



# LEARNING BY COMPETING

Welcome!



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*The Module 1 corresponds to the basic level, in which students will learn the basic aspects of assembling and controlling a robot.*

*Through a practical language and approach, a step-by-step tutorial with descriptions and illustrations of the electronic and mechanical materials needed, instructions for their assembly and programming, recommended software and hardware, and also some maintenance considerations of the final product, which will be a robot ready to perform simple actions*

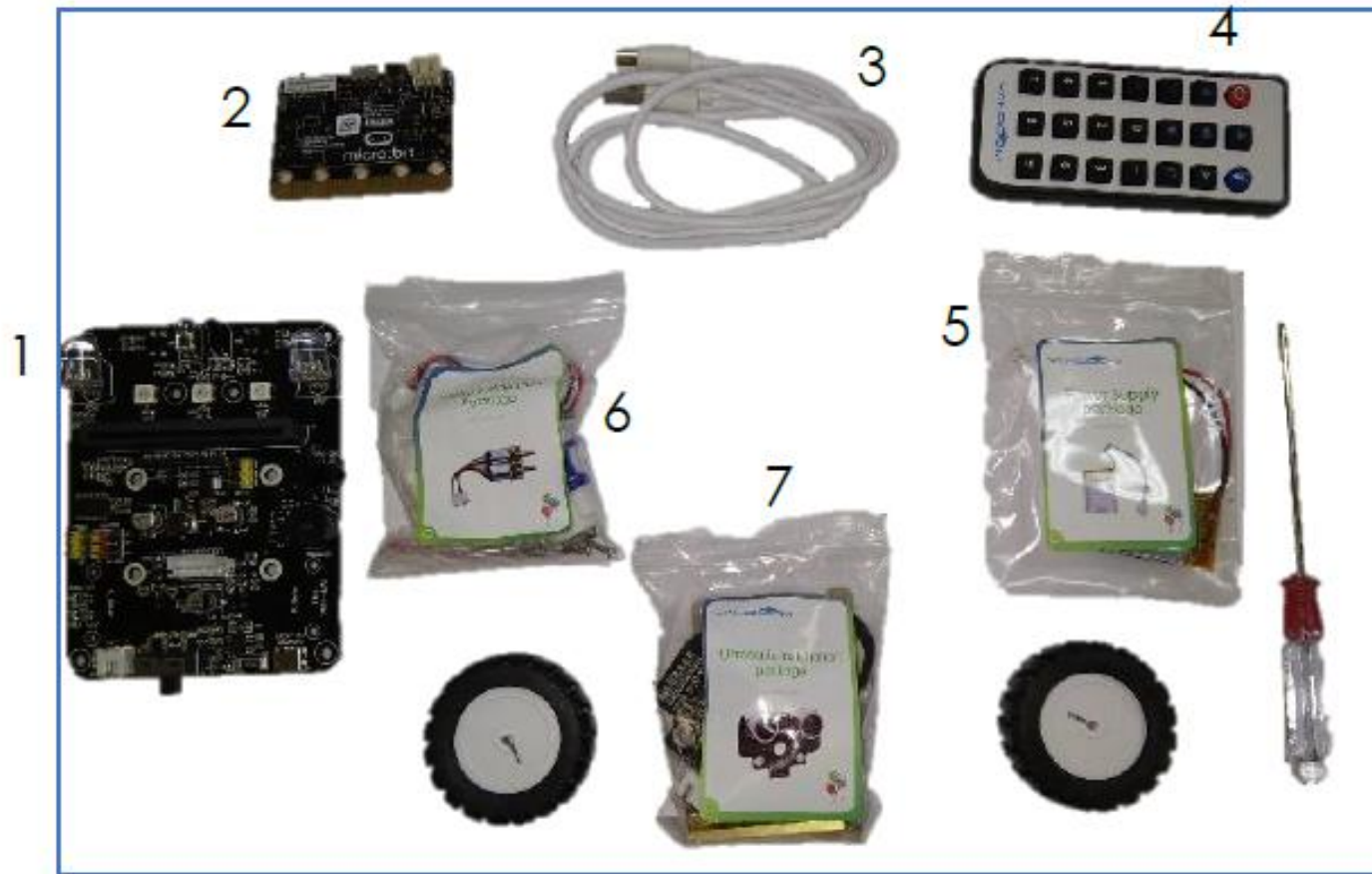
*This robot works as the base for all the work to be carried out in the next modules. You must preserve it and follow all safety and hygiene instructions so that you can use the same model for the entire training course.*

Module 1 will focus on “Assembly and control of the robot”

## Summary:

- Components of the robot to be assembled
- Engine Assembly
- Wheels and Universal Wheel Assembly
- Structure and Ultrasonic Sensor Assembly
- Ultrasonic Interface Assembly
- Battery Assembly
- Connections of the different elements
- Micro: bit Assembly

# WHAT DO WE NEED ?



*Fig. 1 - Necessary components for the assembly of a robot (Source: Author)*

1. Printed Circuit Board
2. Micro: bit Microcontroller
3. USB Cable
4. IR Remote
5. Battery Kit
6. Motor's Kit
7. UltraSonic Sensor's Kit
8. 2 Wheels
9. Screwdriver
10. PC or Laptop



***Ensure you have all the materials  
needed before you start!***

***If something is missing please tell us.***



LET'S START



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# ASSEMBLY OF THE ROBOT

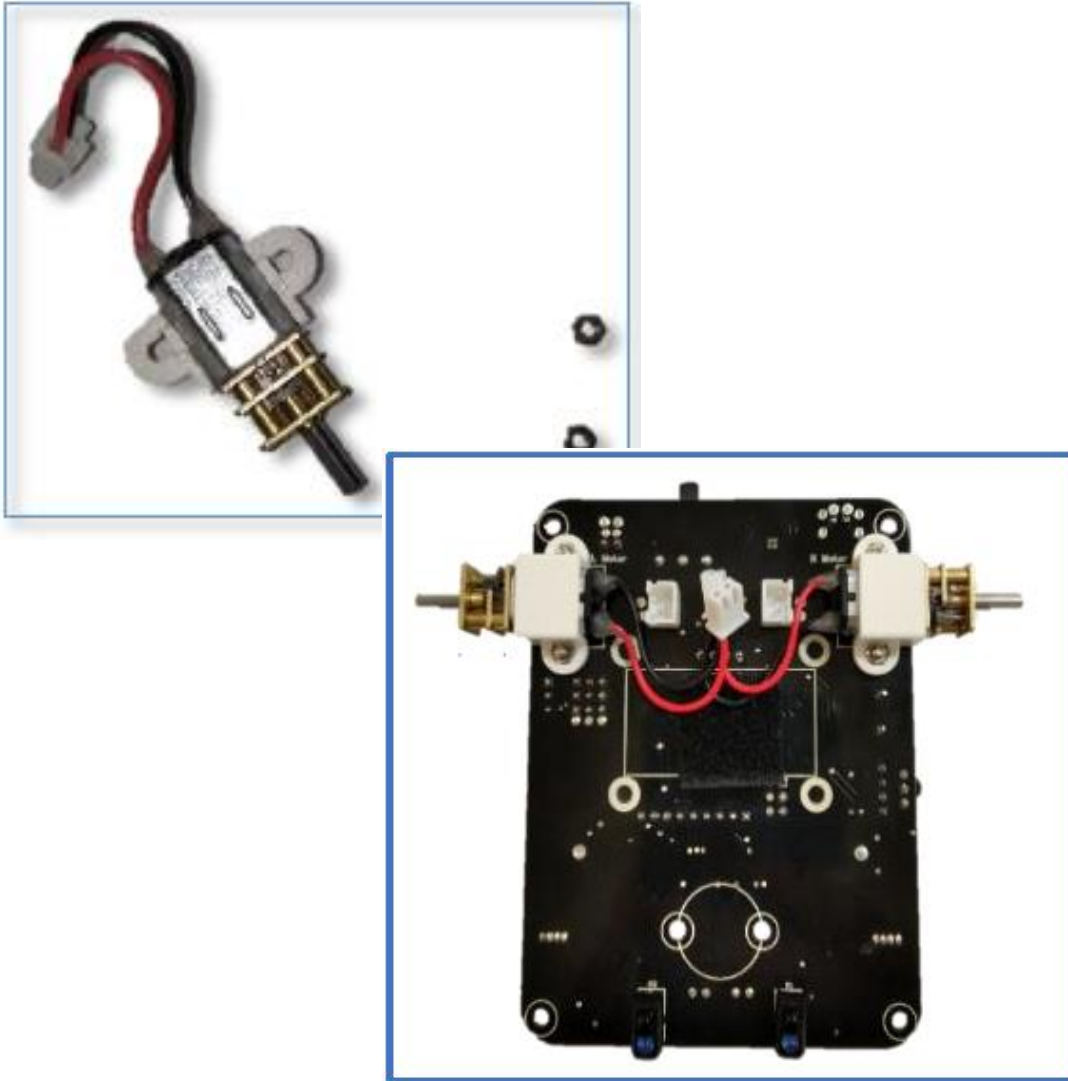
Let's start with the motor's kit.

Inside you have:



<b>Components:</b>	Motors	Supports	Universal Wheel	Pack with screws and nuts
<b>Quantity:</b>	2	2	1	1
<b>Visual Aspects:</b>				

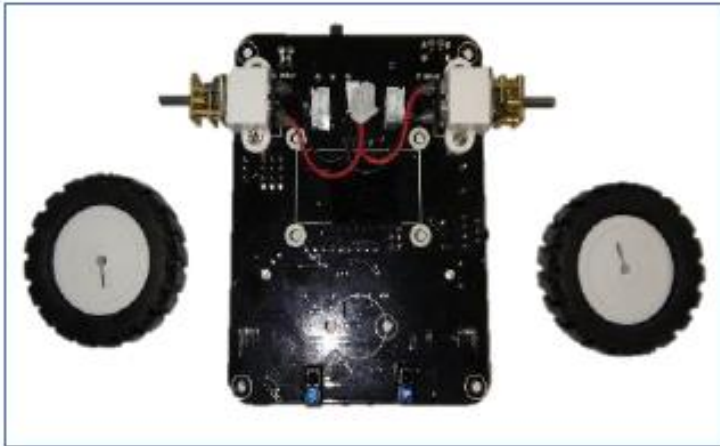
# ASSEMBLY OF THE ROBOT



1. Put the motor on the support
2. Grab 1 nut and place it on the motor support
3. Grab 1 screw and screw it on the PCB like the image
4. Repeat the steps 2 and 3 for the 2nd pair of screws and nuts
5. Now repeat the same process for the other motor



# ASSEMBLY OF THE ROBOT



6. Now, it's time to place the wheels

ATTENTION!

The wheels have only one way to insert on the motor. So be careful!

# ASSEMBLY OF THE ROBOT




7. Time to assembly the last wheel.  
Take the universal wheel
8. Place the nut on their support
9. Screw the nut on the bottom side of our PCB (Note: The screw must be placed from the TOP to BOTTON)
10. Repeat steps 7 and 8 for the other pair of screws and nuts

# ASSEMBLY OF THE ROBOT

Now, we will focus on the Ultrasonic sensor's kit

Inside you have:



Components	Ultrasonic Sensor	Supports			4 Pin (cable included)	Pack with screws and nuts
Subcomponents		Copper pillars	Acrylic Board for Ultrasonic Sensor	Bracket		
Quantity	X1	X4	X1	X1	X1	X1
Visual Aspect						

# ASSEMBLY OF THE ROBOT



The PCB has four holes, one for each copper pillar

11. Take 1 copper pillar and 1 screw
12. Screw that on PCB. Remember, in this case, the screw goes from the BOTTOM to the TOP and the pillar goes only on the TOP
13. Repeat the 1st and 2nd steps for the 3 remaining copper pillars

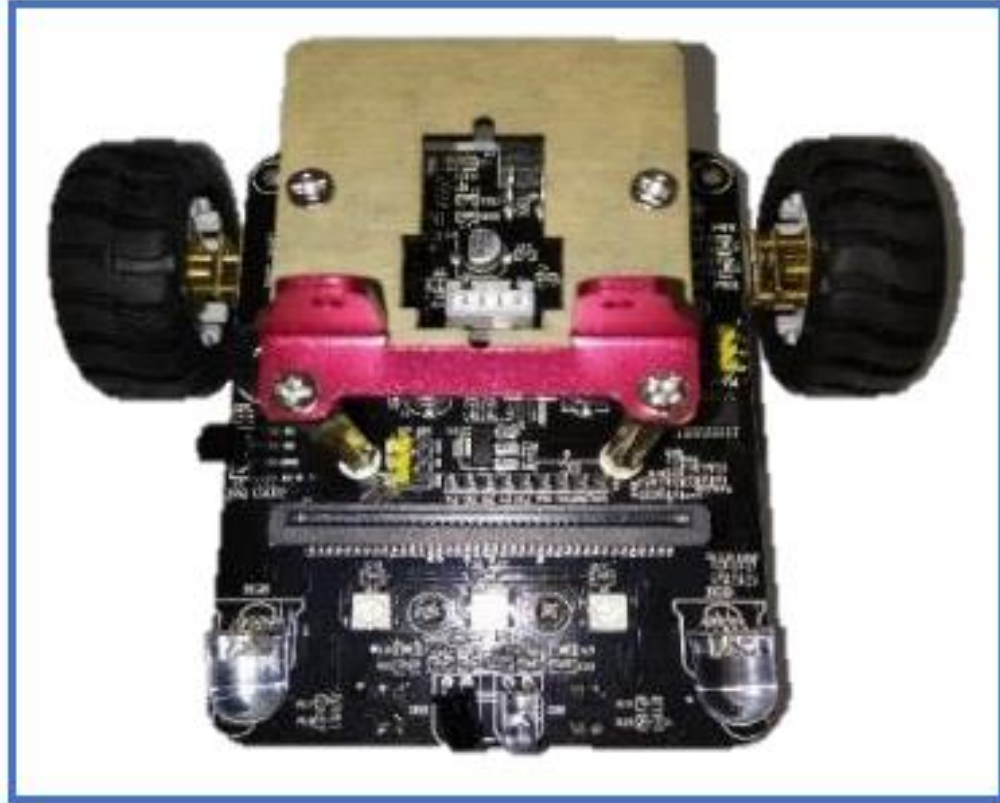
# ASSEMBLY OF THE ROBOT

Now, we will assembly the acrylic board



14. Take the acrylic board and place it on the TOP of the copper pillars (Like the image on the left ←)

15. Take 2 screws and screw the 2 places at the back



## Assembly of the Sonar Bracket

16. Take the Sonar Bracket and place it into his spot
17. Take 2 screws and screw the bracket and the acrylic board to the TOP of the copper pillar at the same time



## Assembly the Ultrasonic Sensor

18. Connect the 4-pin cable to the Ultrasonic Sensor



ATTENTION: There is only one way to do this! Note that the connectors do not have the same shape on both sides.

# ASSEMBLY OF THE ROBOT



## Assembly of the Ultrasonic Sensor

19. Insert the cable through the hole on the acrylic board

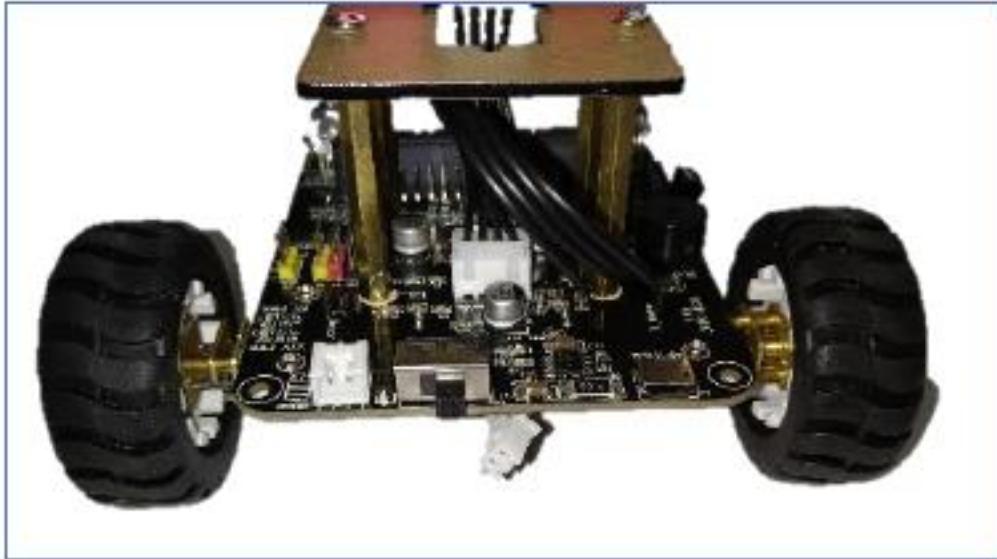
20. Place the sensor in the last 2 holes on the bracket

21. Take 2 screws and 2 nuts and screw the sensor in place.

NOTE: The nut goes on the backside and the screw on FRONT



## Assembly of the Ultrasonic Sensor



22. Now, plug in the other side of the 4-pin cable on the PCB

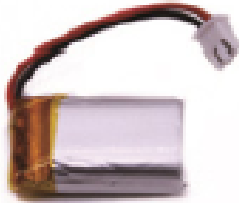

*One more time, be careful with the cable position!*

# ASSEMBLY OF THE ROBOT

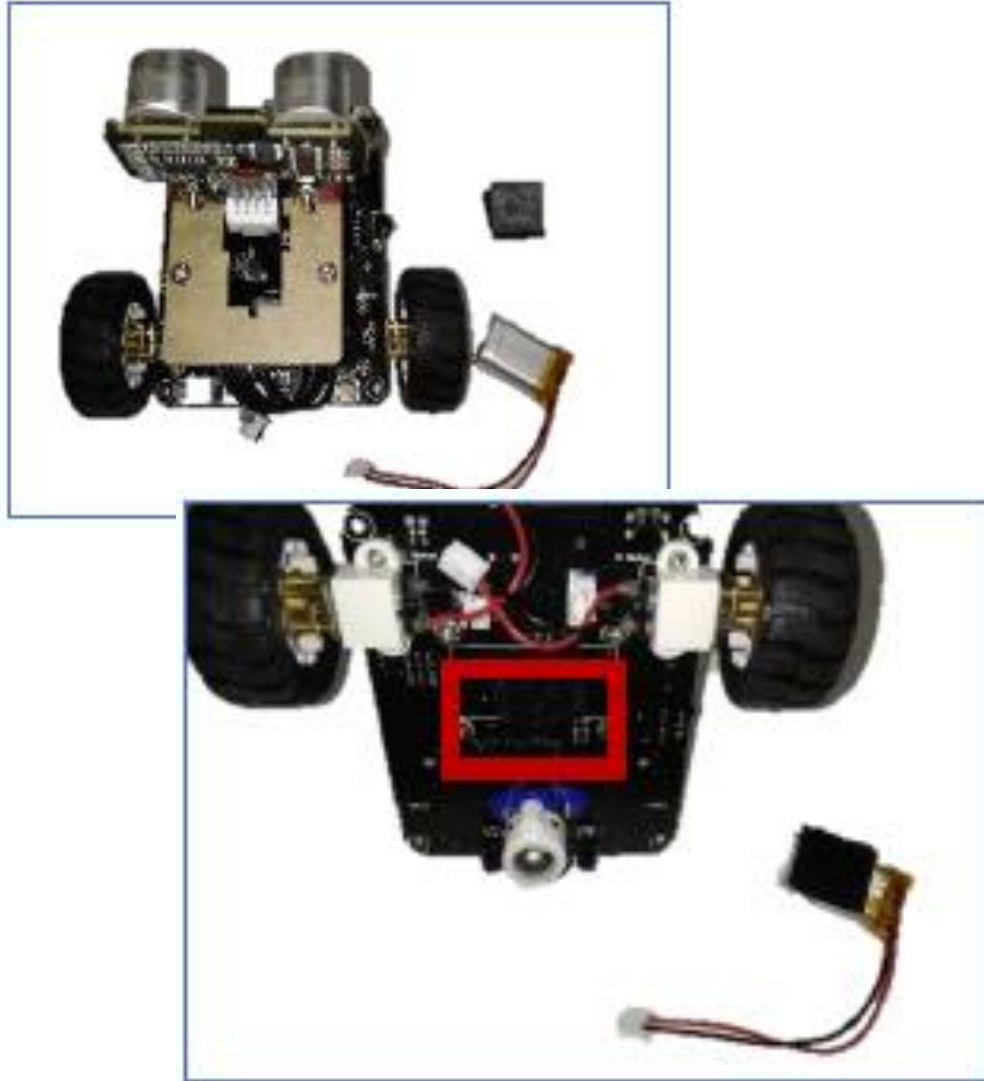
Finally, it's time to assembly our battery's pack

Inside you have:



<b>Component</b>	Battery	M3 magic stickers
<b>Quantity</b>	X1	X2
<b>Visual Aspect</b>		

# ASSEMBLY OF THE ROBOT



Inside the pack, you'll find 2 Velcro strips. They'll help us glue the battery into place

23. Paste one of the Velcro strips in the **BOTTON** of our PCB in the battery place (as illustrated in the image on the left ←)

24. Position the battery in front of you, with the yellow part on and the cable to the right

# ASSEMBLY OF THE ROBOT



## Assembly the Battery

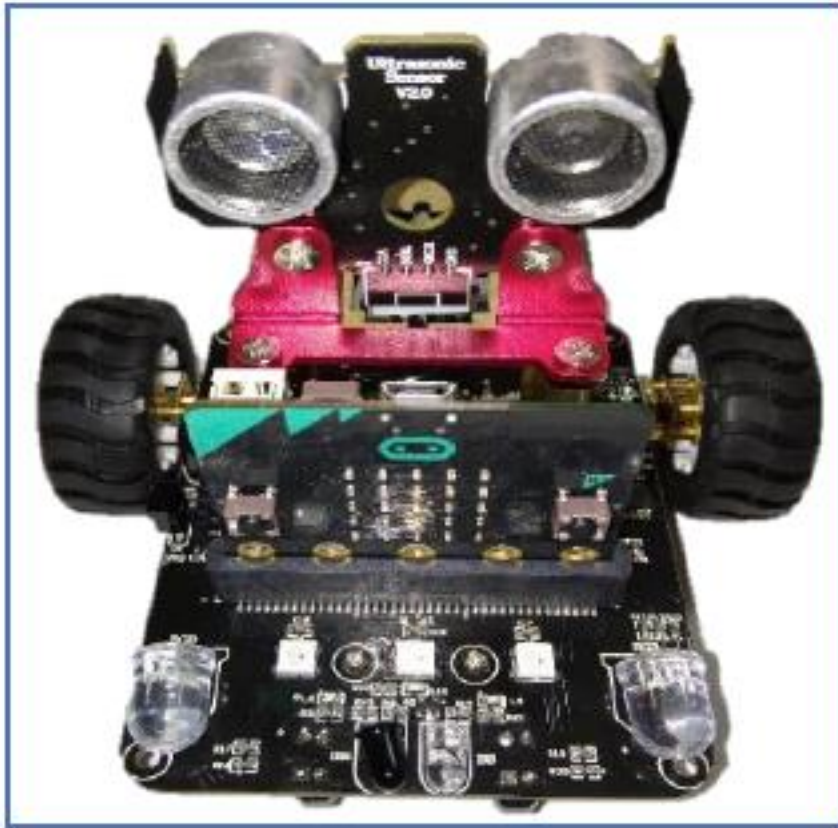
25. Paste now, on this top face, the other piece of strip

26. Now, place the battery

27. Connect the motor's to the PCB

28. Connect the battery to PCB

# ASSEMBLY OF THE ROBOT



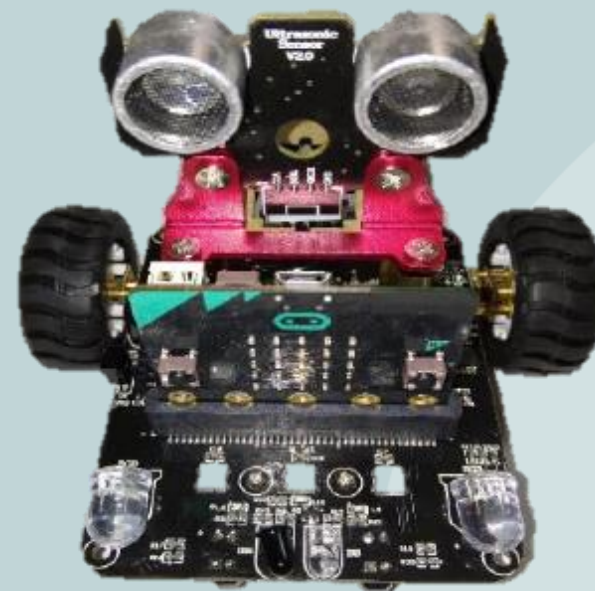
Finally, we'll assemble the micro: bit

29. Connect the micro: bit on the PCB  
micro: bit interface

Remember, the copper zone must be inserted on her interface socket and the LED dot Matrix must be to the front



WELL DONE!



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# TIME TO START PROGRAMMING



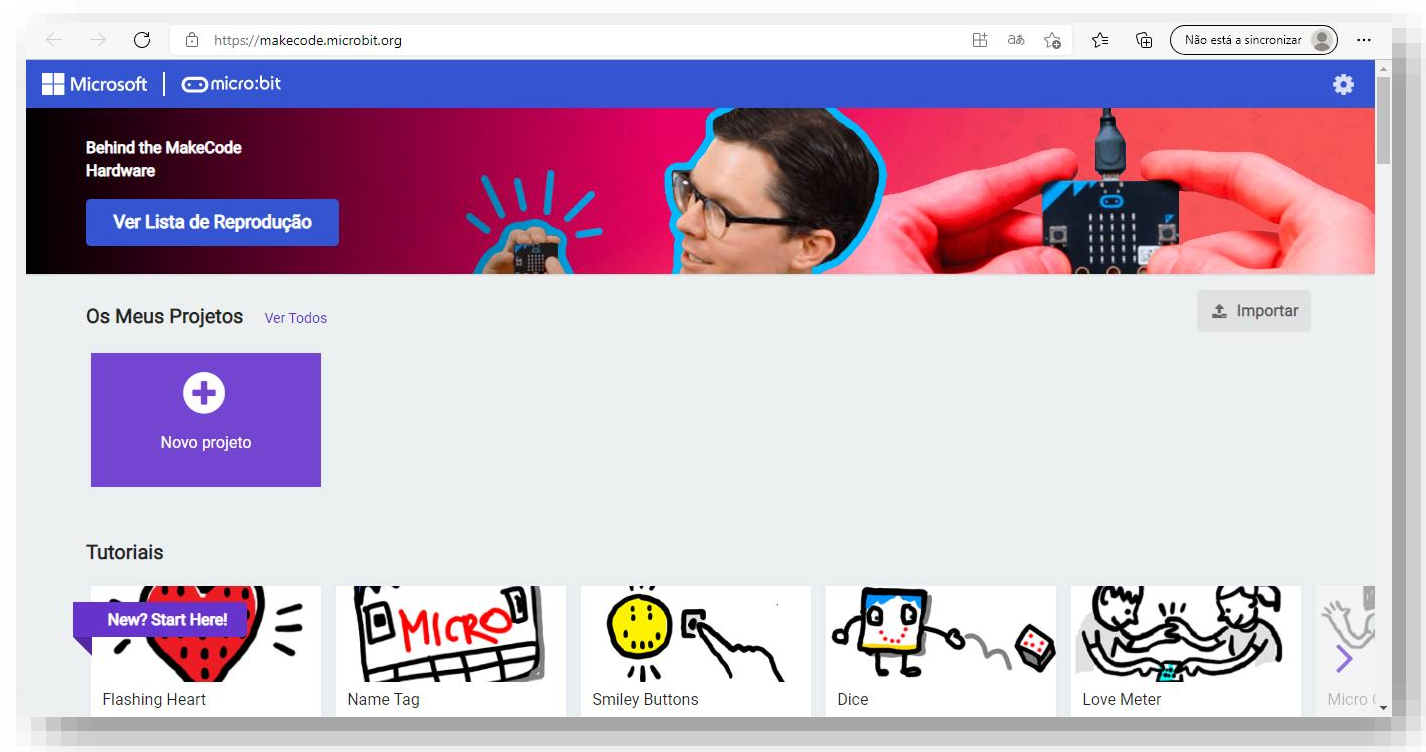
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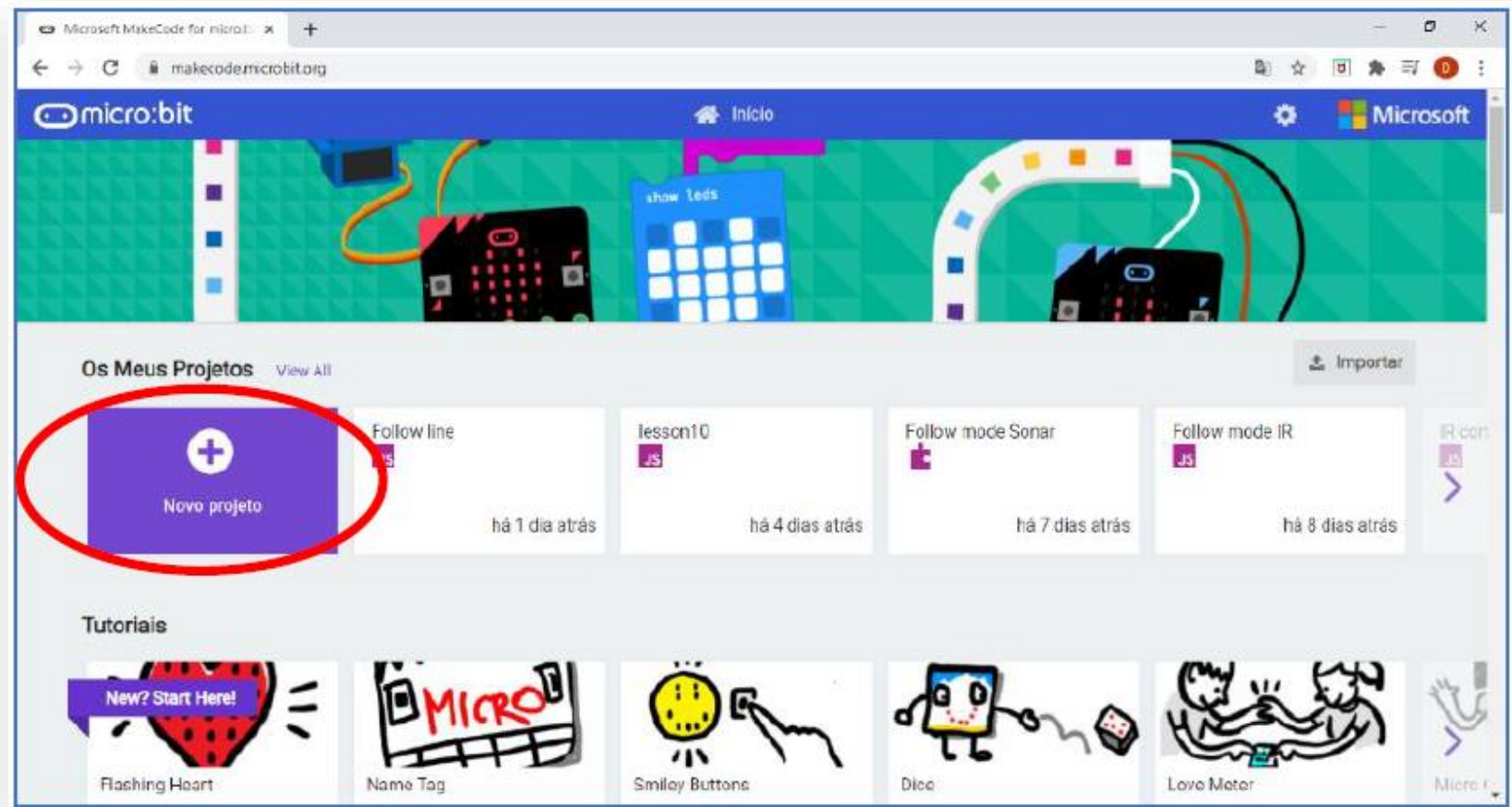
To start programming your robot, please take your laptop now and access to:

[makecode.microbit.org](https://makecode.microbit.org)





Create a new code by clicking the link: “New Project”



Now, your new winning project must be named. Give it a name!

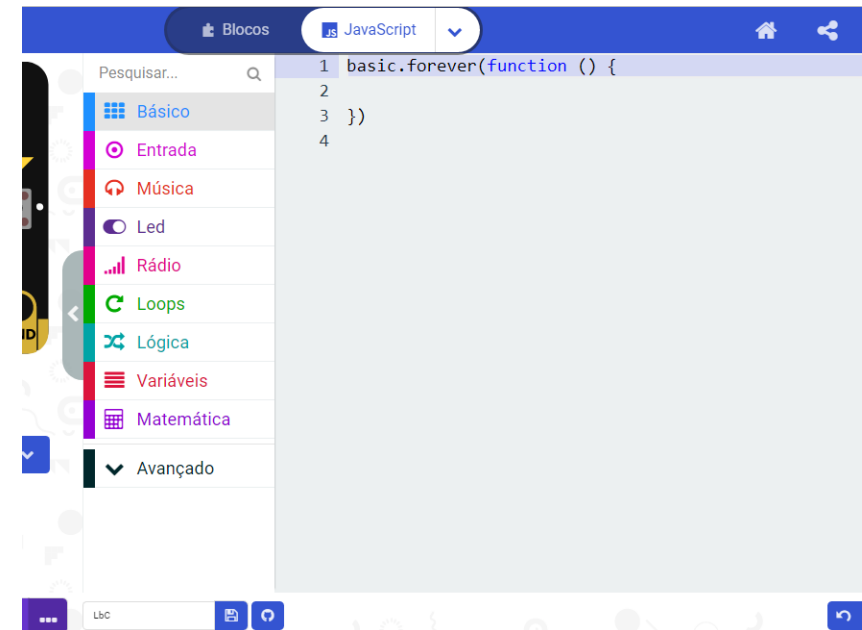
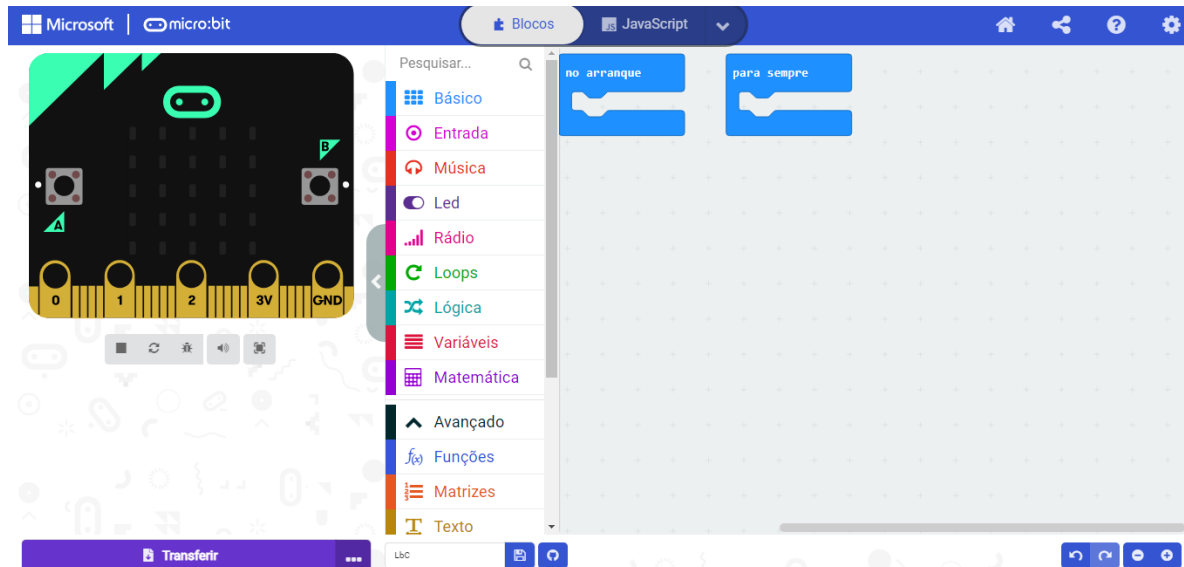
### Create a Project 🤗

Give your project a name.

> Code options

Create ✓

In the main interface, you can choose **blocks programming** (Image on the Left) or **Java.script/Python code programming** (Image on the right)



To program our robot, we'll need to install one particular extension

Browse to **“Advanced”** >> **“Extensions”** and search for:

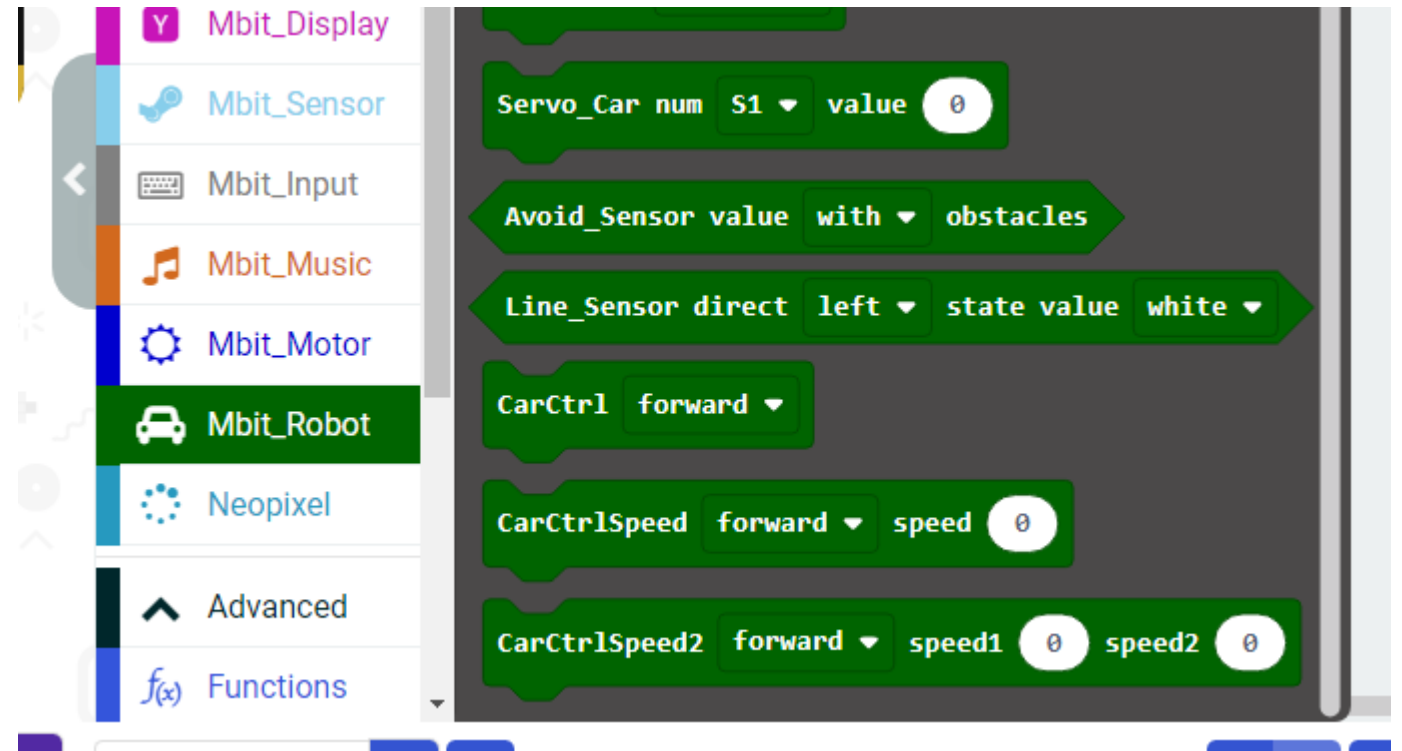
[https://github.com/lzty634158/yahboom\\_mbit\\_en](https://github.com/lzty634158/yahboom_mbit_en)



To move our robot, we will use one particular function named “CarCtrl” or “CarCtrlSpeed”.

These 2 functions allow us to:

- Move our Robot
  - Forward and back
  - Turn to left and right
  - Spin to left or right
  - STOP
- Control the Speed



# MICRO:BIT SOFTWARE



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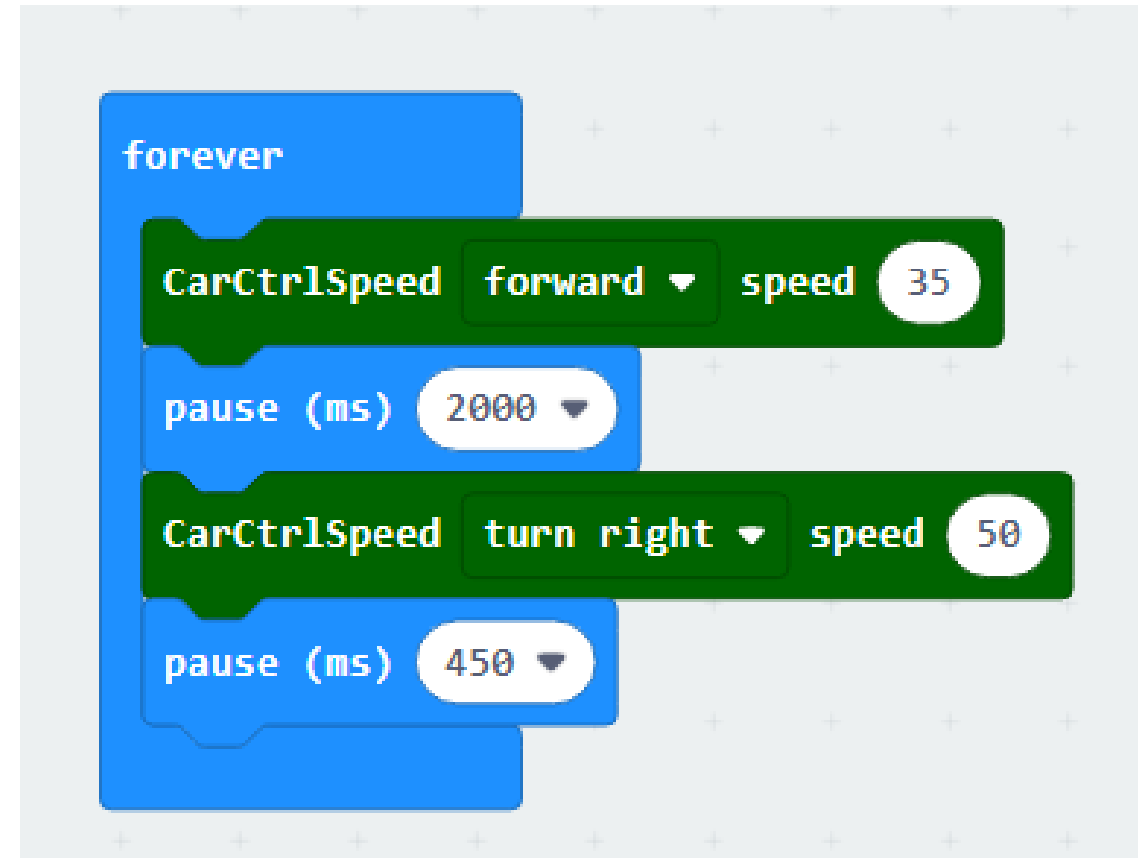


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Let's do one example.

- Create a new code and give it a name you like;
- Program with the instructions like the image on the right →

TRIP: The “CarCtrl” function can be found in the “Mbit\_Robot” section and the pause in the “Basics” section.



Micro:bit board is the brain of our robot

To Program Micro:bit you will need:



✓PC or Laptop

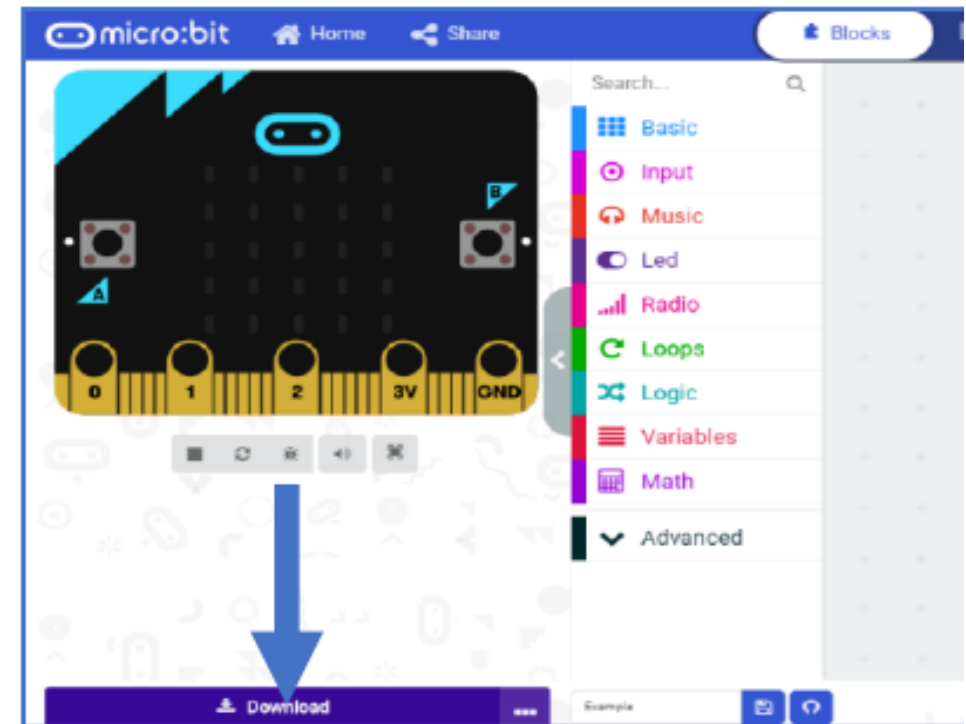
✓USB Cable

✓Micro:bit board



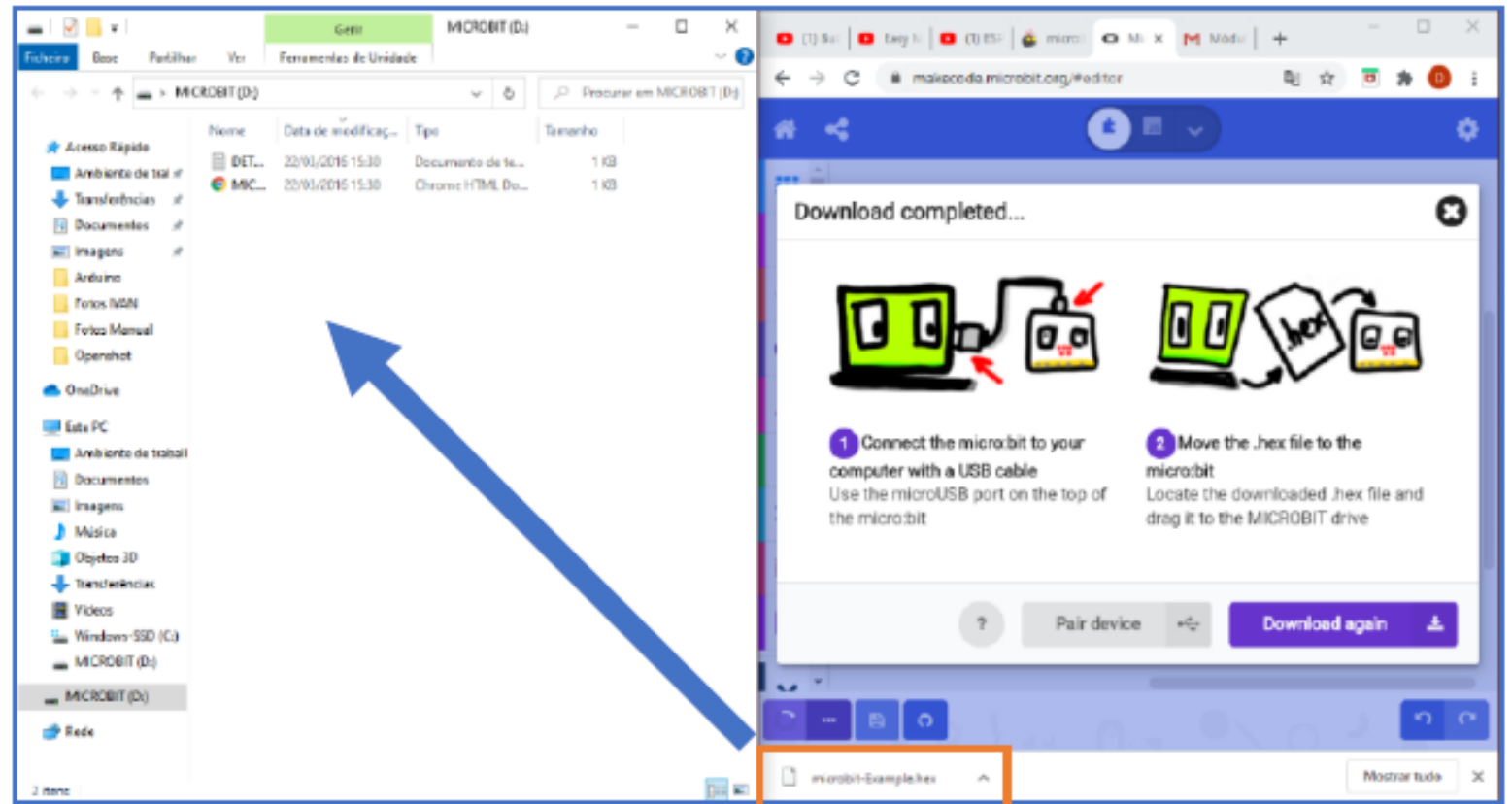
To transfer your amazing code to the micro:bit, you need to follow the next steps:

1. Disconnect the Micro: bit from your PCB interface
2. Connect Micro: bit to your PC with USB Cable
3. Click the download link to transfer the code to your PC



# PROGRAMMING THE MICRO:BIT

4. Drag and Drop the .hex file into your Micro:bit folder
5. Disconnect the Micro: bit from your PC and insert it again in her PCB interface



6. Put your robot on a big table or on the floor and turned ON  
(To turn ON your robot, you have a slider switch in the back)

***What was the result?***





IT'S ALL FOR NOW



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# Thank you for your attention

