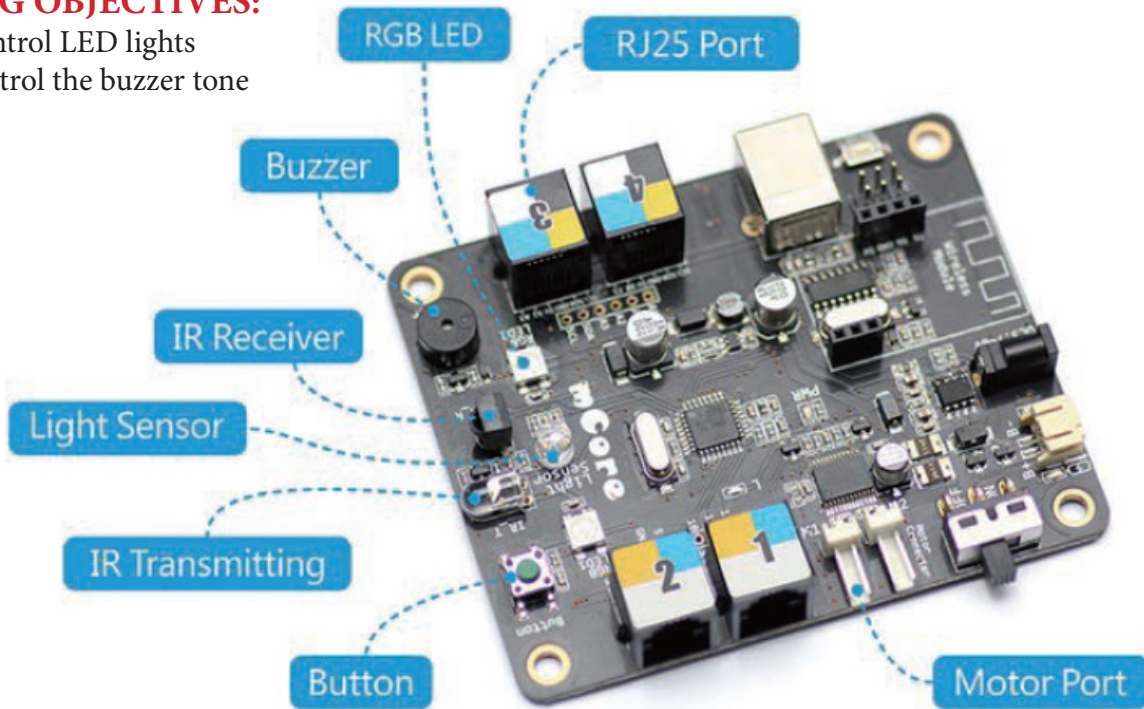


# your first steps with mBot

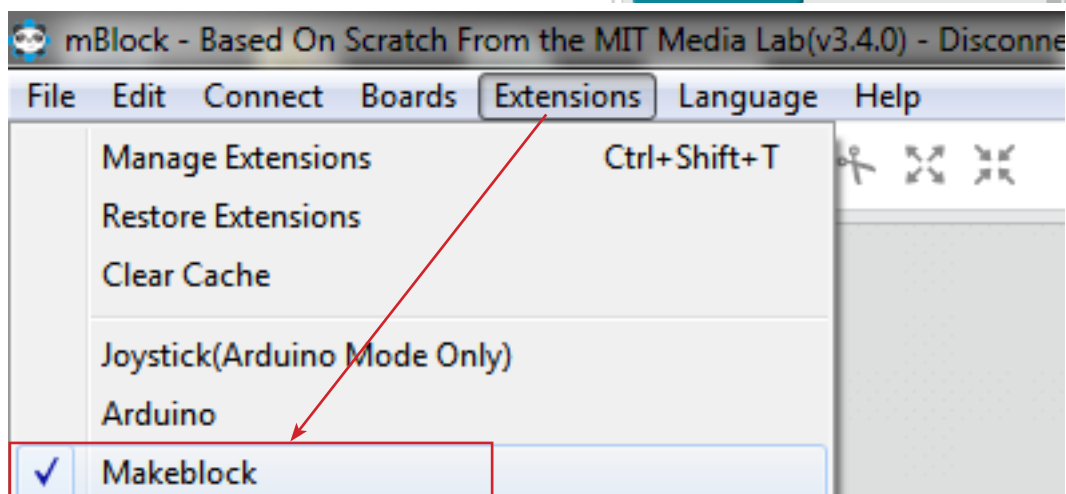
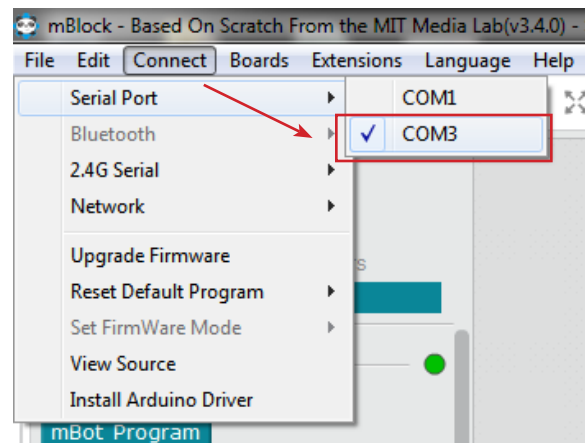
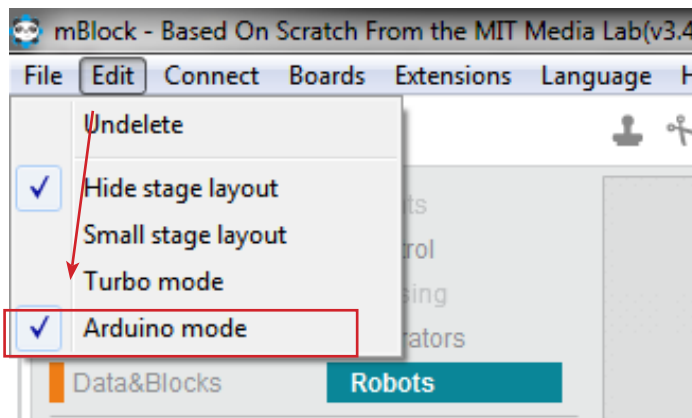
In this module, you'll learn about the connection between physical world and the software!

## LEARNING OBJECTIVES:

- learn to control LED lights
- learn to control the buzzer tone



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

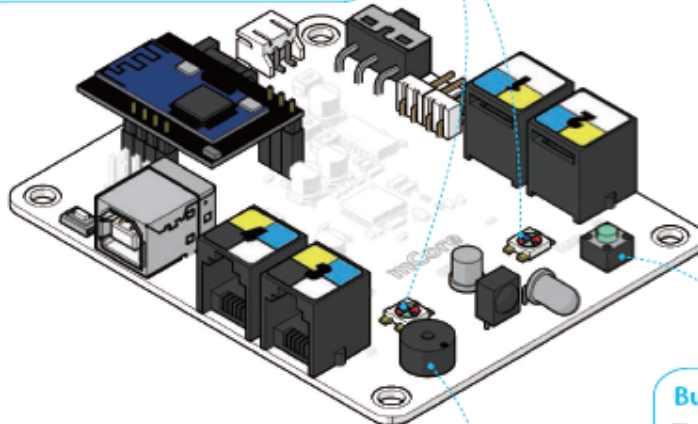


# your first steps with mBot

## ELECTRONIC MODULES covered in this session

### RGRGB LED lights

The RGB LED light is a output light source device. It can output light of any color through the tri-color of the red, the green and the blue.



### Buzzer

The buzzer is an audio device, but also an output device. It can control the different output frequencies so as to give a different tone.

### Button

The button is an input device. It usually defines different functions depending on the application scenario.

### mBot Program

The starting point of event and triggering ways of the program.

play tone on note **B4** beat **Half**

Buzzer can output the tone from C2 to D8.

wait **1** secs

Wait one second. The number can be an integer or a decimal number.

wait until **on board button pressed**

Before “button is pressed”, always wait. The blue blocks in the left can be replaced by other hexagonal blocks.

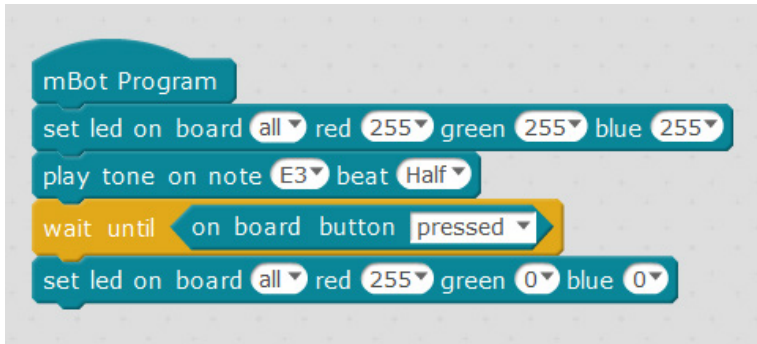
set led on board **all** **red 0** **green 0** **blue 0**

Set the color of RGB LED lights. Each color range is from 0 to255. If you want to turn o the small lights, set all three colors to zero.



# your first steps with mBot

## OUR PROGRAMMING STRUCTURE







## TRY IT

Before running the code try to explain back to the tutor what is happening in the structure flow. What colors are displayed by the mBot (use the table below to lookup colours using the RGB values)

## RGB color table

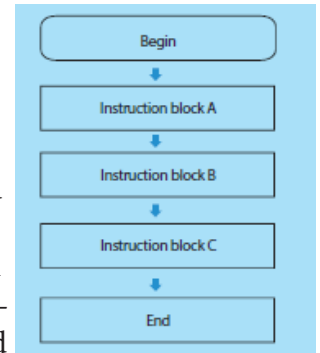
Basic colors:

Color	HTML / CSS Name	Decimal Code (R,G,B)
	Black	(0,0,0)
	White	(255,255,255)
	Red	(255,0,0)
	Lime	(0,255,0)
	Blue	(0,0,255)
	Yellow	(255,255,0)
	Cyan / Aqua	(0,255,255)
	Magenta / Fuchsia	(255,0,255)
	Silver	(192,192,192)
	Gray	(128,128,128)
	Maroon	(128,0,0)
	Olive	(128,128,0)
	Green	(0,128,0)
	Purple	(128,0,128)
	Teal	(0,128,128)
	Navy	(0,0,128)

## Sequence structure description:

The script begins running from the first block, followed by all the other blocks executing in order. This is the sequential structure.

After the program starts, it implements two blocks in turn and waits for the button press. Once the button is pressed the RGB values are changed to Red 255 Green 0 Blue 0.



## CHALLENGE:

The current flow is represented by following steps:

1. Start the program (when you first upload it to mBot)
2. Turn on the bright light
3. Play E3 tone with half beat
4. Wait for the button press
5. Turn on the Red light

Complete the program by adding the steps below:

6. wait for one second
7. Turn on a green light
8. Wait for one second
9. Turn on blue light
10. Wait for one second
11. play C2 tone with full beat
12. turn off the light

Describe what is your program doing.



# your first steps with mBot

## CHALLENGE:

Can you identify which lines in the code correspond to our mblock lines?

```
34 void setup() {  
35     pinMode(A7, INPUT);  
36     rgbled_7.setColor(0,255,255,255);  
37     rgbled_7.show();  
38     buzzer.tone(165, 500);  
39     delay(20);  
40     while (!((0^(analogRead(A7)>10?0:1))));  
41     rgbled_7.setColor(0,255,255,0);  
42     rgbled_7.show();  
43 }
```

There 3 sections of every Arduino program will have the following:

1. The top part where you will declare your global variables
2. The “Setup” - void setup() function- where you layout the initial conditions for the program so that the Arduino knows what kind of work its going to be doing
3. The “Loop” - the loop() function does precisely what its name suggests, and loops consecutively, allowing your program to change and respond.

### What is a function you may ask?

A function is basically like a little machine created out of code... you build it and when you call its name, it does something. Setup and Loop are functions that are built into Arduino. Arduino always expects to see them because they are essential parts of its structure.

### what is “pinMode”?

When we write, pinMode(A7, INPUT); we are telling Arduino that the pin number A7 on the mCore is an input. This refers to our little green button on the board. When the button is pressed, the program will return a value from it.

### what is rgbled\_7?

This is a variable which was created before the setup() function.

## EXTRA TIME: Play a tune

The mBot Program block contains the following sequence of blocks:

- play tone on note C6 beat 10
- wait 0.125 secs
- play tone on note D6 beat 10
- wait 0.125 secs
- play tone on note E6 beat 10
- wait 0.25 secs
- play tone on note G6 beat 10
- wait 0.25 secs
- play tone on note G6 beat 10
- wait 0.25 secs
- play tone on note A6 beat 10
- wait 0.25 secs
- play tone on note G6 beat 10
- wait 0.25 secs
- play tone on note E6 beat 10
- wait 0.25 secs
- play tone on note C6 beat 10
- wait 0.5 secs
- play tone on note D6 beat 10
- wait 0.125 secs
- play tone on note E6 beat 10
- wait 0.25 secs
- play tone on note E6 beat 10
- wait 0.25 secs
- play tone on note D6 beat 10
- wait 0.25 secs
- play tone on note C6 beat 10
- wait 0.25 secs
- play tone on note D6 beat 10
- wait 1 secs

Add a forever block so that the tune does not stop.. Do you know how?

