Interim Report

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Interim Report

For this group project, we all decided to work on the pressure transducer calibration. The purpose of this project is to apply all our computational thinking and coding skills that we have learned throughout this semester! The end goal for this project is for users to be able to input a voltage and recieve an estimated pressure and uncertainty for that pressure as well as the estimated analogue reading, and to allow users to add observations to our dataset and update our model accordingly.

**What is a pressure transducer calibration?**

In a pressure transducer calibration, it involves deadweight testers (DWT) which is the “primary standard for pressure measurement” which consists of a fluid (oil) that transmits pressure, a weight, and piston to all apply pressure and has a connection port to calibrate the gauge (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013). The basic principle to calibrate a pressure gauge using DWT is by loading the weight masses, which is the force, are loaded on the piston area, which rises freely within its cylinder (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013). The weights balance “the upward force created by the pressure within the system” which entails the formula, pressure is equal to force divided by the area (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013). The units can be measured in PSI (pounds per square inch) or in newtons per square meter (Pa) (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

**How Does it Work?**

*Step #1:* Connect the pressure gauge to the test port on the DWT. Ensure that the gauge reads at zero, if not, correct the scale before proceeding with the calibration (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

*Step #2:* Select the weight you want to test and place it on the vertical piston (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

*Step #3:* There is a handle that you can turn so that the weight and piston are supported freely by the oil (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

*Step #4:* spin the vertical piston and make sure that it is floating freely (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

*Step #5:* Before writing down any measurements, wait for a few seconds so that the system is stabilized, then, write down the reading (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

*Step #6:* Repeat steps 2 through 5 using different weights until the pressure gauge reaches it’s maximum value, then decrease the weights until the pressure gauge reaches zero (“How to Calibrate a Pressure Gauge with a Dead Weight Tester,” 2013).

**Looking at our Given Dataset**

Our pressure sensor data consists of four columns: “test\_id”, “pt\_psia”, “pa\_psia”, and “pd\_volts,” and provide us with a total of 108 data entries. With the given “test\_id” column, it consists of nine different ID’s, which implies replicated tests were performed. This is important because the user is testing how the varied true applied pressures affects the voltages read from the transducer, and how the analog pressure is read from the gauge. The true applied pressure and analog pressure are measured in pound-force per square inch, and the transducer measures the electrical signal in volts. We will utilize our dataset to create a model, explore the correlation and uncertainty of estimating true pressure as well as analogue pressure based off of the voltage.

**Each Members’ Responsibilities**

**Harper Hill**

* Complete the user interface to allow users to enter voltages and return an estimated pressure, this includes adding the observations to the current database that we have available
* Sign the effort sheet
* Provide feedback on the other group members coding
* Give a rough idea and plan for the demonstration video
* Submit all of the necessary files for the final report on assigned due date

**Caden McGee**

* Complete and code one portion of project; this involves coding one linear regression model using one variable to predict our outcome variable
* Sign the effort sheet
* Provide feedback on the other group members coding and user interface
* Give a rough idea and plan for the demonstration video

**Abigail Torres**

* Complete and submit all three effort sheets on their assigned due dates
* Complete and submit the interim report on its assigned due date
* Complete and code one portion of project; this involves coding one linear regression model using one variable to predict our outcome variable
* Sign the effort sheet
* Provide feedback on the other group members coding and user interface

References

*How to calibrate a pressure gauge with a dead weight tester*. (2013, August). Retrieved April 25, 2021, from https://www.instrumentationtoolbox.com/2013/08/

how-to-calibrate-pressure-gauge-with.html