3 - Button Morse Code

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# Getting Started

You played around with Morse code in the first activity, let’s test to see how good you are at reading / interpreting dots and dashes. In this activity, you’ll use the button to control the LEDs, and you’ll be in control of generating the Morse code. There is a nice clicky push button connected to Pin 12 on the Digital Sandbox. Let’s look at how to set this up.

Example code on codebender: [https://codebender.cc/sketch:342811](https://codebender.cc/sketch%3A342811)

# void setup()

To set up one LED and the push button, add the following code to your setup():

|  |  |
| --- | --- |
| 10111213 | void setup() { pinMode(4, OUTPUT); pinMode(12, INPUT);} |

# void loop()

To get the LED to react to the push button, we are going to use what we call an if() statement. Copy this code and click upload.

|  |  |
| --- | --- |
| 15161718192021222324 | void loop() { // if the button is pressed (digitalRead(12) == true) then...turn on the LED if (digitalRead(12) == true) { digitalWrite(4, HIGH); } // otherwise (else) turn the LED off. else { digitalWrite(4, LOW); }} |

# Reading a button press

To read a button press, we use the function digitalRead(). This function returns a value that is either **true** or **false** depending on the state of the pin. The way we have the digital sandbox wired, this value is **true** on pin 12 when you push the button down and **false** when the button is released. We can now use this information to make a decision.

# Anatomy of a decision in code - Introducing the if() statment

In programming, you sometimes want the program to be able to make a decision. We do this using the if() statement. The way this works, is it allows us to branch the flow of the program based on a decision or a condition. This condition is called a ***boolean expression*** and is either ***true*** or ***false***.



In our code above, we used the boolean expression **digitalRead(12) == true**. The double equal (==) is comparing the two values and checking to see if they’re equal. If the expression is true, then it executes any code that is in between the curly braces **{ }**, otherwise, it executes the code that is in the curly braces **{ }** after the keyword **else**.

Below is a list of other boolean expressions that you can use. We will use these in later activities.

## Boolean Expressions

|  |  |
| --- | --- |
| A == B  | Is A ***equal to*** B? |
| A != B  | Is A ***not equal to*** B? |
| A > B | Is A ***greater than*** B? |
| A >= B | Is A ***greater than or equal to*** B? |
| A < B | Is A ***less than*** B? |
| A <= B | Is A ***less than or equal to*** B? |

# More Dots and Dashes: Morse Code - Part deux

Now you should have a nice button controlled LED. Change your code so that you have ALL of the LEDs turn on when the button is pressed? Don’t forget to set the pinMode() for the OUTPUT pins -- otherwise, the LEDs will show up dim!



Now, find a friend / partner and see if you can successfully communicate across the room from each other. Take a short word, like “C-A-T” and translate this to Morse code below.

When sending Morse code, make sure you have a short pause between each character and a longer pause at the end of the word. Because you often miss a character, it’s useful to repeat sending the code over and over again. Use the space below to write down the message you’re going to send and the message you receive.

|  |  |
| --- | --- |
| **Message to send** | **Message received** |
| *Letters* | *Morse Code* | *Morse Code* | *Letters* |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Fun Fact!

**CQ** is a code used by [wireless](https://en.wikipedia.org/wiki/Wireless) operators, particularly those communicating in [Morse code](https://en.wikipedia.org/wiki/Morse_code), (— · — · — — · —). Transmitting the letters *CQ* on a particular [radio](https://en.wikipedia.org/wiki/Radio) [frequency](https://en.wikipedia.org/wiki/Frequency) is an invitation for any operators listening on that frequency to respond with a CQ. It is still widely used in [amateur radio](https://en.wikipedia.org/wiki/Amateur_radio).

Source: Wikipedia, https://en.wikipedia.org/wiki/CQ\_(call)