PT100 Project Report

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***Abstract*—The project involves mapping voltage readings from the voltage divider circuit made with the PT100 RTD sensor to temperatures. The data is collected using Arduino Uno, connected using platformio. Using the least square method, regression is applied to collected data to get the relation between readings and temperature.**

1 Training Data

The circuit used to obtain data is shown in Figure0.

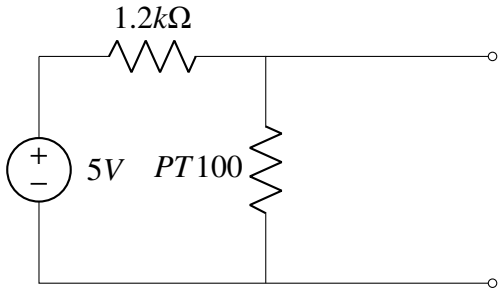

Fig. 0: Circuit Used

The data used for training the model is shown in table 0

Temperature	Reading
30	86
34	88
40	91
46	92
56	95
60	97
70	99
80	100
94	104
98	105

TABLE 0: Training Data

2 Model

The Voltage (and hence,its analog reading by Arduino) of PT100 is related to the temperature by the relation:

$$V = A + BT \tag{2.0.1}$$

for n such data points,

$$\mathbf{V} = \mathbf{Xn} \tag{2.0.2}$$

where,

$$\mathbf{V} = \begin{pmatrix} V_1 \\ V_2 \\ \vdots \\ V_n \end{pmatrix} \tag{2.0.3}$$

$$\mathbf{X} = \begin{pmatrix} 1 & T_1 \\ 1 & T_2 \\ & \vdots \\ 1 & T_n \end{pmatrix} \tag{2.0.4}$$

$$\mathbf{n} = \begin{pmatrix} A \\ B \end{pmatrix} \tag{2.0.5}$$

$$\tag{2.0.6}$$

3 Solution

The best-fit solution for the equation is found using function `numpy.linalg.lstsq` in python. This function gives a solution such that the squared error between estimated and training data is minimum.

Using `numpy.linalg.lstsq` in python on (2.0.2),

$$\mathbf{n} = \begin{pmatrix} 79.64814 \\ 0.26401 \end{pmatrix} \tag{3.0.1}$$

The training data and estimation are plotted in 0.

The mean squared error in training = 0.79632

4 Testing

The data used for testing is shown in Table0.

The testing data, along with estimation, is plotted in Figure0

Mean squared error in test = 0.52712

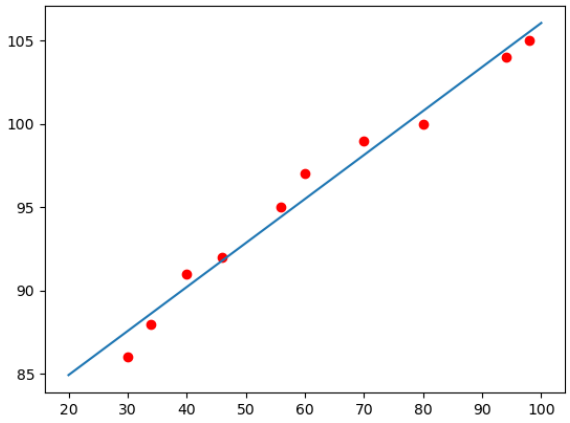

Fig. 0: Training Data and estimation

Temperature	Reading
31	87
52	94
66	98
90	103

TABLE 0: Training Data

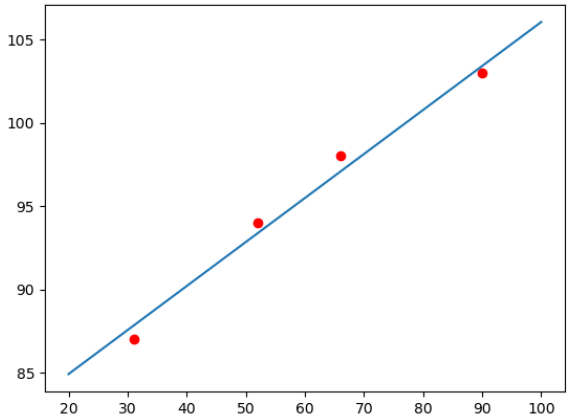

Fig. 0: Testing