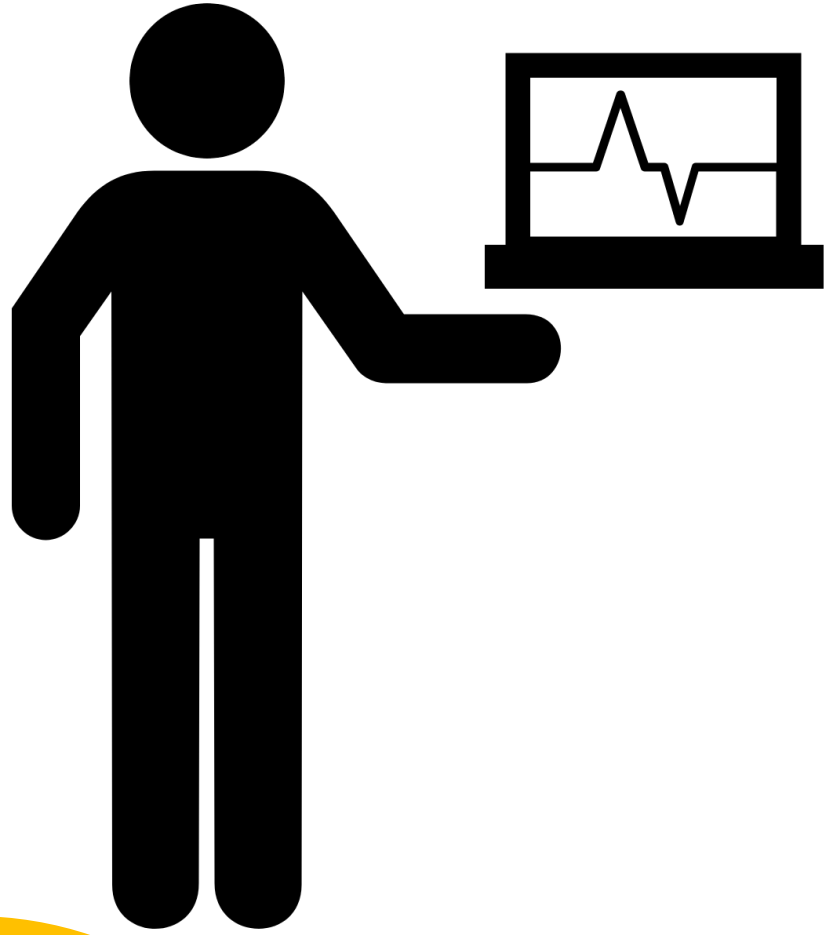
Programiranje i robotika u radu s djecom

Ivan Bosnić, MIPS d.o.o.

JavaCro'23

MIPS®

Sadržaj

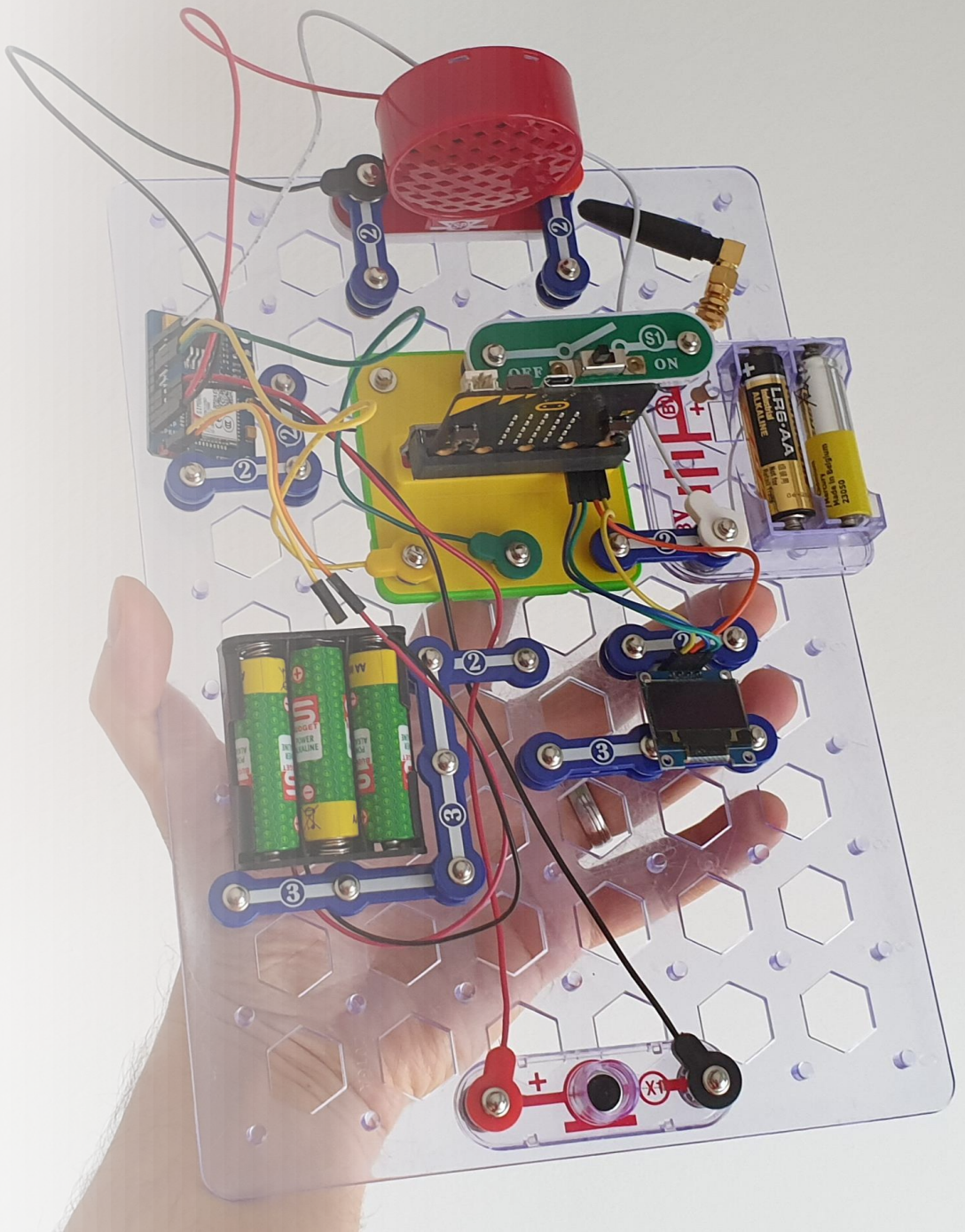


Osobno iskustvo

- od 2017. u neformalnom obrazovanju
- od igre sa sinom do edukacija
- puno naučenog
- brojna poznanstva
- mnogo osmijeha :)

Savjeti

- dječja individualnost
- učenje igrom
- predstavljanje umjesto nametanja
- višeslojne aktivnosti
- posjećivanje STEM događanja
- „manje je više”
- „sharing is caring”



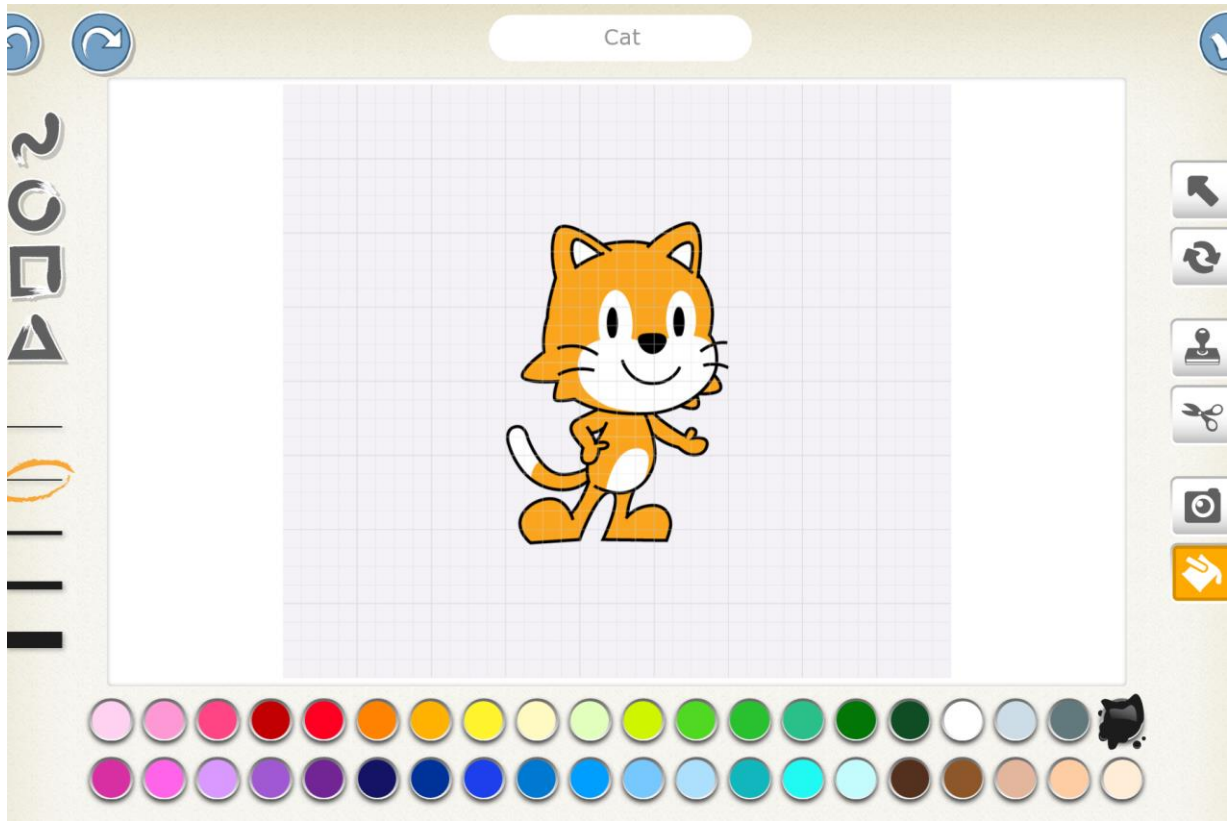
Vrtić/predškola

- izazovnije zbog dobi djece - malo vrtića i ustanova nudi aktivnosti
- mogućnosti:
  - učenje kroz igru
  - uključivanje djetetovih prijatelja
  - opremanje grupe u vrtiću
  - organiziranje večeri programiranja

Robot Turtles

⚙ LEGO Early Simple Machines

ScratchJr



Osmo Coding

Bee-Bot / Botley 2.0 the Coding Robot / Code & Go Robot Mouse Activity Set / Matatalab / Pro-Bot

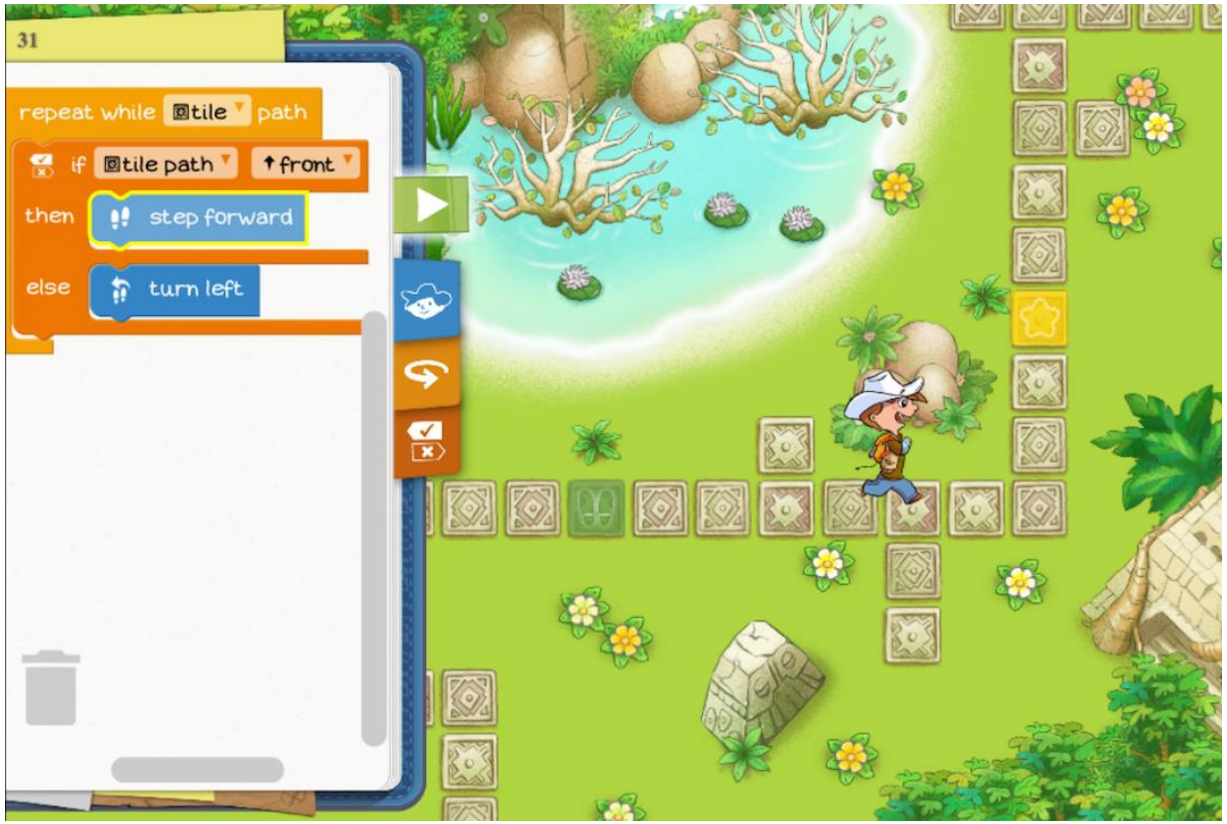
Scottie Go!


EDUCATION
Scottie Go!
DISCOVER THE WORLD OF CODING
BEGIN
SWITCH TO
TURN LEFT
STEP
PICK UP
TURN RIGHT
STEP
PLACE
END
2
3
HERE
BEHIND
ON THE RIGHT

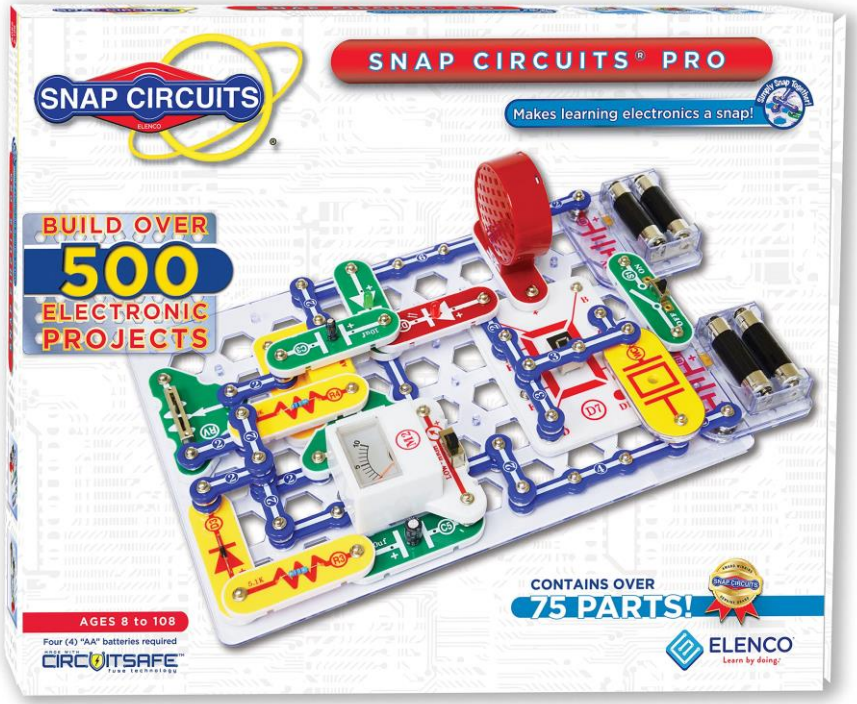

Scottie Go!
DISCOVER THE WORLD OF CODING

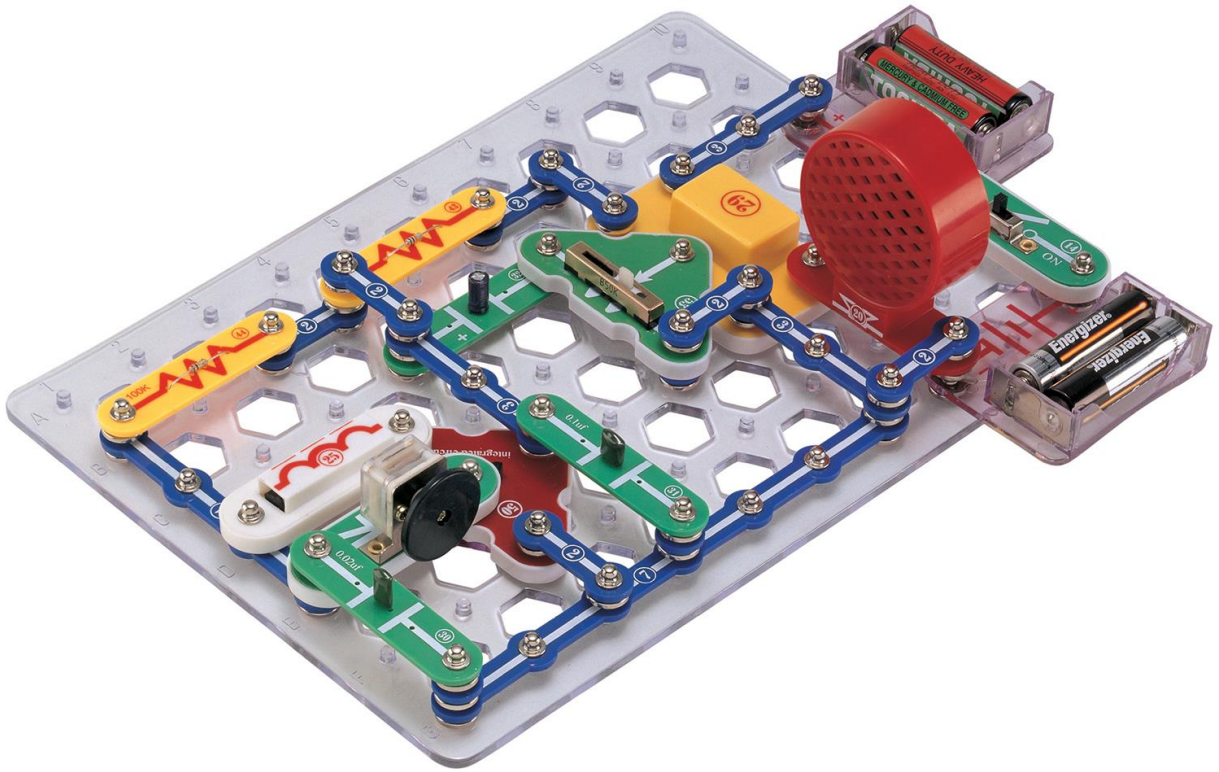
Run Marco!


Run Marco!
A coding adventure around the world


31
repeat while tile path
if tile path front
then step forward
else turn left

⚡ Snap Circuits





⚡ Makey Makey


1000s of possibilities!
Makey Makey
THE WORLD IS YOUR CONSTRUCTION KIT!
MakeyMakey.com
SPACE
CLICK
EARTH
Makey Makey

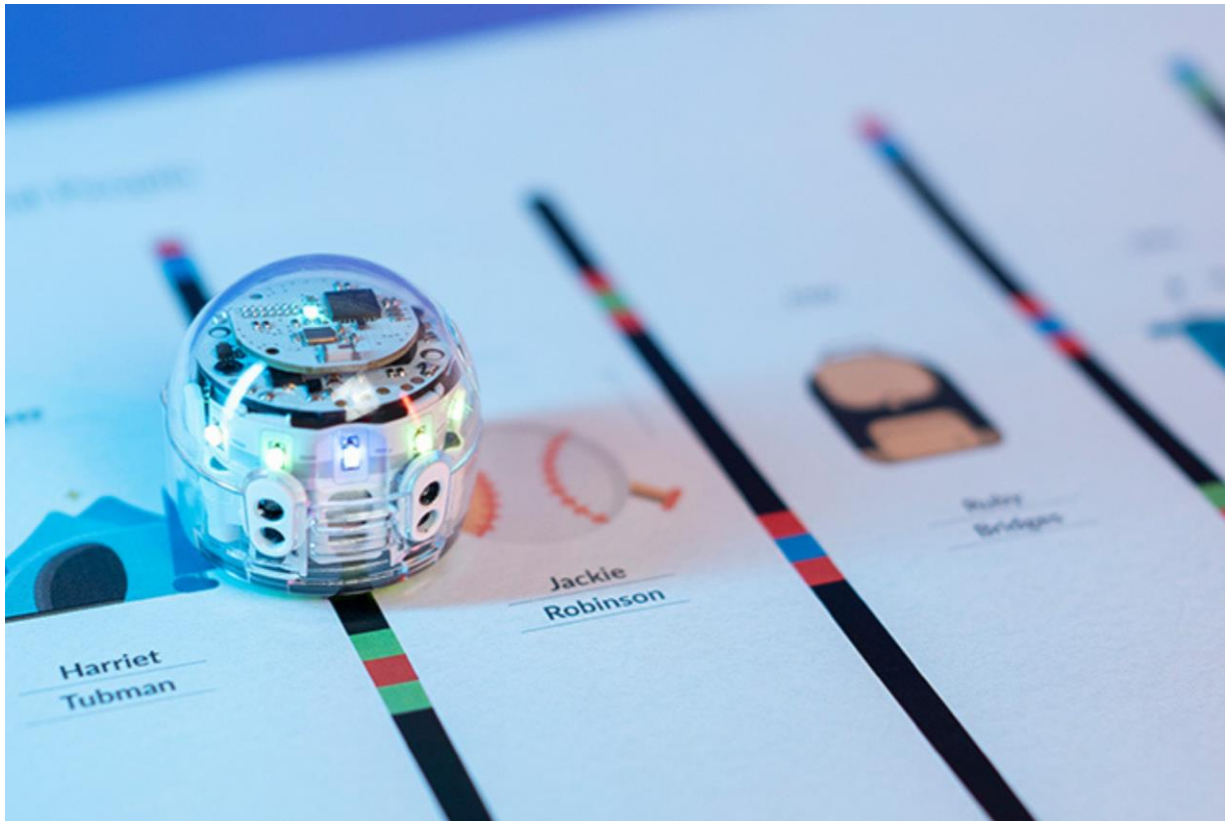
⚙ Spintronics

Razredna nastava

- Scratch u školama
- razne aktivnosti i natjecanja
- mogućnosti:
  - lokalizacija alata i materijala
  - mentoriranje, izravno ili kroz rad neke ustanove

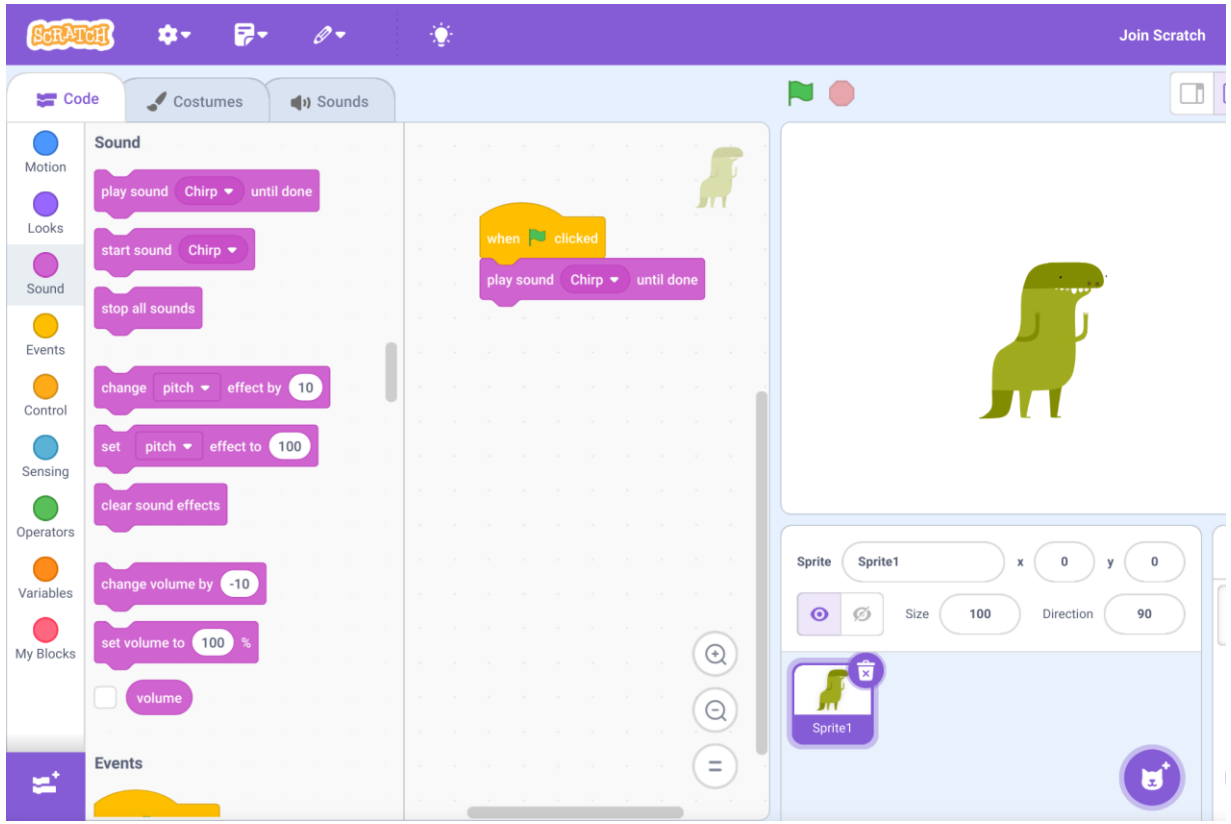
Ozobot

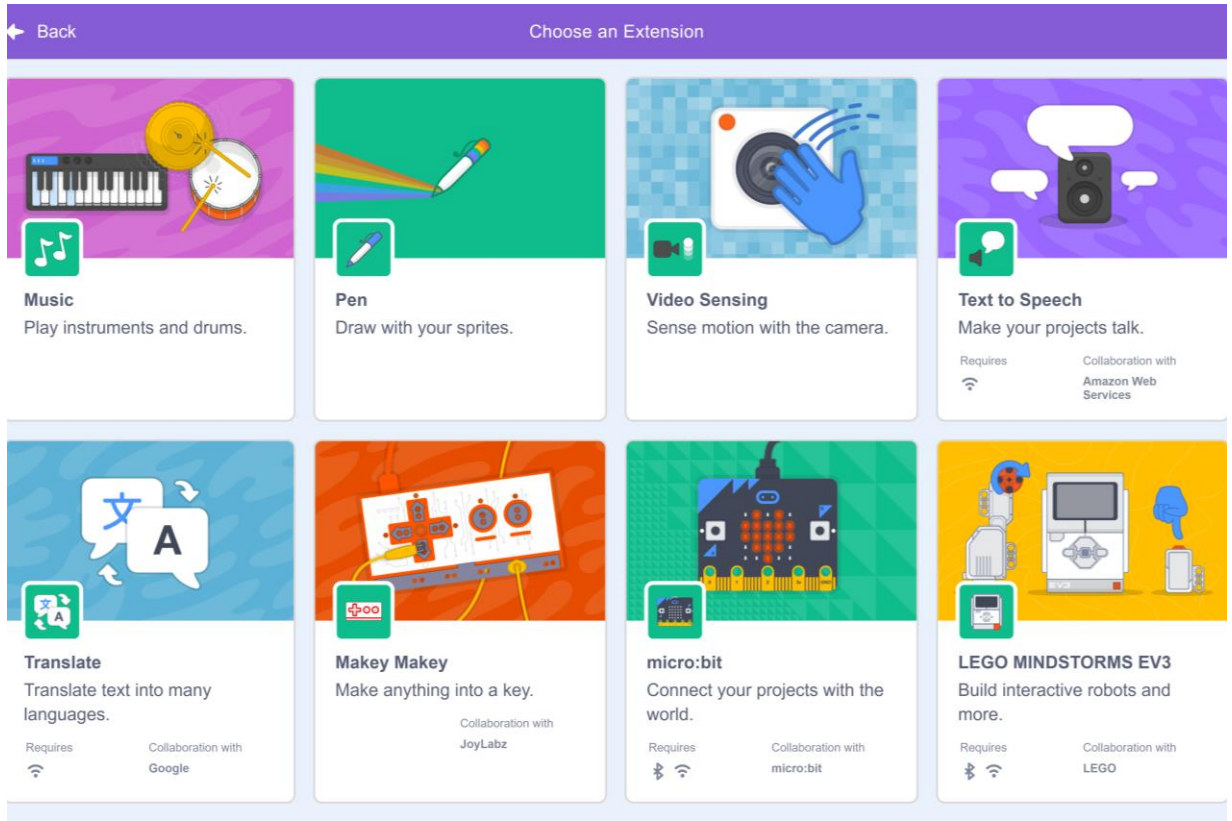

Bot Camp
For Educators
Cool Moves


Harriet
Tubman
Jackie
Robinson

Potato Pirates

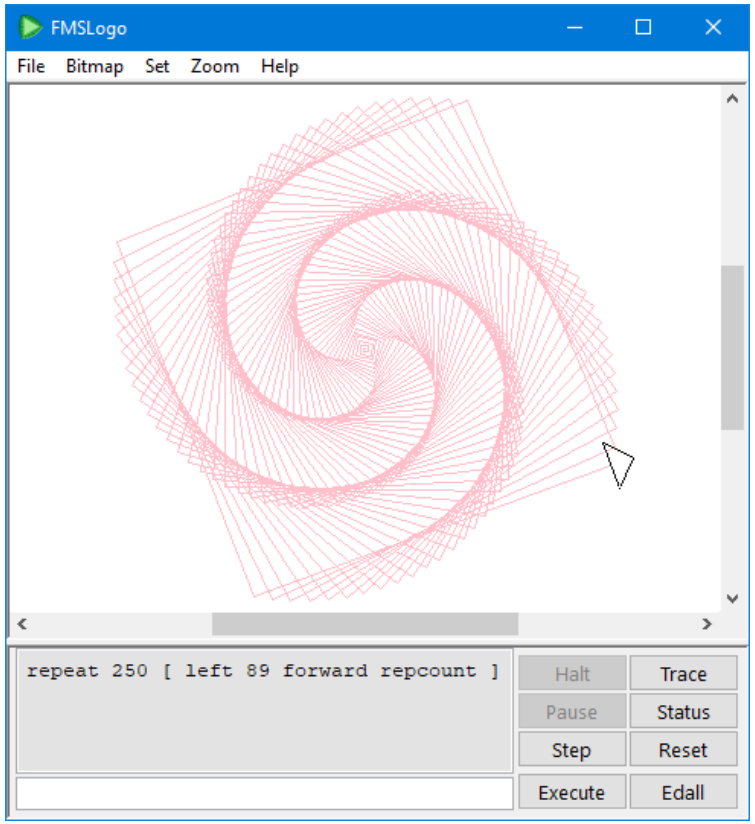
Scratch


Join Scratch
Code
Costumes
Sounds
Motion
Looks
Sound
Events
Control
Sensing
Operators
Variables
My Blocks
Sound
play sound Chirp until done
start sound Chirp
stop all sounds
change pitch effect by 10
set pitch effect to 100
clear sound effects
change volume by -10
set volume to 100 %
volume
Events
when clicked
play sound Chirp until done
Sprite Sprite1 x 0 y 0
Size 100 Direction 90
Sprite1


Back
Choose an Extension
Music
Play instruments and drums.
Pen
Draw with your sprites.
Video Sensing
Sense motion with the camera.
Text to Speech
Make your projects talk.
Requires
Collaboration with
Amazon Web Services
Translate
Translate text into many languages.
Requires
Collaboration with
Google
Makey Makey
Make anything into a key.
Collaboration with
JoyLabz
micro:bit
Connect your projects with the world.
Requires
Collaboration with
micro:bit
LEGO MINDSTORMS EV3
Build interactive robots and more.
Requires
Collaboration with
LEGO

LEGO WeDo 2.0

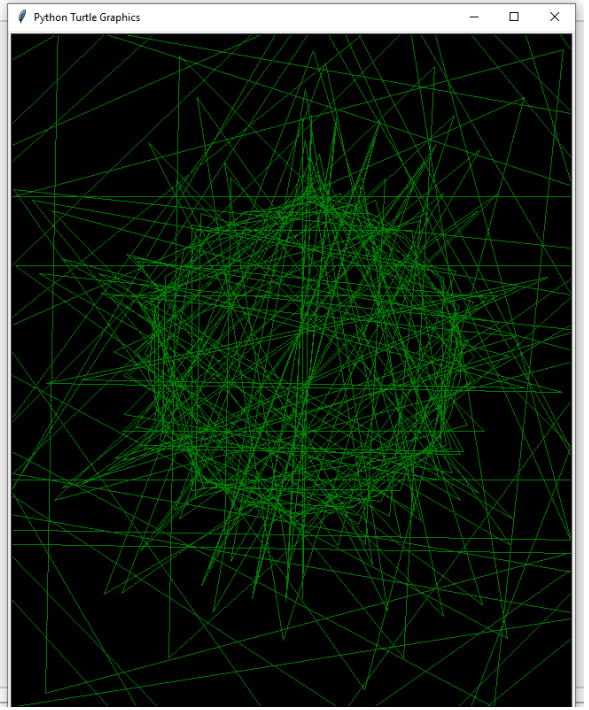
Logo



Virus in Python (Turtle Library)

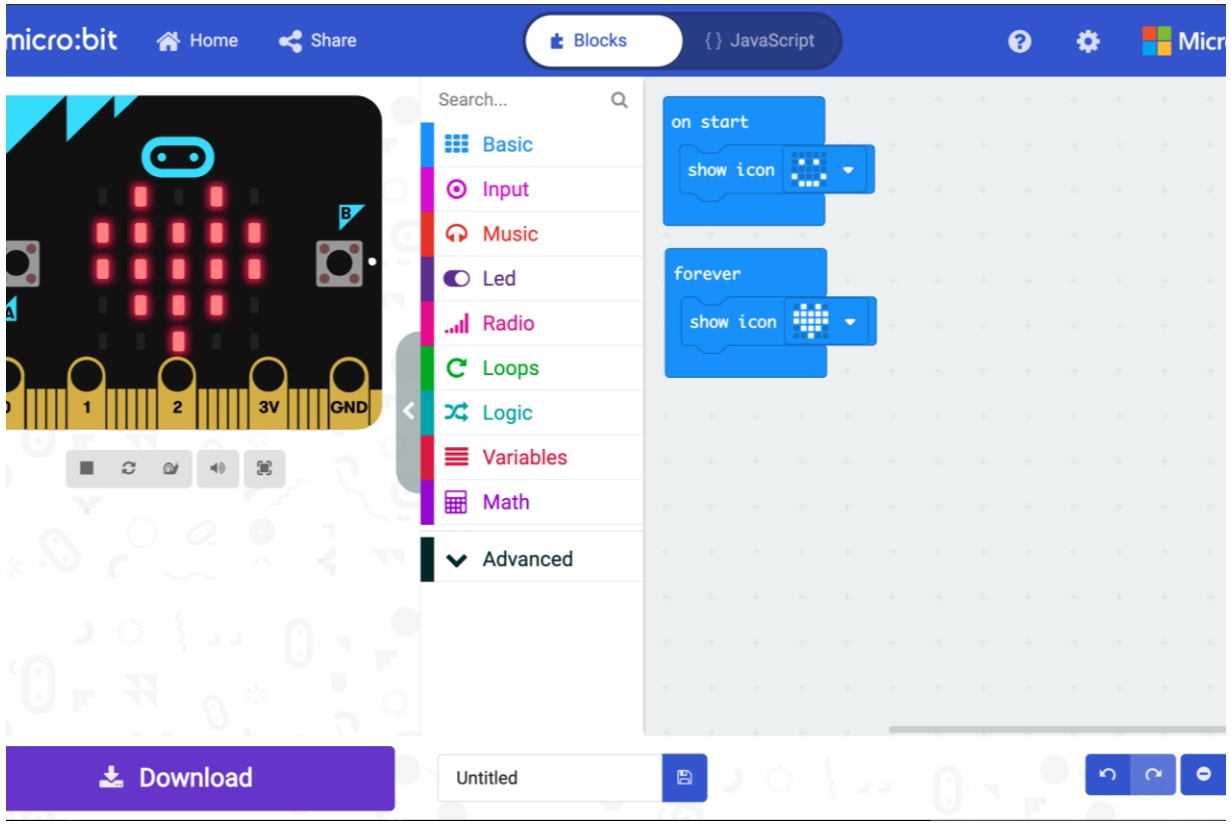
```
import turtle
a=0
b=0
#clcoding.com
turtle.bgcolor("black")
turtle.speed(0)
turtle.pencolor("green")
turtle.penup()
turtle.goto(0,200)
turtle.pendown()

while True:
    turtle.forward(a)
    turtle.right(b)
    a+=3
    b+=1
```

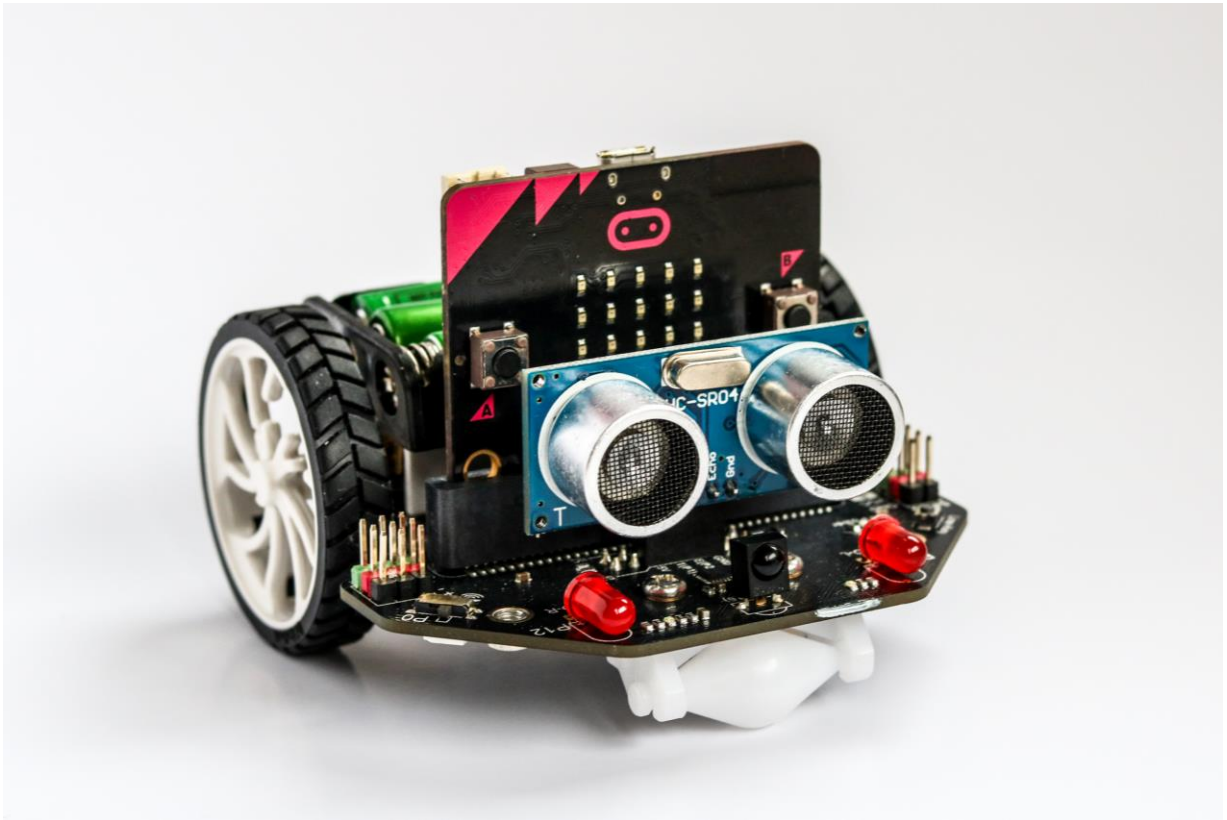


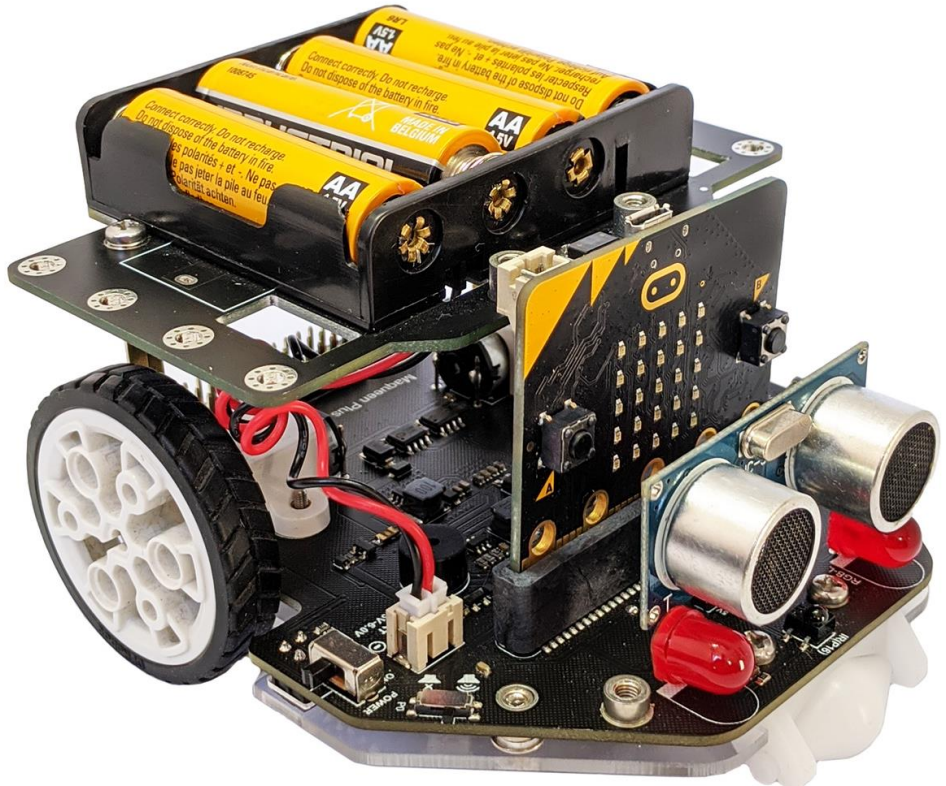
Turing Tumble

MakeCode for micro:bit

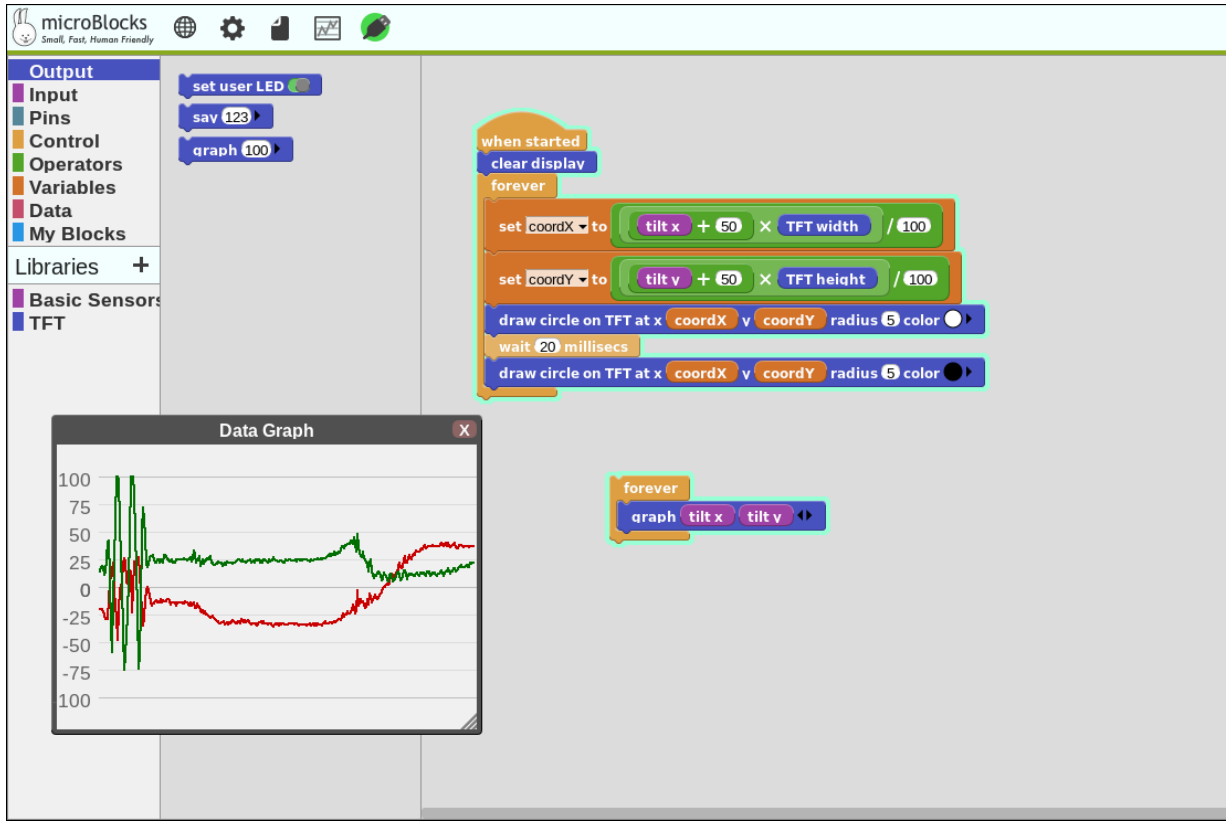


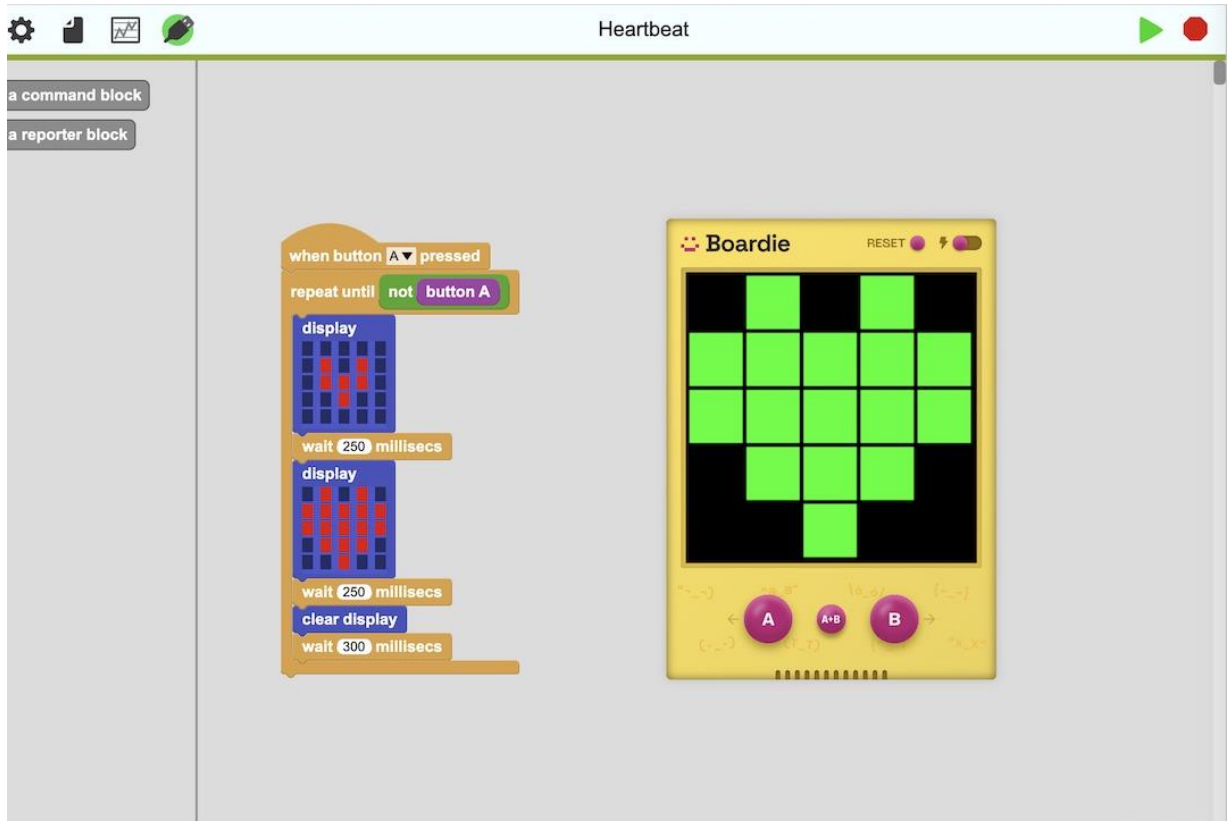
Maqueen



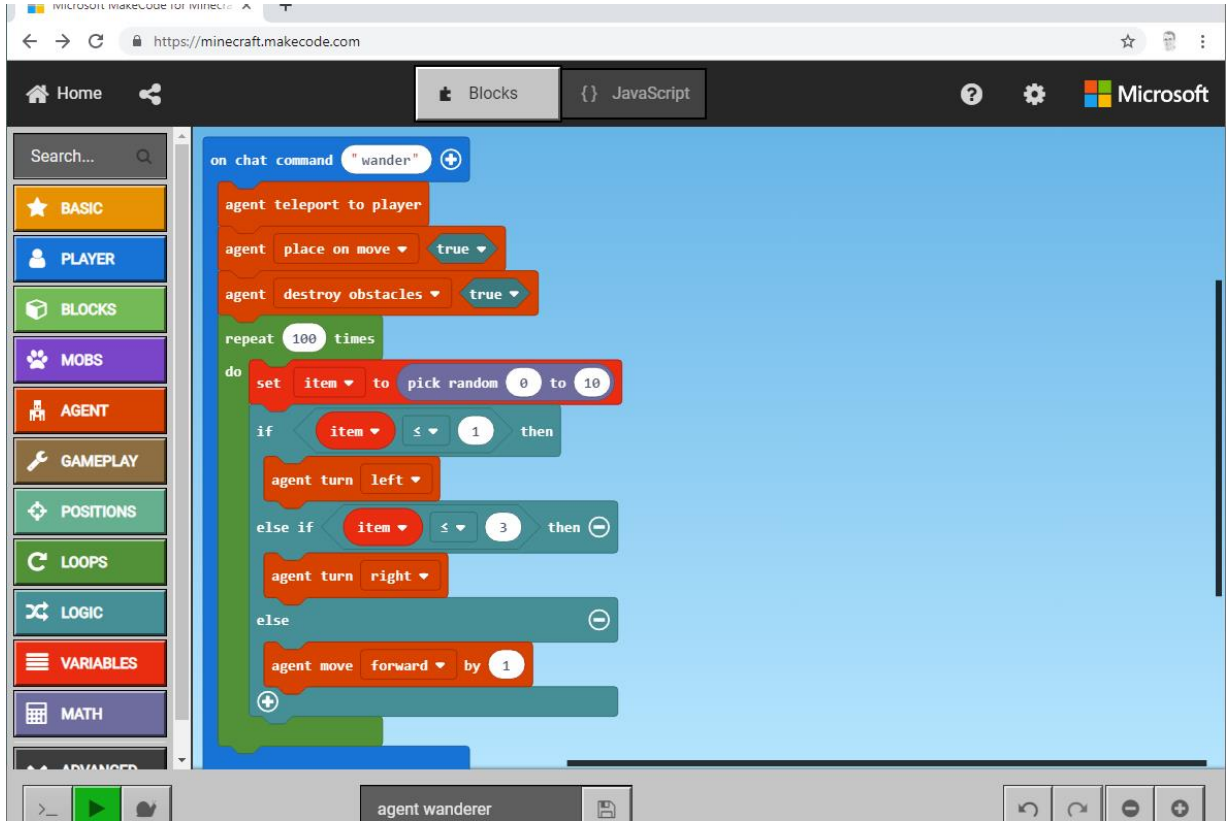


Microblocks





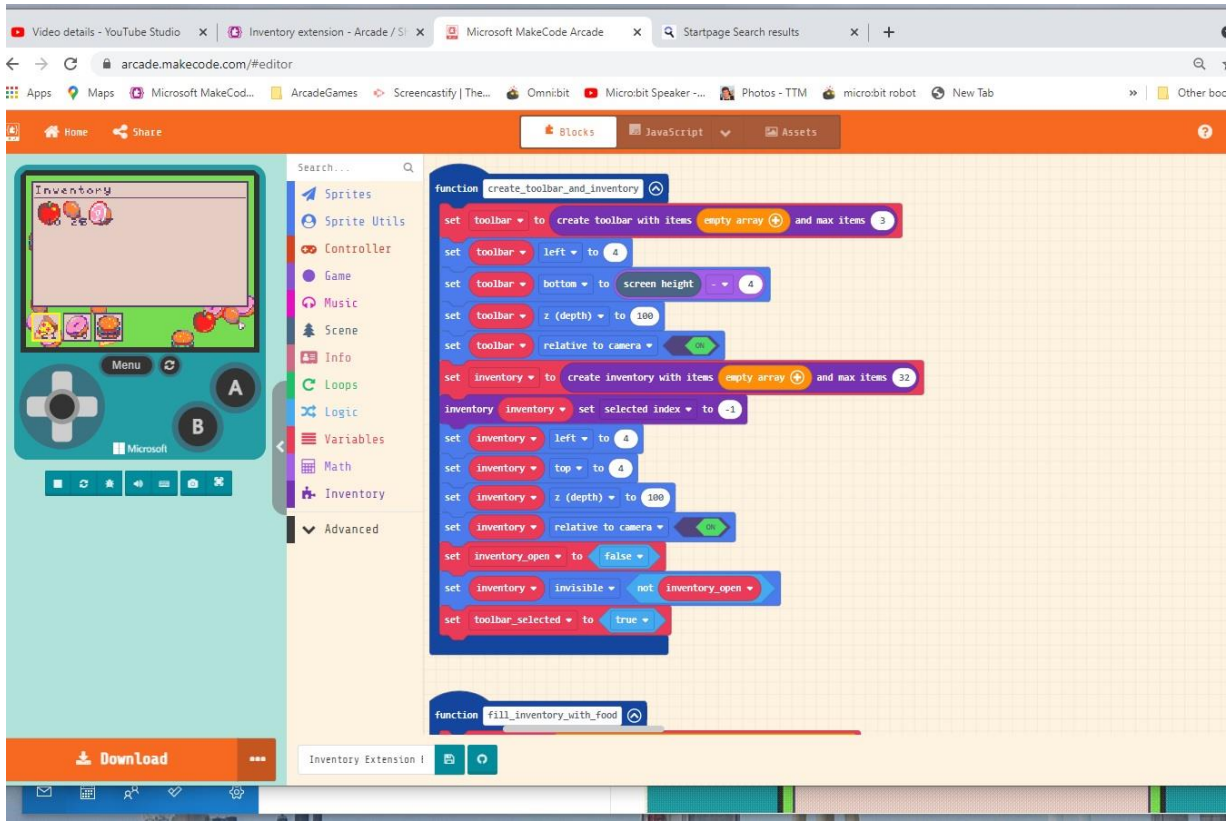
Minecraft Education



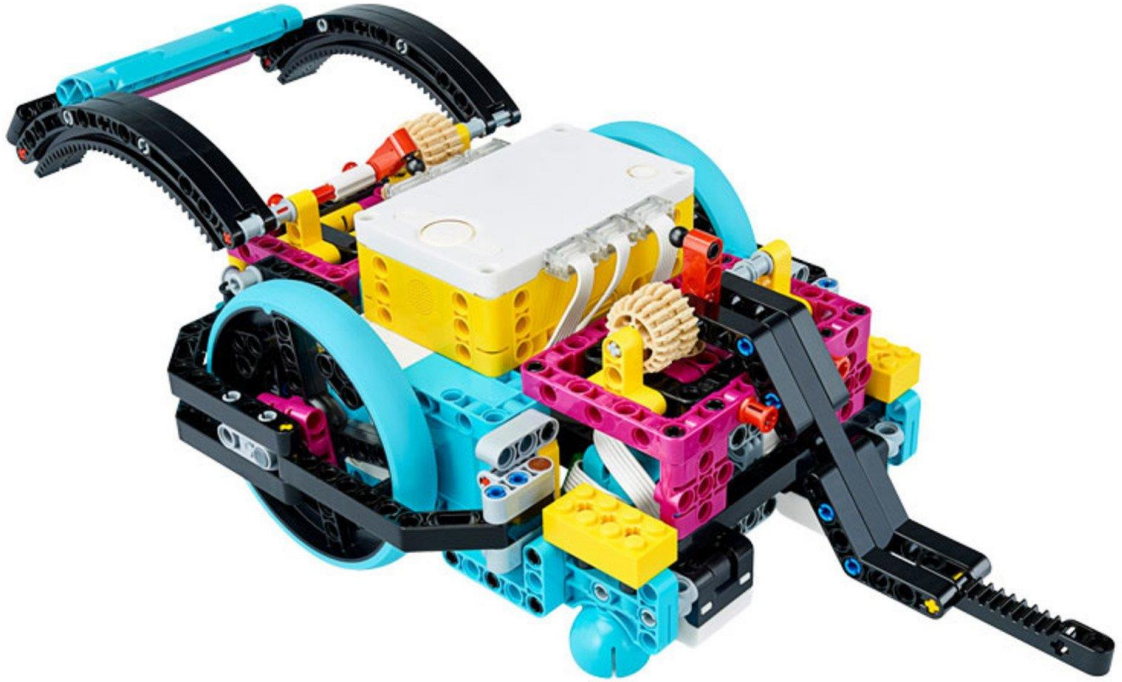
Predmetna nastava

- većinom Python i HTML
- dronovi i umjetna inteligencija
- sve je više aktivnosti i natjecanja
- mogućnosti:
  - pomoć učiteljima
  - izrada novih alata i sadržaja ili proširenje postojećih

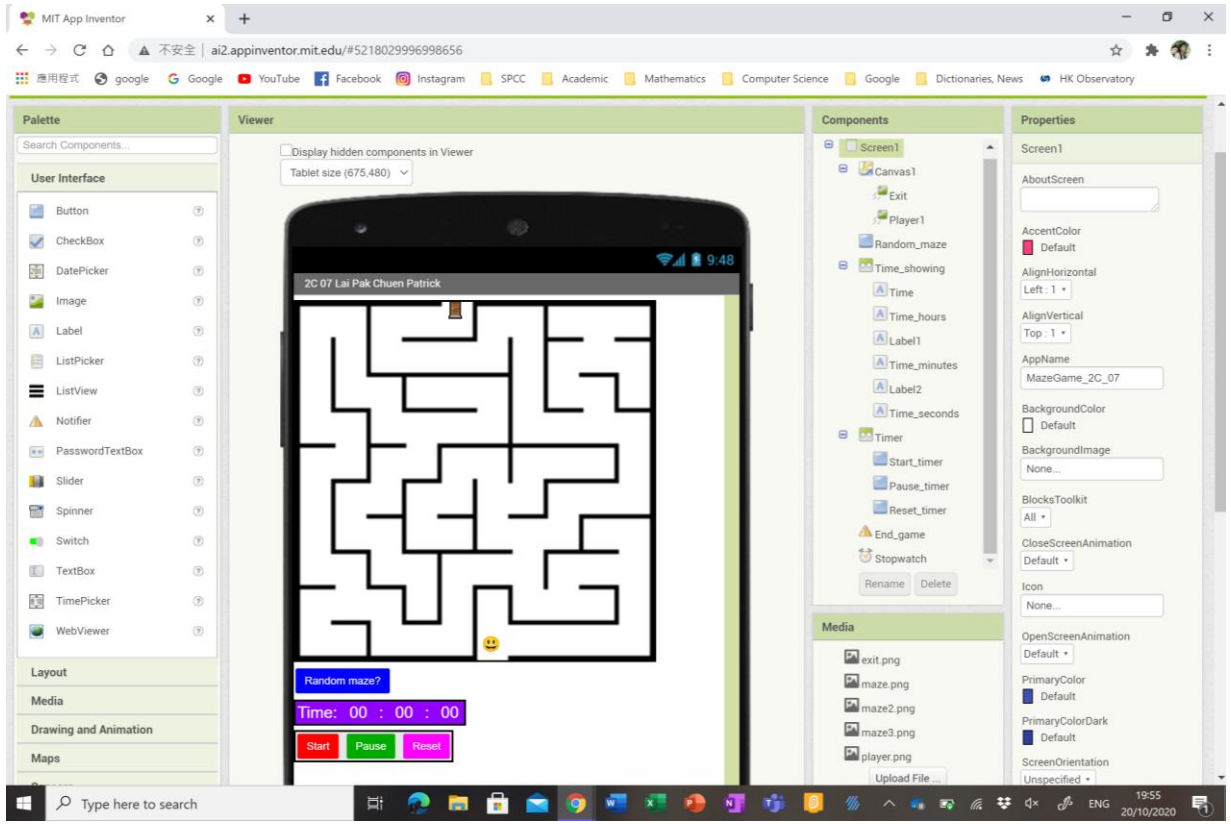
MakeCode Arcade

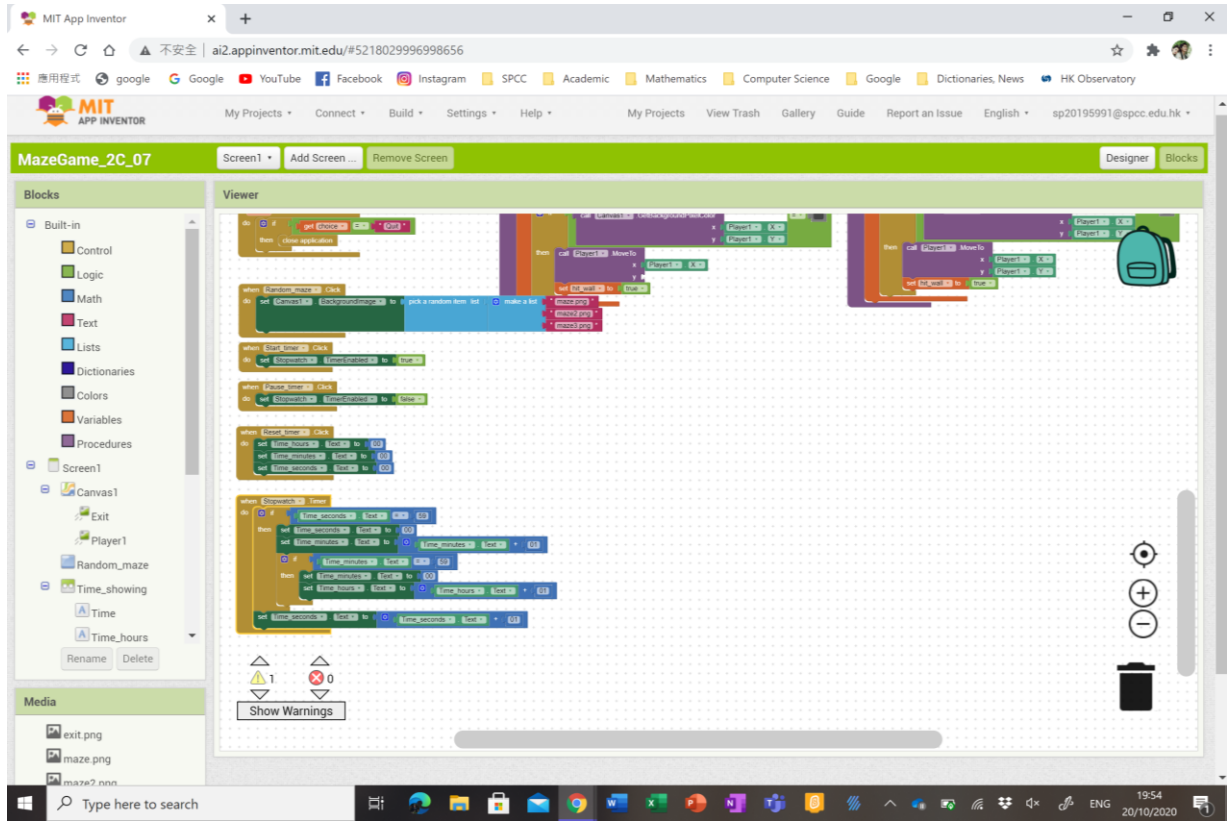


LEGO SPIKE Prime

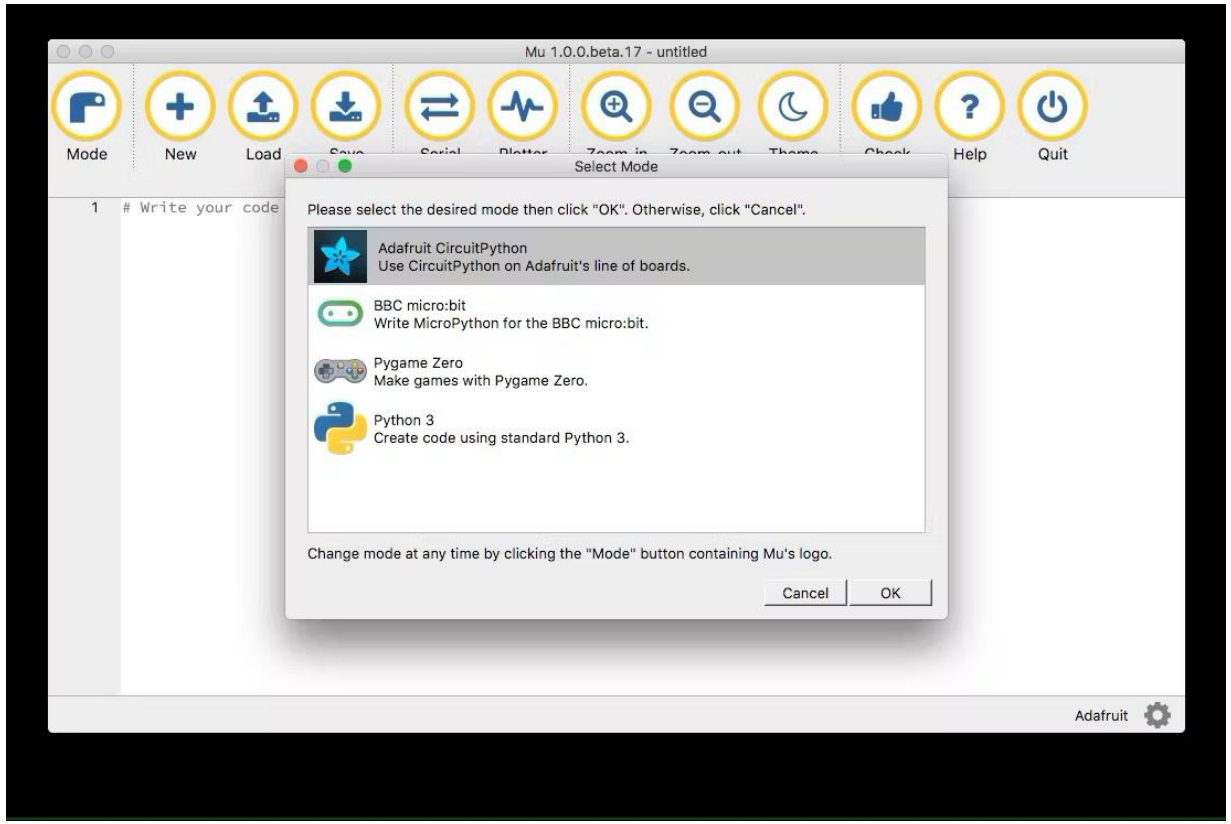


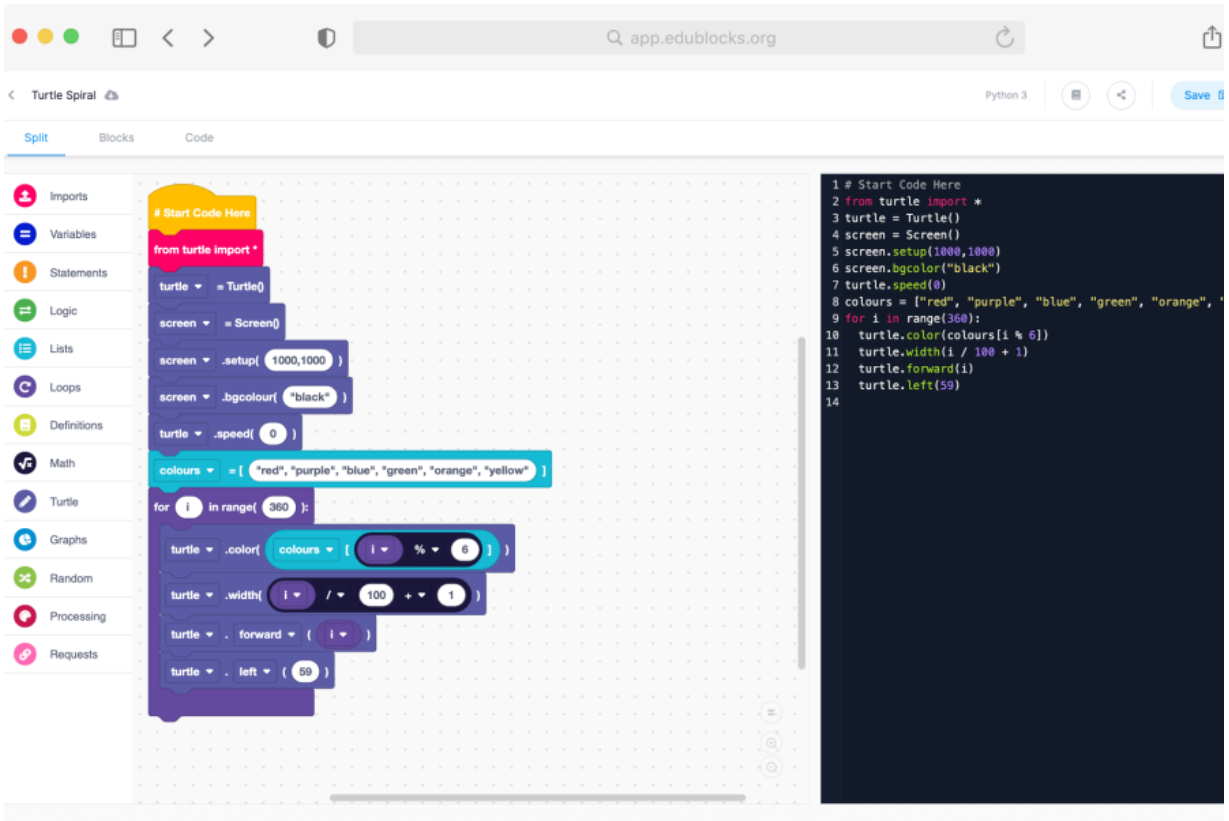
MIT App Inventor



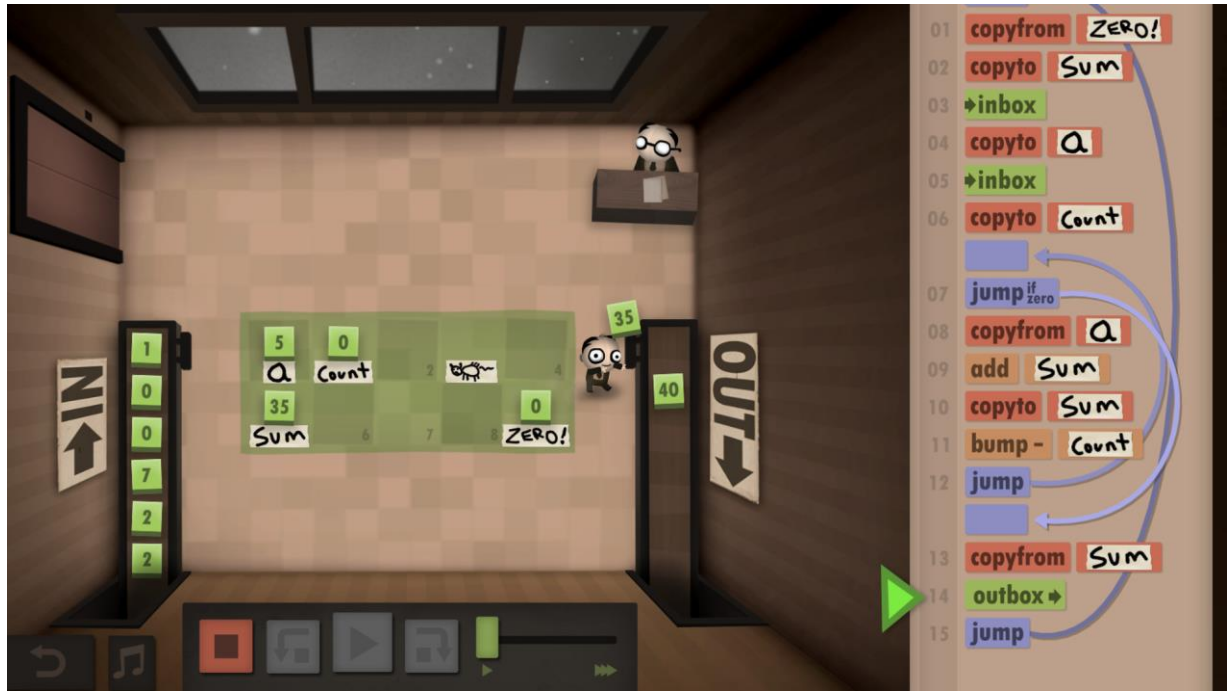


Python

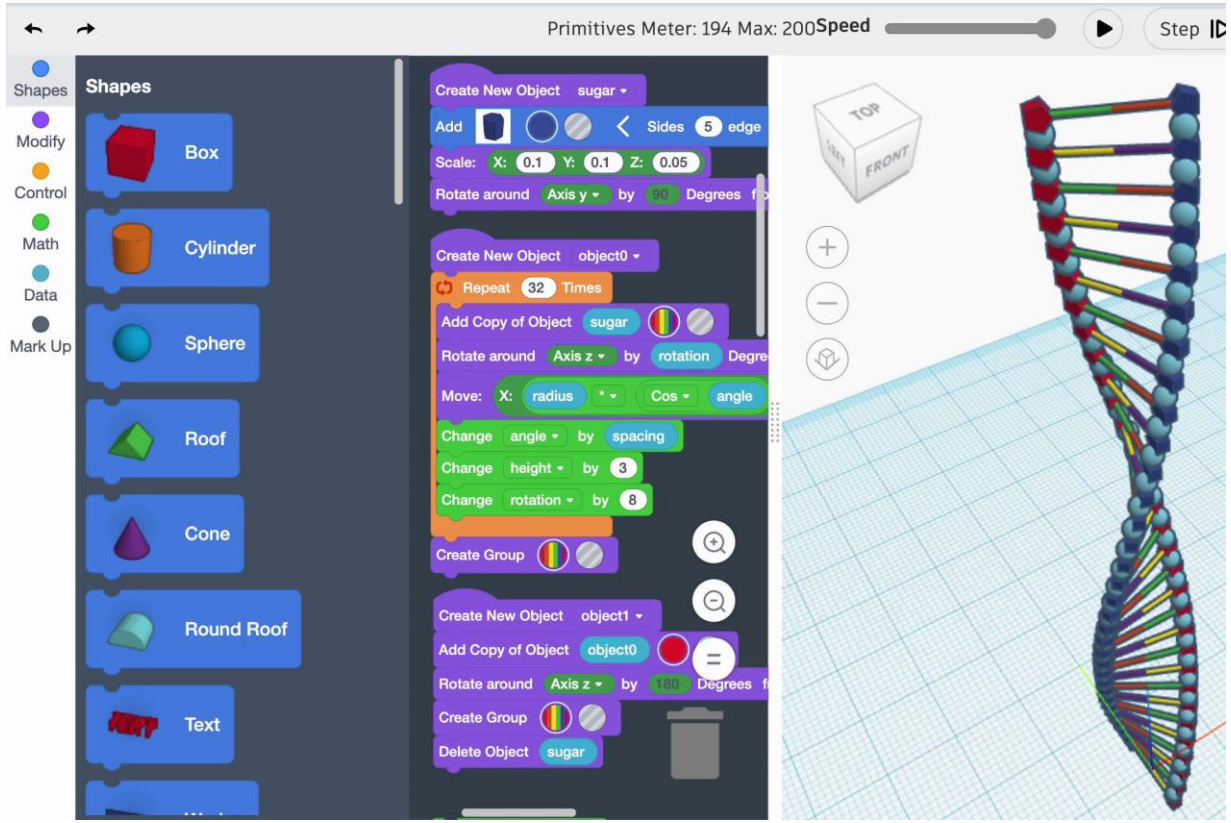

Mu 1.0.0.beta.17 - untitled
Mode
New
Load
Help
Quit
1 # Write your code
Select Mode
Please select the desired mode then click "OK". Otherwise, click "Cancel".
Adafruit CircuitPython
Use CircuitPython on Adafruit's line of boards.
BBC micro:bit
Write MicroPython for the BBC micro:bit.
Pygame Zero
Make games with Pygame Zero.
Python 3
Create code using standard Python 3.
Change mode at any time by clicking the "Mode" button containing Mu's logo.
Cancel
OK
Adafruit

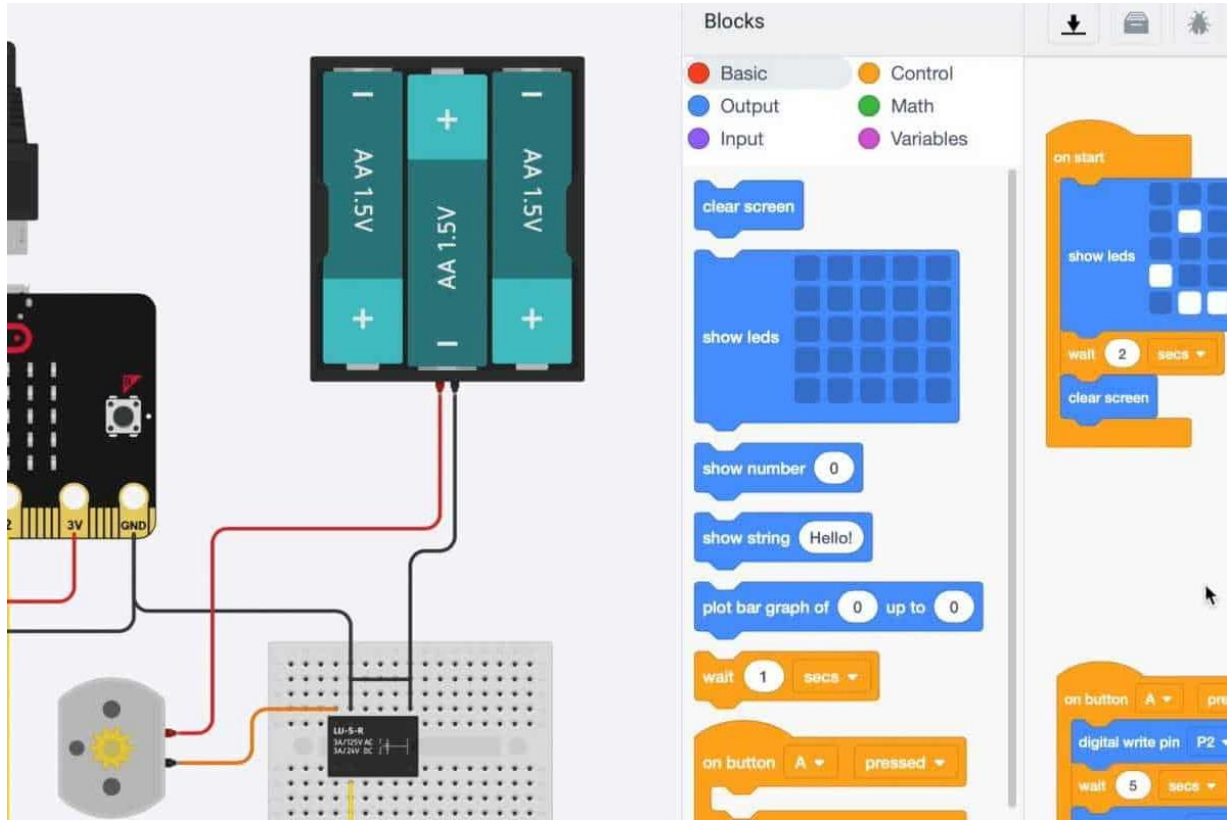

app.edublocks.org
Turtle Spiral
Python 3
Save
Split
Blocks
Code
Imports
Variables
Statements
Logic
Lists
Loops
Definitions
Math
Turtle
Graphs
Random
Processing
Requests
# Start Code Here
from turtle import *
turtle = Turtle()
screen = Screen()
screen.setup(1000,1000)
screen.bgcolor("black")
turtle.speed(0)
colours = ["red", "purple", "blue", "green", "orange", "yellow"]
for i in range(360):
turtle.color(colours[i % 6])
turtle.width(i / 100 + 1)
turtle.forward(i)
turtle.left(59)

Human Resource Machine

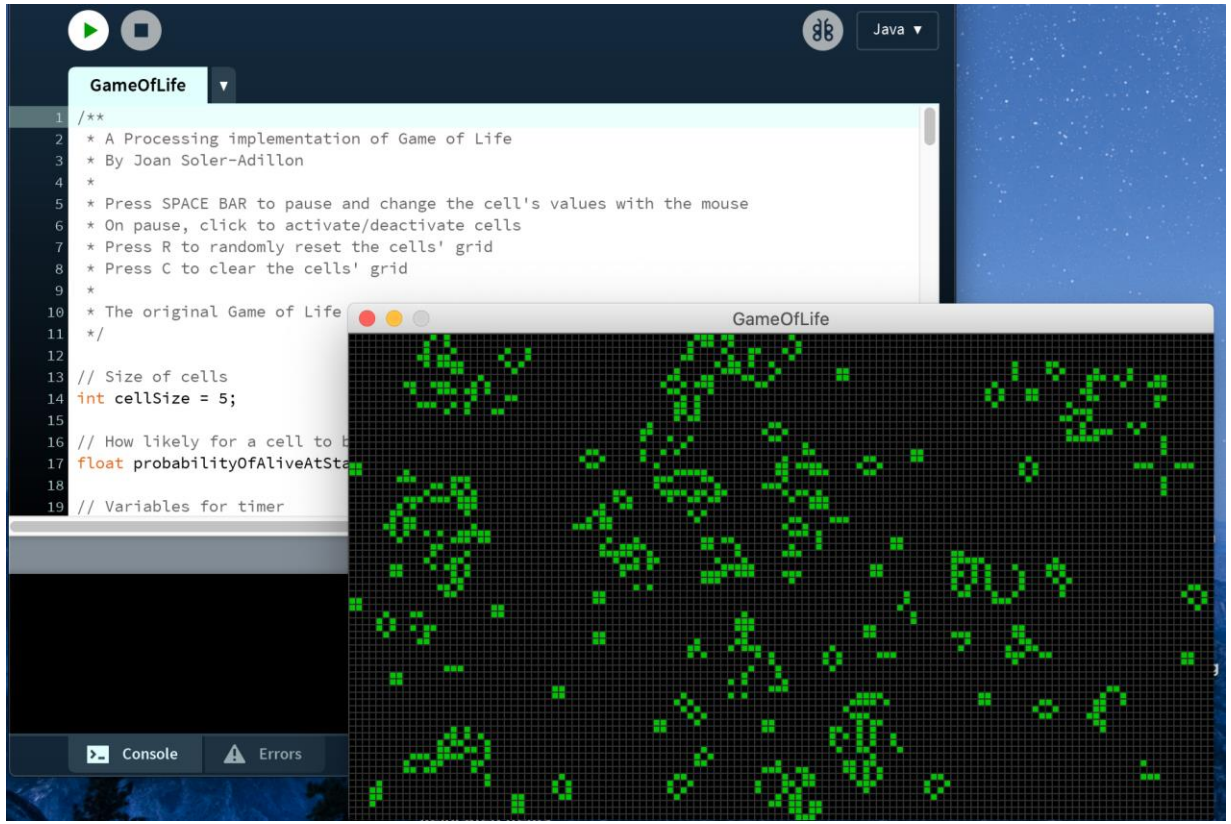


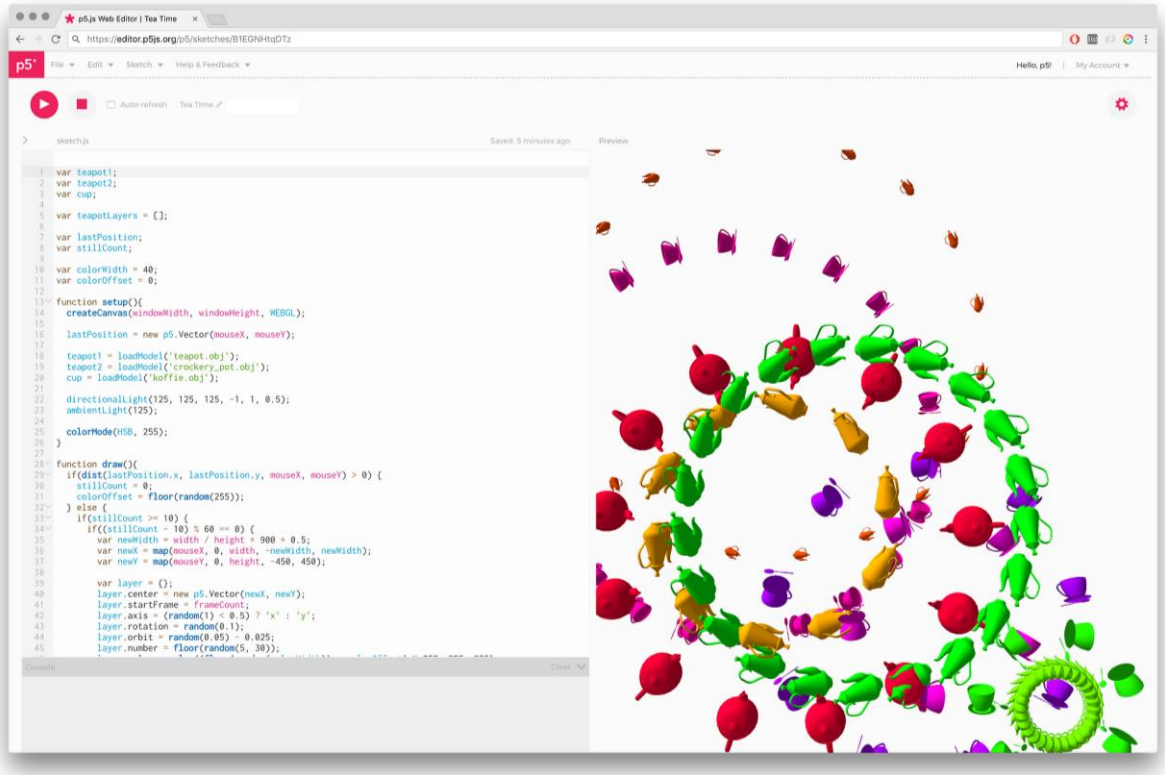
Tinkercad


Primitives Meter: 194 Max: 200
Speed
Step
Shapes
Modify
Control
Math
Data
Mark Up
Box
Cylinder
Sphere
Roof
Cone
Round Roof
Text
Create New Object sugar
Add Sides 5 edge
Scale: X: 0.1 Y: 0.1 Z: 0.05
Rotate around Axis y by 90 Degrees
Create New Object object0
Repeat 32 Times
Add Copy of Object sugar
Rotate around Axis z by rotation
Move: X: radius * Cos angle
Change angle by spacing
Change height by 3
Change rotation by 8
Create Group
Create New Object object1
Add Copy of Object object0
Rotate around Axis z by 180 Degrees
Create Group
Delete Object sugar
TOP
FRONT

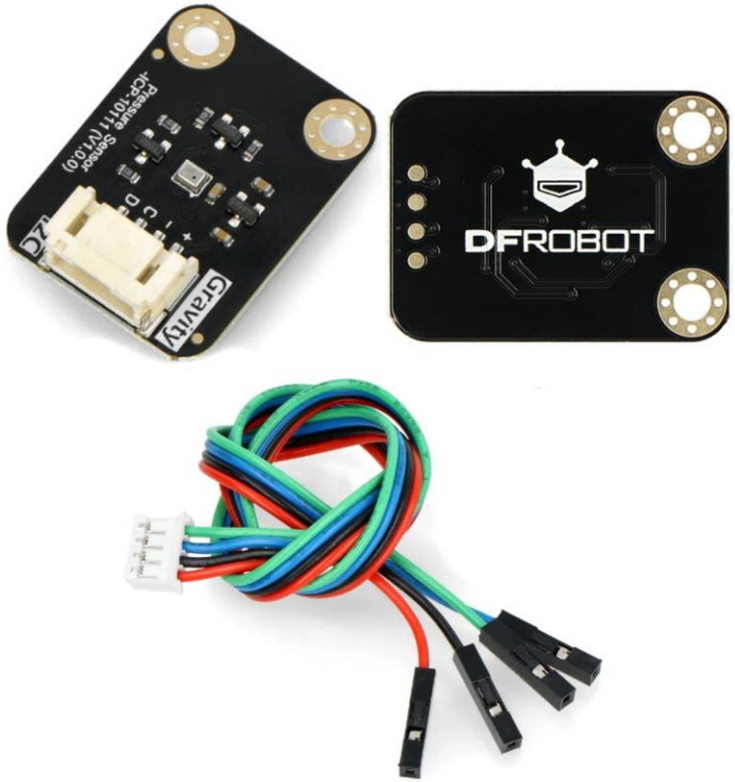

AA 1.5V
AA 1.5V
AA 1.5V
3V
GND
Blocks
Basic
Control
Output
Math
Input
Variables
clear screen
show leds
show number 0
show string Hello!
plot bar graph of 0 up to 0
wait 1 secs
on button A pressed
on start
show leds
wait 2 secs
clear screen
on button A
digital write pin P2
wait 5 secs

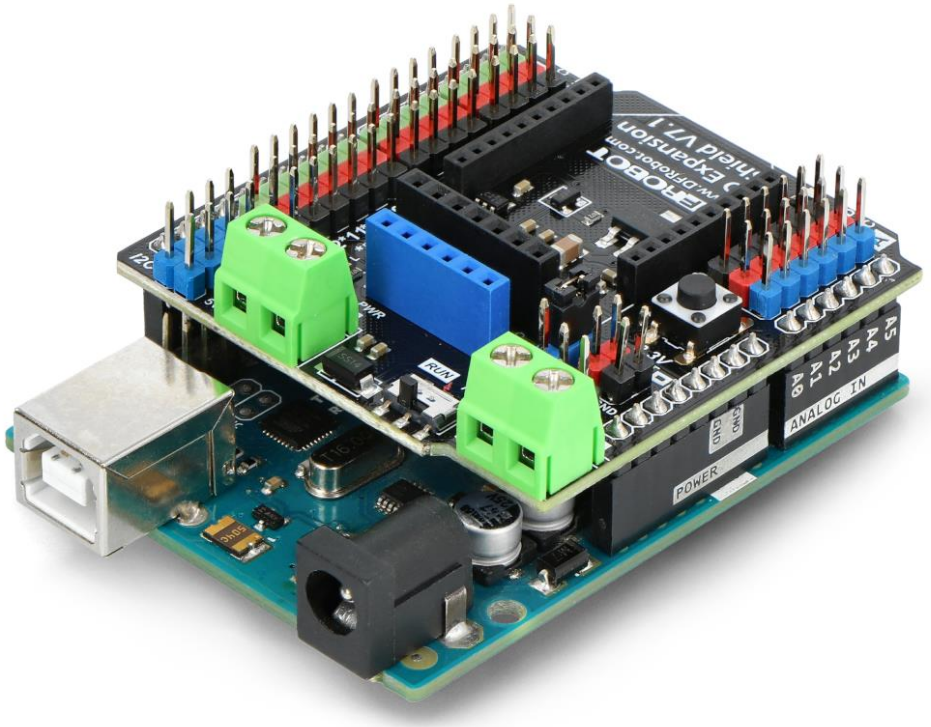
Processing


Java
GameOfLife
/**
* A Processing implementation of Game of Life
* By Joan Soler-Adillon
*
* Press SPACE BAR to pause and change the cell's values with the mouse
* On pause, click to activate/deactivate cells
* Press R to randomly reset the cells' grid
* Press C to clear the cells' grid
*
* The original Game of Life
*/
// Size of cells
int cellSize = 5;
// How likely for a cell to
float probabilityOfAliveAtSta
// Variables for timer
GameOfLife
Console
Errors


p5.js Web Editor | Tea Time
https://editor.p5js.org/p5/sketches/B1EGNHtqDTz
var teapot1;
var teapot2;
var cup;
var teapotLayers = [];
var lastPosition;
var stillCount;
var colorWidth = 40;
var colorOffset = 0;
function setup(){
createCanvas(windowWidth, windowHeight, WEBGL);
lastPosition = new p5.Vector(mouseX, mouseY);
teapot1 = loadModel('teapot.obj');
teapot2 = loadModel('crockery_pot.obj');
cup = loadModel('koffie.obj');
directionalLight(125, 125, 125, -1, 1, 0.5);
ambientLight(125);
colorMode(HSB, 255);
}
function draw(){
if(dist(lastPosition.x, lastPosition.y, mouseX, mouseY) > 0) {
stillCount = 0;
colorOffset = floor(random(255));
} else {
if(stillCount >= 10) {
if((stillCount - 10) % 60 == 0) {
var newWidth = width / height * 900 + 0.5;
var newX = map(mouseX, 0, width, -newWidth, newWidth);
var newY = map(mouseY, 0, height, -450, 450);
var layer = {};
layer.center = new p5.Vector(newX, newY);
layer.startFrame = frameCount;
layer.axis = (random(1) < 0.5) ? 'x' : 'y';
layer.rotation = random(0.1);
layer.orbit = random(0.05) - 0.025;
layer.number = floor(random(5, 30));

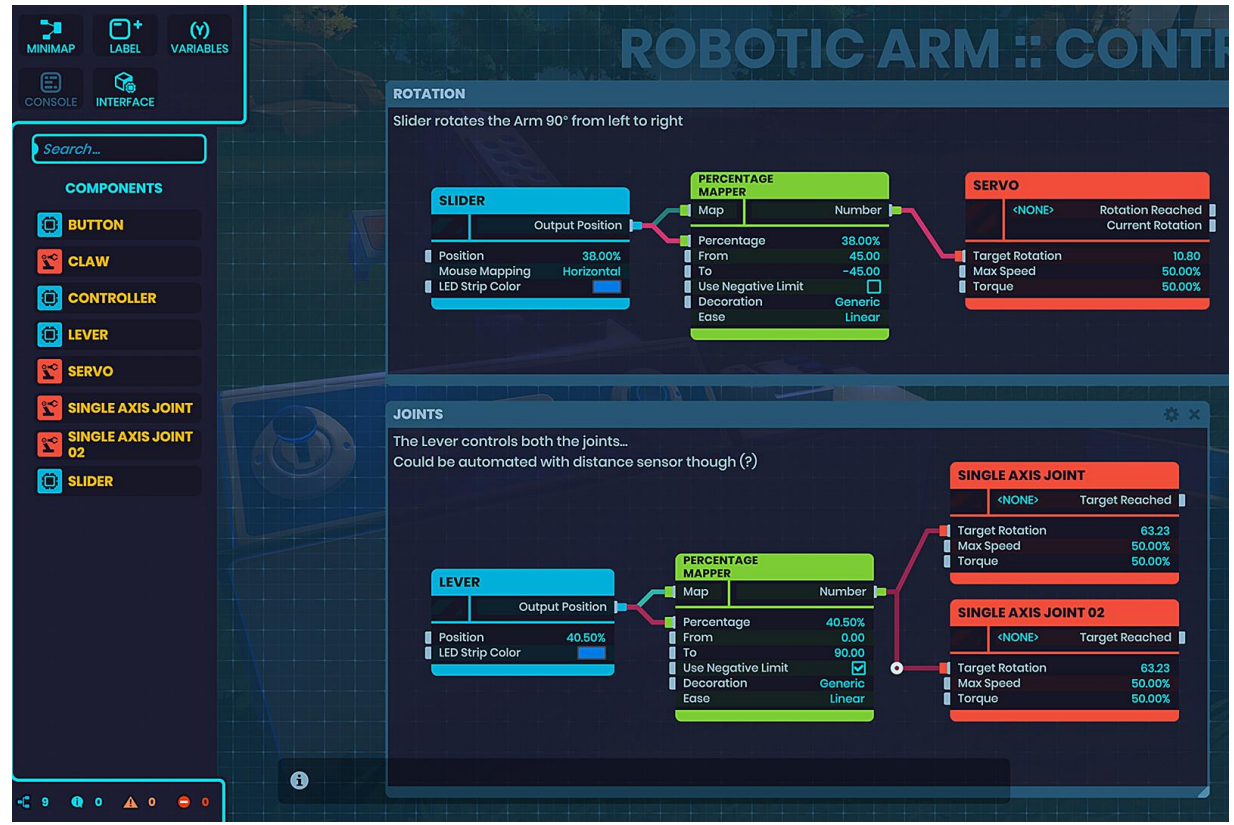
⚡ Gravity


Pressure Sensor
SEN0257 (V1.0.0)
I2C
Gravity
DFROBOT

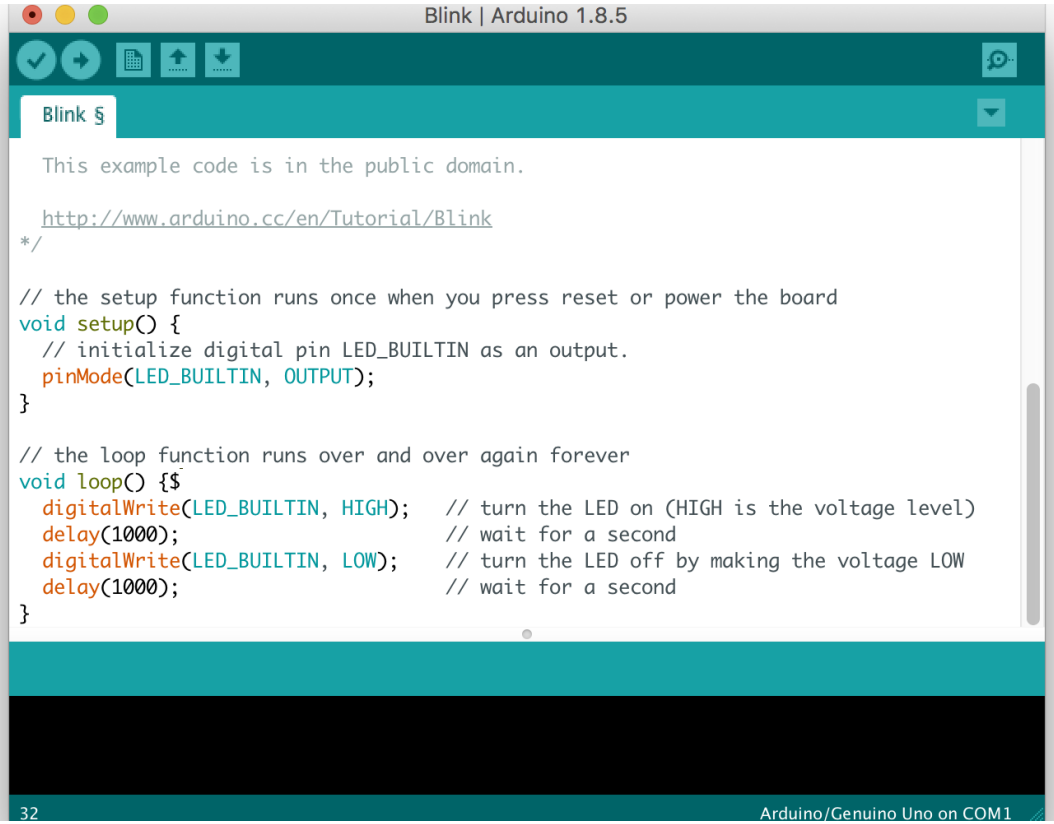

DFROBOT
Expansion
Shield V7.1
RUN
POWER
ANALOG IN

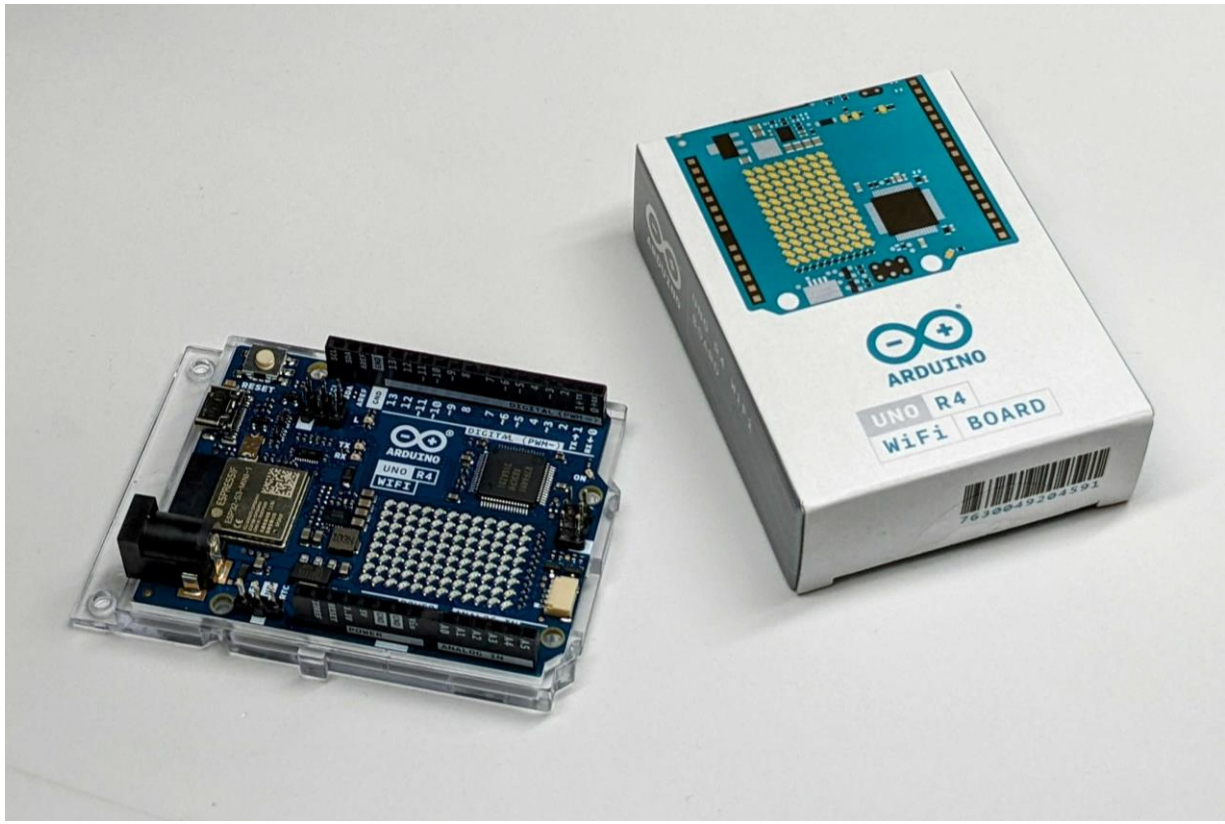
Plasma


ROBOTIC ARM
DEVICE 05
0.50 / 8.68 Kg


MINIMAP
LABEL
VARIABLES
CONSOLE
INTERFACE
Search...
COMPONENTS
BUTTON
CLAW
CONTROLLER
LEVER
SERVO
SINGLE AXIS JOINT
SINGLE AXIS JOINT 02
SLIDER
ROBOTIC ARM :: CONTR
ROTATION
Slider rotates the Arm 90° from left to right
SLIDER
Output Position
Position 38.00%
Mouse Mapping Horizontal
LED Strip Color
PERCENTAGE MAPPER
Map Number
Percentage 38.00%
From 45.00
To -45.00
Use Negative Limit
Decoration Generic
Ease Linear
SERVO
<NONE> Rotation Reached
Current Rotation
Target Rotation 10.80
Max Speed 50.00%
Torque 50.00%
JOINTS
The Lever controls both the joints...
Could be automated with distance sensor though (?)
LEVER
Output Position
Position 40.50%
LED Strip Color
PERCENTAGE MAPPER
Map Number
Percentage 40.50%
From 0.00
To 90.00
Use Negative Limit
Decoration Generic
Ease Linear
SINGLE AXIS JOINT
<NONE> Target Reached
Target Rotation 63.23
Max Speed 50.00%
Torque 50.00%
SINGLE AXIS JOINT 02
<NONE> Target Reached
Target Rotation 63.23
Max Speed 50.00%
Torque 50.00%

Arduino


Blink | Arduino 1.8.5
Blink §
This example code is in the public domain.
http://www.arduino.cc/en/Tutorial/Blink
*/
// the setup function runs once when you press reset or power the board
void setup() {
// initialize digital pin LED_BUILTIN as an output.
pinMode(LED_BUILTIN, OUTPUT);
}
// the loop function runs over and over again forever
void loop() {$
digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
delay(1000); // wait for a second
digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
delay(1000); // wait for a second
}
32
Arduino/Genuino Uno on COM1


ARDUINO
UNO R4
WiFi
BOARD

Natjecanja

Natjecanje iz informatike (5.+)

- https://informatika.azoo.hr/
- školsko natjecanje
- algoritmi
  - Logo
  - Python/C/C++
- Osnove informatike
  - Digitalne kompetencije (5. i 6.)
  - Osnove informatike (7. i 8.)
- Razvoj softvera
  - od ideje do softvera

HONI (3.+)

Hrvatsko otvoreno natjecanje u informatici

- Hrvatsko otvoreno natjecanje u informatici
- https://hsin.hr/honi/
- online natjecanje
- 5 do 7 kola tijekom školske godine
- Python, Pascal, C/C++ i Java
- najbolji natjecatelji idu na Juniorsku hrvatsku informatičku olimpijadu

HLL (1.+)

HRVATSKA LOGO LIGA

- Hrvatska logo liga
- https://logoliga.hsin.hr/
- online natjecanje
- 5 do 6 kola kroz školsku godinu
- FMSLogo
- najbolji natjecatelji idu na Hrvatsku logo olimpijadu

Dabar (1.+)

- https://ucitelji.hr/dabar/
- međunarodni školski izazov iz informatike i računalnog razmišljanja
- jednom godišnje online se rješava 12 zadataka
  - MikroDabar (1. i 2.)
  - MiliDabar (3. i 4.)
  - KiloDabar (5. i 6.)
  - MegaDabar (7. i 8.)

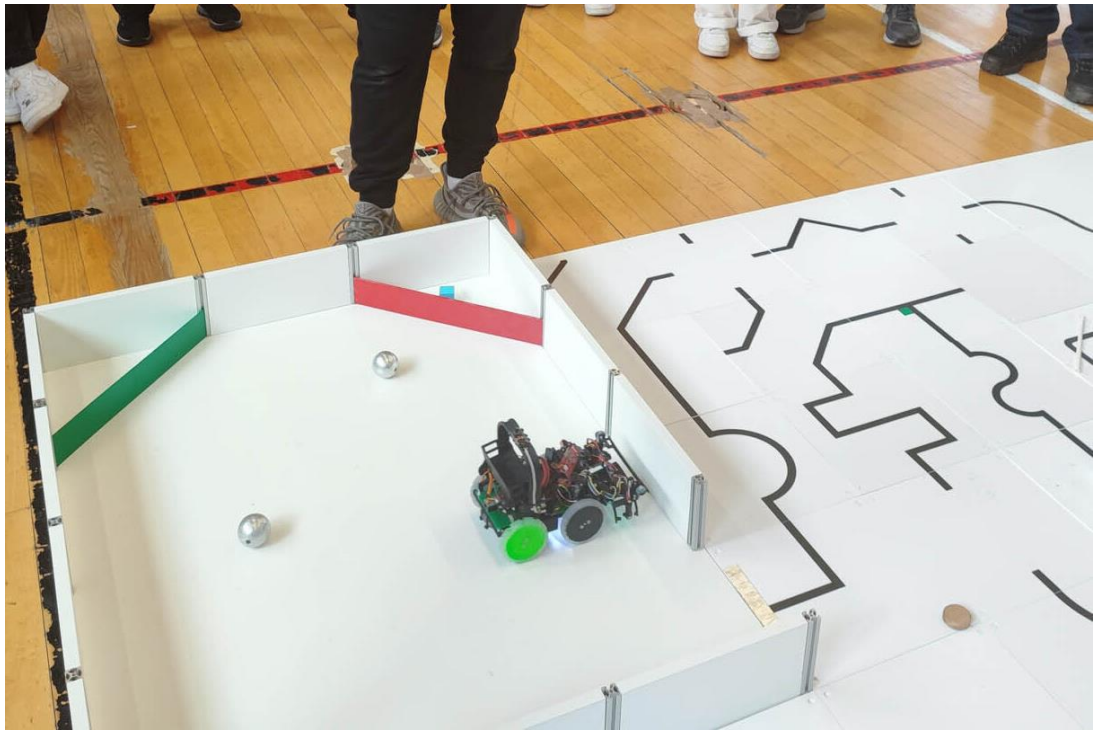
FLL (2.+)

- FIRST LEGO League
- https://fllcroatia.org/
- ekipa s 3 do 10 članova
- dobije se zadatak i staza, slaže se i programira LEGO Technic robot za rješavanje
- Challenge (4.-8.), Explore (2.-4.) i Discover (4-6 godina, zasad nema u Hrvatskoj)
- kotizacija

WRO (2.+)

- World Robot Olympiad
- https://wro.hr/
- ekipa s 2 do 3 člana
- napraviti i programirati LEGO robota koji savladava zadatke na podlozi (Robomission i Future Inovators) ili se natječe protiv drugih robota (Robosports)
- kotizacija

RoboCup Junior (1.+)



- https://robocupcroatia.com/
- ekipa s 2 do 4 člana
- izrada robota koji spašava žrtvu (Rescue), izvodi koreografiju (OnStage) ili igra nogomet (Soccer)
- kotizacija

Croatian Makers liga (1.+)

- https://croatianmakers.hr/en/croatian-makers-league/
- ekipa s 2 do 4 člana
- dijelom online, a dijelom uživo
- kroz niz kola rješavaju se razni zadaci na stazi s robotom Maqueen
- najbolje ekipe idu u superfinale

Generacija NOW (1.+)

- https://croatianmakers.hr/hr/generacija-now/
- projekt
- ekipe učenika dobiju opremu, poduku i materijale te rješavaju zadane i vlastite izazove
- najbolji radovi budu izloženi i nagrađeni na završnome događanju

Škola budućnosti (1.+)

- https://skolabuducnosti.stemi.education/
- projekt
- uključenim školama donira se oprema i materijali, imaju pristup edukacijama i predavanjima te mogu sudjelovati na završnoj konferenciji

Zahvaljujem na pozornosti.