

# Frobo Battery Voltage Measurement

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On the Frobo platform the battery Voltage is measured using a simple Voltage divider circuit created using a resistor of 1800 Ohm (measured to 1807 Ohm) and a variable resistor of 1000 Ohm (trimmed to 700 Ohm). In parallel with the variable resistor is a Zener 4.7V to protect the analog input from overvoltage.

Define Voltages tested using a variable power supply :

In[1]:=

```
battVolt = {10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 11.0, 11.1,
11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 12.0, 12.1, 12.2, 12.3, 12.4,
12.5, 12.6, 12.7, 12.8, 12.9, 13.0, 13.1, 13.2, 13.3, 13.4, 13.5, 13.6,
13.7, 13.8, 13.9, 14.0, 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8,
14.9, 15.0, 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 16.0};
```

The measured Voltages :

In[2]:=

```
measuredVolt = {2.794, 2.823, 2.850, 2.878, 2.905, 2.932, 2.959, 2.987, 3.013,
3.041, 3.067, 3.094, 3.120, 3.148, 3.174, 3.201, 3.227, 3.254, 3.279, 3.305,
3.330, 3.356, 3.381, 3.406, 3.430, 3.456, 3.480, 3.504, 3.528, 3.553, 3.576,
3.600, 3.623, 3.646, 3.669, 3.692, 3.714, 3.737, 3.758, 3.779, 3.800,
3.822, 3.842, 3.863, 3.883, 3.902, 3.921, 3.941, 3.959, 3.978, 3.996,
4.014, 4.031, 4.048, 4.065, 4.082, 4.097, 4.113, 4.128, 4.144, 4.159};
```

In[3]:=

```
voltData =
{ measuredVolt[[#]], battVolt[[#]] } & /@ Table[i, {i, Length[battVolt]};
p1 = ListPlot[voltData];
```

Fit the measurements using a 2 degree polynomial :

In[5]:=

```
n1m = NonlinearModelFit[voltData, a + b x + c x^2, {a, b, c}, x]
```

Out[5]=

```
FittedModel [ 8.51580946 - 1.93498898 x + 0.891967185 x^2 ]
```

In[6]:=

```
aVal = 8.516;
bVal = -1.935;
cVal = 0.8920;
```

In[9]:=

```
p2 = Plot [aVal + bVal x + cVal x^2,
{x, measuredVolt[[1]], measuredVolt[[Length[measuredVolt]]}];
```

Show the measured voltages (dots) and the fitted polynomial (line) :

In[10]:=

