

An abstract graphic in the upper left quadrant features a large, faint grey circle with a smaller, solid white circle inside it. A thin white line connects the center of the small circle to the top-left edge of the large circle. The background is a dark blue grid of light points.

LA ROBÓTICA EN LOS TIEMPOS DEL COVID

GONZALO ZABALA

CAETI - UAI



UAI

Universidad Abierta
Interamericana

“En los últimos quince años, la educación tecnológica se ha basado esencialmente en la tecnología digital, dejando de lado el uso de material concreto. Aún contando con excelentes simuladores del mundo físico, el trabajo con material concreto permite el desarrollo de estructuras cognitivas que lo digital no ofrece.”

Zabala, Morán, Blanco - 2010

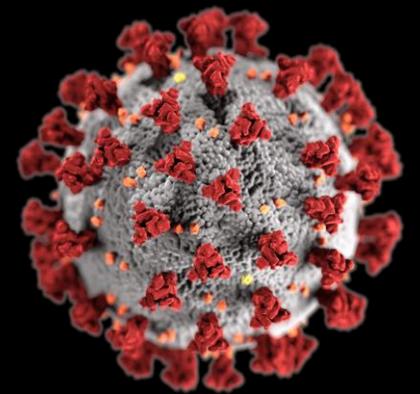
“[...] nos encontramos con un grave panorama, dado que ciertas estructuras cognitivas no son desarrolladas por la ausencia de material concreto en el juego y en la educación.”

Healey - 1991

“Un número de participantes cita una inadecuada representación de la realidad física [...] La simulación puede producir comportamientos no realistas.”

Afzal et al. - 2020

Y un día llegó el COVID...



[Esta foto](#)

desconocida
o está bajo

Intentando volver a las aulas...

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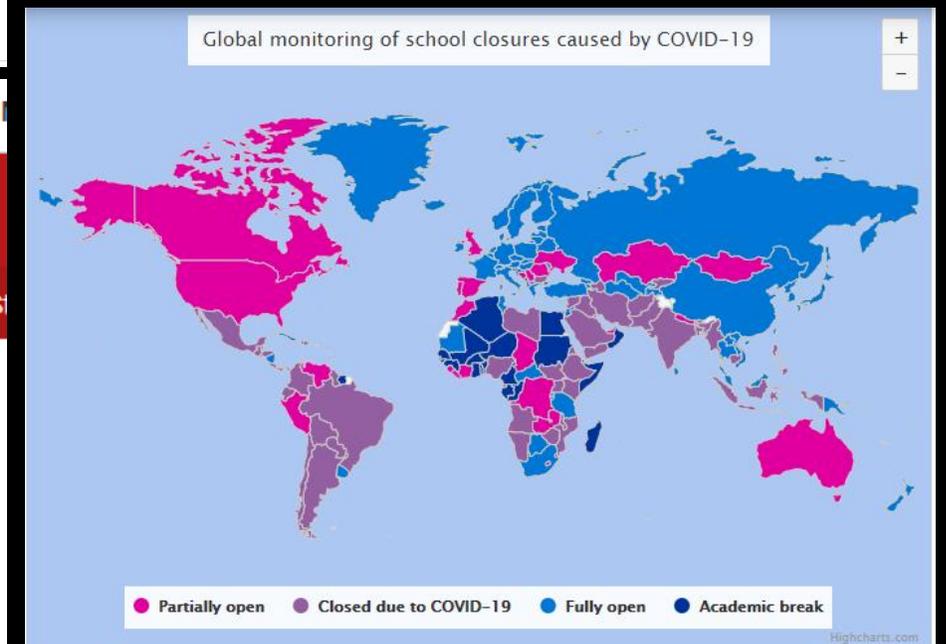
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Coronavirus: will UK schools have to close again?

Thousands of teachers are self-isolating - but the government is determined not to order new closures

Curated new
it's needed



¿En qué lugar está la robótica en el retorno a lo presencial?

Trabajo en equipo



Competencias



Compartir materiales

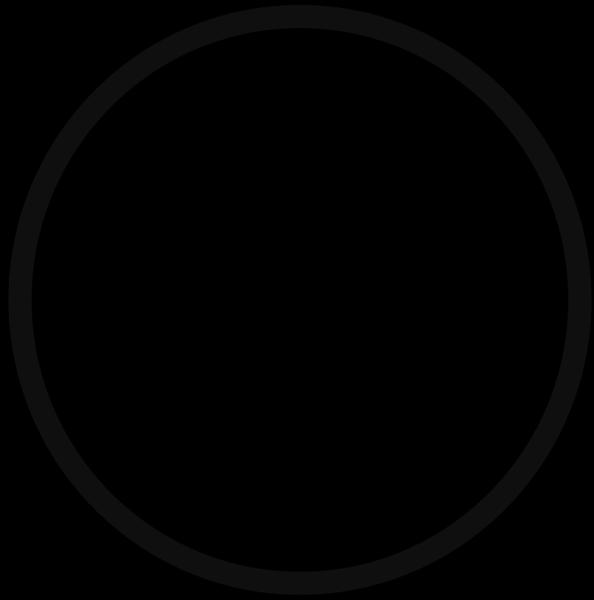




El único camino... la simulación

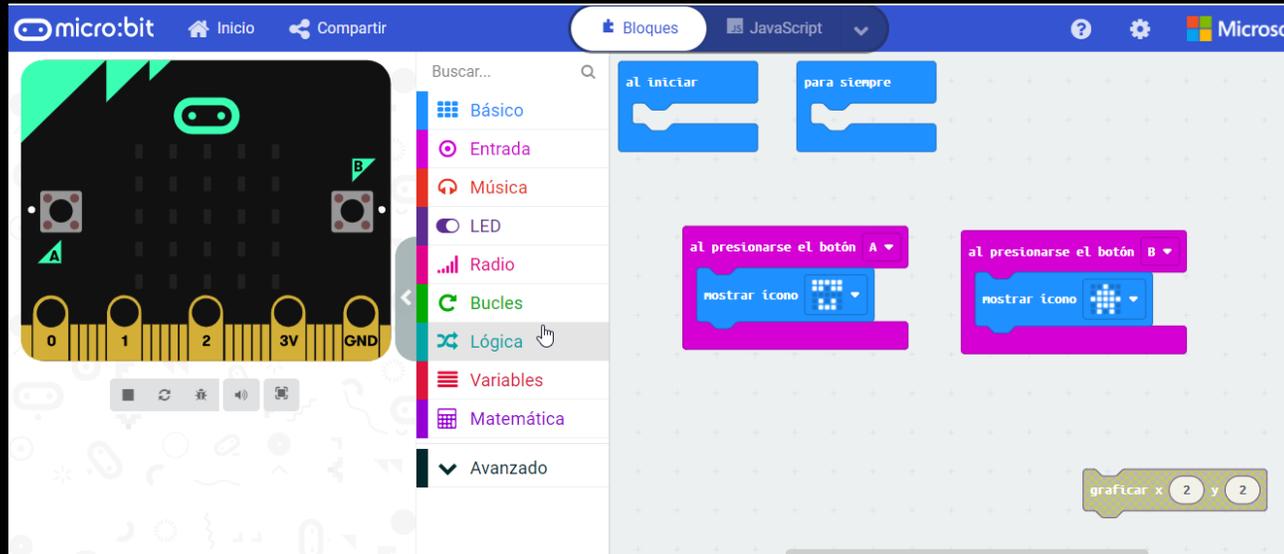
- Desventajas
 - La realidad tiene infinitas variables continuas. Las computadoras, finitas y discretas.
 - Para acercarme al mundo real, el equipo debe tener alto poder de cómputo.
 - Es menos natural el trabajo en equipo.
 - La construcción del robot en espacios simulados es mucho más compleja.
 - Es difícil simular lo imponderable... (no hay pelos en los pisos simulados... 😊)
- Ventajas
 - Bajo costo.
 - Ubicuidad.
 - Más fácil de depurar.

Pero, la mayor ventaja es que, hoy por hoy, ES LO ÚNICO POSIBLE



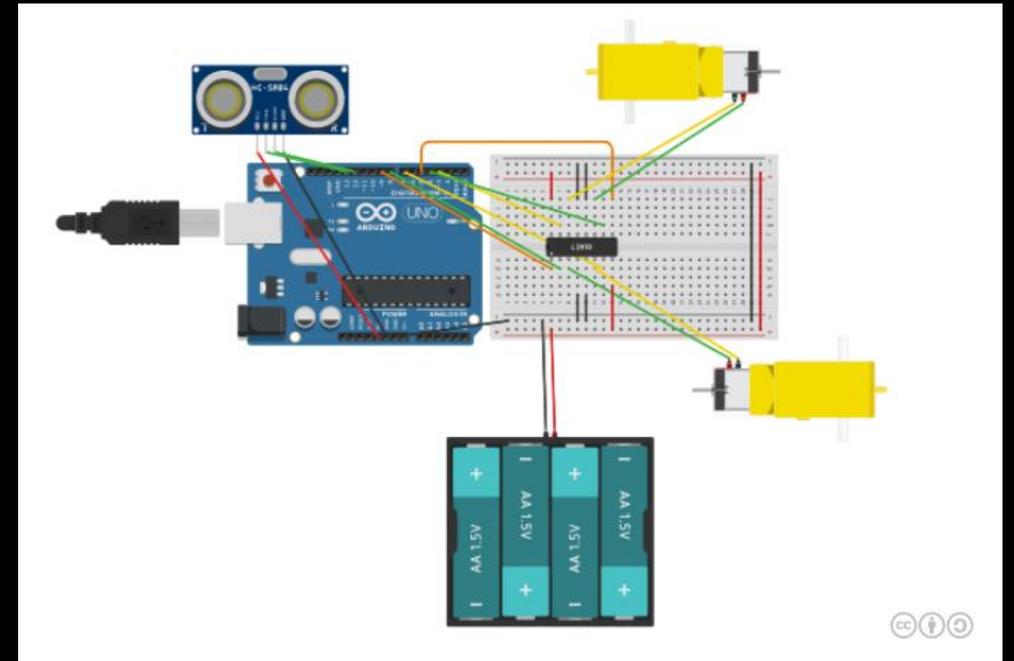
ESPACIOS DE SIMULACION

Carentes de contexto

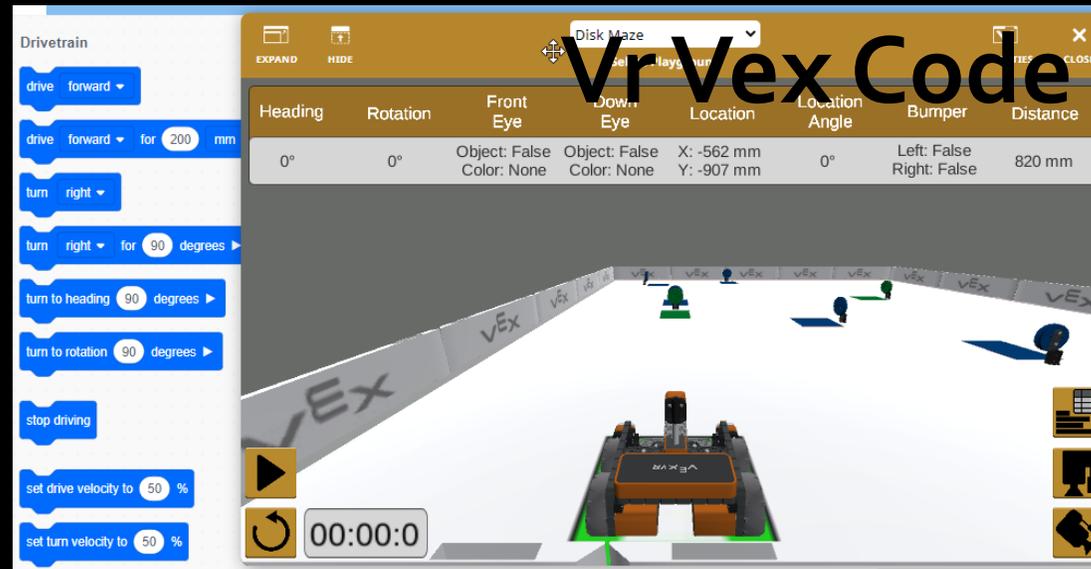
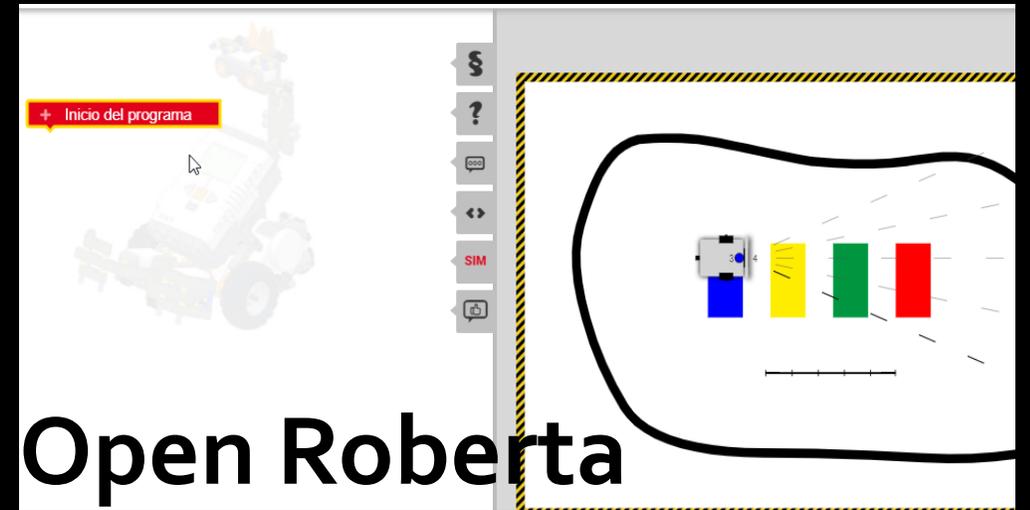
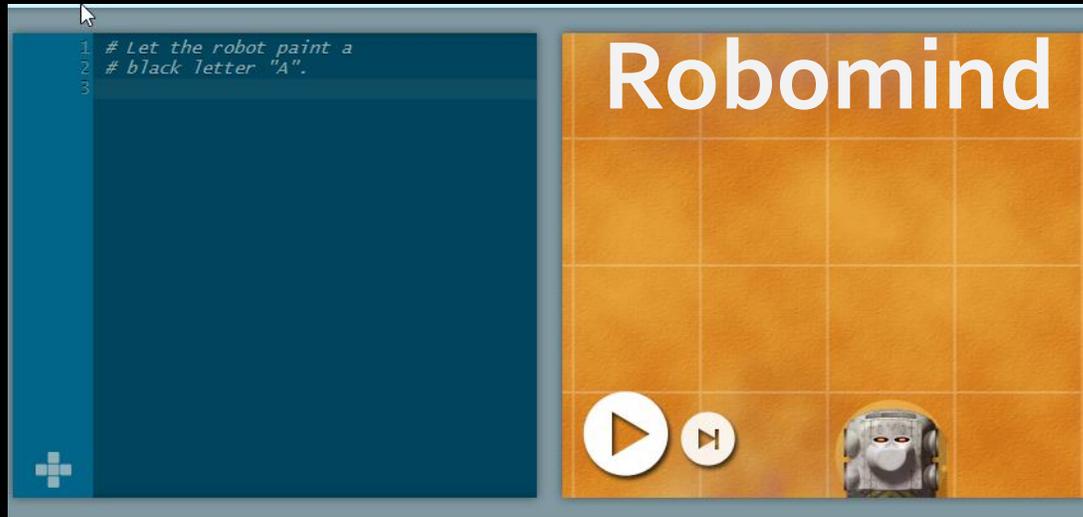


Makecode

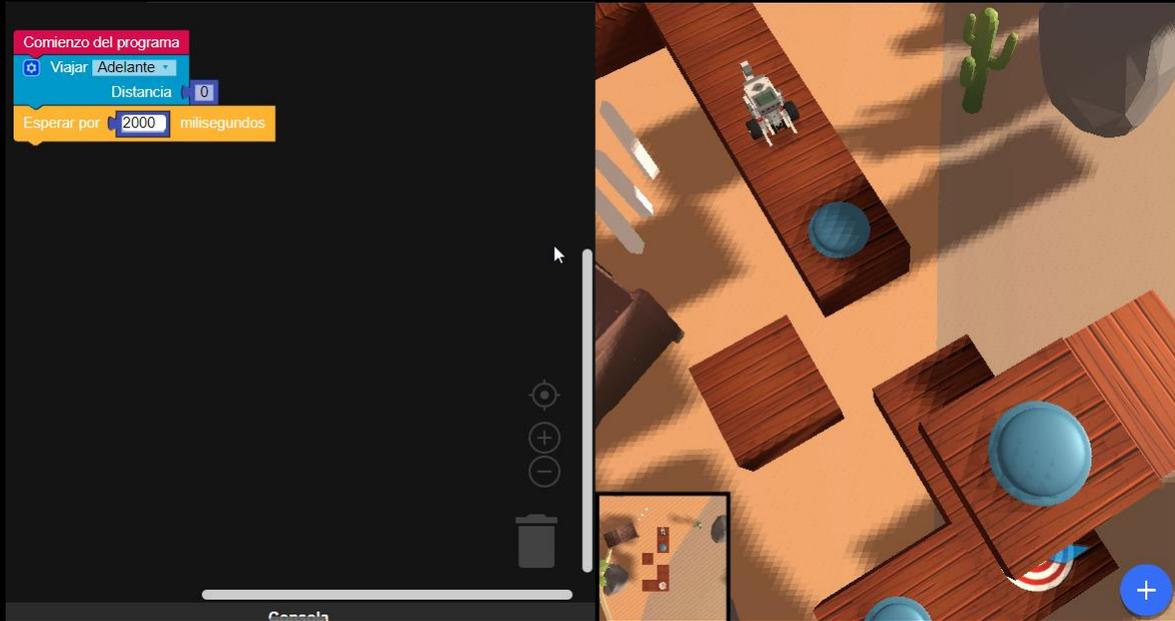
Tinkercad



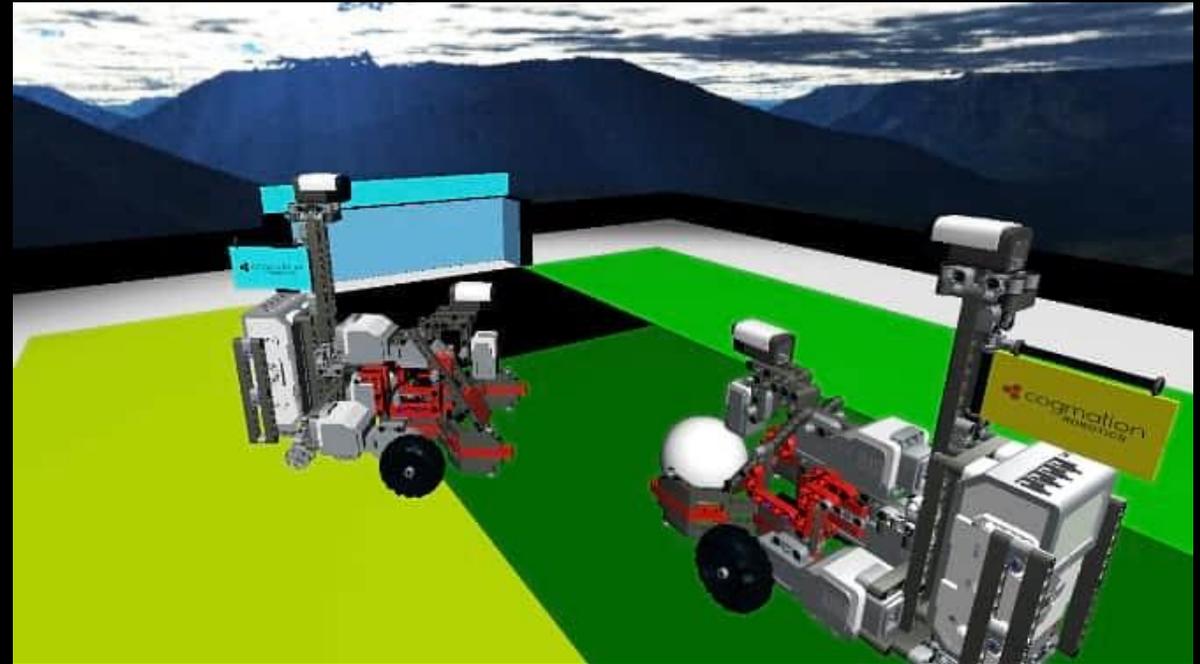
Mundos 2D



Mundos 3D con física

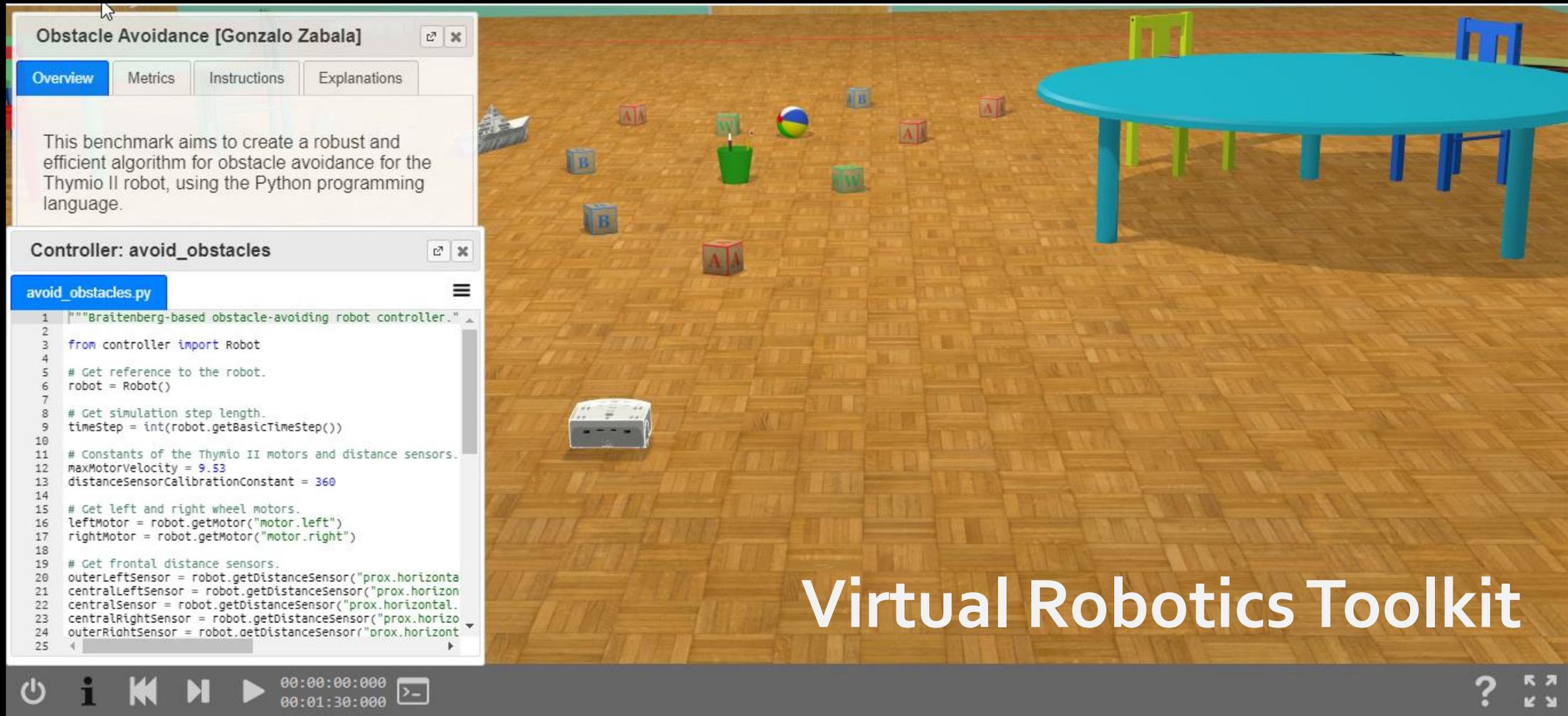


CoderZ



Virtual Robotics Toolkit

Mundos 3D con física



The image shows a 3D virtual environment with a wooden floor, a blue table, and various obstacles like blocks and a ball. A small white robot is positioned in the center. On the left, there is a code editor window titled "Obstacle Avoidance [Gonzalo Zabala]" with tabs for "Overview", "Metrics", "Instructions", and "Explanations". The "Overview" tab is active, displaying a description of the benchmark. Below it, the "Controller: avoid_obstacles" is shown, with a code editor displaying the Python code for the controller.

Obstacle Avoidance [Gonzalo Zabala]

Overview Metrics Instructions Explanations

This benchmark aims to create a robust and efficient algorithm for obstacle avoidance for the Thymio II robot, using the Python programming language.

Controller: avoid_obstacles

avoid_obstacles.py

```
1 """Braitenberg-based obstacle-avoiding robot controller."""
2
3 from controller import Robot
4
5 # Get reference to the robot.
6 robot = Robot()
7
8 # Get simulation step length.
9 timeStep = int(robot.getBasicTimeStep())
10
11 # Constants of the Thymio II motors and distance sensors.
12 maxMotorVelocity = 9.53
13 distanceSensorCalibrationConstant = 360
14
15 # Get left and right wheel motors.
16 leftMotor = robot.getMotor("motor.left")
17 rightMotor = robot.getMotor("motor.right")
18
19 # Get frontal distance sensors.
20 outerLeftSensor = robot.getDistanceSensor("prox.horizontal
21 centralLeftSensor = robot.getDistanceSensor("prox.horizon
22 centralSensor = robot.getDistanceSensor("prox.horizontal
23 centralRightSensor = robot.getDistanceSensor("prox.horizo
24 outerRightSensor = robot.getDistanceSensor("prox.horizont
25
```

Virtual Robotics Toolkit

Limitaciones

- Carecen de contexto
 - No interactúan con un mundo
 - No tienen física
 - Necesitan de una bajada a un dispositivo físico
- Mundos 2D
 - No tienen física
 - Los sensores posibles son limitados o demasiado ad-hoc
 - Esencialmente para aprender programación
- Mundos 3D
 - Caros
 - Complejos
 - Necesitan de mucho poder de cómputo
 - No tienen presencia de robots simultáneos

¿Cómo hacemos la Roboliga? (¡En su cumpleaños número 20!)

The image shows a screenshot of the Robocup Junior Virtual Rescue simulation interface. The window is titled "Simulation Controls" and "Simulation View". The left panel, titled "Erebus Rescue Simulator Release 7", contains three buttons: "REMOVE CONTROLLER", "RELOCATE", and "NO DETECTION API". Below these buttons is a purple bar with three circular icons: a play button, a pause button, and a refresh button. Underneath the bar, the time "07:58" is displayed, and at the bottom, the number "0" is shown. The main simulation view displays a 3D environment with a robot in the bottom-left corner, a red light source, and various obstacles. A toolbar at the top of the simulation view includes icons for camera, zoom, and playback, with a timer showing "0:00:06:272" and a speed of "0.00x". A console window is visible at the bottom of the simulation view.

Simulation Controls

Simulation View

Erebus Rescue Simulator
Release 7

REMOVE CONTROLLER

RELOCATE

NO DETECTION API

07:58

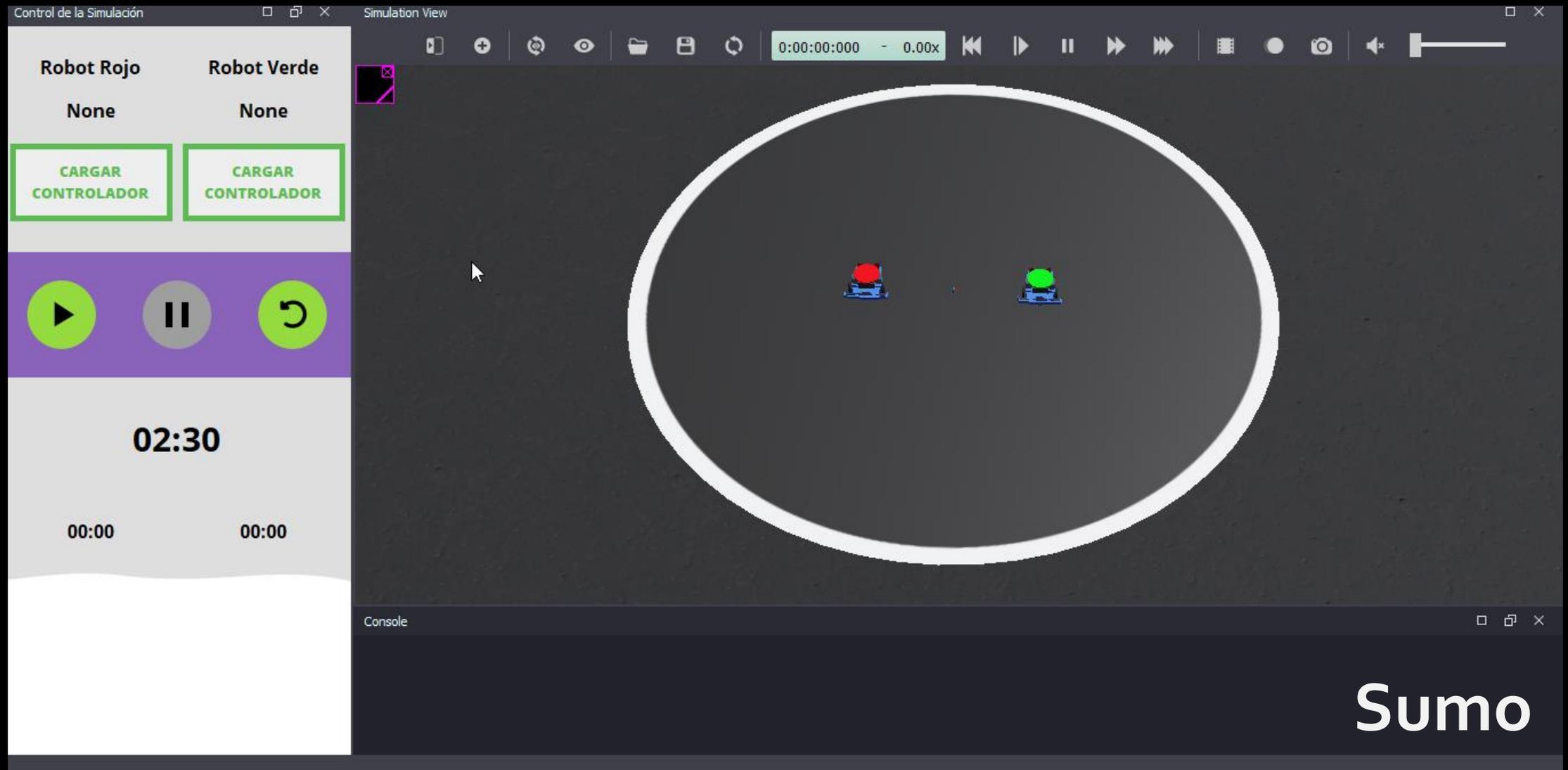
0

0:00:06:272 - 0.00x

Console

Robocup Junior Virtual Rescue

Y nuestra propia creación...



Entorno de programación para nivel inicial

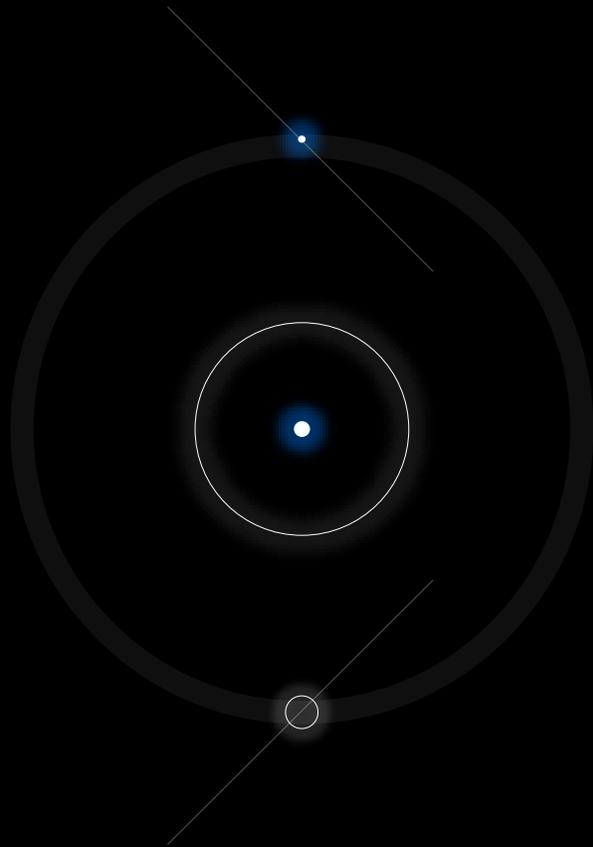
The screenshot displays the 'webots-blockly' web application interface. At the top, the title 'Roboliga Virtual 2020' is visible, along with file management buttons: 'Nuevo...', 'Abrir...', and 'Guardar como...'. A text field for 'Nombre del robot:' contains the name 'Uba', and another field for 'Escribir código en:' shows the file path 'C:\Users\Gonzalo\OneDrive - uai.edu.ar\'. On the left, a 'Bloques' (Blocks) sidebar lists categories: Start, Robot, Printing, Control, Matemática, Variables, Procedimientos, and Funciones. The main workspace contains a 'loop' block with two 'establecer velocidad de' (set speed of) blocks, one for 'motorIzquierdo' and one for 'motorDerecho', both set to a value of 100. On the right, a 'Código' (Code) editor shows the following Python code:

```
1 #RobotName: Uba
2 from RobotRL import RobotRL
3
4 robot = RobotRL()
5
6 while robot.step():
7     robot.setVl(100)
8     robot.setVd(100)
9
10
```

Below the code editor is a 'Salida' (Output) window showing the timestamp '24/9/2020 14:08:59' and the message: 'Compilación exitosa! El archivo se escribió correctamente!' (Compilation successful! The file was written correctly!). At the bottom, the Windows taskbar is visible with various application icons and the system tray showing the date '24/9/2020' and time '14:09'.

Links fundamentales para la Roboliga

- <https://www.facebook.com/Roboliga/>
- <http://bit.ly/RoboligaVirtual>
- www.roboliga.edu.ar



GRACIAS

Gonzalo Zabala 

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