Open Roberta (Blockly-based)

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Open Roberta
Simple visual robot/microcontroller programming

Built with Blockly https://lab.open-roberta.org

Transforms visual programs to Python/Java/C/C++

Deploys the program on the robot

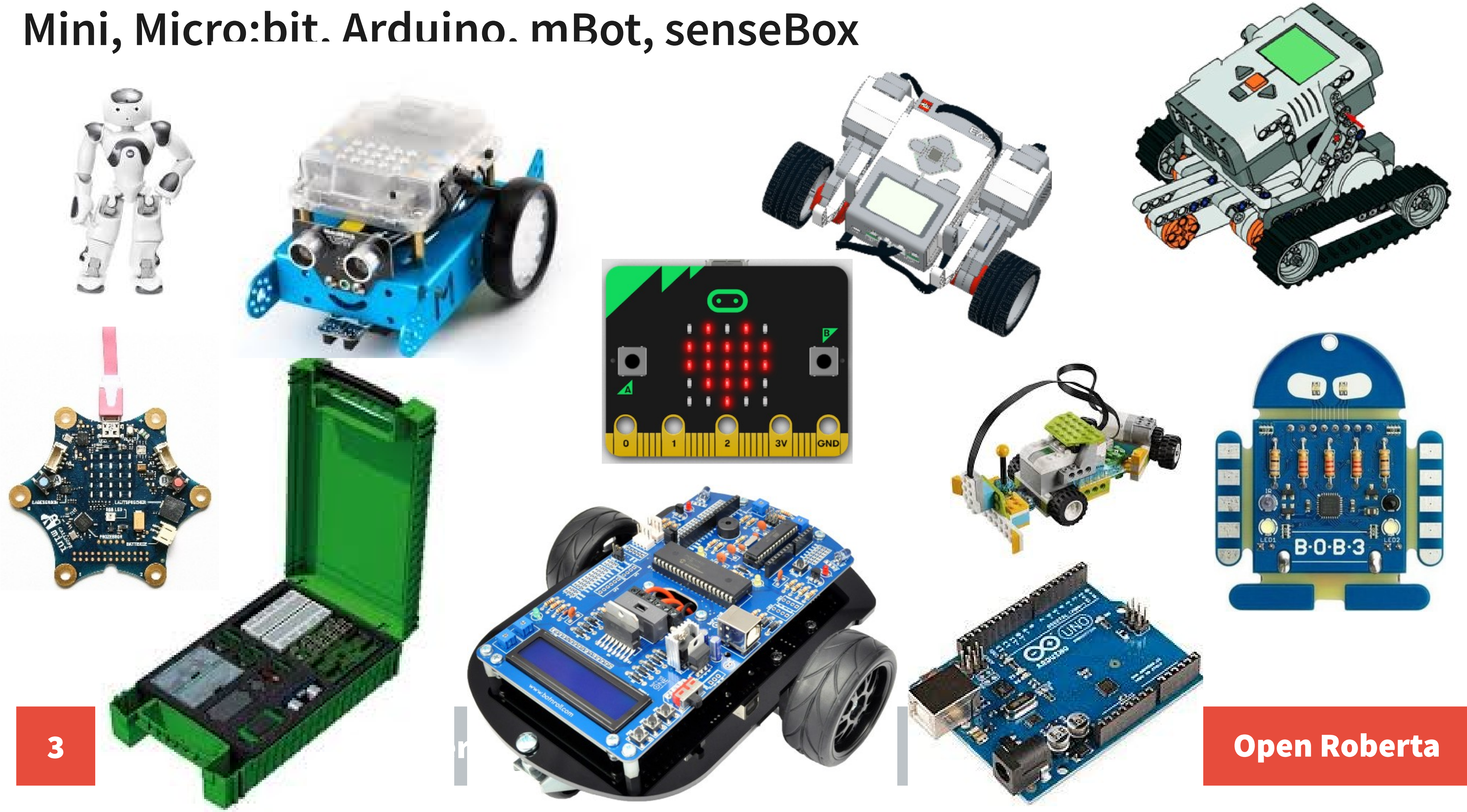
Runs the program on the robot (or on the PC)

Visual interface to the robot configuration details

- Motors, sensors, wheels geometry, LCD displays, LEDs, ports, shields

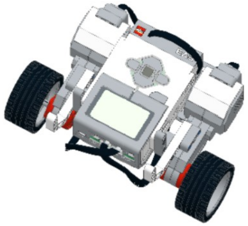
Open Roberta
Many robots and embedded systems supported

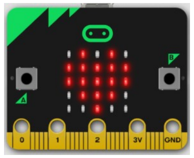
NAO, BOB3, Lego WeDo 2, Lego EV3, Lego NXT, Bot’n Roll, Calliope Mini, Micro:bit, Arduino, mBot, senseBox



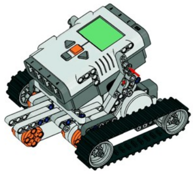
Many languages

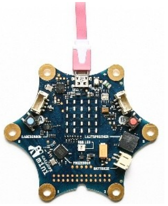
Python: Lego EV3 micro:bit NAO



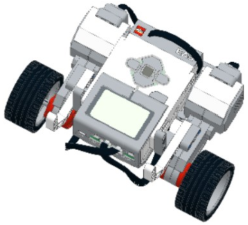


C/C++: Arduino, Bot'n roll, Lego NXT, BOB3, SenseBox, mBot, Calliope



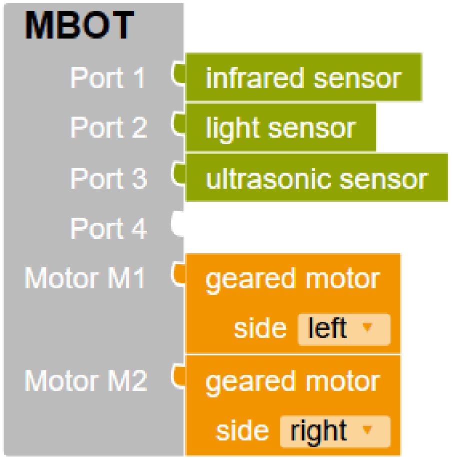


Java: Lego EV3



Json: Lego WeDo (runs on PC)

Visual Robot configuration



MBOT

Port 1 infrared sensor

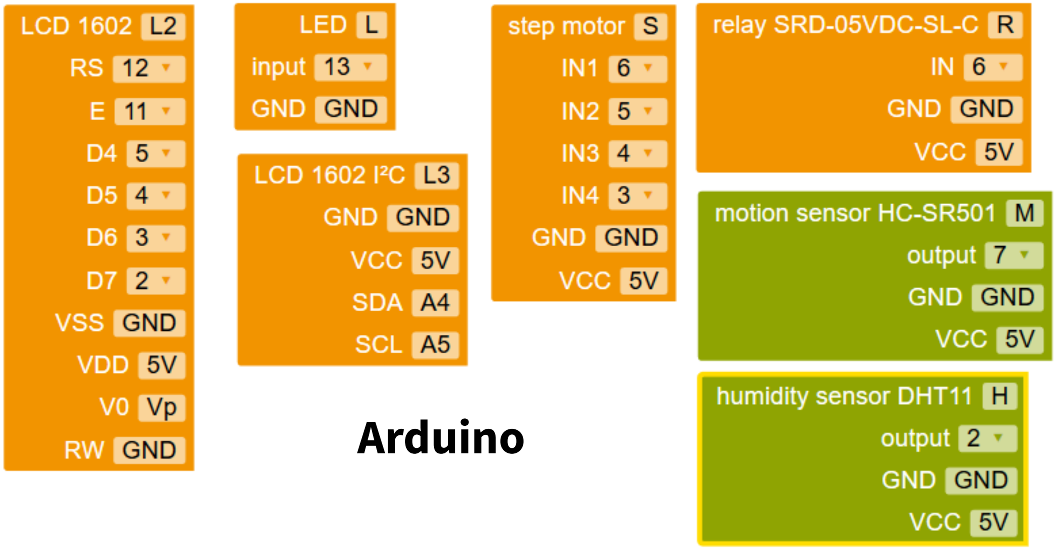
Port 2 light sensor

Port 3 ultrasonic sensor

Port 4

Motor M1 geared motor
side left

Motor M2 geared motor
side right



LCD 1602 L2
RS 12
E 11
D4 5
D5 4
D6 3
D7 2
VSS GND
VDD 5V
V0 Vp
RW GND

LED L
input 13
GND GND

LCD 1602 I²C L3
GND GND
VCC 5V
SDA A4
SCL A5

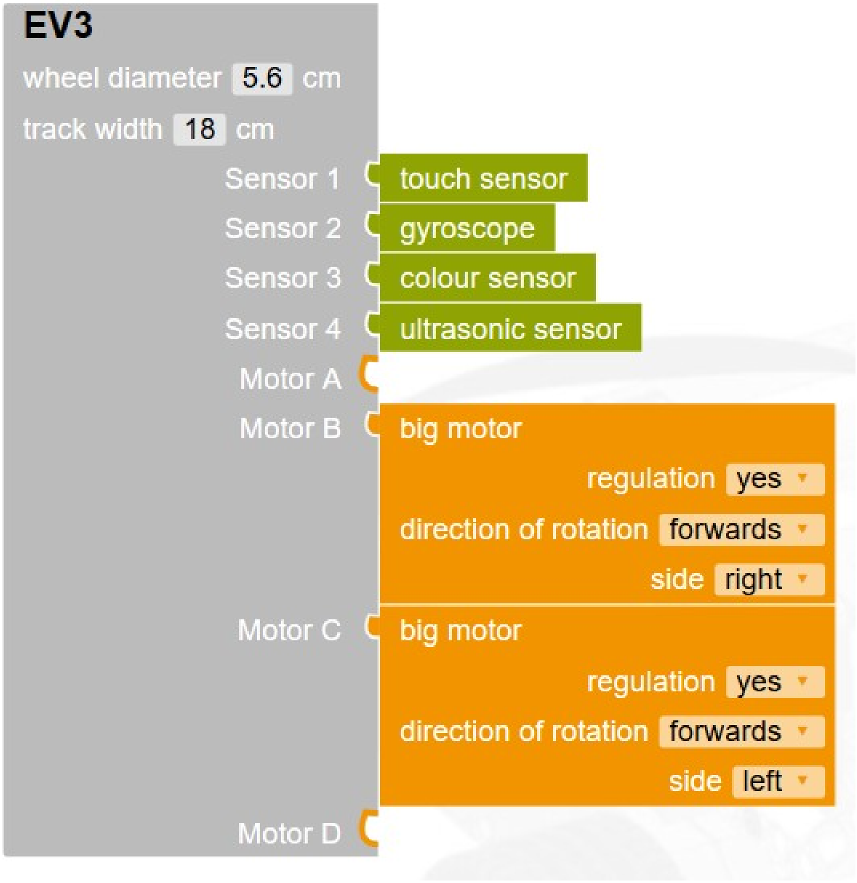
step motor S
IN1 6
IN2 5
IN3 4
IN4 3
GND GND
VCC 5V

relay SRD-05VDC-SL-C R
IN 6
GND GND
VCC 5V

motion sensor HC-SR501 M
output 7
GND GND
VCC 5V

humidity sensor DHT11 H
output 2
GND GND
VCC 5V

Arduino



EV3

wheel diameter 5.6 cm

track width 18 cm

Sensor 1 touch sensor

Sensor 2 gyroscope

Sensor 3 colour sensor

Sensor 4 ultrasonic sensor

Motor A

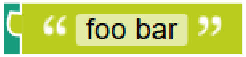
Motor B big motor
regulation yes
direction of rotation forwards
side right

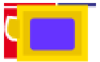
Motor C big motor
regulation yes
direction of rotation forwards
side left

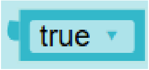
Motor D

Data types

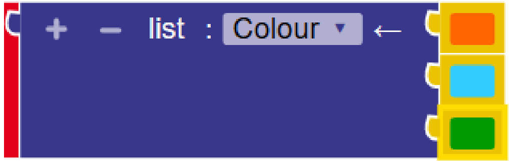
Number

String 

Colour 

Boolean 

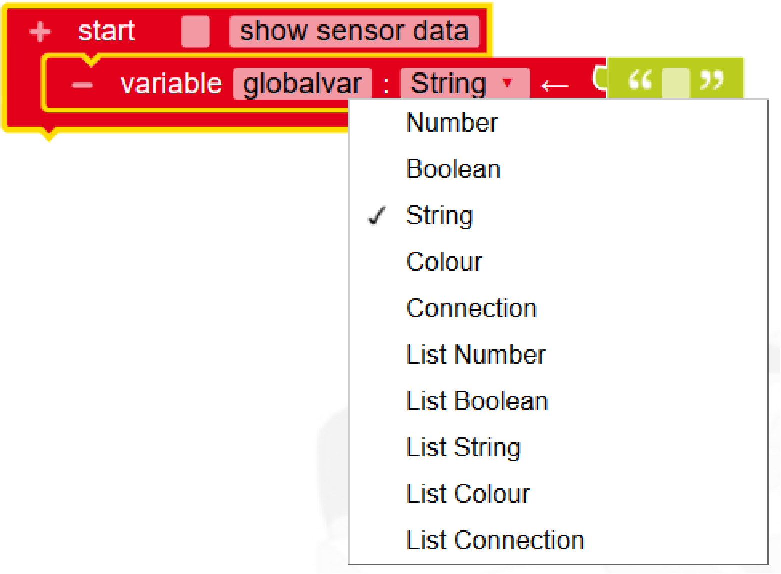
Connection

List of <T> 

(same type for all elements)

Variables and arguments are typed
(the connector is coloured)

Data types are visually enforced
(cannot join if the type is wrong)



Execution model: single thread

Single thread of execution (main program/main loop)

New Functions?	YES
Global variables?	YES
Local variables?	PARTIALLY (function’s arguments are mutable)
Messages?	NO
Events?	NO

Events must be simulated by polling the sensors

EV3 robots can connect via BT and exchange text messages

“Advanced” programming

Counted Loops, Foreach, Repeat until, Repeat while

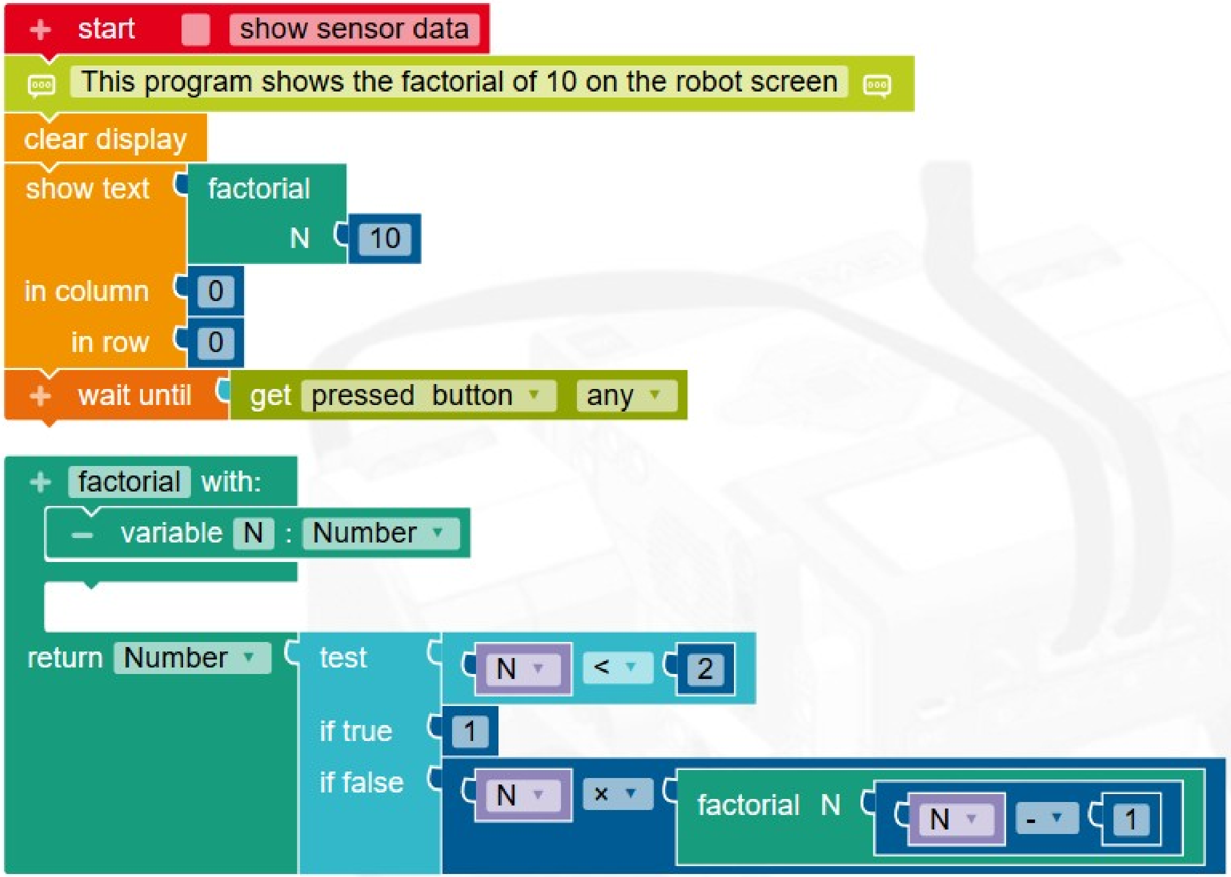
Continue, break

Wait N ms, Wait until condi

If, if-else, if-elif-…-else

Constrain value between

Recursion? YES



```
+ start   show sensor data
  This program shows the factorial of 10 on the robot screen
  clear display
  show text   factorial
                N  10
    in column  0
    in row     0
+ wait until   get pressed button ▾  any ▾

+ factorial with:
  – variable N : Number ▾

  return Number ▾   test      N ▾  < ▾  2
                    if true   1
                    if false  N ▾  × ▾  factorial N  N ▾  - ▾  1
```

Demo

DEMO