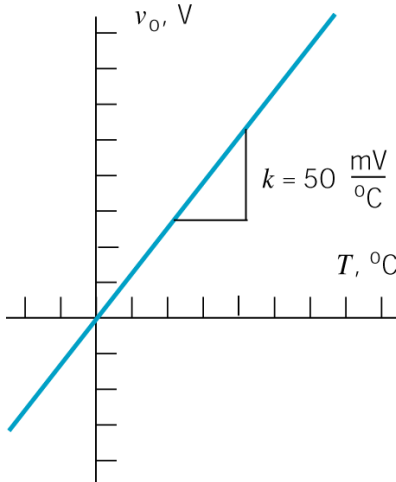


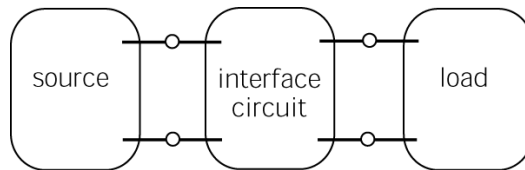
# Introduction to Signal Processing

A **signal** is a voltage or current to which we attach a meaning. For example, consider a voltage,  $v_o$ , that is proportional to temperature:

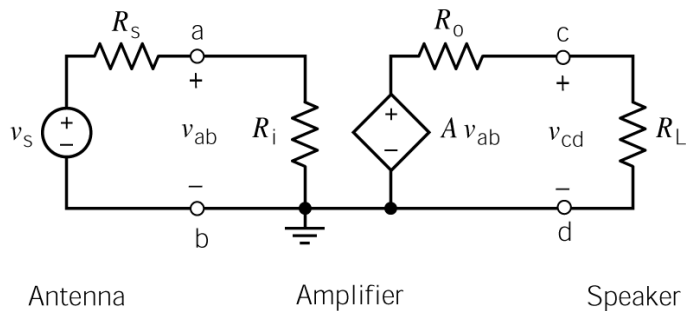


A voltage  $v_o = 1.5 \text{ V} = 1500 \text{ mV}$  indicates a temperature  $T = \frac{1500}{50} = 30 \text{ }^\circ\text{C}$ .

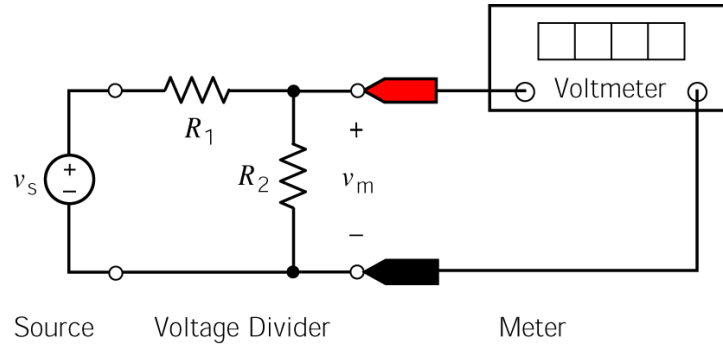
An **interface circuit**, sometimes called an IO circuit, is a circuit that connects two other circuits:



The source provides a signal, i.e. a current or voltage. The load receives a signal. The interface circuit converts the signal provided by the source into the signal required by the load. Here's a familiar example, perhaps taken from a cell phone:

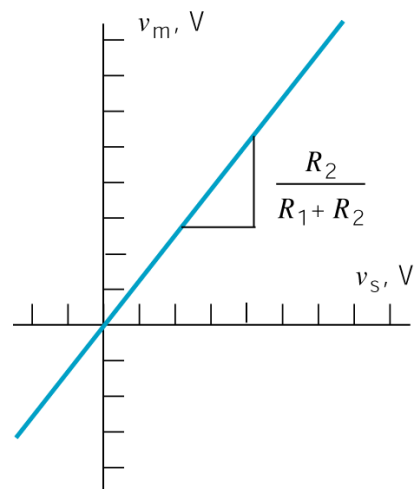


Consider using a voltage divider as an interface circuit:



We see that

$$v_m = \left( \frac{R_2}{R_1 + R_2} \right) v_s$$



Consequently:

- $v_m$  is proportional to  $v_s$ . The constant of proportionality is called the **gain** of the voltage divider.
- The gain of the voltage divider is determined by specifying the values of  $R_1$  and  $R_2$ .
- $0 \leq \text{gain} = \frac{R_2}{R_1 + R_2} \leq 1$