Analog Input from a Potentiometer

A potentiometer is a passive device that provides an adjustable electrical resistance. A potentiometer is a convenient way of allowing user input to a running Arduino program.

The left side of Figure 1 is a photograph the potentiometer included in the Sparkfun Inventor’s Kit\(^1\) of a typical the schematic representation of a potentiometer called a trim-pot.

![Image from https://www.sparkfun.com/products/9806](https://www.sparkfun.com/products/9806)

**Figure 1:** A typical rotary potentiometer (left). Schematic for a potentiometer (right).

A potentiometer has three electrical contacts and functions as an adjustable voltage divider as depicted by the schematic in the right side of Figure 1. Terminals A and B have a fixed resistance. Terminal C, called the wiper, is mechanically adjusted by turning the knob\(^2\) with the embossed arrow shown in the photograph on the left side of Figure 1. In the typical potentiometer circuit, a supply or input voltage is applied across terminals A and B. The output voltage is measured between terminals C and B or terminals C and A.

Figure 2 is a schematic of the electrical wiring of a potentiometer used as a variable voltage tied to an Arduino analog input pin. Terminals A and B are connected to a 5V supply and ground. The wiper is connected to an analog input pin. Figure 3 shows the wiring of a potentiometer connected to analog input pin 3 of an Arduino.

The `potentiometer_input.ino` program in Listing 1 reads and prints the voltage between the wiper and ground for a potentiometer wired as in Figure 3. The reading will be an integer between 0 and 1023. To convert to voltage, multiply the reading by 5/1023.

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\(^1\)https://www.sparkfun.com/products/11227

\(^2\)Potentiometers may have knobs, screws, or sliders for adjusting the wiper position.
Listing 1: Arduino program to read and display voltage across a potentiometer with the wiper connected to analog input pin 3.