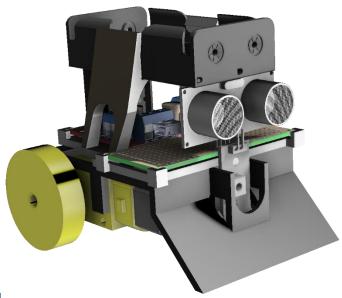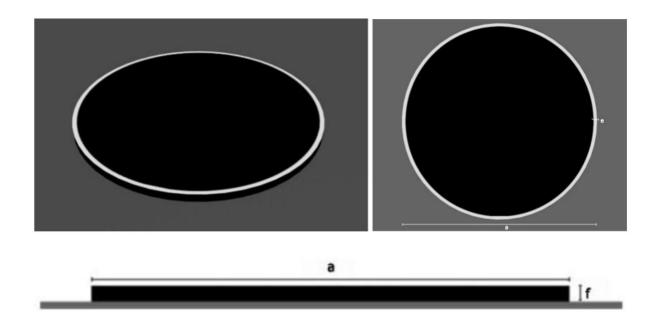# Sumo-Bot CRF edition

Background

The name "sumo" is from an old Japanese sport consisting of two opponents fighting in a ring where the goal is to push each other ou. In robot sumo, two robots are competing against each other trying to do the same thing.
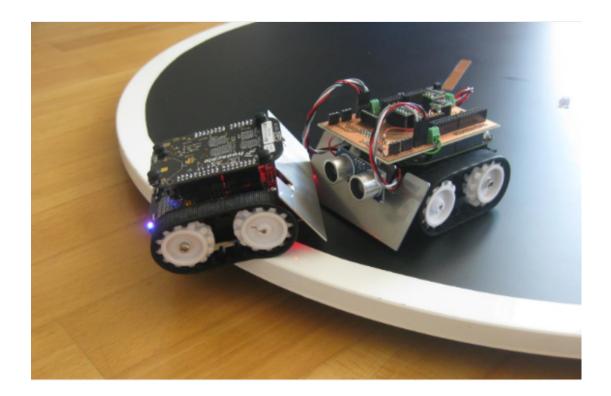
Sumo is divided into several classes with specific weight and measurements. This kit is for a "mini" sumo. With rules:

1. Maximum outer dimensions: 10x10 cm
2. Maximum weight: 500g
3. The robot shape could be changed after start.
4. Must be self-controlling.

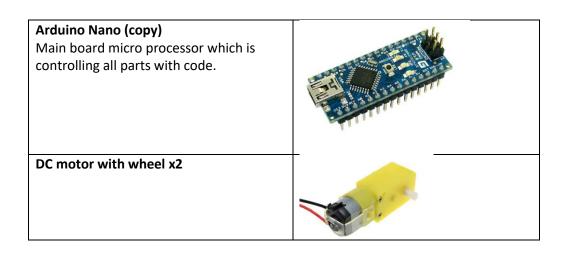The contest ring is designed in a certain way for each class and have two colours. Black with a white frame.

Contest ring, also called "The Doyho"

Component and Use

Arduino Nano (copy) Main board micro processor which is controlling all parts with code.	
DC motor with wheel x2	

Motor driver L298N Dual H bridge Provides constant voltage to the motors and can be controlled with the Arduino	
Ultrasonic sensor HC-SR04 Measuring distance with sound and is used to locate the opponent.	
IR sensor TCRT5000 Makes the robot able to spot if it is on the black or white part of the contest ring.	
Lithium battery 18650 x2 Supplies Arduino and motor driver with voltage.	
Jumper wires Some wires between different parts of the robot.	
3D-printed frame Holds the sumo-bot together	

Strategy

There are loads of different strategies. The example code of this robot kit is one of the most basic.
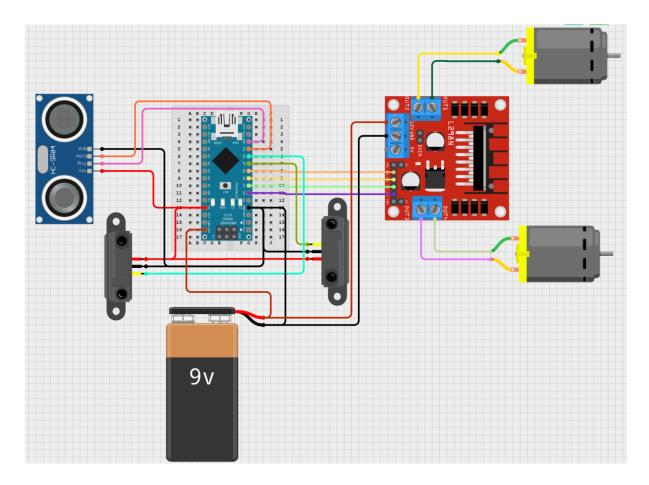
Five seconds after connecting power cables, the robot will start rotating.

And if the opponent is found in a given range found by the ultrasonic sensor it will attack. Which means stop rotating and going forward against the opponent and try to push it off the contest ring. If

If the opponent moves out of the way, rotating will be applied.

The robot will go forward if the IR-sensor in the back discovers a white line, and backward if the frontal IR-sensor detects white line.
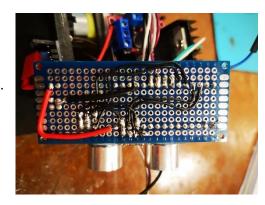
Conceptual Circuit

Pinout Scheme

Purpose	PINout Arduino
Trig on Ultrasonic	D10

Echo on Ultrasonic	D9
IR-sensor out front	D8
IR sensor out back	D7
Motor driver IN 1	D6
Motor driver IN 2	D5
Motor driver IN 3	D4
Motor driver IN 4	D3

Before building

You get to choose between two kits.
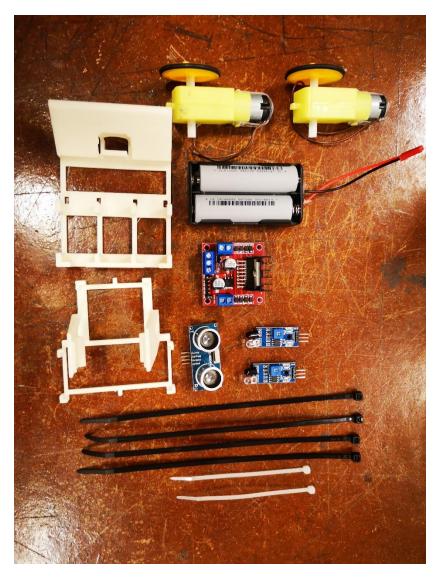
 One with a pre soldered circuit board ready to be put together.

And one with some soldering on an experimental board required. Guidelines and tips for this will be found beneath the building guide.

The following building guide is based on a pre soldered board.
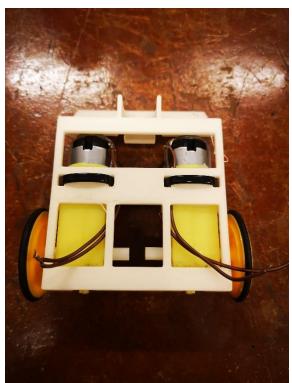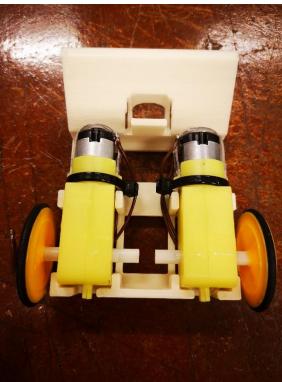
Building step by step

Step 1

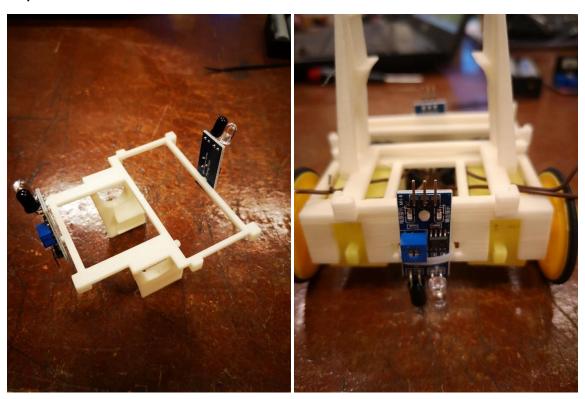Make sure all parts are included.

Step 2

Use two long zip ties to fasten the DC motors to lower chassis. Make sure the brown cables are at the right place.
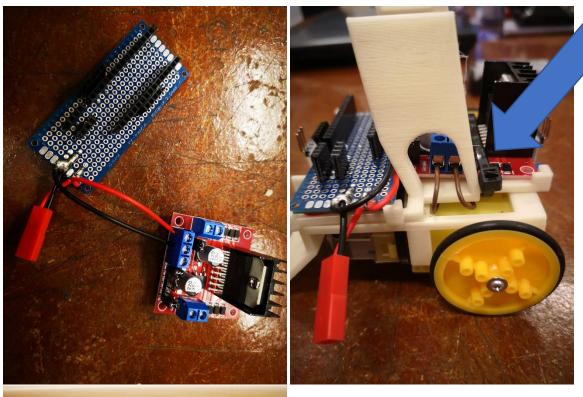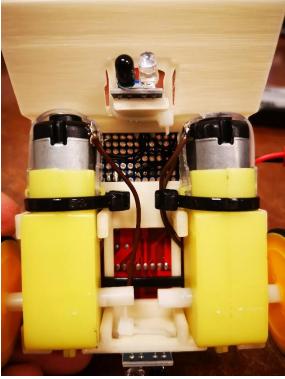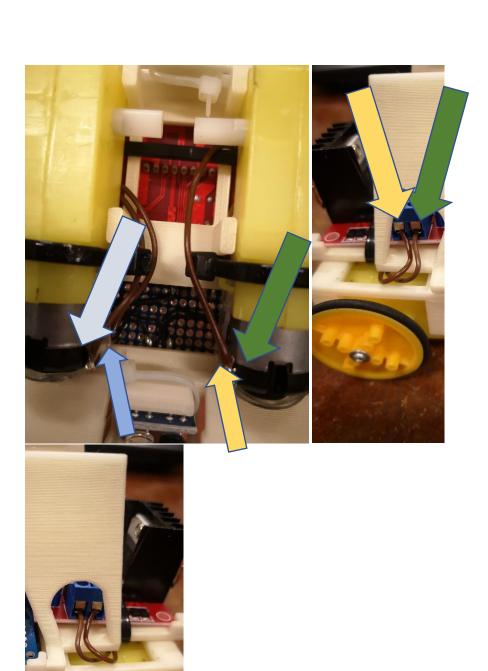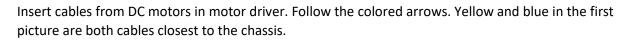
Step 3

Fit IR sensors on the pegs sticking out from top chassis. Then place on top of the upper chassis and fasten with short zip ties around the IR sensors.
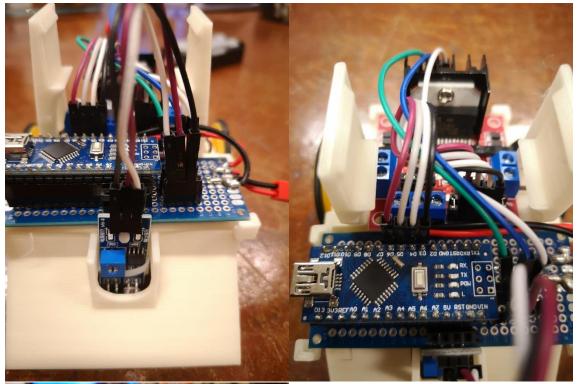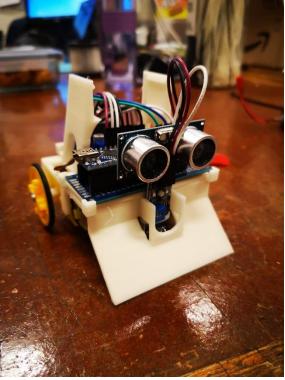
Step 4

Attach power cables from main circuit to motor driver as shown. Make sure cables are fastened properly. Then place on chassis and fasten with long zip tie.
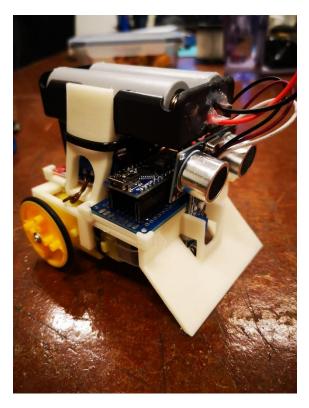
Step 5

Insert cables from DC motors in motor driver. Follow the colored arrows. Yellow and blue in the first picture are both cables closest to the chassis.

Step 6

Insert all dupont-cables and make sure to put them in the right place and order. Insert the Ultrasonic sensor.

Step 7

Place battery casing in the clamps and put a long zip tie underneath.

Programming

The Arduino included is already programmed with desired code. But you are welcome to change it however you want.

In order to program this, you will need Arduino IDE software, with the library "HCSR04". Choose "Arduino Nano" as chip and ATmega328P (old bootloader) as processor.

Instructions soldering circuit board

If not chosen the pre soldered kit.

After soldering – test your circuit with multimeter.