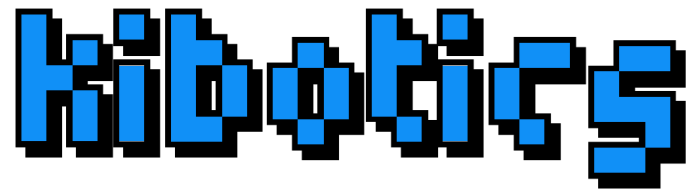


Kibotics: online web plataform for Educational Robotics



Contact: josemaria.plaza@gmail.com



@KiboticsOrg

www.youtube.com/@kibotics

www.linkedin.com/company/kibotics

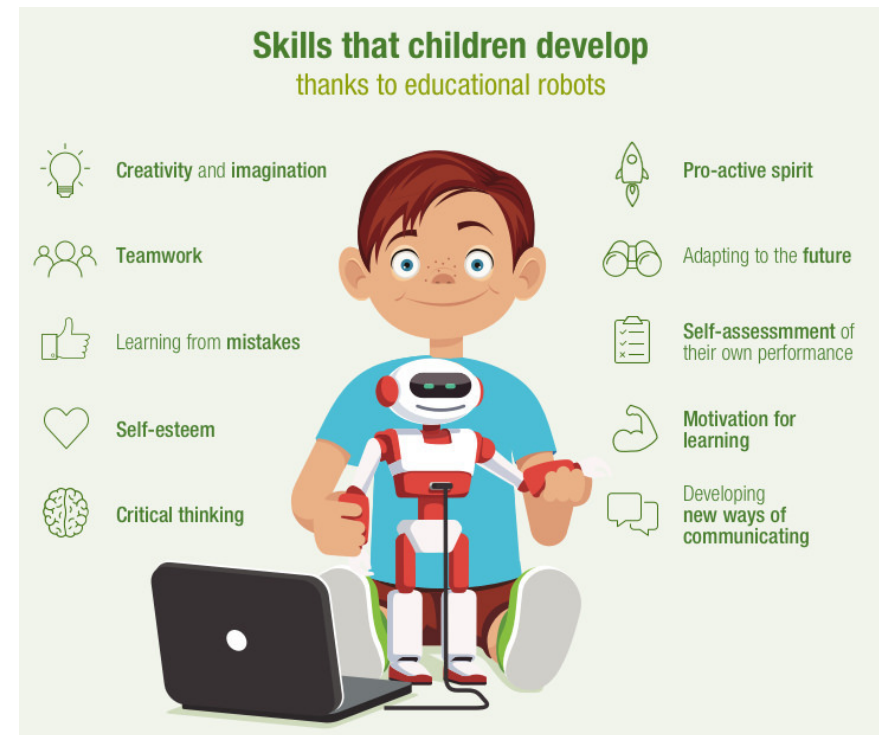
Robotics, a growing and useful technology



- Growing number of successful robotics applications in society
- Growing demand of education in robotics: engineering professionals, colleges, schools...
- $robot = hardware + software$
- $hardware = sensors + actuators + computers$

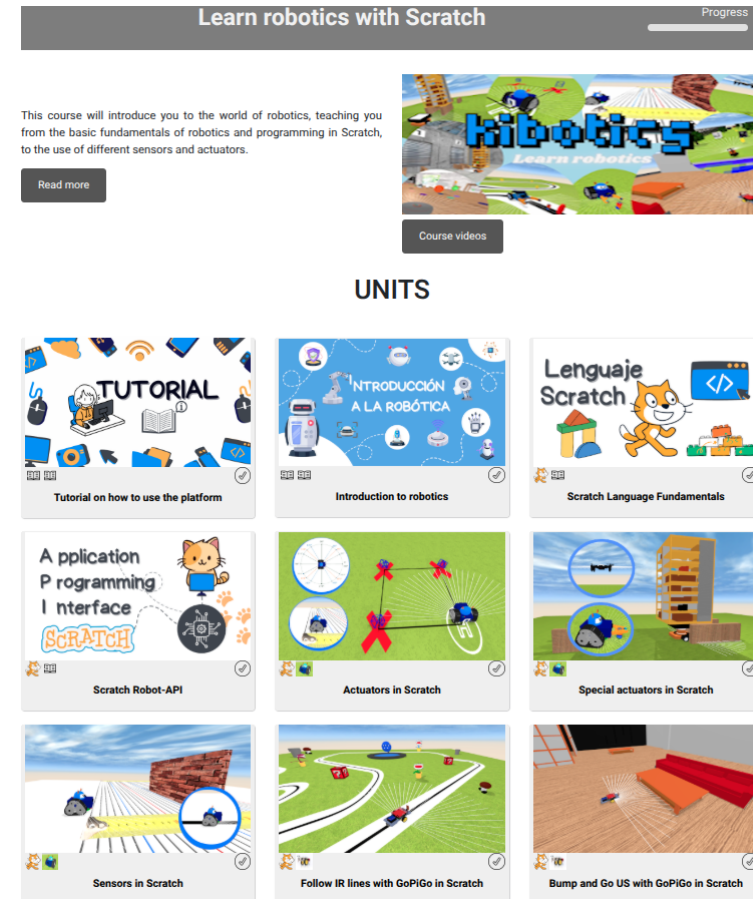
Robotics in pre-university (K12) education, children

- Engaging introduction to technology
- **STEM** subjects
Science, Technology, Engineering, Math
- + allows Project Based Learning
- + allows *gamification*
- + allows learning from error
- + allows team working
- Robots can be programmed!
Computational Thinking



Main features of Kibotics

- **Online**, web browser
- Primary, secondary, vocational
- Computational thinking
- **Scratch** and **Python** languages
- **Physical robots** y **simulated ones**
mBot, drone, LEGO, vision...
- Social interaction
- English, Spanish
- 2025 Video



- Learn **Robotics**
- Learn **Computational thinking**
- *Learn by doing*
- *Digital Twin*: 1^o simulated, 2^o real
- Engaging Games! *Gamification*
- + many available *video tutorials*
- + *theory explanations* inside each exercise
- It requires internet access
- It can be integrated in digital plataforms
(*Single Sign On*)




What will you learn in this unit?

In this exercise you will have to program our robot **GoPiGo** so that it can wander around a room without hitting any obstacles. The GoPiGo must be programed to use its **ultrasonic sensor** to obtain information of the environment continuously, and their **actuators** to execute the necessary actions to move around the room, avoiding various obstacles based on the obtained information.

The program should make the GoPiGo move in a straight line until it is close to an obstacle. At that moment, the program should make the GoPiGo stop, move back for a few moments, and turn left or right by a *random*, number of degrees and continue moving in a straight line as it did initially.

In this unit you will learn the basics of how a sensor widely used in robotics works and how to use it: the ultrasonic sensor.

We will use logic blocks to make decisions based on the ultrasonic sensor readings.

You will program one of the most famous robot behaviors, the **Bump and Go**.

Theory

Ultrasonic sensors are electronic devices that have two components:

1. An ultrasonic emitter, which will emit a sound that we humans are not able to hear (although other animals can).
2. An ultrasound receiver sensitive to ultrasound. An electronic "ear" capable of transforming that sound into an electrical impulse.

Thanks to these devices, we can obtain the distance to an object from the robot.

The detailed explanation of the US sensor was covered in the Sensors unit, go back to this unit if you need to recall it. [Go to the unit Sensors](#)

 More information: Us sensor pill

Blocks to use

Sensors

We are going to use the ultrasonic sensor (abbreviated US) that the GoPiGo has on its front side. This...

Study time: 2.5 hours

Difficulty: 

[Frequently asked questions](#)



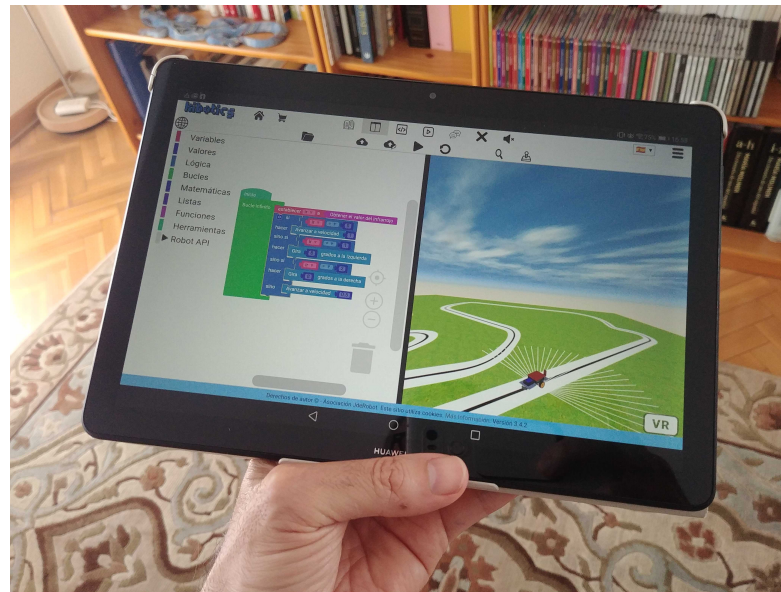
 Mark as completed

Content

-  What will you learn in this unit?
-  Theory
-  Blocks to use
-  Hints for solving the exercise
-  Collecting
-  Did you know that...?

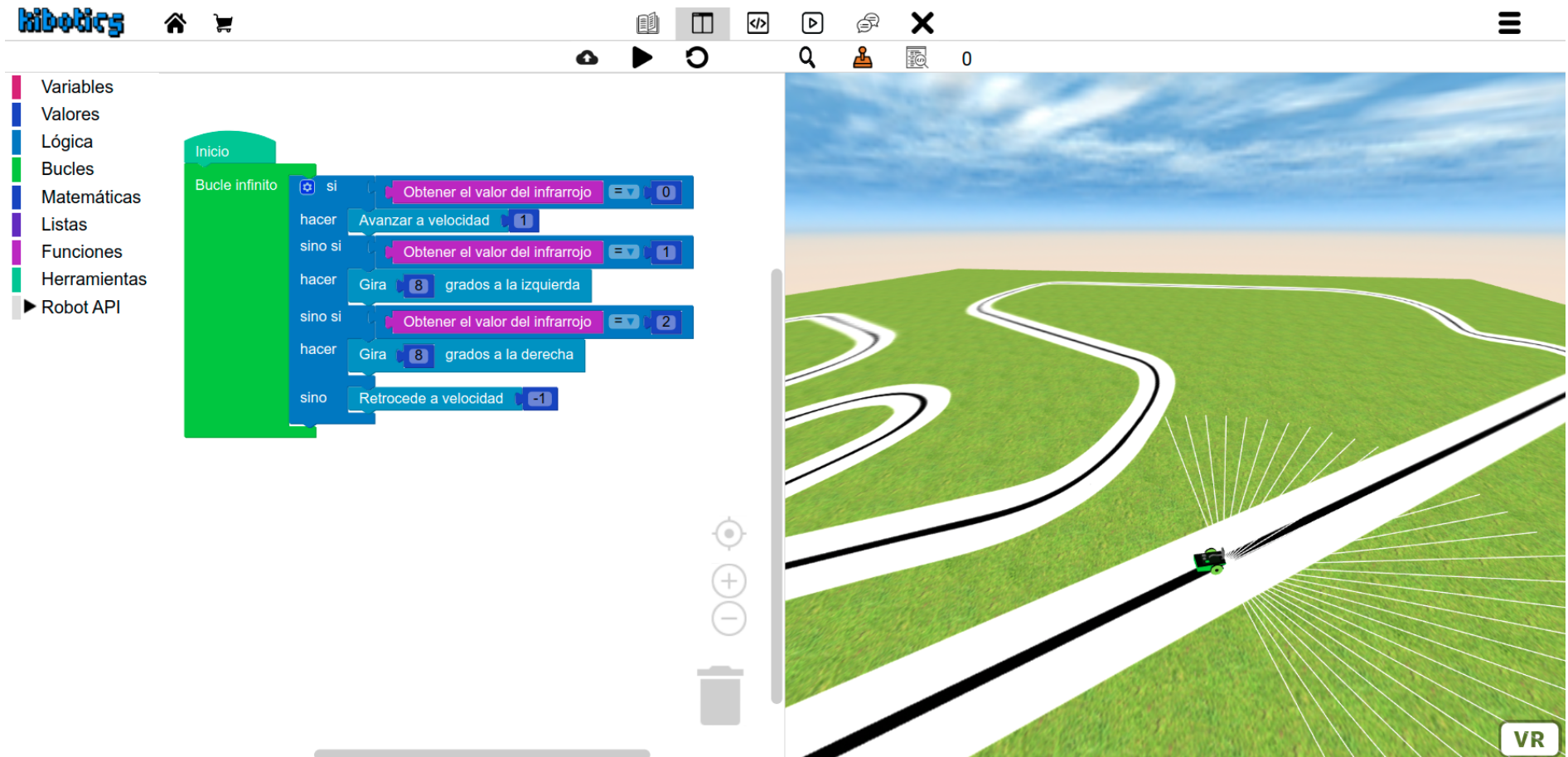
<https://kibotics.org>

- Zero installation
- Anytime, anywhere :-)
- Crossplatform: Windows, Linux, MacOS, tablets, Android

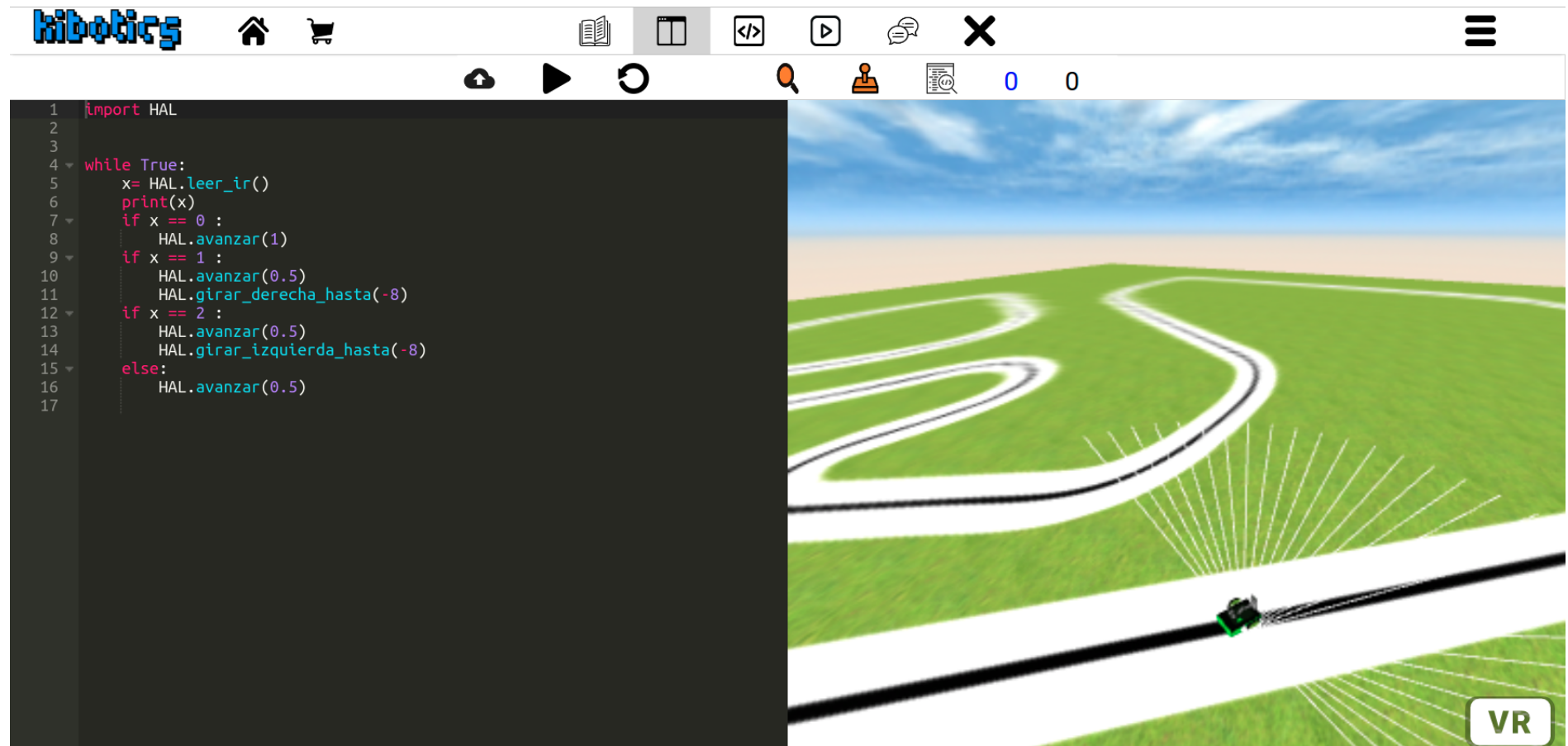


Programming languages: Scratch and Python

- **Scratch**: visual language, easy to learn

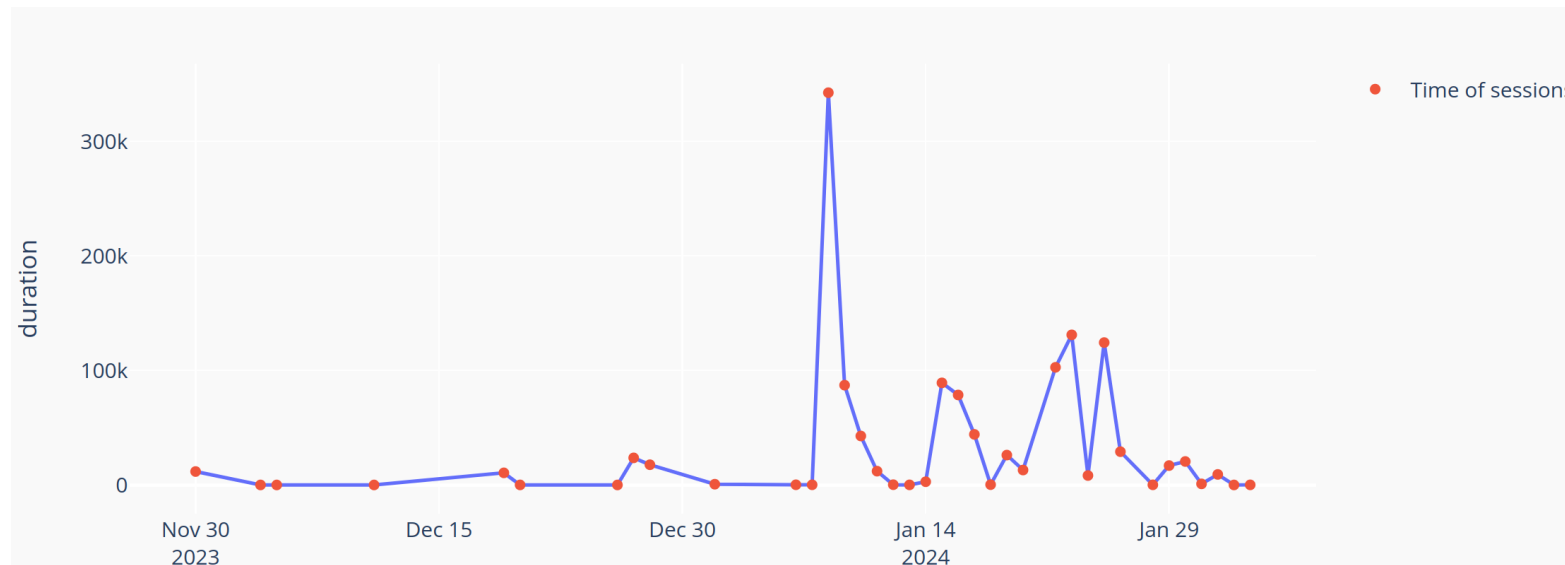


- **Python**: text language, simple but powerful
- Also used at many universities and jobs



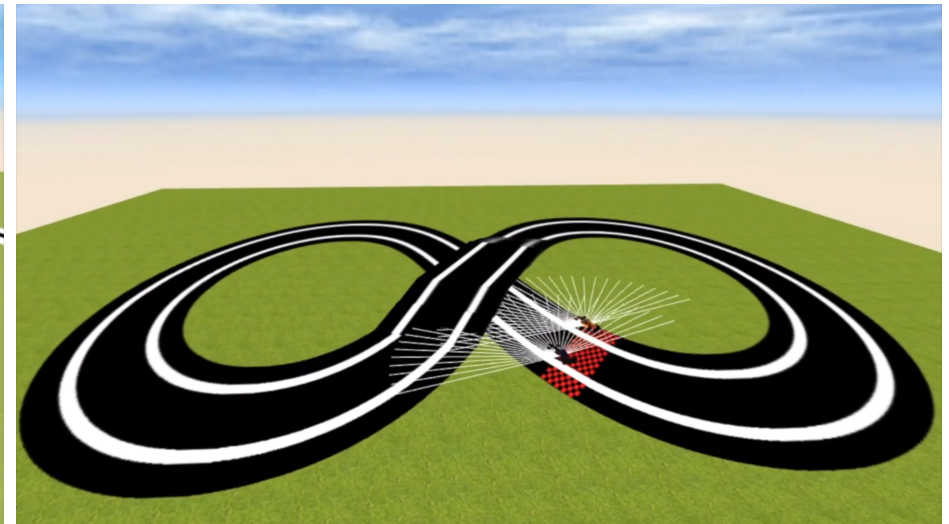
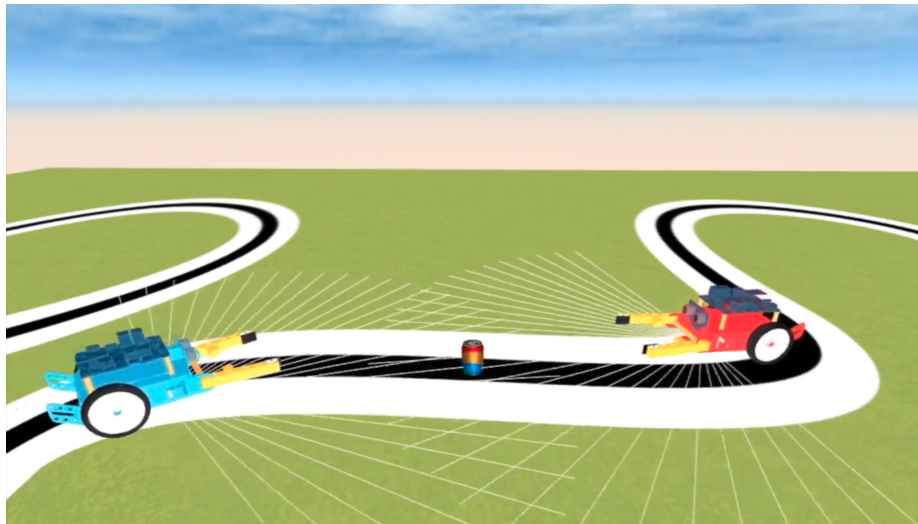
Services for teachers

- Reference solutions provided
- Access to their students' source codes (read, write, execute)
- Automatic assessment and score
- Learning analytics, students activity is monitored



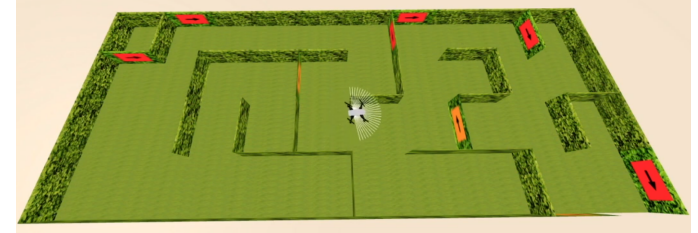
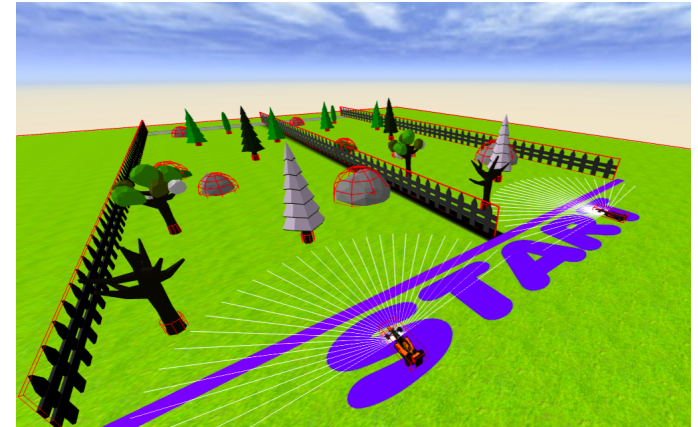
We periodically organize online competitions

- Open, JuegosRoboticos 2022. Follow them in Twitch :-)
- Play and compete with other users
- Steel the bacon, Formula1 racing, obstacle avoidance race



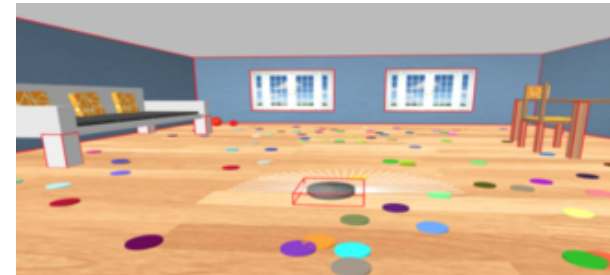
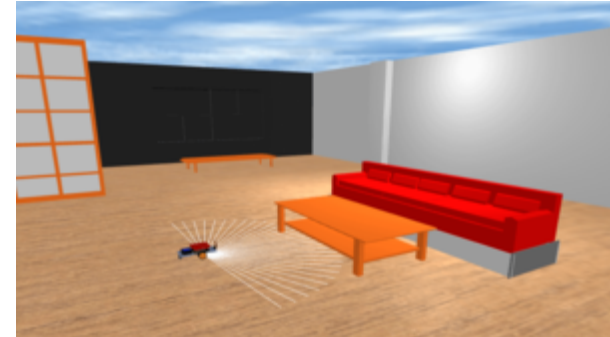
Robotics & Computational Thinking Courses

- Adapted to official syllabus
 - Incremental complexity
 - Practical units and theory units
 - We can create *tailored courses*
 - In Scratch and Python flavours
1. [Learn Robotics course](#)
 2. [Robots with Arts course](#)
 3. [Drones course](#)
 4. [Learn Computational Thinking course](#)
 5. [Robots with Vision course](#)
 6. [Games with Robots course](#)



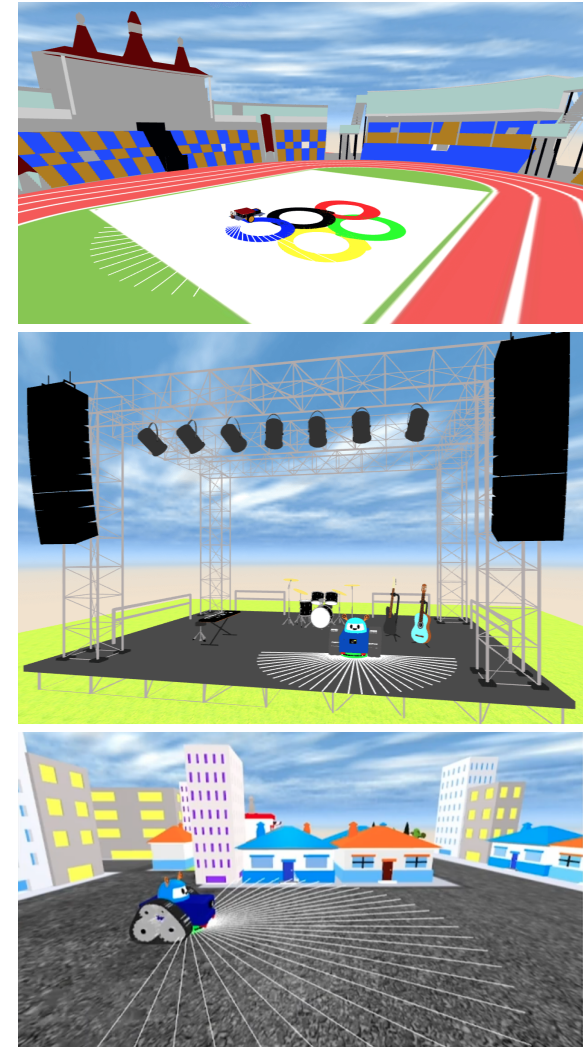
1. 'Learn Robotics' course

- Sensors: IR, distance, contact
- Actuators: motors, gripper
- Programming languages: Scratch, Python
- Simple applications
 - Obstacle avoidance with distance sensor
 - Follow line with IR sensor
- More funny applications
 - Vacuum cleaner robot
 - Robot for warehouses
 - Steal the bacon game
- Creative unit: select your robot + world



2. 'Robots with arts' course

- A *creative* introduction to robots
- Special actuators: *drawing*, music
- Special sensors: clapping sound
- Programming languages Scratch, Python
- Robotics applications:
 - Drawing the Olympics flag
 - Drawing a Mondrian picture
 - A robot guiding tourists in a Museum
 - Singing a song
 - Guide your robot with claps through a city



3. 'Drones' course

- Take-off, landing, 3D movements
- Follow a moving ball in the air

4. 'Learn Computational Thinking' course

- Robots are more engaging than classical approach
- Loops, conditionals, variables... Scratch, Python

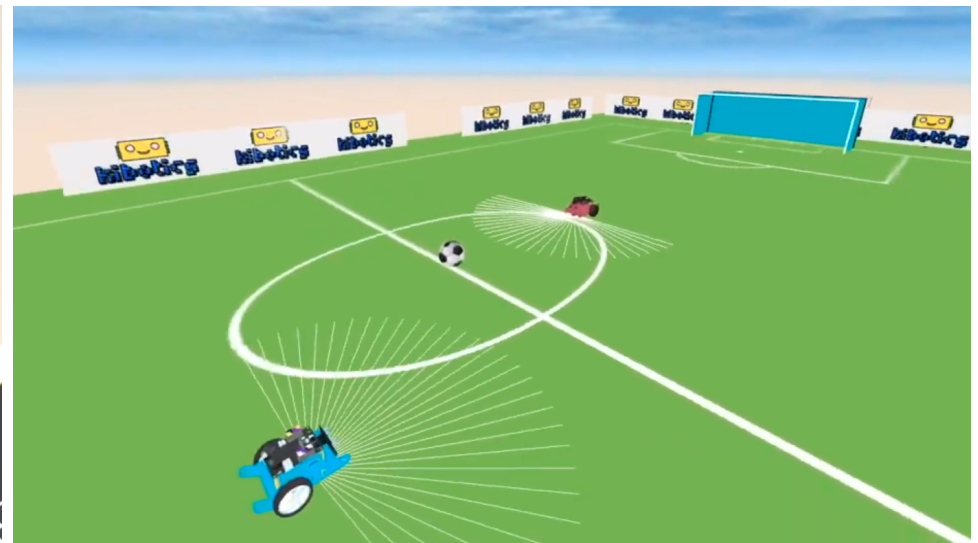
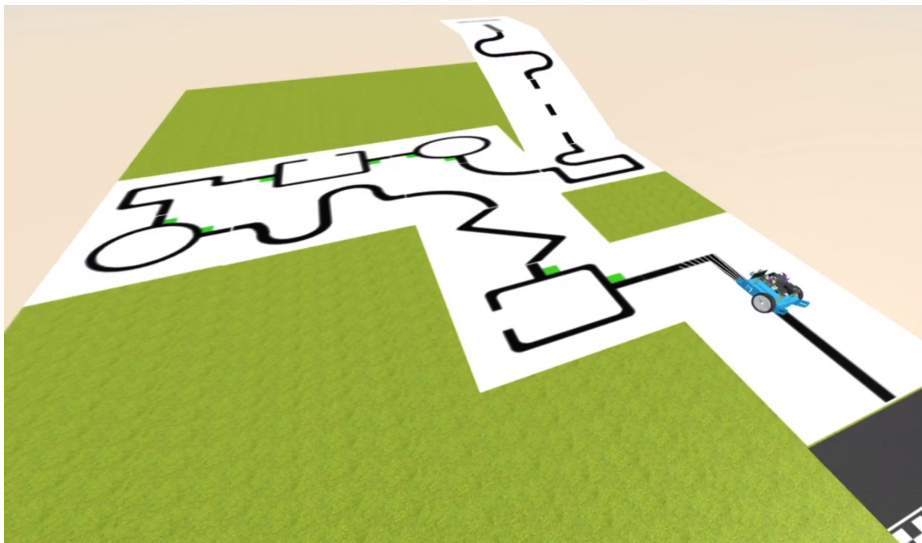
5. 'Robots con vision' course

- Cameras are a common sensor in robots
- Autonomous driving road, traffic lights detection
- Follow Person using vision



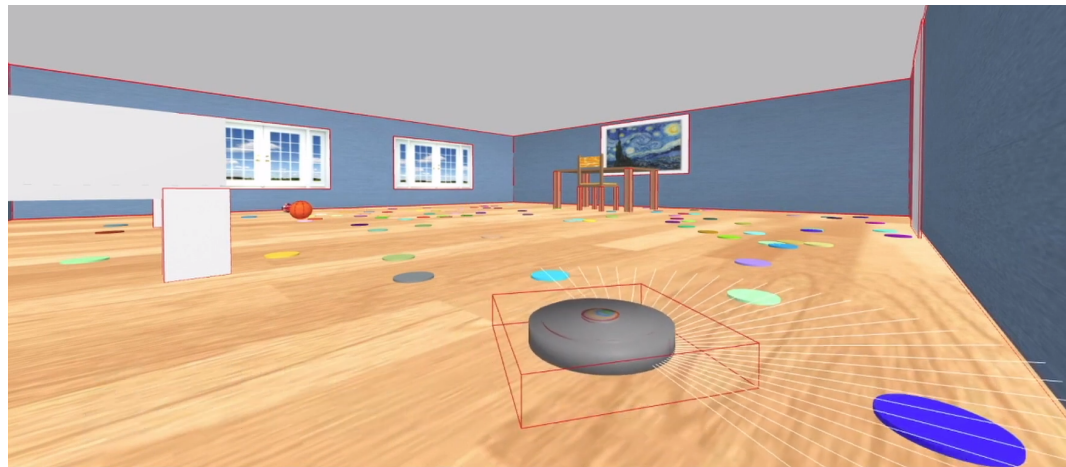
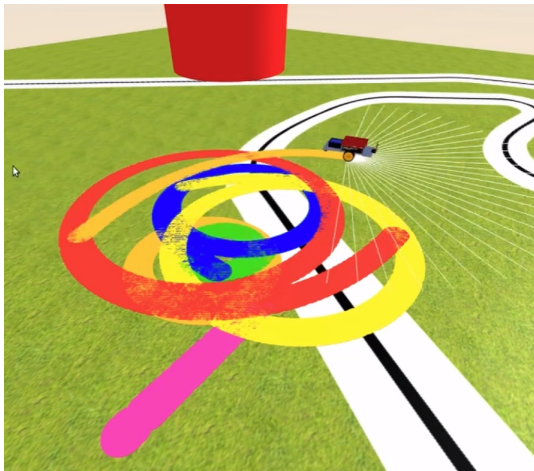
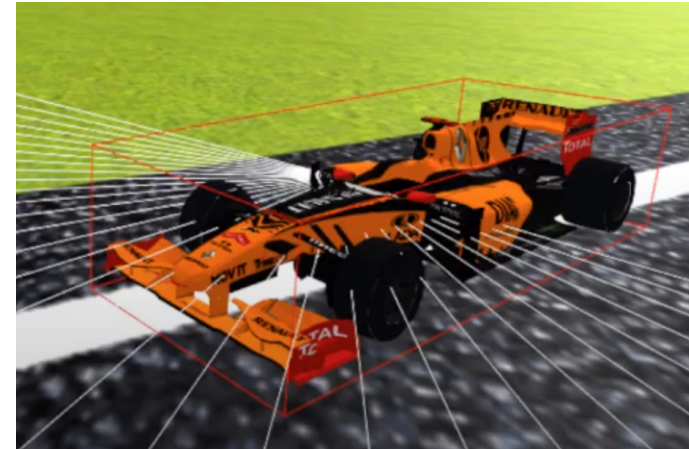
6. 'Games with robots' course

- Challenges: learn while playing with robots
- Automatic score system, **increases motivation**
- Automatic *opponents* of various skill levels (and also other users)
- Football, follow line racing, vacuum cleaner, drone cat & mouse, line tracking chase ...



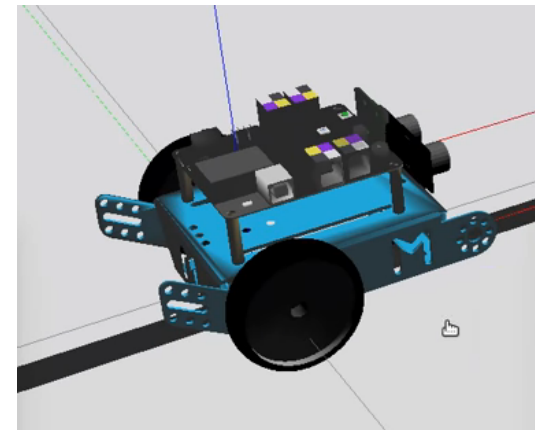
Many supported robots

- Physical robots and simulated ones
- Digital twins
- Robotic Vacuum Cleaner
- Autonomous car, Formula-1 car
- Drawing robot



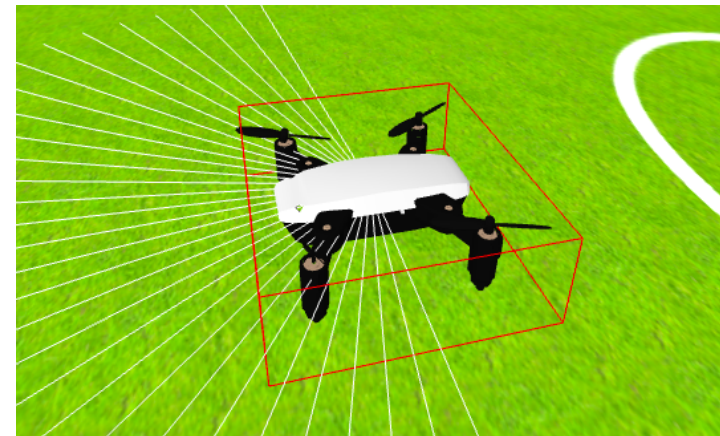
mBot robot

- Commercial, Makeblock
- Cheap, easy to buy
- Robust
- Arduino processor
- Motors
- Ultrasound, Infrared
- Physical and simulated mBot



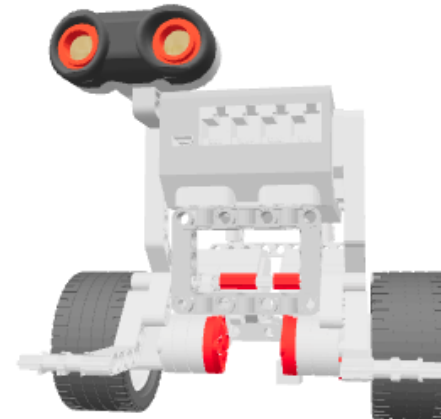
Tello drone

- Commercial, DJI+Intel
- Cheap, easy to buy
- Robust and stable
- Camera
- Position based control
- Speed based control
- Physical and simulated drone



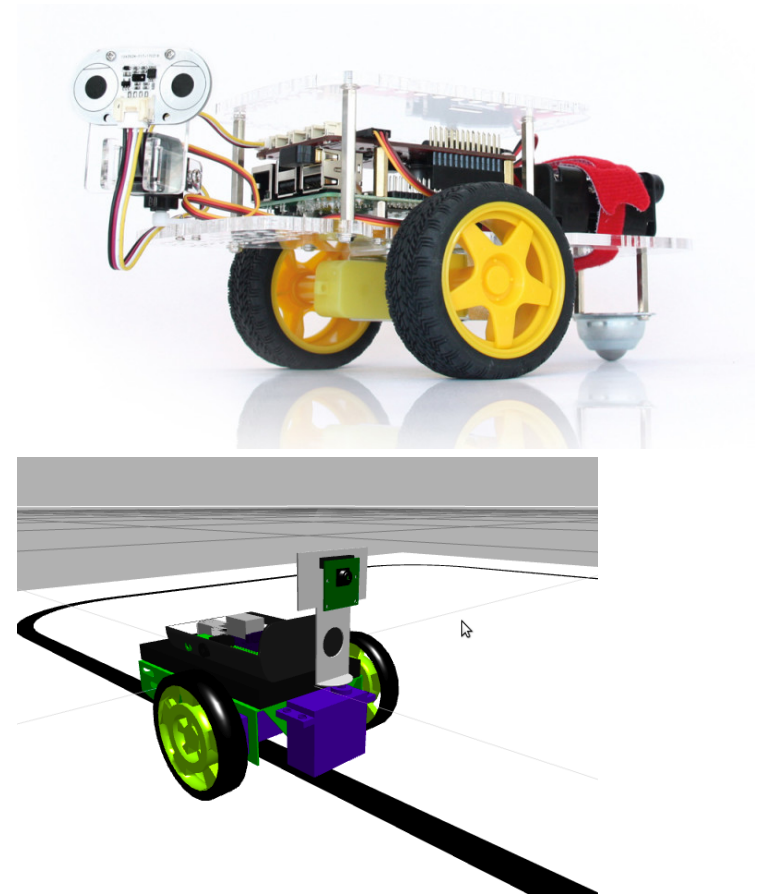
LEGO EV3 robot

- Commercial, LEGO
- Robust
- Several mechanical assemblies
- ARM9 processor, Linux
- Motors with encoders
- Ultrasound, Infrared
- Physical and simulated EV3



GoPiGo robot

- Commercial, Dexter industries
- RaspberryPI processor
- Motors with encoders
- Ultrasound, Infrared
- PiCam camera, vision
- Physical and simulated GoPiGo



Successful stories with Kibotics

- School of Computational Thinking INTEF (2019)
- Fuenlabrada city council (2019-2021)
- RoboCampeones competition 2019
- IES Martínez Uribarri (Salamanca, courses 2019-2021)
- 800 students from schools in Comunidad de Madrid (2023)
- Collaboration with FERTILE Erasmus+ K220 project (2024)
- +400 Alkor school, Hamelin school... (2025)