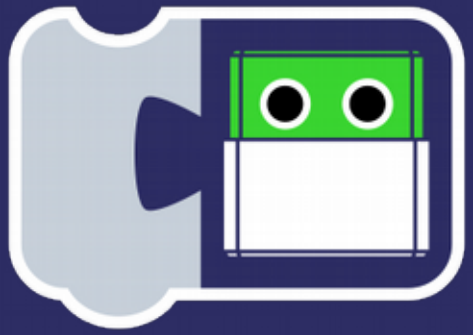
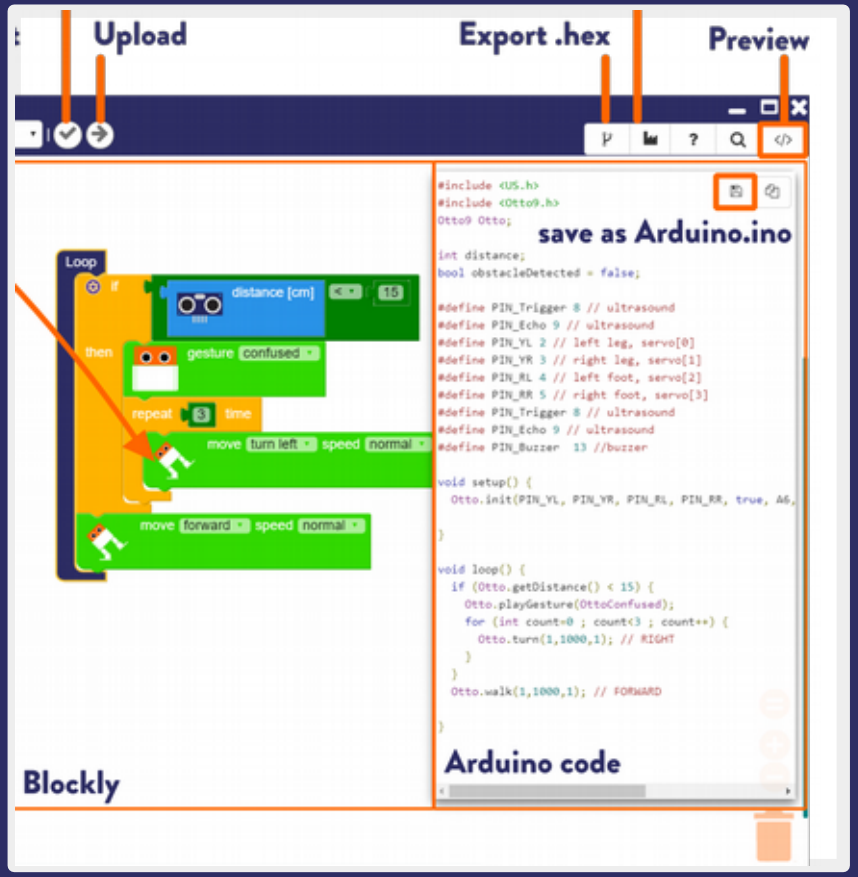


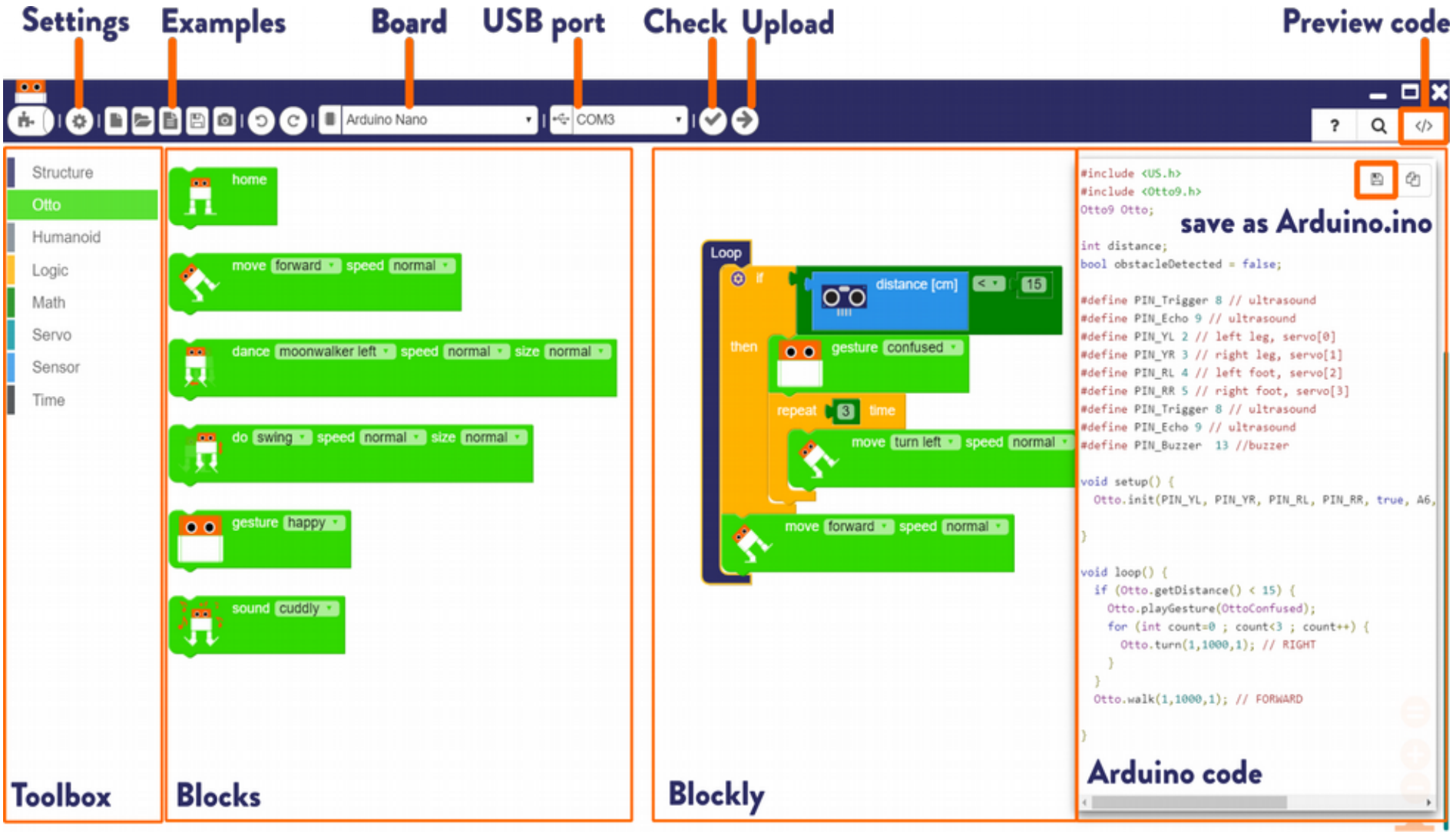
Blockly guide

code your own robot

- familiarize with the block programming environment.
- First simple projects, like programming a dance with Otto.
- learn the concept of sequential thinking and conditionals.
- make a complicated project, Otto must carry out a determined action.



install the software with the examples in: https://www.ottodiy.com/#blockly


Settings
Examples
Board
USB port
Check
Upload
Preview code
Arduino Nano
COM3
Structure
Otto
Humanoid
Logic
Math
Servo
Sensor
Time
Toolbox
home
move forward speed normal
dance moonwalker left speed normal size normal
do swing speed normal size normal
gesture happy
sound cuddly
Blocks
Loop
if
distance [cm] < 15
then
gesture confused
repeat 3 time
move turn left speed normal
move forward speed normal
Blockly
save as Arduino.ino
#include <US.h>
#include <Otto9.h>
Otto9 Otto;
int distance;
bool obstacleDetected = false;
#define PIN_Trigger 8 // ultrasound
#define PIN_Echo 9 // ultrasound
#define PIN_YL 2 // left leg, servo[0]
#define PIN_YR 3 // right leg, servo[1]
#define PIN_RL 4 // left foot, servo[2]
#define PIN_RR 5 // right foot, servo[3]
#define PIN_Trigger 8 // ultrasound
#define PIN_Echo 9 // ultrasound
#define PIN_Buzzer 13 //buzzer
void setup() {
Otto.init(PIN_YL, PIN_YR, PIN_RL, PIN_RR, true, A6,
}
void loop() {
if (Otto.getDistance() < 15) {
Otto.playGesture(OttoConfused);
for (int count=0 ; count<3 ; count++) {
Otto.turn(1,1000,1); // RIGHT
}
}
Otto.walk(1,1000,1); // FORWARD
}
Arduino code

Examples

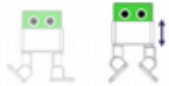
Walk ..... Level: ★☆☆☆☆ ..... Robot: Otto DIY ..... OPEN

Legs calibration ..... Level: ★★★☆☆ ..... Robot: Otto DIY ..... OPEN

Blink LED on board ..... Level: ★☆☆☆☆ ..... Robot: Otto DIY ..... OPEN

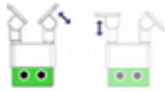
Buzzer beeps ..... Level: ★☆☆☆☆ ..... Robot: Otto DIY ..... OPEN

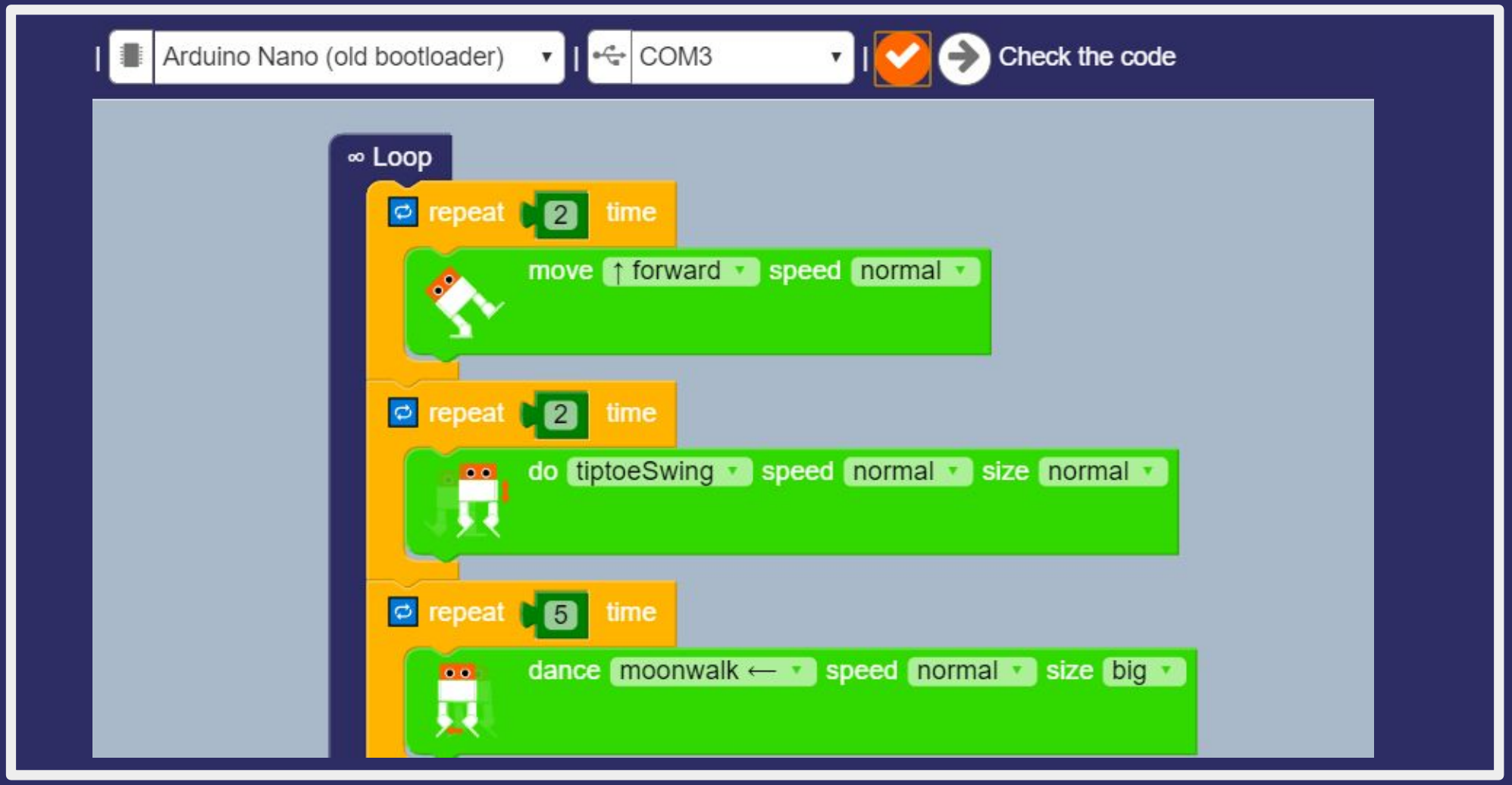
Dance ..... Level: ★★☆☆☆ ..... Robot: Otto DIY ..... OPEN

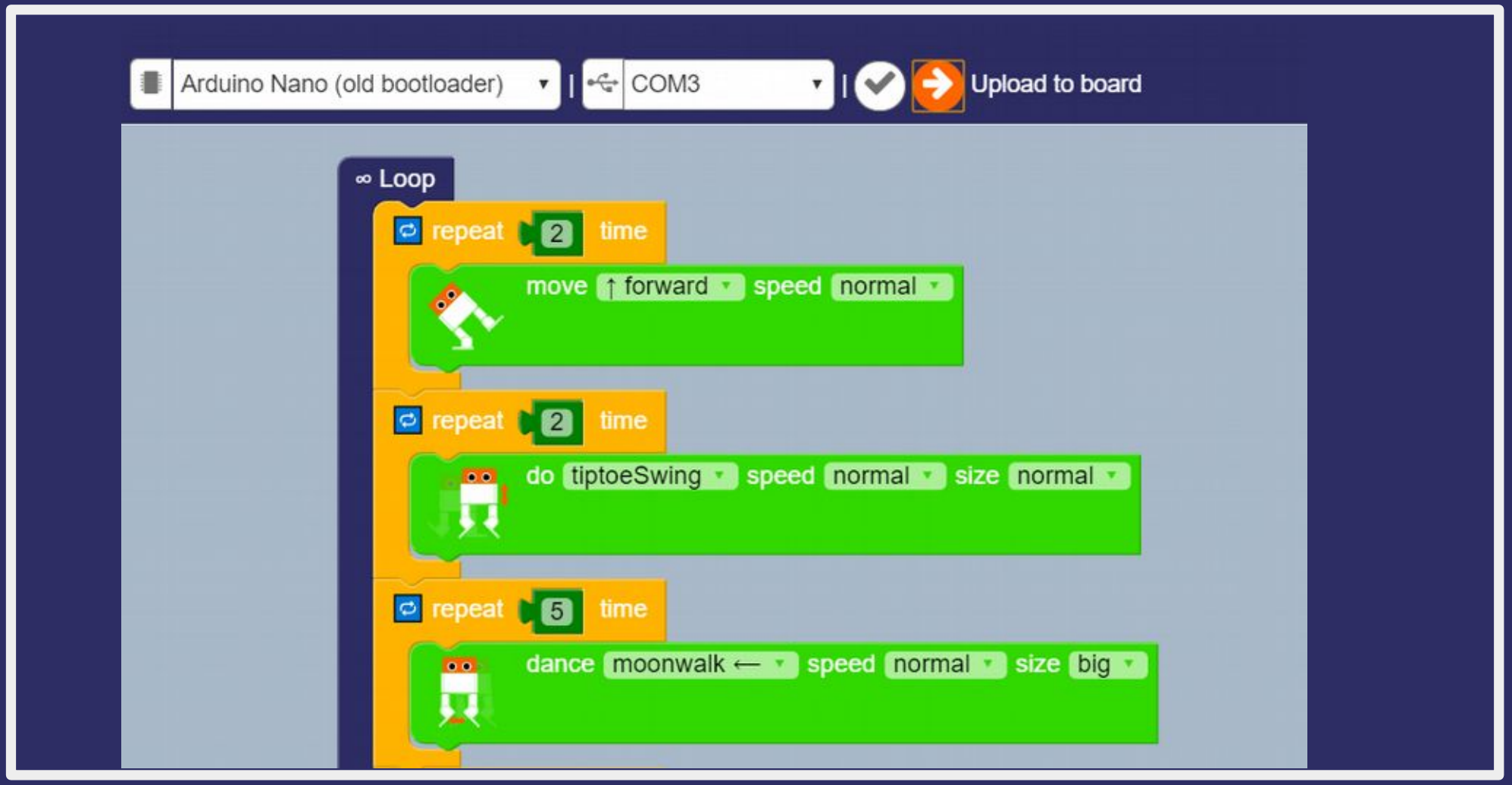


Avoid obstacles ..... Level: ★★☆☆☆ ..... Robot: Otto DIY ..... OPEN

Servo control ..... Level: ★★☆☆☆ ..... Robot: Otto DIY ..... OPEN



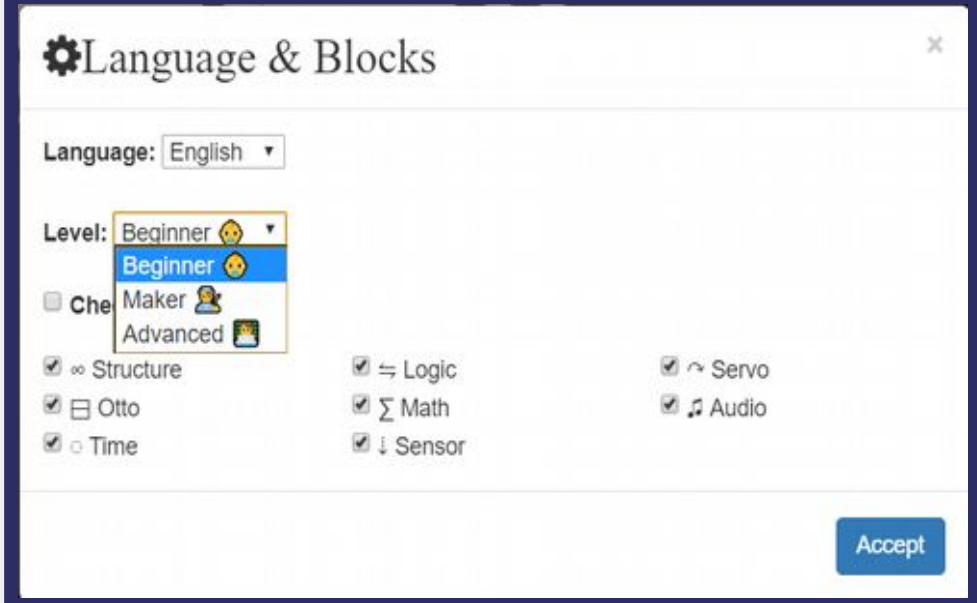

Arduino Nano (old bootloader)
COM3
Check the code
∞ Loop
repeat 2 time
move ↑ forward speed normal
repeat 2 time
do tiptoeSwing speed normal size normal
repeat 5 time
dance moonwalk ⟵ speed normal size big

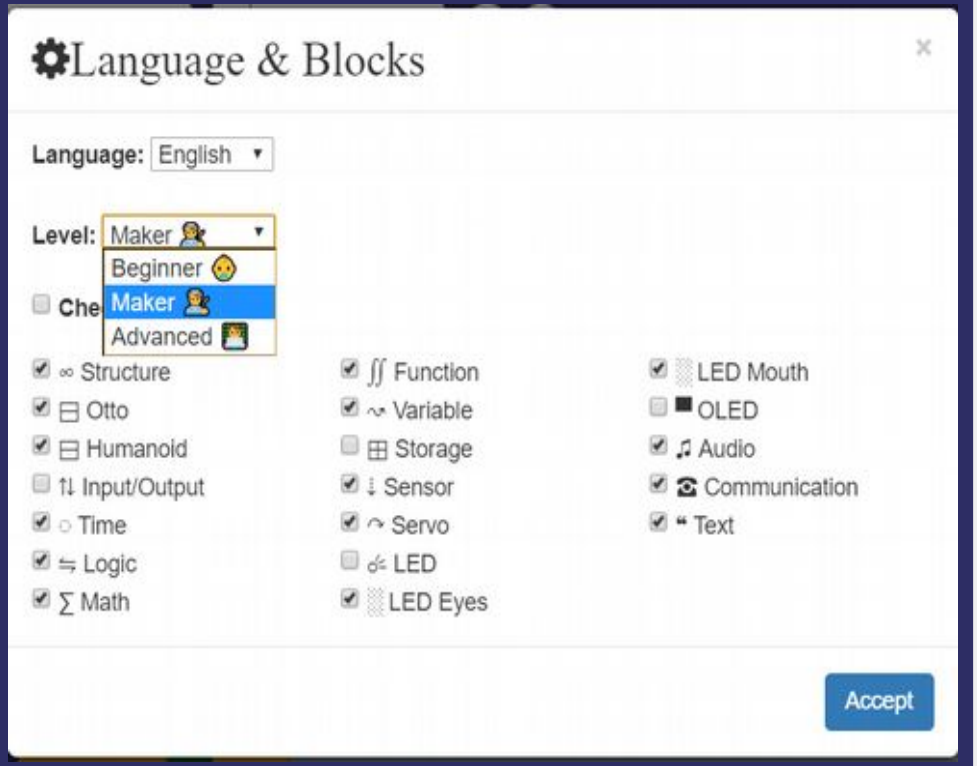

Arduino Nano (old bootloader)
COM3
Upload to board
∞ Loop
repeat 2 time
move ↑ forward speed normal
repeat 2 time
do tiptoeSwing speed normal size normal
repeat 5 time
dance moonwalk ← speed normal size big

you did it!

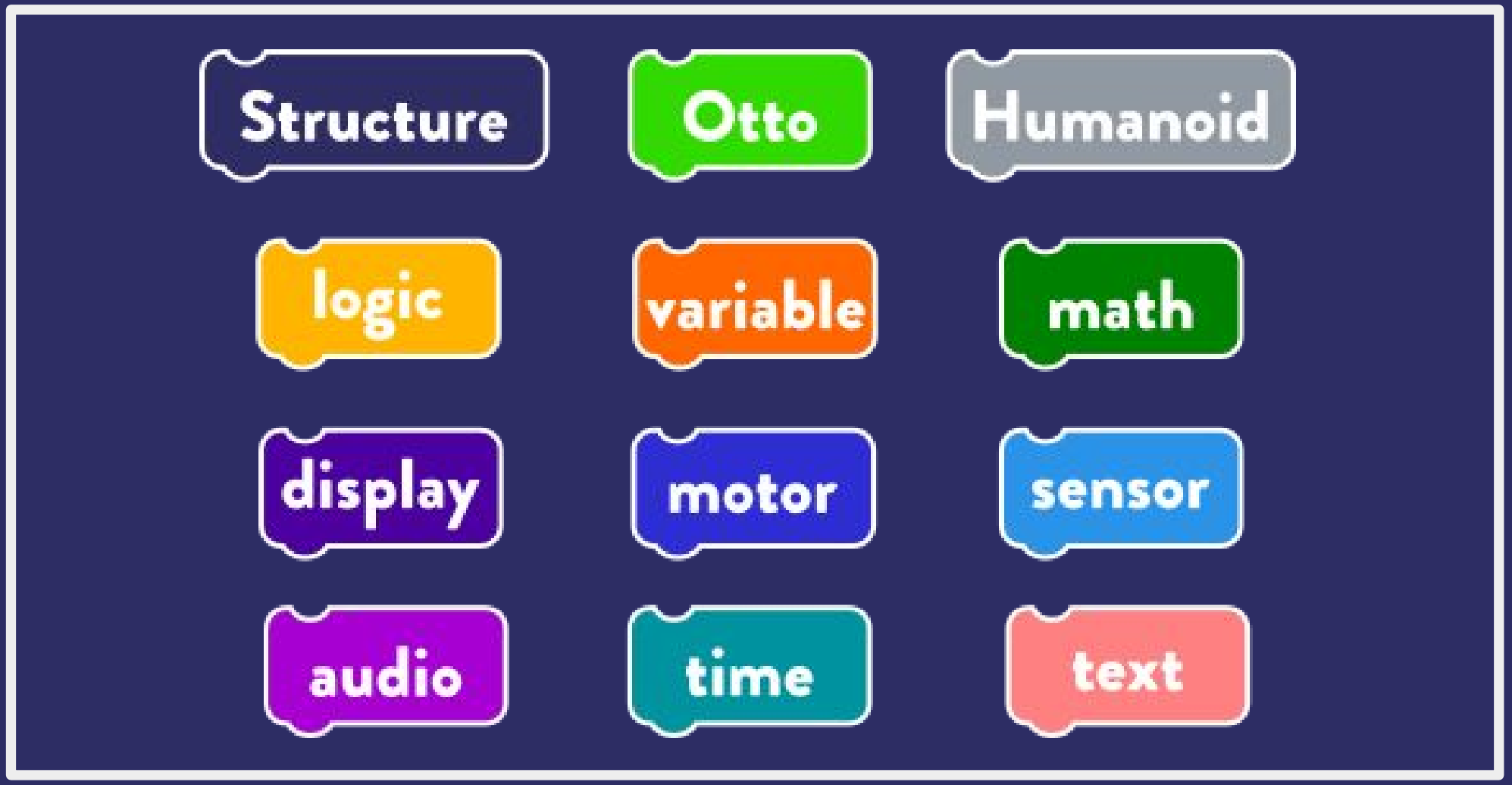
now let's learn the basics

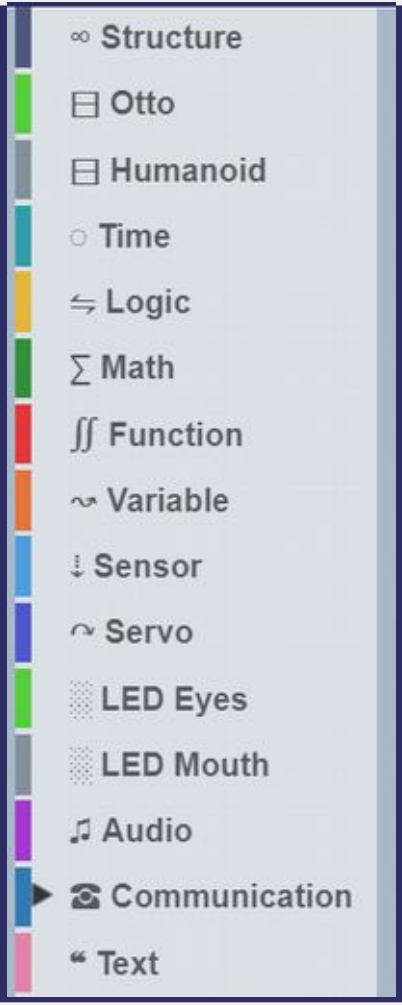
Check the settings according to level and language*





*after click on Accept Press F5 to reload.


Structure
Otto
Humanoid
logic
variable
math
display
motor
sensor
audio
time
text



Structure: Start or stop or create a loop in the program.
Time: used to delimit the program over time.
Otto and Humanoid specific movements, sounds and gestures.
Logic: create conditionals, repetitions and logic programming.
Math: make calculations or to insert numbers.
Function: create a procedure that can be repeated.
Variable: A variable is a named value that can be changed.

Sensor: interact with the environment with multiple sensors.
Motor: move a servo motor or activate a regular DC motor.
Display: turn on or off multiple types of LEDs or matrix or screen.
Audio: emit a sound (with an mp3 player or a buzzer-piezo).

Communication: with certain modules. Bluetooth or Serial.
Text: insert text into the program.

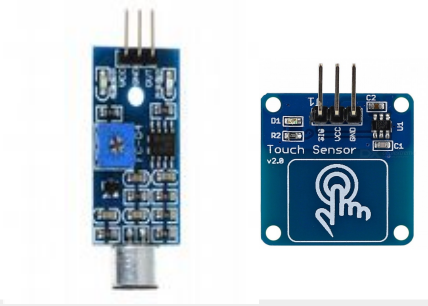
parts of a robot

- difference between sensors and actuators.
(inputs vs outputs)
- where is the brain of the robot?
- what is a servomotor?
- can Otto talk?
- how does Otto see?
- other components & interactions.

buy in: ottodiy.com

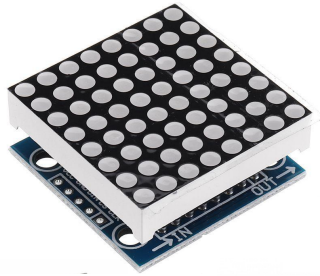
every robot has basically 3 component groups:

sensors (INPUTS)
able to interpret information.



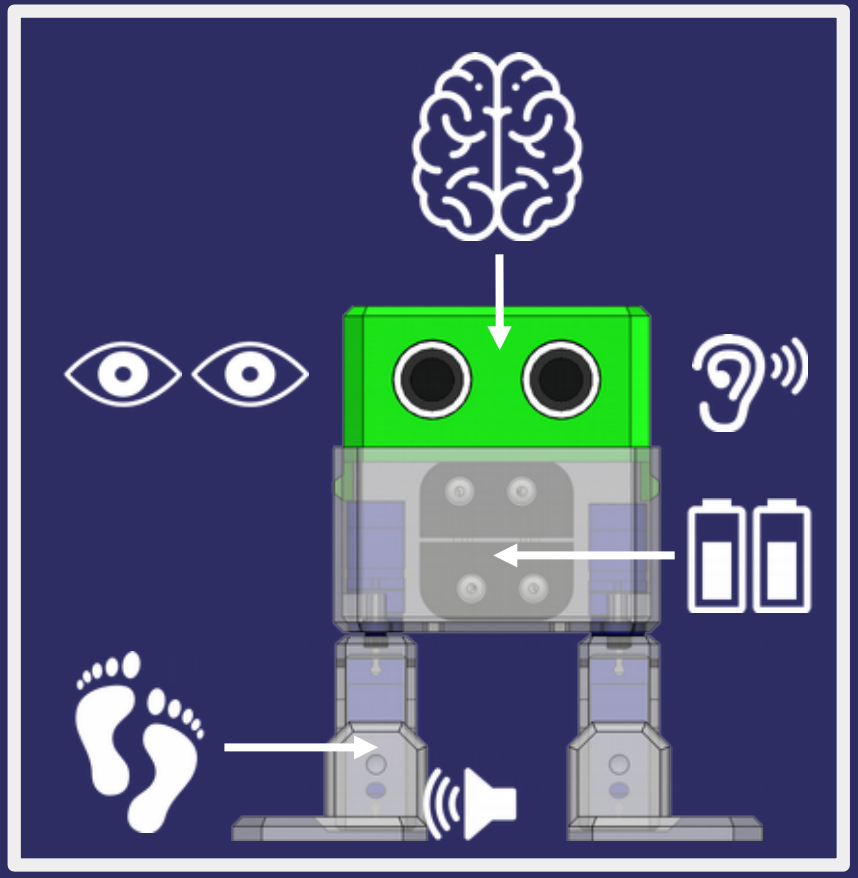
processor system
a "mini computer"

actuators (OUTPUTS)
produce the effect programmed.



we could say that the sensors are the robot's senses, these transmit information to the processor that allows to alter the function performed by actuators.

in addition a robot will need a power source to function and a physical structure to support the elements that compose it and perform its functions.



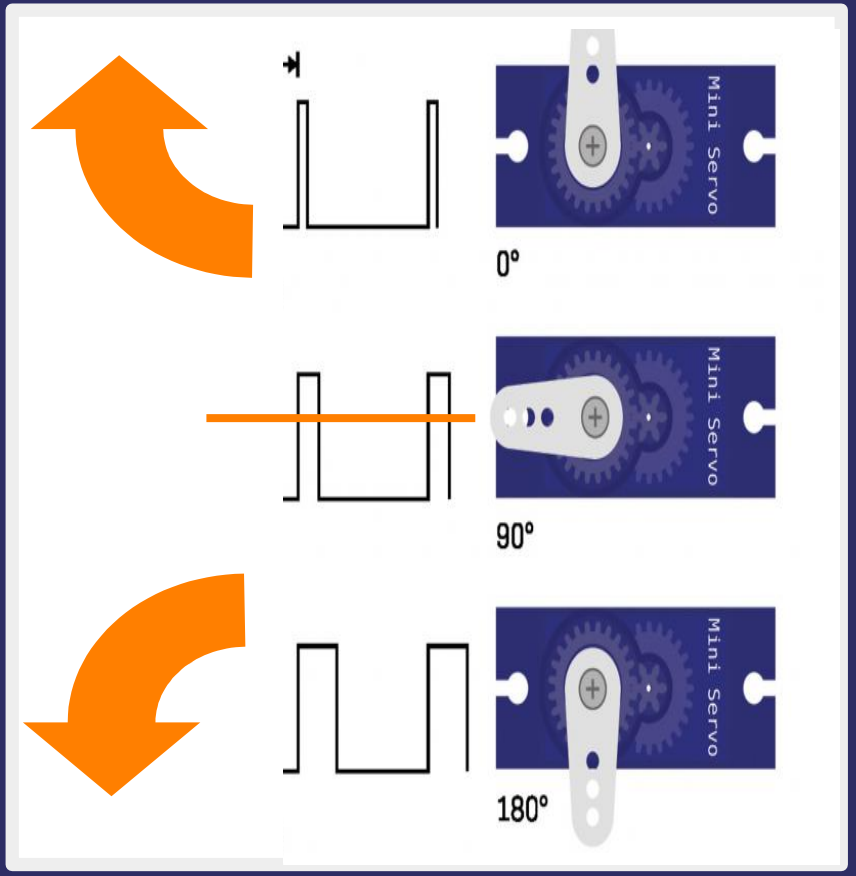
how does a robot think?

- think (process) one thing at a time, he can't do two things at the same time.
- think and repeat actions very quickly, so much that sometimes we can't even see what he is doing and you have to tell him to wait a bit.
- he never does anything you haven't told him, you have to program everything, whatever you want he to do and give him the orders one at a time.
- normally, when a robot finishes its list of orders, it returns to start over, repeating your programming over and over again. (Loop)

what is a servomotor?

is an actuator that can rotate (usually between 0° and 180°). it is used to control the angular position, at neutral can rotate 90° to the left and 90° to the right. (forced beyond this and they will break)

Otto has 4 servo motors that collectively help the robot walk and dance.



servomotor includes 3 pins:

VCC power pin (typically red) connects to V (+5V)

GND ground pin (typically brown or black) connects to G (0V)

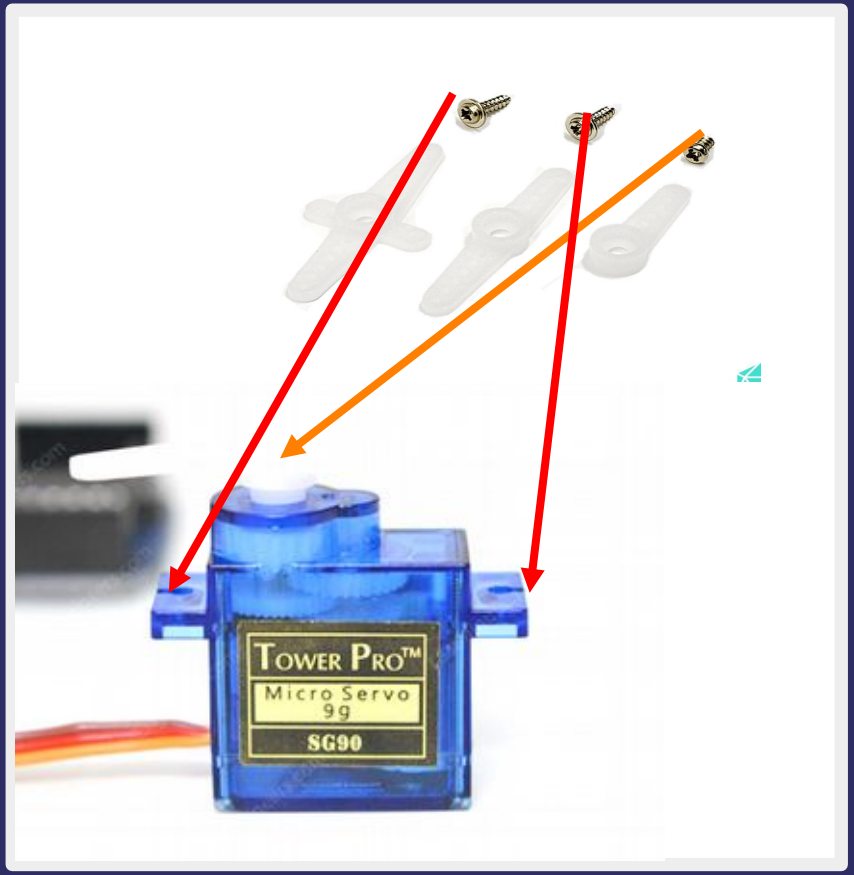
PWM signal pin (typically orange or white) receives the control signal, connects to the S of a determined pin number.

it comes with 3 screws:

2 for mounting (long & pointy)

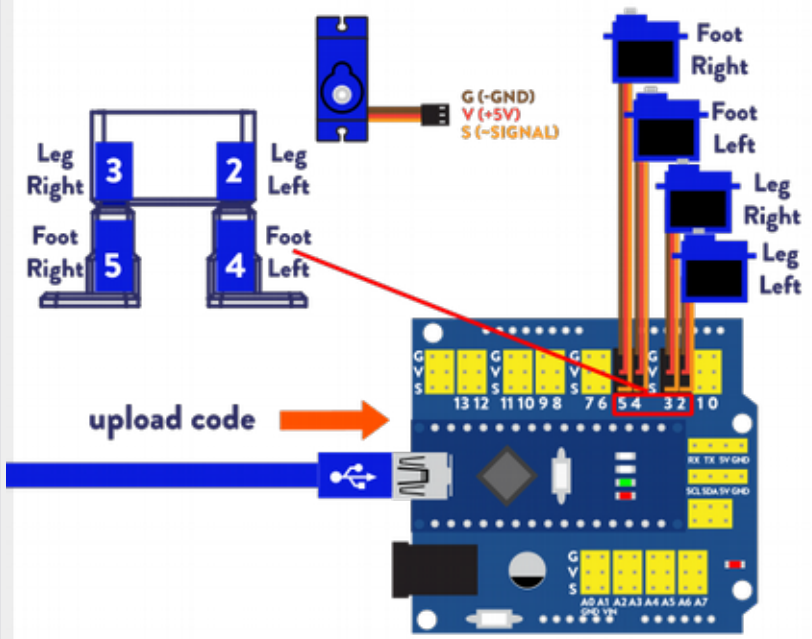
1 for center horn short & flat)

and
3 horns/ arms “white keys”
we only need 1 per servo.



time to code again!

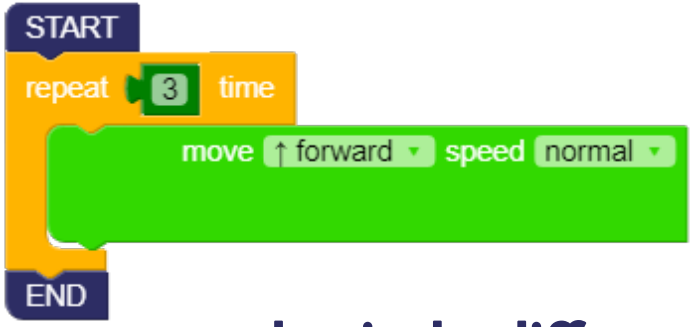
servos wiring



example servo control (align center)

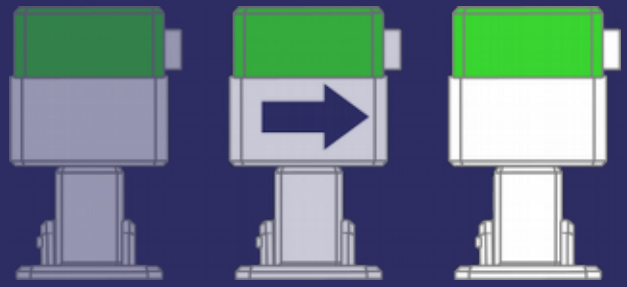
walk before run

2 walk examples



what is the difference?

Otto.walk(1,1000,1);



can you make Otto run?

dance time!

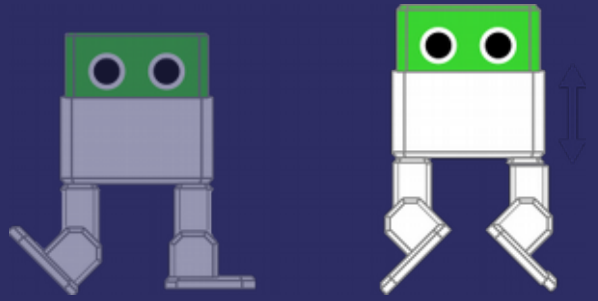
Otto.walk(2,1000,1);

Otto.tiptoeSwing(2, 1000, 25);

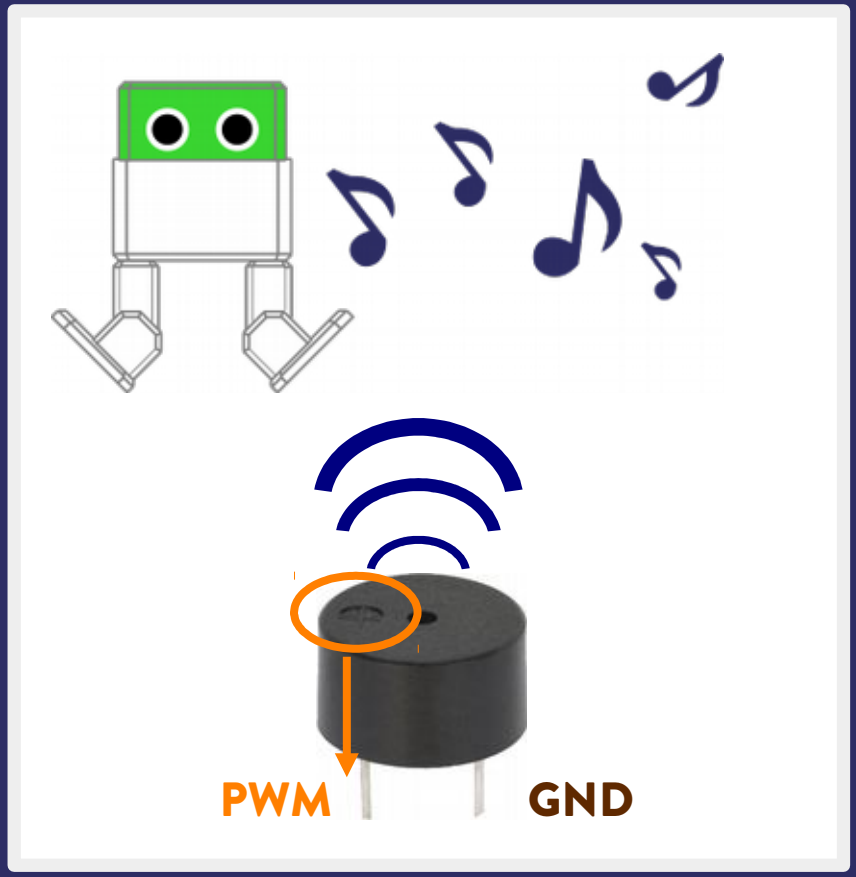
Otto.moonwalker(5, 1000, 40, 1);

Otto.moonwalker(5, 1000, 40, -1);

Otto.crusaito(5, 1000, 40, 1);



can Otto talk?

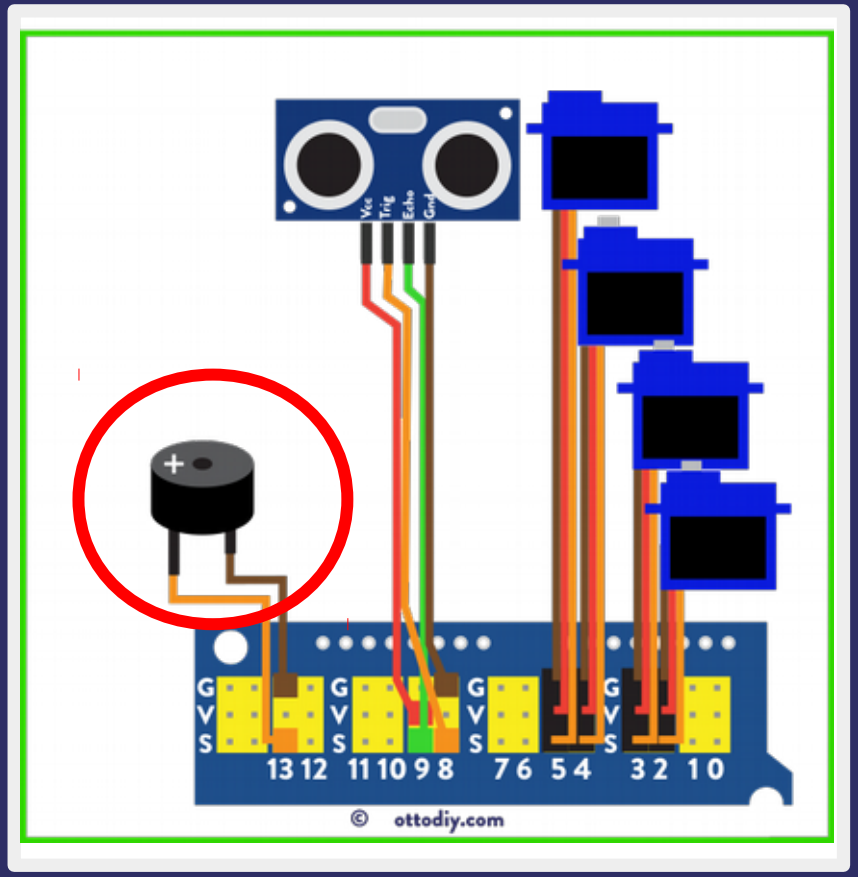


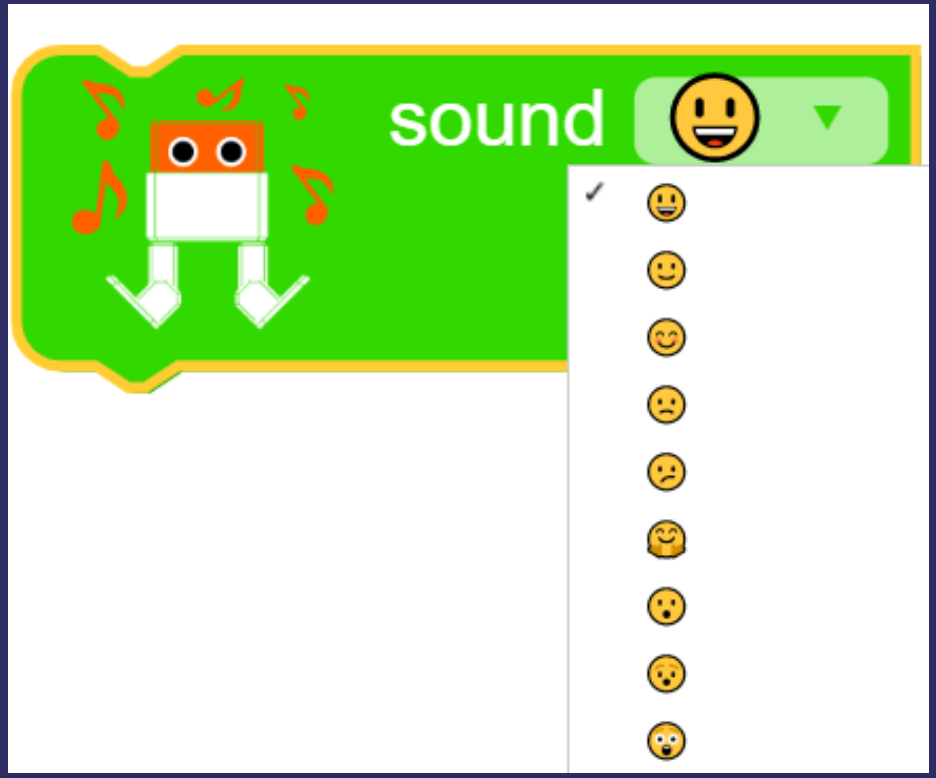
piezo buzzer

is an actuator used to generate sound, beep or even make the melody of a song.

Otto can't talk but he can create sounds related to his emotions similar to R2D2.

make sure to identify the positive mark and connect in the right pin



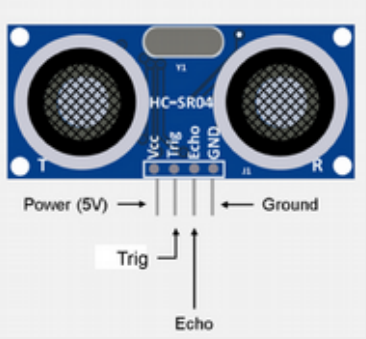


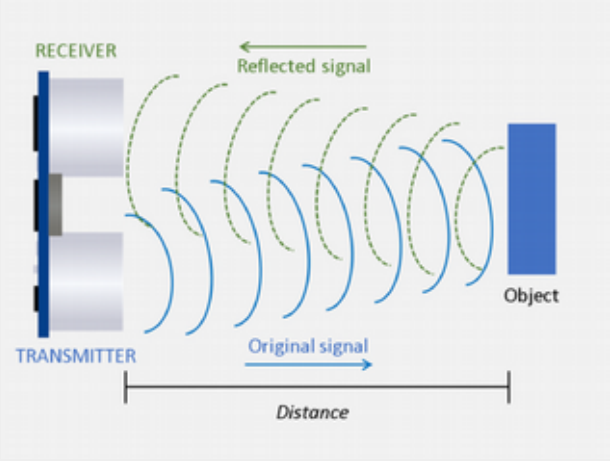
Otto.sing(S_superHappy);

what is a gesture?


```
Otto.playGesture(OttoLove);
Otto.playGesture(OttoSuperHappy);
Otto.playGesture(OttoSad);
Otto.playGesture(OttoSleeping);
Otto.playGesture(OttoConfused);
Otto.playGesture(OttoAngry);
Otto.playGesture(OttoMagic);
Otto.playGesture(OttoWave);
Otto.playGesture(OttoVictory);
Otto.playGesture(OttoFail);
Otto.playGesture(OttoFart);
```

how does Otto “see”?





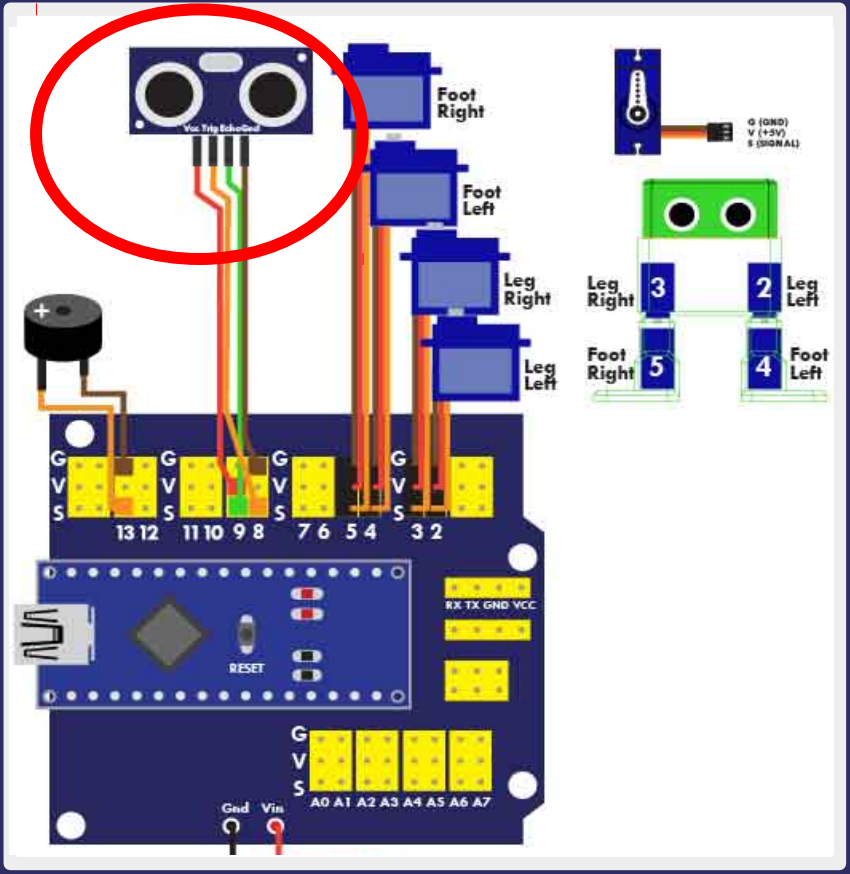
ultrasonic sensor

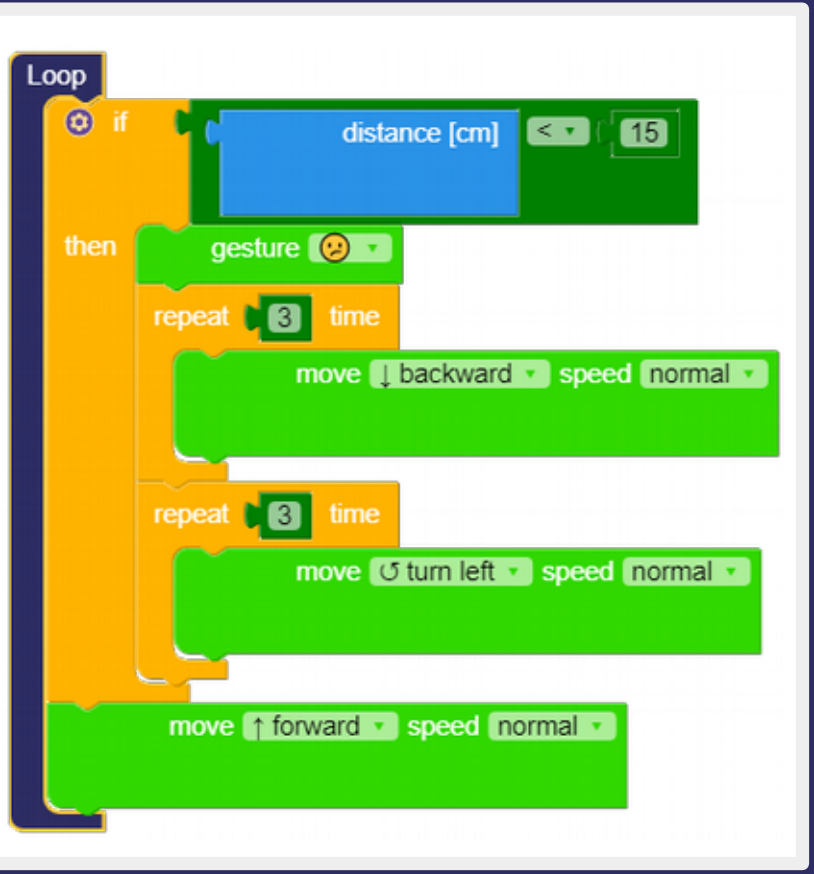
is used to measure the distance to an object by using ultrasonic waves, includes 4 pins:

VCC (Power), GND (Ground)
TRIG receives the control signal
ECHO sends a signal (pulse)

by measuring the duration of pulse we can calculate the distance.

Otto can avoid obstacles!


Foot Right
Foot Left
Leg Right
Leg Left
Leg Right 3
2 Leg Left
Foot Right 5
4 Foot Left
G (GND)
V (+5V)
S (SIGNAL)
G V S
13 12 11 10 9 8 7 6 5 4 3 2
RESET
RX TX GND VCC
A0 A1 A2 A3 A4 A5 A6 A7
Gnd Vin

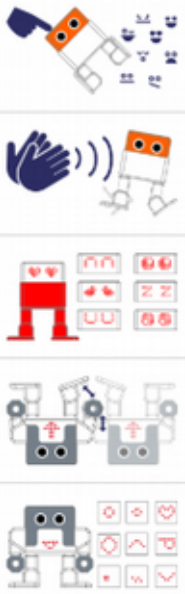

Loop
if
distance [cm]
< 15
then
gesture
repeat 3 time
move ↓ backward speed normal
repeat 3 time
move ↺ turn left speed normal
move ↑ forward speed normal

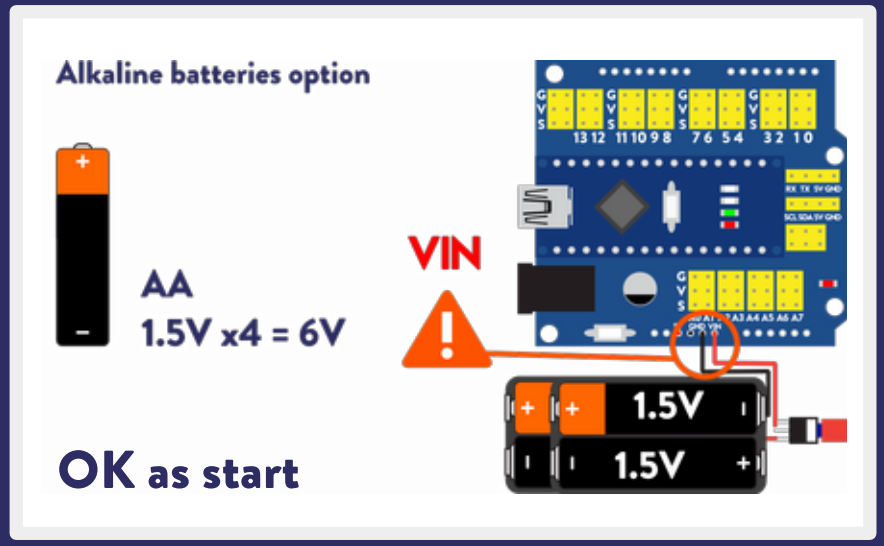
what will you code?

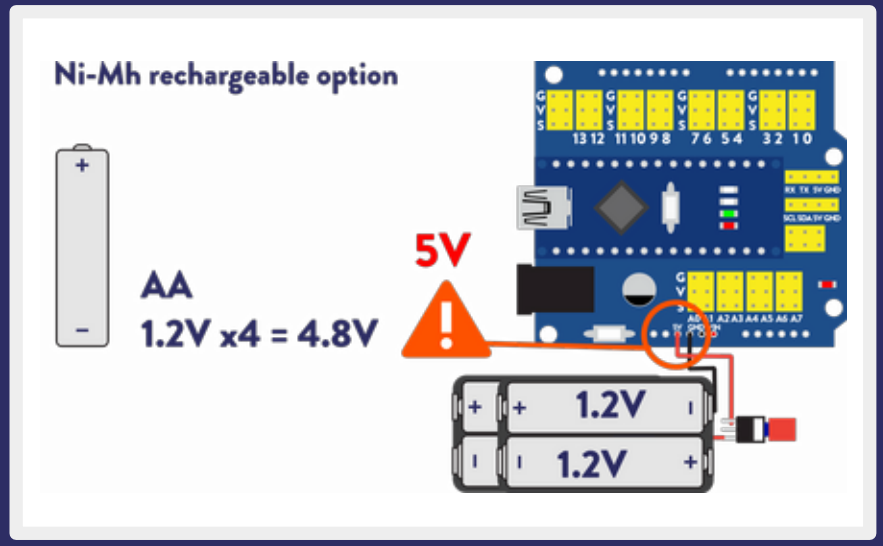
other components & interactions

touch & sound sensors and LED matrix displays. (depends on the robot kit)

Touch interaction	Level: ★★★☆☆	Robot: Otto DIY +	OPEN
Sound interaction	Level: ★★★☆☆	Robot: Otto DIY +	OPEN
Emotions	Level: ★★★☆☆	Robot: Otto DIY Eyes	OPEN
Legs & Arms calibration	Level: ★★★★☆	Robot: Otto DIY Humanoid	OPEN
Arms & LED Matrix	Level: ★★★★☆	Robot: Otto DIY Humanoid	OPEN

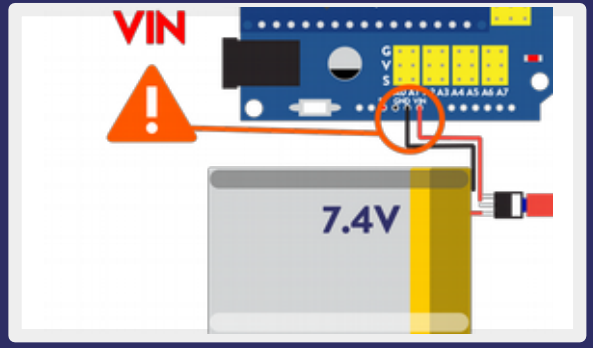






but for better performance and care of the environment, use rechargeable batteries.

more detail info here:
https://www.ottodiy.com/blog/power



troubleshooting & debugging

find and fix, perseverance is important.

not finding Otto connected in your PC?
install the CH340 driver to recognize USB device.

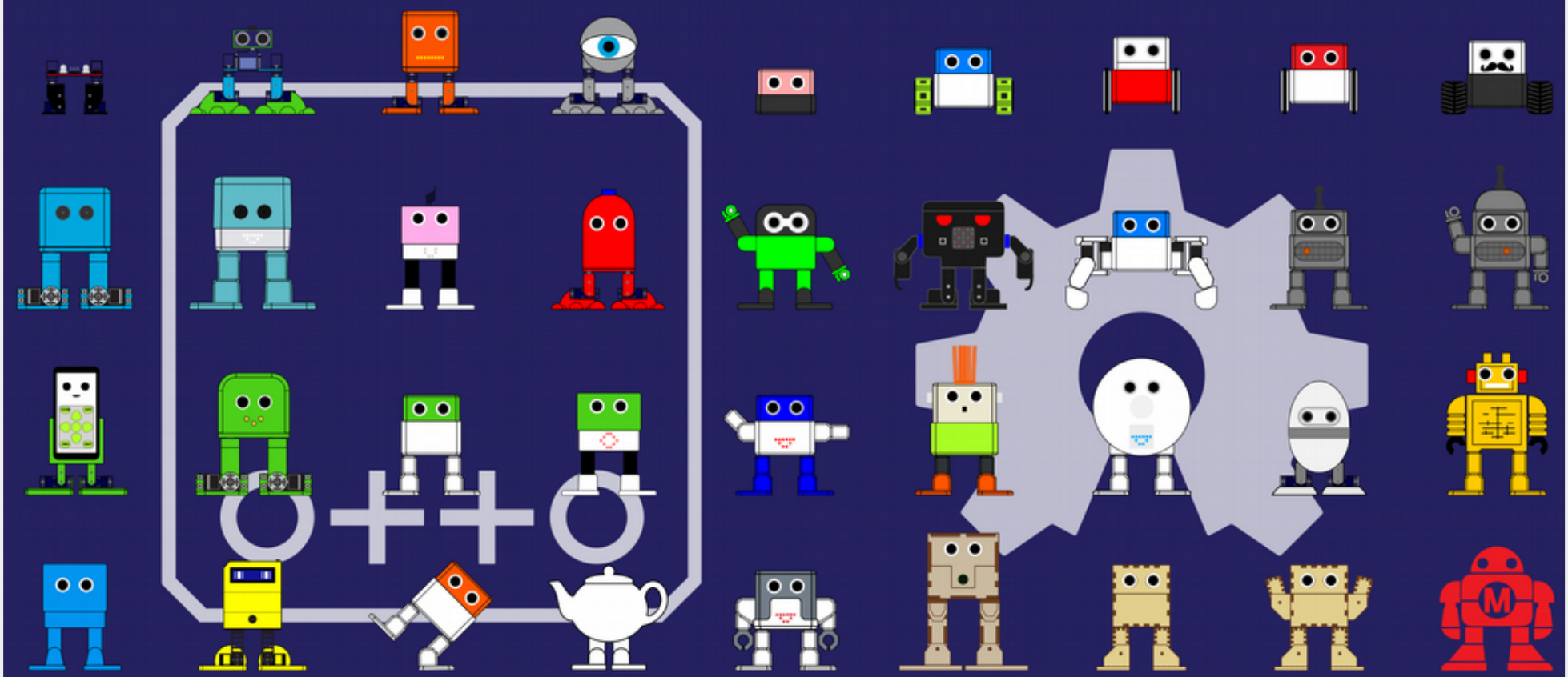
can not upload code?
check USB cable and that Bluetooth is disconnected

does Otto reset every now and then?
that is because of lack of power, discharged batteries.

are Otto legs and feet twisted?
check that you centered your servos before assembly for precise movements calibration is needed read this blog article: https://www.ottodiy.com/blog/calibration

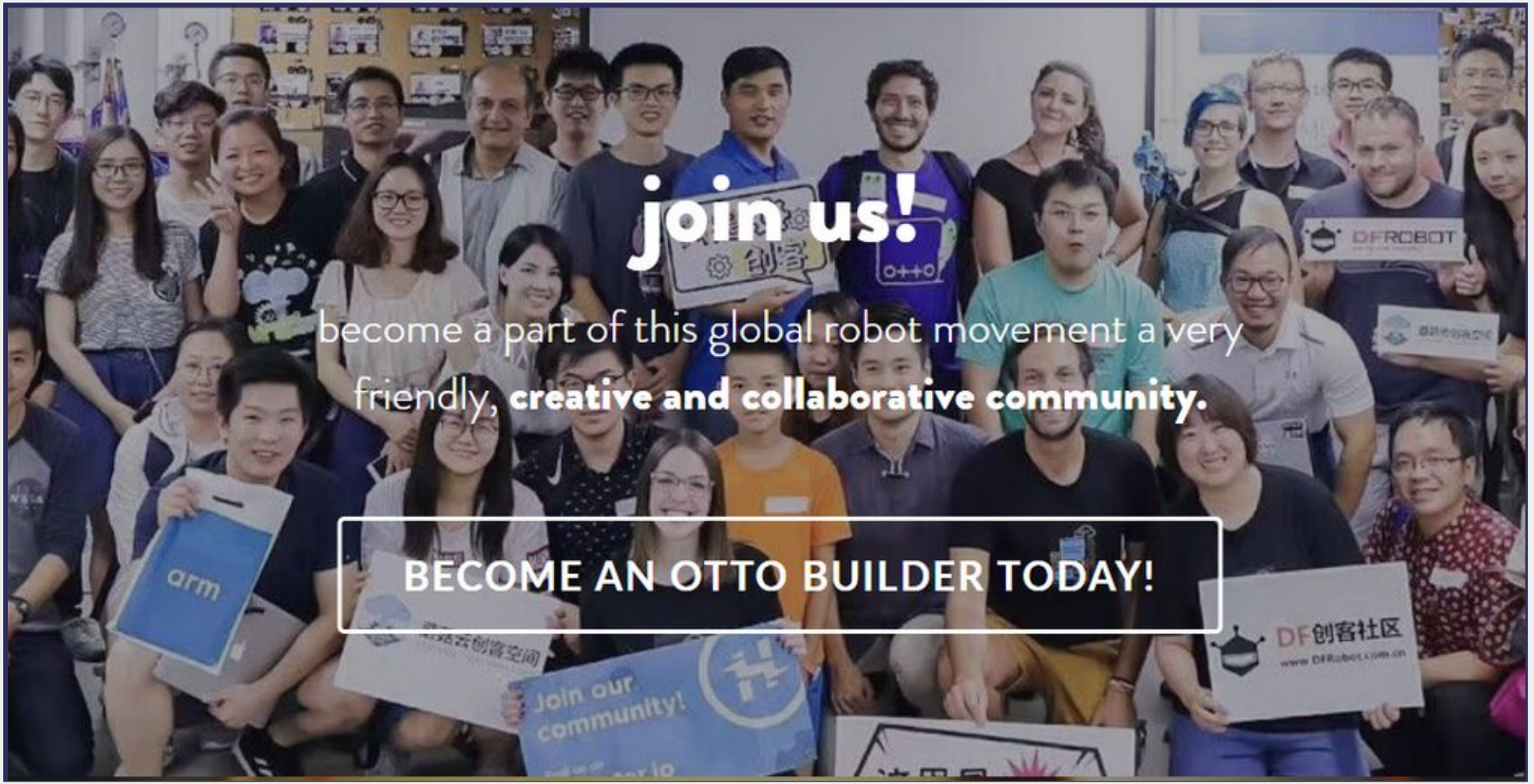
ask for help in the community forum : https://wikifactory.com/+OttoDIY/forum

more robot projects you can make:

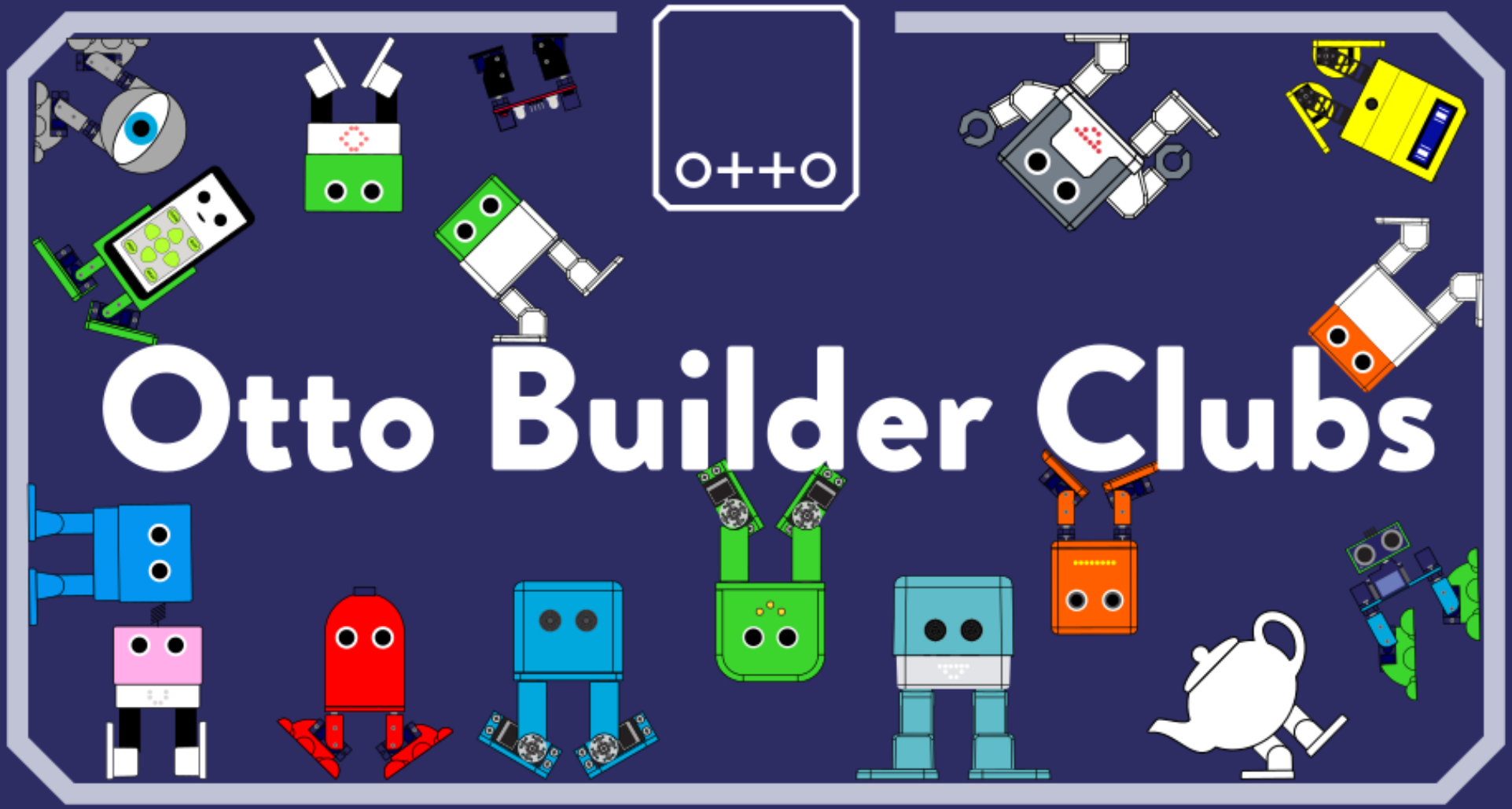


ottodiy.com

https://wikifactory.com/+OttoDIY/projects



join us here: ottodiy.com/#join-us



start your own here: https://www.ottodiy.com/blog/clubs

create yours here: https://www.ottodiy.com/blog/clubs

build

motor skills
spatial thinking
dexterity

code

problem solving
logical thinking
collaboration

design

creativity
lateral thinking
confidence

play

social skills
story telling
interaction

ottodiy.com

1. build your own robot

2. code your own robot
3. learn to code
4. learn to really code

5. create your own dance for Otto

6. what is inside Otto?
7. play with sensors

8. design your own robot
9. make your own accessories

10. document your new Otto REMIX

reach to us for more content

thanks!

ottodiy.com