

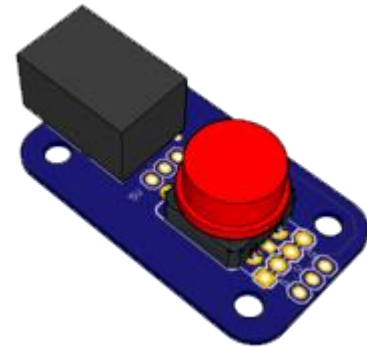
# TScratch Basics

## Coding with mBlock (Software)

# Learning Objective

In this lesson you will learn:

## TScratch (TSense Button)



- Include a physical input into your project!
- Coding an Digital input and output with mBlock
- Conditional coding

# Conditional Coding

## What are conditions?

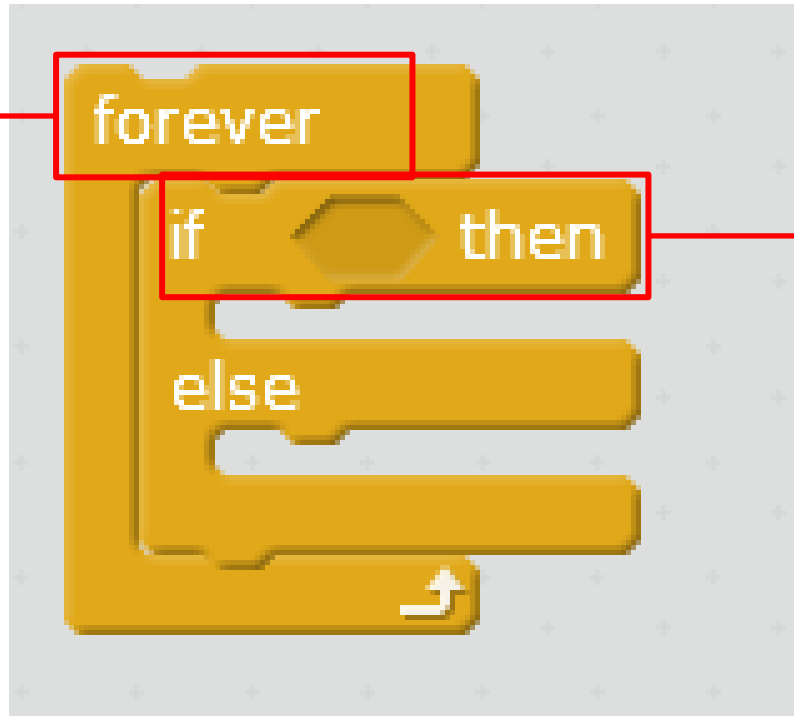
- IF – ELSE
- Example

If the last school bell rings, what would you do?

- a) Stay in class
- b) Go home

# Coding condition in mBlock

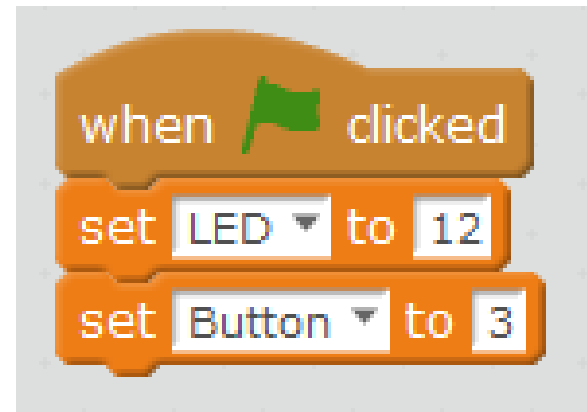
The script constantly checks for the conditions



If the condition is met, the program executes the code within the second loop

# Write your first control program

- In this program, we will have a button **digital input (port 3)** and LED **digital output (port 12)**.
- Create the respective variables in the Data&Blocks tab, then define them in the scripting area:



# Write your first control program

- Within a forever loop, set your conditions. In this case, we want the LED light to be switched ON when the button is pressed.
- If button input is HIGH → LED output is HIGH
- If button input is LOW → LED output is LOW
- Button input is HIGH when button is pressed, meaning button = 1
- Button input is LOW when button is NOT pressed, meaning button = 0

# Write your first control program

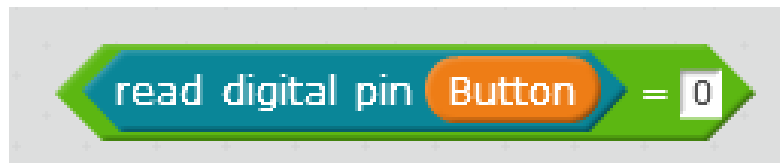
- From the Operators tab, drag the  :



Double-click and type the number 0 in the box

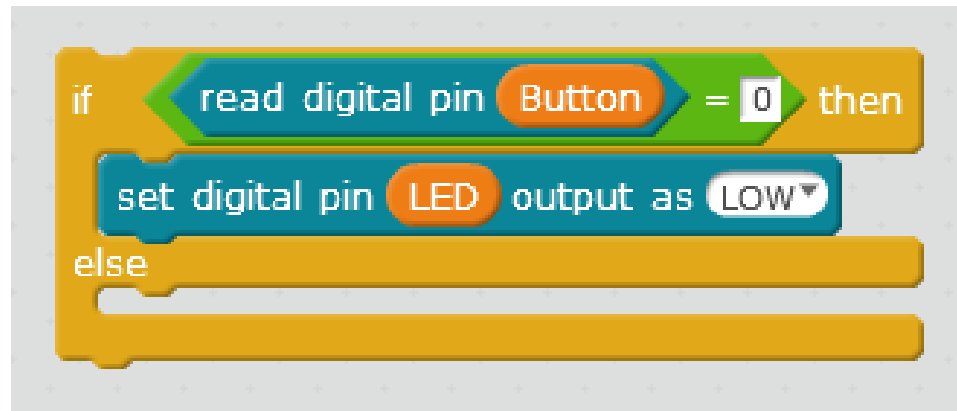
Note: Remember to drag the Button variable inside!

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



# Write your first control program

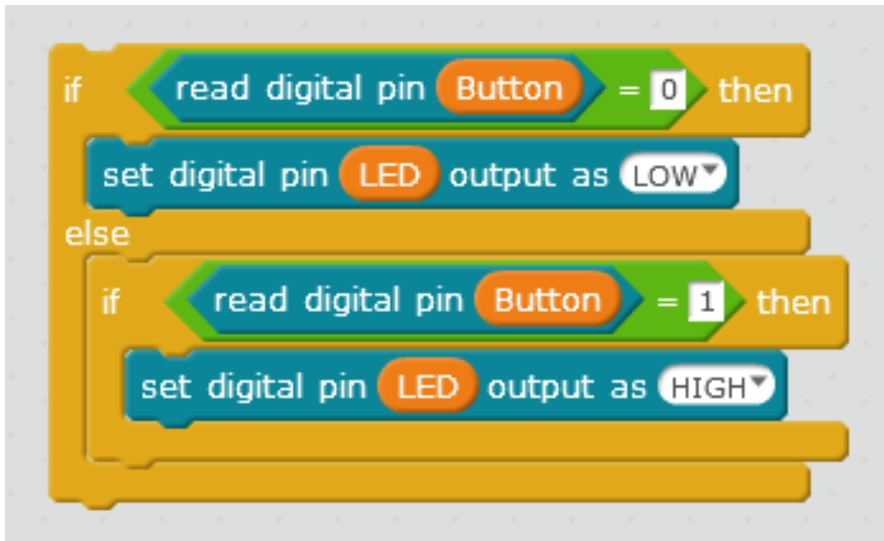
- First condition: if the Button input is LOW (0), the LED output is LOW.
- Drag out an **if... else** control block and insert the condition:





# Write your first control program

- Second condition: if the Button input is HIGH (1), the LED output is HIGH.
- Insert the condition in a **NEW if** block, then into the **else** part:

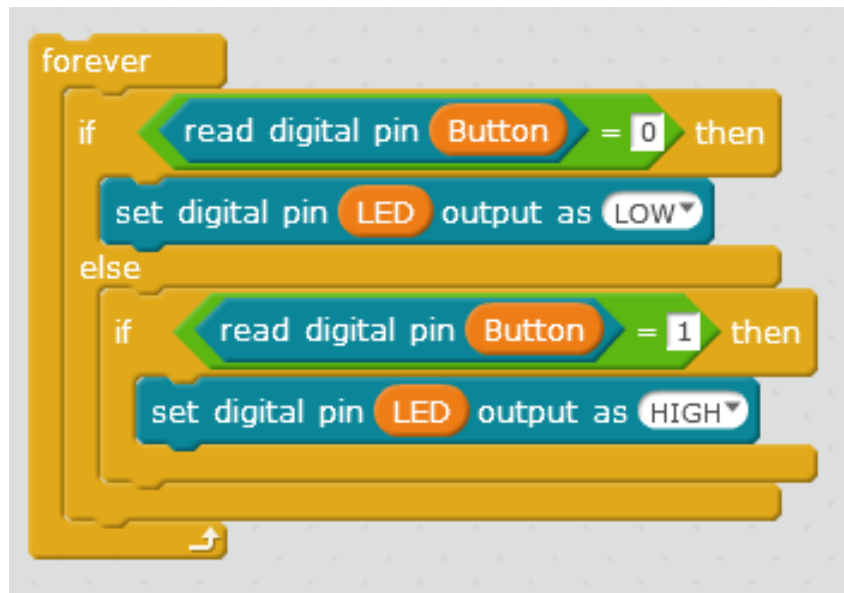


```
if read digital pin Button = 0 then
  set digital pin LED output as LOW
else
  if read digital pin Button = 1 then
    set digital pin LED output as HIGH
```

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 first 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:

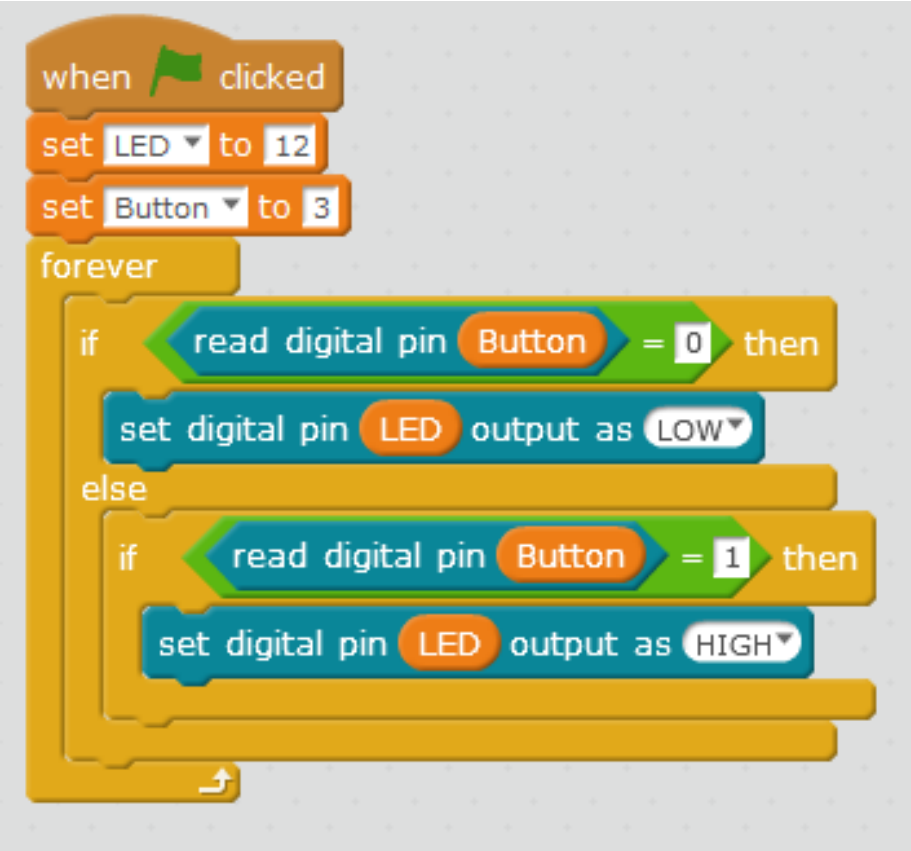


```
forever loop
  if read digital pin Button = 0 then
    set digital pin LED output as LOW
  else
    if read digital pin Button = 1 then
      set digital pin LED output as HIGH
```

The image shows a Scratch code block for a 'forever' loop. Inside the loop, there are two 'if' conditions. The first 'if' condition checks if the 'read digital pin Button' is equal to 0. If true, it sets the 'digital pin LED output' to 'LOW'. The second 'if' condition is part of an 'else' block and checks if the 'read digital pin Button' is equal to 1. If true, it sets the 'digital pin LED output' to 'HIGH'. The code block is yellow and has a small arrow at the bottom right indicating it loops back.

# Write your first control program

- Complete program:



```
when clicked
  set LED to 12
  set Button to 3
  forever
    if read digital pin Button = 0 then
      set digital pin LED output as LOW
    else
      if read digital pin Button = 1 then
        set digital pin LED output as HIGH
```

The image shows a Scratch script for controlling an LED. It starts with a 'when clicked' event block. This is followed by two 'set' blocks: 'set LED to 12' and 'set Button to 3'. A 'forever' loop block contains two 'if' blocks. The first 'if' block checks 'if read digital pin Button = 0 then' and is followed by 'set digital pin LED output as LOW'. The second 'if' block is part of an 'else' branch and checks 'if read digital pin Button = 1 then' followed by 'set digital pin LED output as HIGH'.

# Write your first 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 LED light.
- LED light is switched on → “LED on”
- LED light is switched off → “LED off”

# Write your first control program

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



```
when green flag clicked
  set LED to 12
  set Button to 3
  forever loop
    if read digital pin Button = 0 then
      say LED Off
      set digital pin LED output as LOW
    else
      if read digital pin Button = 1 then
        say LED On
        set digital pin LED output as HIGH
```