ME 120 Fall 2017

## Analog Input from a Potentiometer

A potentiometer is an adjustable voltage divider that can be used as a method of user input to an Arduino program. The left side of Figure 1 is a photograph of a potentiometer with pins that fit into a breadboard. The right side of Figure 1 shows a schematic representation of the potentiometer.

A potentiometer has three external electrical contacts. By turning the knob, the electrical resistance between the middle contact and the two external contacts is adjusted. The change in resistance allows the potentiometer to function as a variable voltage divider as depicted by the schematic in the right side of Figure 1. The resistance between terminals A and B is fixed. In the typical potentiometer circuit, a supply (or input) voltage is applied across terminals A and B. The output voltage is measured between terminals W and B or terminals W and A.



**Figure 1:** A typical rotary potentiometer (left). Schematic for a potentiometer (right). The middle pin is called the "wiper".

Figure 2 is a schematic of a potentiometer that can supply a variable voltage to an analog input pin of an Arduino. Terminals A is connected to a 5V supply and terminal B is connected to ground. The wiper is connected to an analog input pin. Figure 3 shows a physical representation of the wiring with the wiper of the 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 2 Figure 3. The reading will be an integer between 0 and 1023. To convert to voltage, multiply the reading by 5/1023.



Figure 2: Schematic of a potentiometer connected to an Arduino analog input pin. The A, B, and W pins correspond to the terminals in Figure 1.



Figure 3: Arduino wiring of a potentiometer circuit for analog input on pin 3.

```
11
   File: potentiomter_input.ino
//
// Read a potentiometer and print the raw analog input value
// and the voltage
void setup()
{
 Serial.begin(9600);
}
void loop()
{
        potPin=3, potReading;
 int
 float potVoltage;
 potVal = analogRead( potPin );
 potVoltage = potVal*5.0/1023.0;
 Serial.print( potVal );
 Serial.print(" ");
 Serial.println(potVoltage)
}
```

**Listing 1:** Arduino program to read and display voltage across a potentiometer with the wiper connected to analog input pin 3.