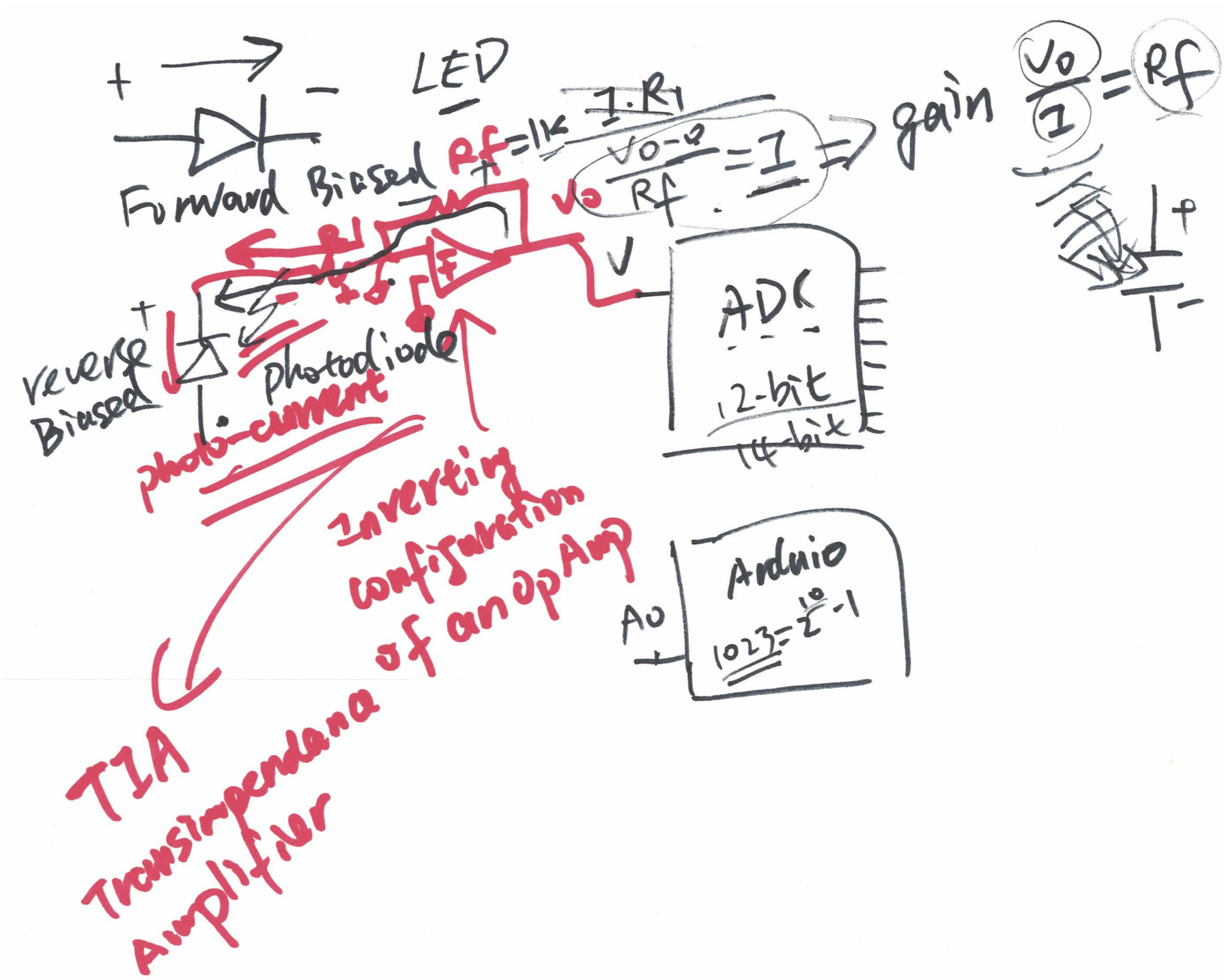
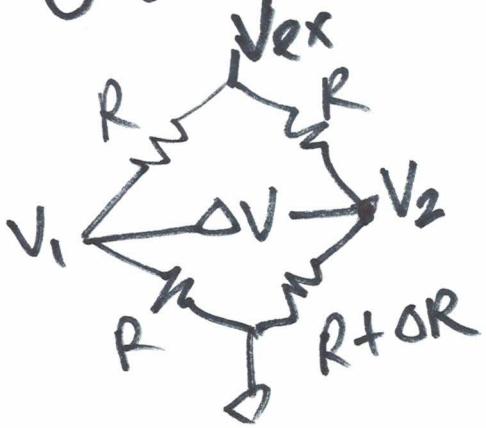

+
−
LED
Forward Biased
Rf = 1k
I.R1
Vo-0
Vo
Rf
= I
gain
Vo/I = Rf
V
ADC
12-bit
Arduio
A0
1023 = 2^10 - 1
reverse Biased
photodiode
photo-current
inverting configuration of an opAmp
TIA
Transimpendance Amplifier

① Quarter Bridge.



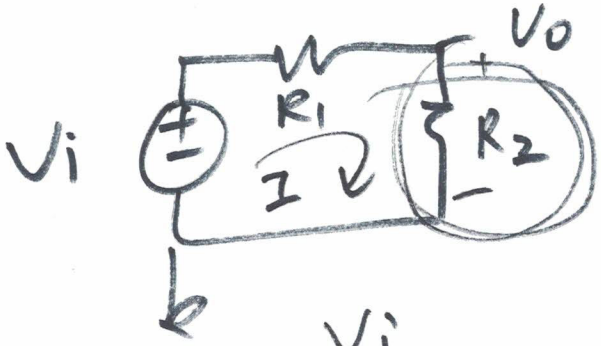
$$\Delta V = V_2 - V_1 = Vex\frac{R+\Delta R}{R+R+\Delta R} - Vex\frac{1}{2}$$

$$= Vex\left(\frac{R+\Delta R}{2R+\Delta R} - \frac{1}{2}\right)$$

$$= Vex\left(\frac{2R+2\Delta R-2R-\Delta R}{2(2R+\Delta R)}\right)$$

$$= Vex\frac{\Delta R}{4R+2\Delta R}$$

$$= Vex\frac{\Delta R}{4R}$$



$$\frac{V_o}{R_2} = \frac{V_i}{R_1+R_2}$$

$$V_o = V_i \cdot \frac{R_2}{R_1+R_2}$$

$$\frac{V_o}{V_i} = \frac{R_2}{R_1+R_2}$$

Voltage divider theory