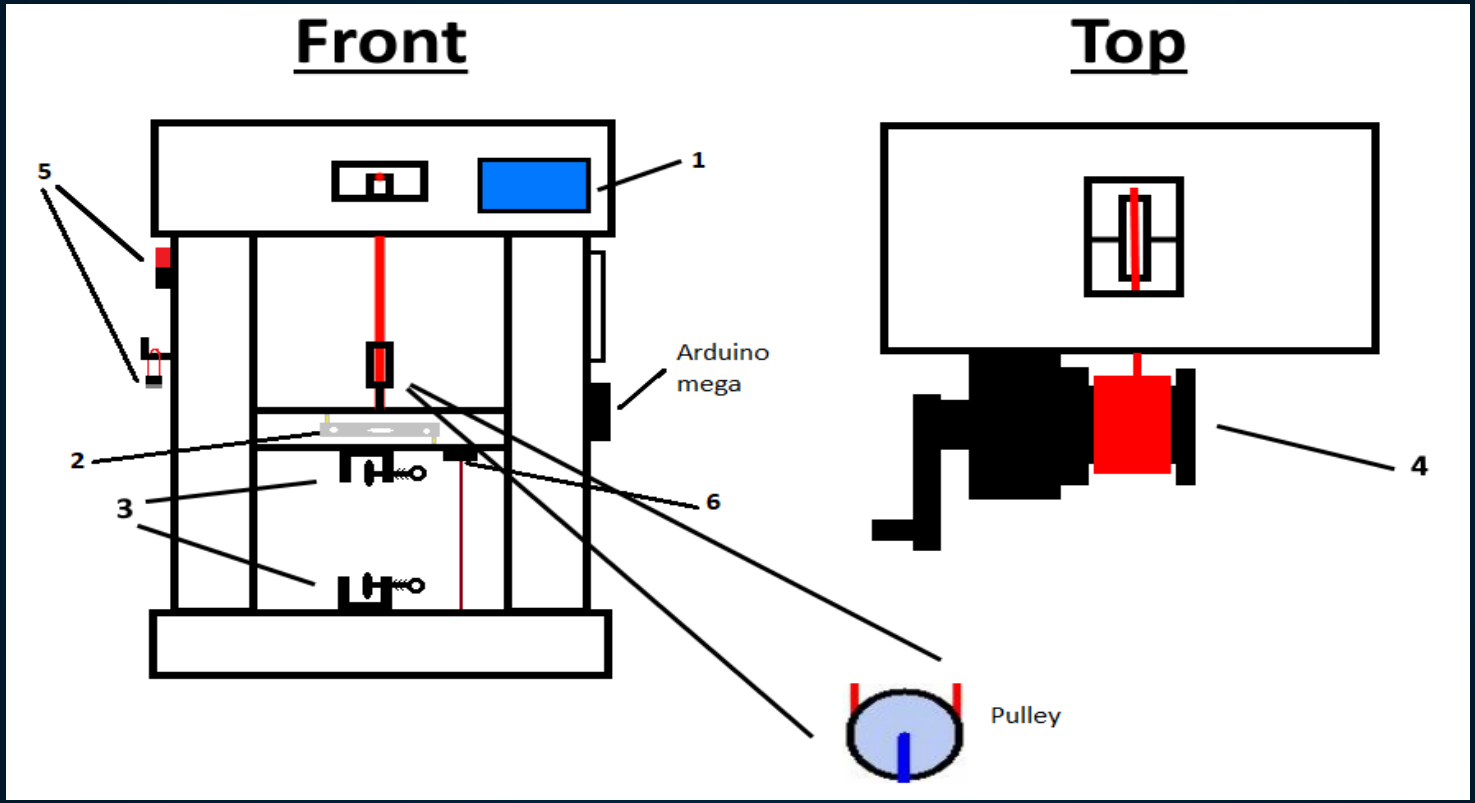
VS




Stress-Strain Curve for Latex
Stress(MPA)
Strain(-)
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
4


Stress-Strain Curve for Nitrile Gloves
Stress (MPa)
Strain (-)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
0.5
1
1.5
2
2.5

Item	Part #	Cost
Time Of Flight Sensor	VL53L1X	$15
wire for distance sensor	STEMMA QT header	$1
Load Cell 20kg & Amplifier	Hx711	$9.5
Data logger	HiLetgoSD card reader	$7
Display screen	2.2" TFT Screen	$25
Card Reader/Writer	USB/MicroSD adaptor	$6
Fishing reel	Zebco 606	$21
MicroSD	Verbatim 16GB	$5
micro-controller	Arduino mega	$24
Inputpad	4x4 Keypad	$13
RTC module	ds1307	$4
TOTAL		**$152**


Front
Top
1
2
3
4
5
6
Arduino
mega
Pulley

Crank and Pulley System

- 3 pulley mechanical advantage
  - Supports 3x the applied load
  - Allows for loads greater than 4kg to be applied (up to 6kg)
- Failsafe to prevent damaging load cell
- Crank provides greater control and consistency when taking measurements
- Entire system costs less than $30

Upgraded Clamps

- Much greater clamping strength than original design
  - Prevents slipping when using thin samples
- Heavy duty to grip and hold larger samples
- Much quicker and easier to secure samples than original design

Contribution

Q&A