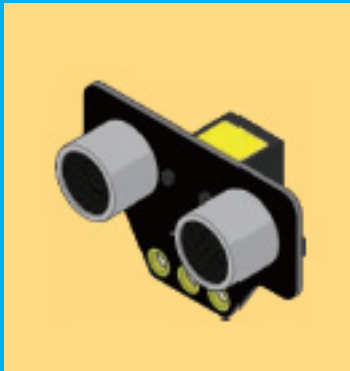


module 2 - ULTRA SENSOR

In this module, you'll learn about the connection between physical world and the software!

LEARNING OBJECTIVES:

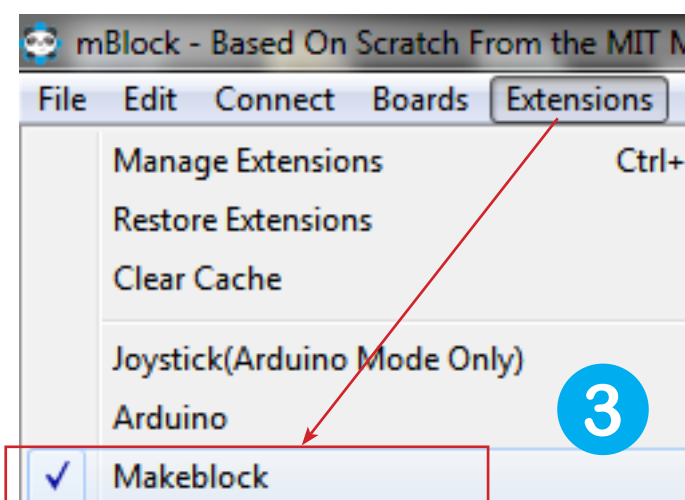
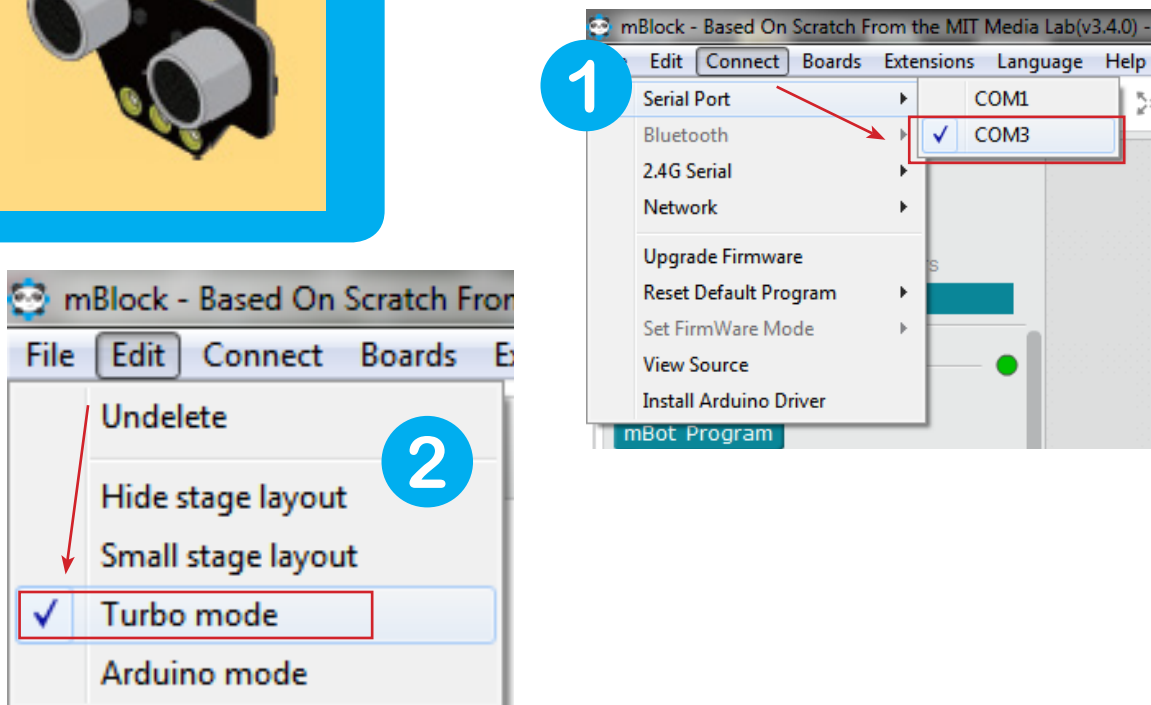
- Learn how to control and apply the ultra sensor



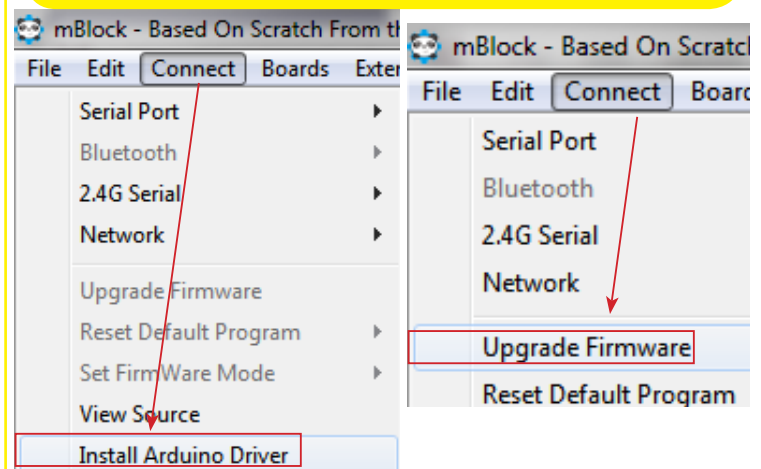
Ultrasonic sensor is an input device for detecting distance. It has two “eyes”, one of which is to emit ultrasonic waves while the other one is responsible for receiving the signal bounced back after detecting an obstacle. Hence, it realizes the goal of measuring distance.

Detection range: 3cm-400cm; Detection angle: 30 °.

BEFORE WE START: Make sure you have mBlock software installed and correct options selected



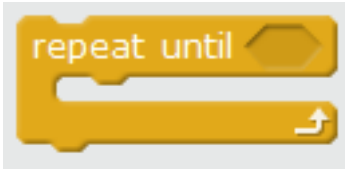
If you can't find the correct port please try to install Arduino driver. Then try to select the new port and next Upgrade the Firmware:



BUILDING BLOCKS



Repeat encased script for specified times, and then continue to perform the following script.



Repeat until the condition is satisfied (the condition is within the space). When the condition is not satisfied, the wrapped script will constantly run. If met, the program will move on to the following scripts.



Constantly repeat:
The encased script keeps running and cannot be terminated.



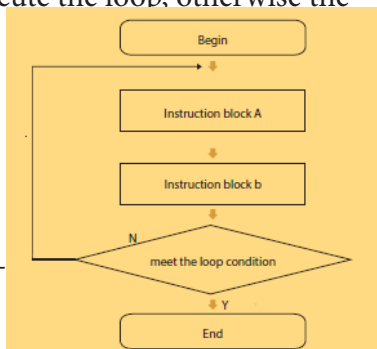
Ultrasonic sensor block: to give feedback on the distance between the ultrasonic sensor and any obstacles in front of it.

OUR PROGRAMMING STRUCTURE

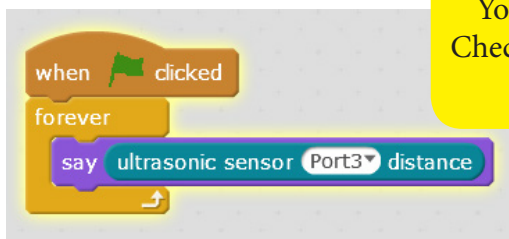
LOOP structure description:

Loop structure is the structure which repeats its contained execution script. As the right flow chart shows, instruction block A and B are called as loop body. If the loop condition is false, re-execute the loop, otherwise the loop ends.

When you need to repeat the same script, we often use the loop structure.



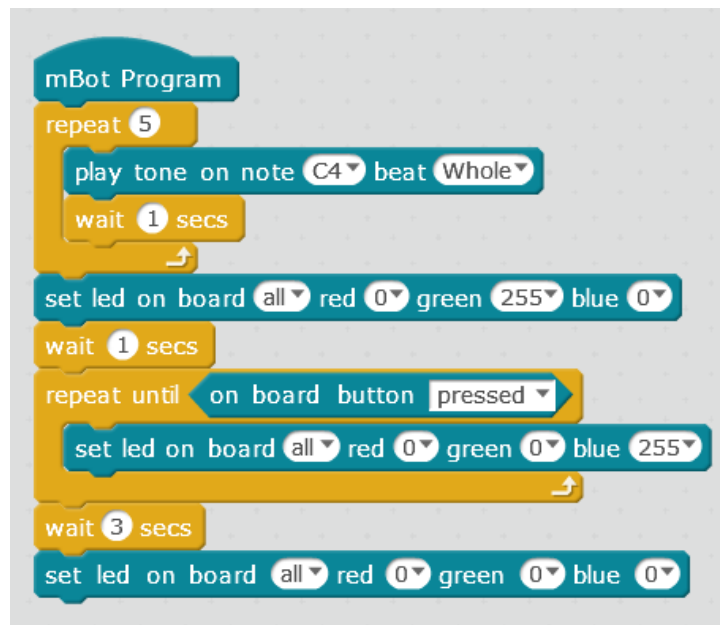
Try the script below and see what it does when you move your robot close/away from an obstacle.

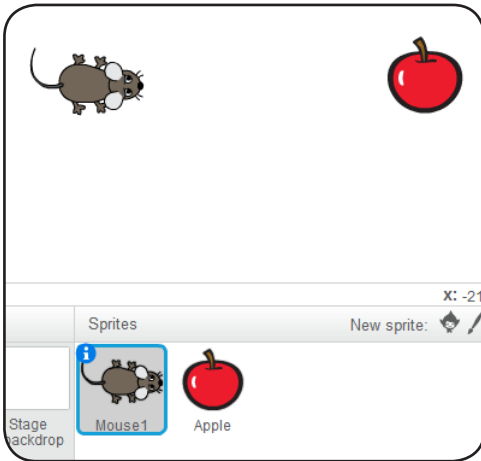


You may need to choose a different port number. Check on your board what port is the ultrasonic sensor connected to.

TRY IT

Describe to the mentor what does the script below do.





Expansion exercises:

Let's make the first mBlock program now! In this program the mouse wants to eat the apple so it contains two sprites while achieving interactive control effects through mCore baseboard. When the program starts, mCore utters a sound and waits for you to press the button on the mCore. Once you press the button, the mouse moves toward the apple. The mCore sounds again when the mouse hits the apple.

Version 1: Mouse eats apple on button press

MOUSE SPRITE

Let the mouse move towards Apple's position

Press the space bar to start the program->let the mouse move to the initial position-> Play tone C4->wait0.5 seconds-> Stop Playing ->before pressing button on the mCore, wait->let the mouse move to the specified location

APPLE SPRITE

Make a sound when the mouse eats the apples

Press the space bar to start the program-> Wait before you hit the mouse-> Play mCore buzzer tone with C4->wait0.2 seconds-> Change the tone as F2->wait0.2 seconds-> Stop playing sound



Version 2: Control mouse via ultrasonic sensor

MOUSE SPRITE

Mouse1

x: 0 y: -120 direction: 0°

rotation style:

can drag in player: ☐

show: ☒

when green flag clicked

repeat 5

wait until touching Apple?

play tone on note C4 beat Half

stop all

when green flag clicked

forever

set x to ultrasonicsensor Port3 distance * pick random -6 to 6

say ultrasonicsensor Port3 distance

Stop the program after the mouse collects 5 apples

Wait for the mouse to hit the apple -> play a tone for 0.5 second -> stop the program after 5 apples are collected.

Use mCore together with the ultrasonic sensor to control the moving of the mouse.

You must use values that are through constantly repeating and updating the ultrasonic sensor to make the position of the mouse dynamically change.

APPLE SPRITE

Apple

x: 85 y: 60 direction: 90°

rotation style:

can drag in player: ☐

show: ☒

when green flag clicked

forever

show

go to x: pick random -200 to 200 y: 140

repeat until touching edge?

change y by -10

hide

Keep apples falling

Repeatedly execute its contained script -> Display Apple -> Specify the location that the apple appears -> Repeatedly move the apple down until it hit the edge -> After it hits the edge, hide the apple

Exercises

1. Try to use loop structure to control RGB light on the baseboard. Let them flash once every second and indicate which building blocks are the loop body.
2. Try to make the buzzer sound as C4 in 10 times, E5 in 20 times, B6 in 30 times, and then keep repeating. Can you distinguish these loop bodies inside it? Try it.
3. Write a program that will make the robot move forward until it gets within 5cm of an obstacle. Use following blocks:

set motor M1 speed 0

set motor M2 speed 0

set motor M1 speed 100

set motor M2 speed 100

repeat until

ultrasonicsensor Port3 distance

<

4. Modify the program above so that buzzer plays C4 when it gets within 6 - 5cm of an obstacle

