Electronics
Resistive Sensors

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Introduction to transducers
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- output transducer = actuator
Resistive sensors

A resistive sensor is a resistor which changes according to some physical change in its environment. Some examples would be:

- **Potentiometer**: the resistance varies with physical movement
- **Photoresistor**: the resistance varies with light
- **Thermistor**: the resistance varies with heat
- **Strain gauge (or gage)**: the resistance varies with stress or compression
- **Force-dependent resistor**: the resistance varies with applied pressure

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Here’s an example of how a strain gauge works.
$R = \rho \frac{L}{A}$
Resistive sensors

Resistive sensors in voltage dividers

\[ R' = \rho \frac{(L-\Delta L)}{(A+\Delta A)} < R \]
Resistive sensors

Resistive sensors in voltage dividers

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Resistance
Sensors

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Resistance

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Thermistors

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\[ V_{out} = V_{in} \left( \frac{R_2}{R_1 + R_2} \right) \]

True if \( I_{out} \equiv 0 \)
If we want to put a variable resistor in a voltage divider, then we need to *choose* the other resistor.
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To make the output vary *over as large a range as possible* as the variable resistor goes from $R_{min}$ to $R_{max}$, it turns out we want to choose the other resistor, $R$ so that

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