



2.5V Zener reference
 TL431LP U2
 +5V
 R6 100
 C3 100nF
 +2V5
 R1 348
 R2 348
 R3 348
 Wheatstone -
 Wheatstone +
 Strain Gauge Connector
 J1
 R4 348
 R8 348
 R9 348
 GND
 Wheatstone bridge section

Output section
 Status LED
 Op-amp supply
 ON LED
 LED
 D1
 R13 348
 +5V
 Op-amp power
 GND
 U1C LM358
 4
 8
 +5V
 AMP OUT
 1
 2
 GND
 J4
 1
 2
 GND
 5V INPUT
 C1 220uF
 C5 1uF
 +5V
 Second stage out
 R12 348
 R10 348
 U1B LM358
 5
 6
 7
 GND
 R5 348
 RV1 1k
 C4 1uF
 +2V5
 R11 3k
 R14 1k
 First stage out
 R7 348
 U1A LM358
 3
 4
 1
 2
 GND
 R4 348
 R8 348
 R9 348
 Wheatstone -
 Wheatstone +
 First stage out
 R12 348
 R10 348
 U1B LM358
 5
 6
 7
 GND
 R5 348
 RV1 1k
 C4 1uF
 +2V5
 R11 3k
 R14 1k
 First stage out
 R7 348
 U1A LM358
 3
 4
 1
 2
 GND
 R4 348
 R8 348
 R9 348
 Wheatstone -
 Wheatstone +
 First stage out

First stage
 $V_{out} = V_{in} \cdot \frac{R_2}{R_1 + R_2}$
 Gain = $V_{out} / V_{in} = \frac{R_2}{R_1 + R_2}$

Second stage
 $V_{out} = -\frac{R_2}{R_1} \cdot V_{in}$
 Gain = $V_{out} / V_{in} = -\frac{R_2}{R_1}$

RV1 and R11 can be illustrated as 2 resistors in series
 Resistor 1 is R11 plus the resistance of the potentiometer between pin 3 and pin 2 (wiper)
 Resistor 2 is the resistance of the potentiometer between pin 2 (wiper) and pin 1

Curious Scientist	
Sheet:	File: StrainGaugemodule.kicad_sch
Title: Strain gauge educational circuit	
Size: A4	Date: 2023-04-23
KiCad E.D.A. kicad (7.0.0)	Rev: 1/1