

TScratch Basics

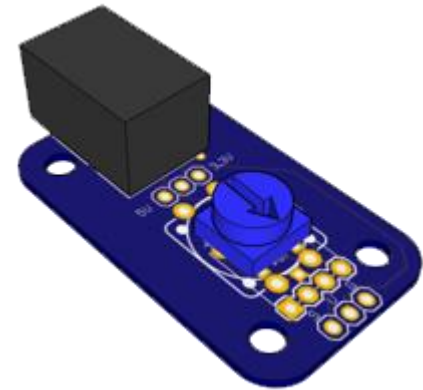
Coding with mBlock (Software)

Learning Objective

In this lesson you will learn:

TScratch

TSense (Potentiometer)



- Include an analog (potentiometer) input into your project!
- Coding an analog input with mBlock

Analog Vs Digital comparison

Digital Signal

- Values/reading either high [1] or low [0]
- Readings is simple
- Activation (i.e. On and off) is straightforward

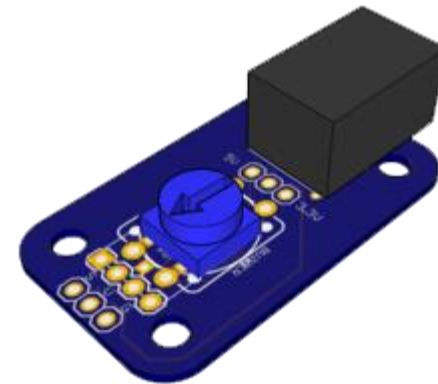
Analog Signal

- Values/reading either Ranges from 0 to 1023
- Readings may be difficult
- Activation (i.e. On and off) requires a condition

What is a Potentiometer?

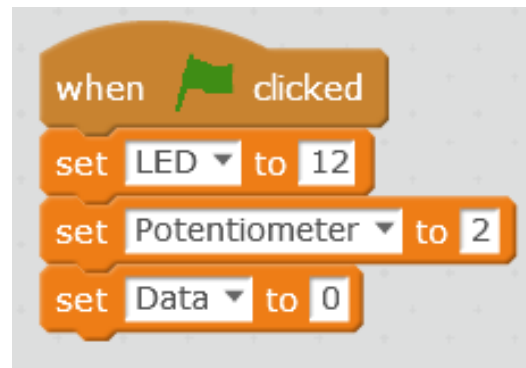
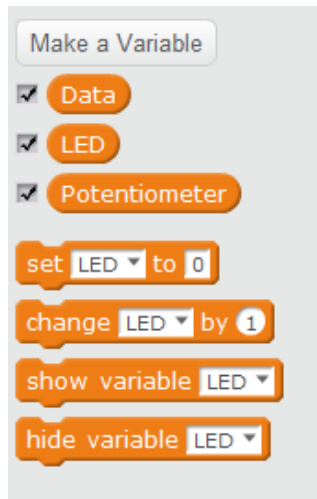


- A potentiometer consists of a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider.
- Turning the knob changes the voltage.
- Normally used in volume control knobs and light dimmers.



Write your pot control program

- In this program, we will have a potentiometer **analog input (port 2)** and LED **digital output (port 12)**. We will also be creating a variable Data to help us track the potentiometer value.
- Create the respective variables in the Data&Blocks tab, then define them in the scripting area:



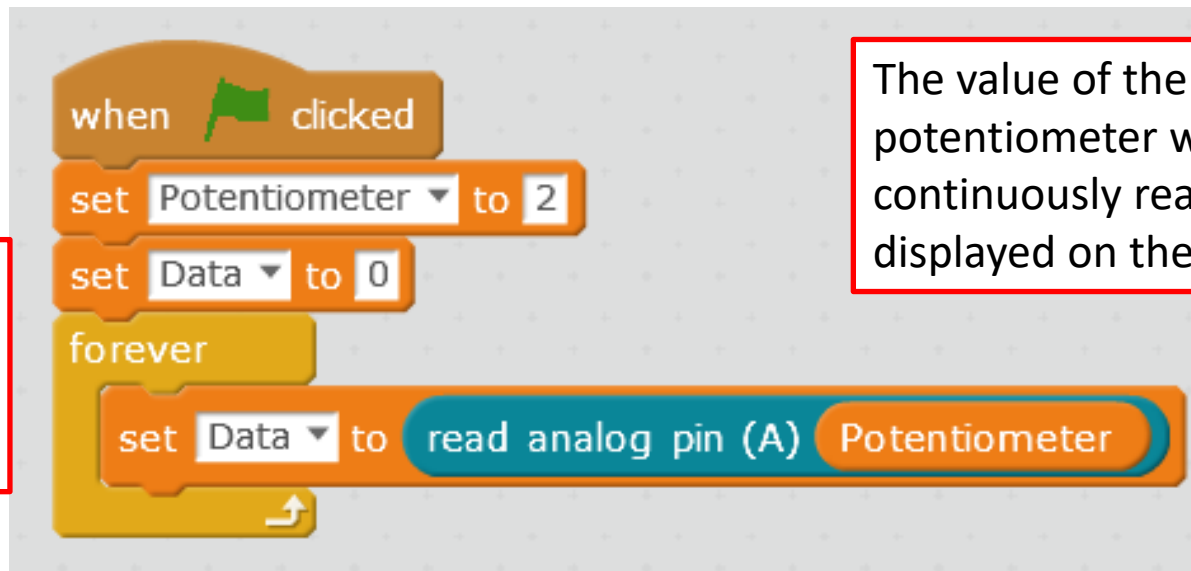
Write your pot control program

- Within a forever loop, set your conditions. In this case, we want the LED to be switched ON when the potentiometer knob is turned to a certain analog value.
- Since we are using analog input, we need to use a number value.
- When potentiometer value is < 500 , LED is switched OFF.
- When potentiometer value is > 500 , LED is switched ON.

Write your pot control program

- Before we can start programming, we need to find our potentiometer values.
- Write a simple program to display the value:

Forever loop to continuously check for changes in state

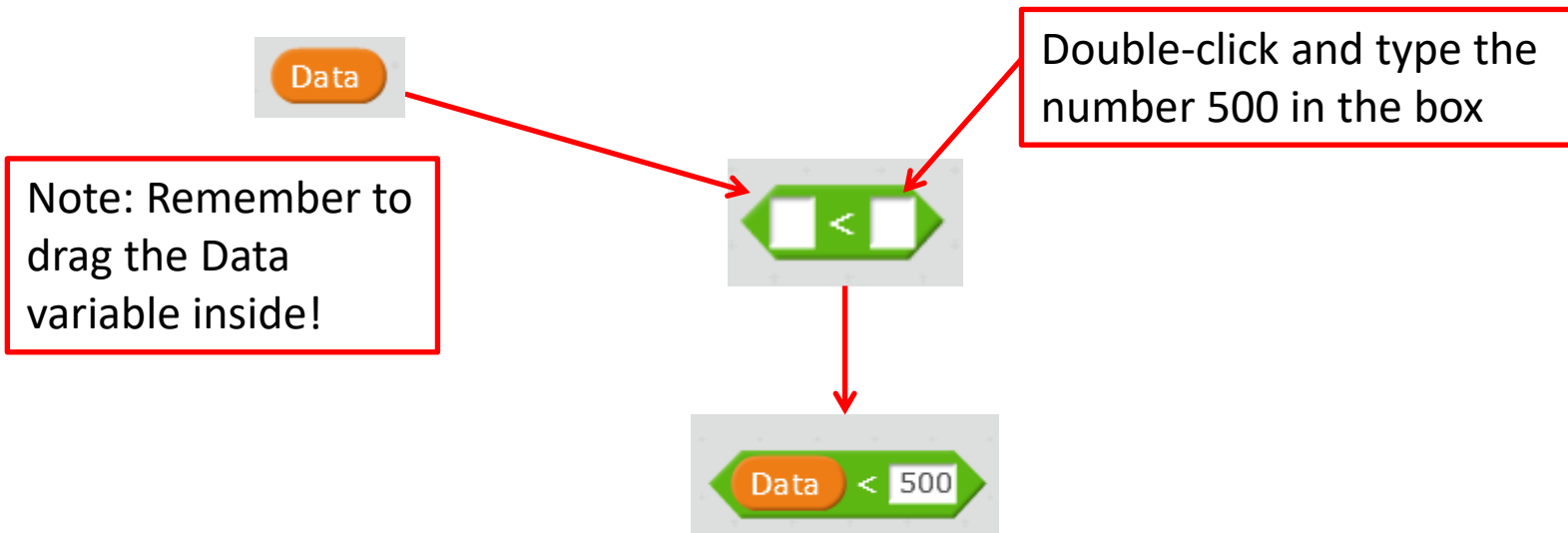


```
when clicked
  set Potentiometer to 2
  set Data to 0
  forever
    set Data to read analog pin (A) Potentiometer
```

The value of the potentiometer will be continuously read and displayed on the stage

Write your pot control program

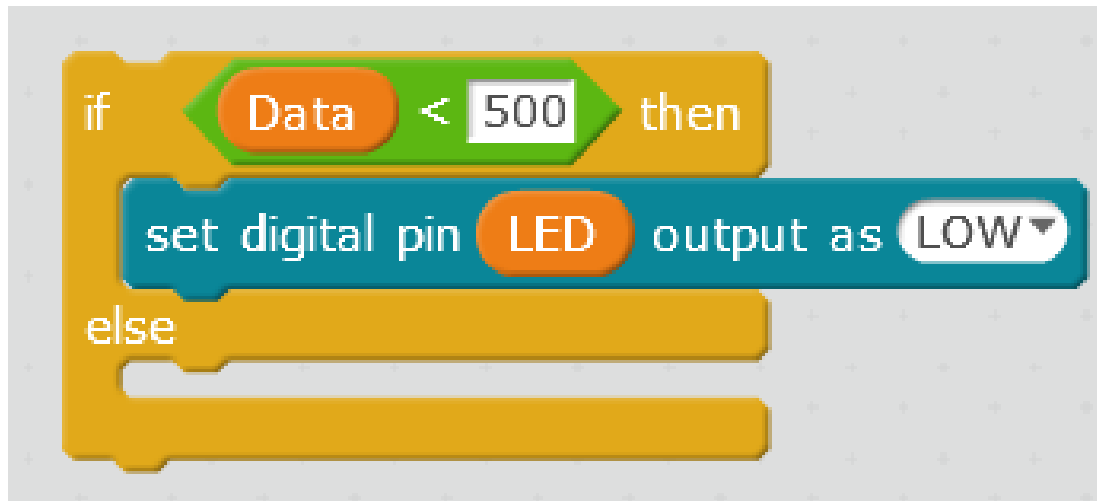
- From the Operators tab, drag the :



- Click and drag the block over the white square you want it to go until it lights up to insert it.

Write your pot control program

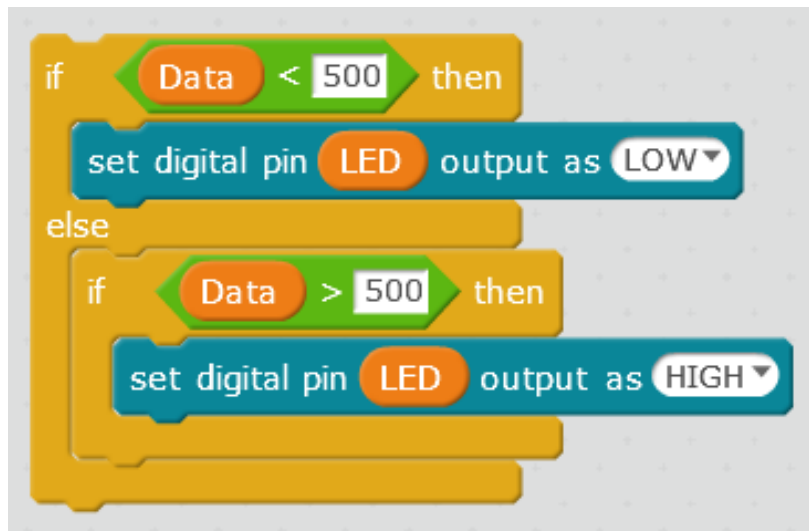
- First condition: when potentiometer value is < 500 , LED is switched OFF.
- Drag out an **if... else** control block and insert the condition:



Make sure the correct variables are in the correct places, and you are using **digital** pins with the correct designation (input or output)!

Write your pot control program

- Second condition: when potentiometer value is > 500 , LED is switched ON.
- Insert the condition in a **NEW if** block, then into the **else** part:

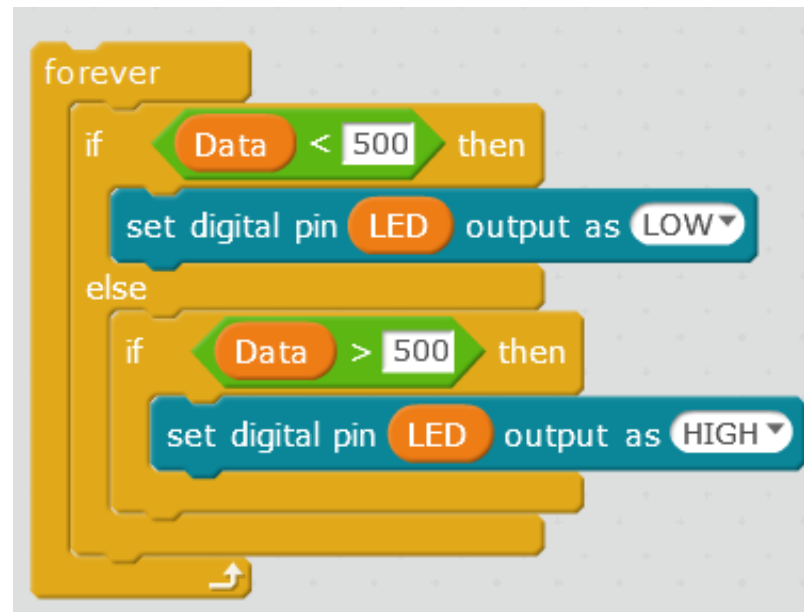


```
if (Data < 500) then
  set digital pin LED output as LOW
else
  if (Data > 500) then
    set digital pin LED output as HIGH
```

Note: There are **TWO** if conditions, but only **ONE** if... else block!
In the case that the first condition is not fulfilled, **ONLY THEN** will the program check for the second condition!

Write your pot control program

- We want the program to continuously check if the conditions are fulfilled, in case there is a change of state.
- Insert your conditions into a forever loop:

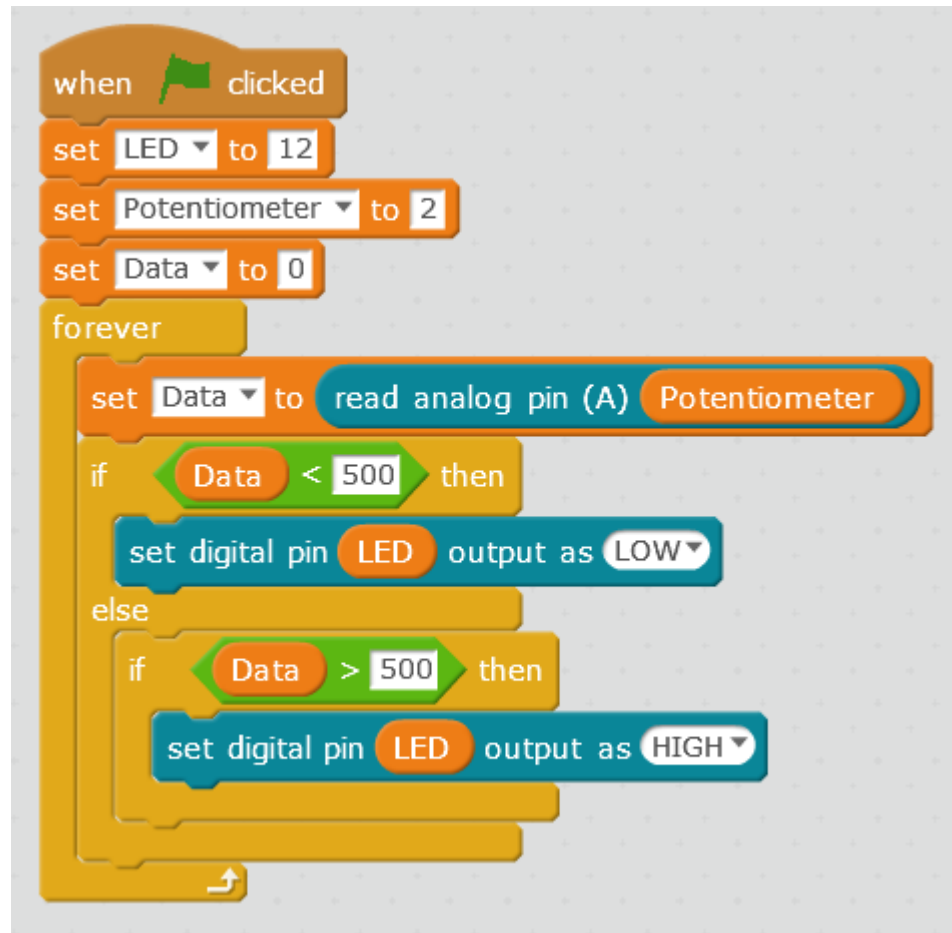


```
forever
  if Data < 500 then
    set digital pin LED output as LOW
  else
    if Data > 500 then
      set digital pin LED output as HIGH
```

The image shows a Scratch code block for a pot control program. It consists of a yellow 'forever' loop block containing two conditional blocks. The first is an 'if' block with the condition 'Data < 500' and the action 'set digital pin LED output as LOW'. The second is an 'else' block containing an 'if' block with the condition 'Data > 500' and the action 'set digital pin LED output as HIGH'. The code is set against a light gray background with a grid pattern.

Write your pot control program

- Complete program:



```
when clicked
  set LED to 12
  set Potentiometer to 2
  set Data to 0
  forever
    set Data to read analog pin (A) Potentiometer
    if Data < 500 then
      set digital pin LED output as LOW
    else
      if Data > 500 then
        set digital pin LED output as HIGH
```

The image shows a Scratch script for controlling an LED with a potentiometer. The script starts with a 'when clicked' event, followed by three 'set' blocks: 'set LED to 12', 'set Potentiometer to 2', and 'set Data to 0'. A 'forever' loop contains a 'set Data to read analog pin (A) Potentiometer' block, followed by an 'if' block. The 'if' block has two branches: one for 'Data < 500' which sets the digital pin LED output to 'LOW', and an 'else' branch for 'Data > 500' which sets the digital pin LED output to 'HIGH'.

Write your pot control program

- Additional scripting:
- mBlock comes with a default panda sprite when the software is loaded. To make the program more interesting, we can program the panda to state the condition of the buzzer.
- Potentiometer value $> 500 \rightarrow$ “LED on”
- Potentiometer value $< 500 \rightarrow$ “LED off”

Write your pot control program

- Drag the text block from the Looks tab and add the desired text:



```
when green flag clicked
  set LED to 12
  set Potentiometer to 2
  set Data to 0
  forever loop
    set Data to read analog pin (A) Potentiometer
    if Data < 500 then
      say LED off
      set digital pin LED output as LOW
    else
      if Data > 500 then
        say LED on
        set digital pin LED output as HIGH
      else
        
```