Lesson 4

Potentiometer

Teacher Guide

**The potentiometer**

A potentiometeris a three-terminal resistor with a sliding or rotating contact that forms a variable voltage divider. The resistance of the potentiometer between the sliding contact and one terminal is proportional to the distance the slider has moved from that terminal. This allows the potentiometer to be used as a variable resistor to control the flow of current in a circuit.

**Using Potentiometers with the RP2040**

To connect a potentiometer to the RP2040, the three terminals of the potentiometer should be connected to the following pins:

* VCC: Connect this terminal to the 3.3V pin on the RP2040.
* GND: Connect this terminal to the GND pin on the RP2040.
* Signal: Connect this terminal to one of the ADC pins on the RP2040 (GP26, GP27, or GP28).

Once the potentiometer is connected, the ADC can be used to read the voltage from the potentiometer.

**How potentiometers are used in the real world.**

1. Volume control: Potentiometers are commonly used in audio equipment to control the volume of speakers or amplifiers. The resistance of the potentiometer varies as the knob is turned, which changes the amount of current that flows through the circuit and, ultimately, the volume of the sound.
2. Brightness control: Potentiometers are also used in electronic devices to control the brightness of LEDs or displays. By varying the resistance of the potentiometer, you can adjust the voltage that is applied to the LED or display, which in turn controls its brightness. Think dimmer switch.
3. Speed control: Potentiometers can also be used to control the speed of motors or fans. The resistance of the potentiometer determines the amount of current that flows through the motor or fan, which in turn affects its speed.

**Starter Code:**

A screen shot of a computer code

Description automatically generated

**Explanation of the code**

The from machine import Pin, ADC statement imports the Pin and ADC classes from the machine module. These classes are used to control the GPIO pins and read analogue values from the RP2040 microcontroller, respectively.

The from time import sleep statement imports the sleep() function from the time module. This function is used to pause the program for a specified amount of time.

The adc = ADC(0) statement creates an ADC object named adc. The 0 argument specifies that the potentiometer is connected to ADC channel 0.

The while True: loop runs forever. This means that the code inside the loop will be executed repeatedly until the program is stopped manually.

The print(adc.read\_u16()) statement prints the current analogue value read from the potentiometer to the console. The adc.read\_u16() function returns the analogue value as a 16-bit integer.

The sleep(0.5) statement pauses the program for 0.5 seconds. This prevents the program from reading the potentiometer too often and overloading the RP2040 microcontroller.