RoboGen project

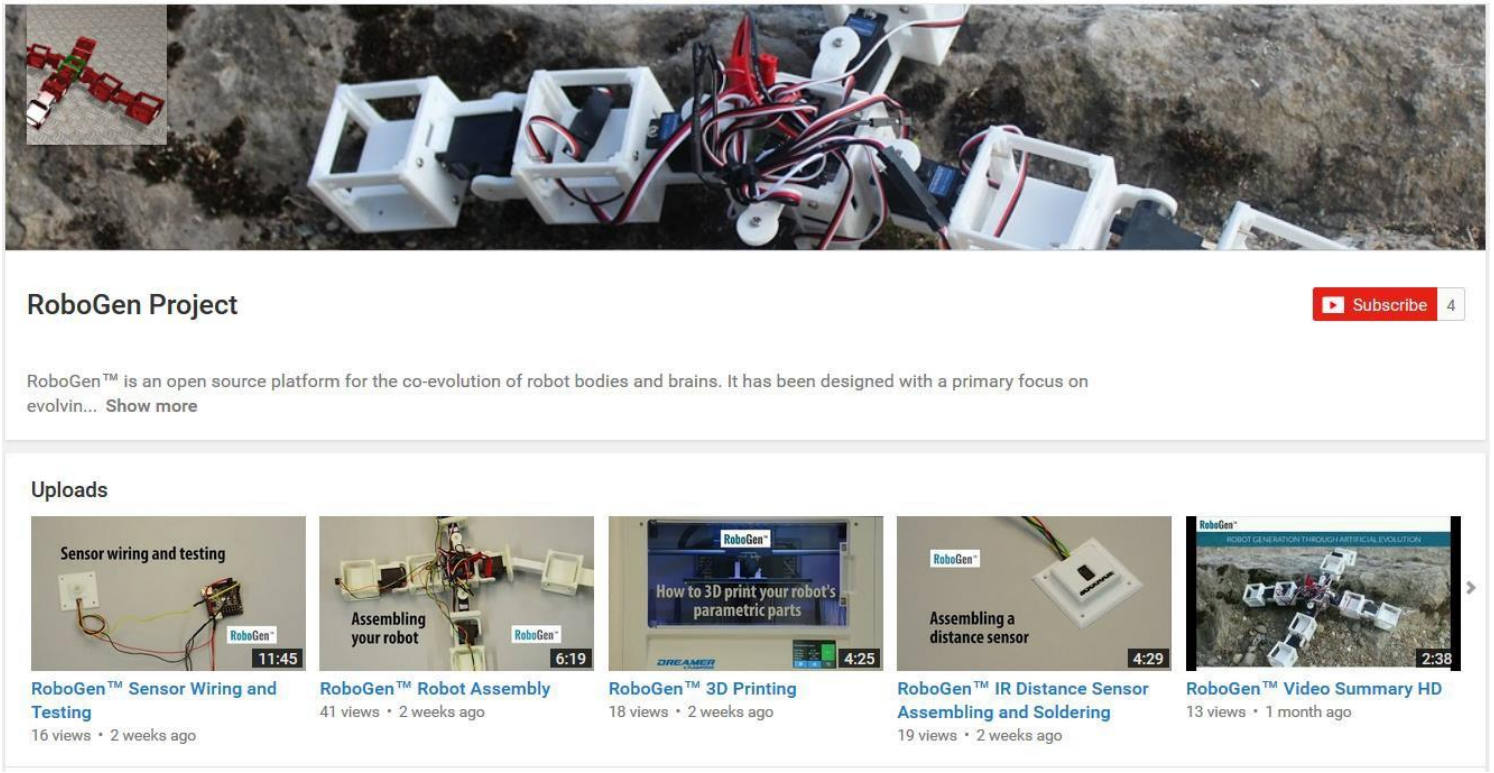
Hardware Introduction

Shuhang Zhang
Shuhang.zhang@epfl.ch
Euan Judd
euan.judd@epfl.ch

EPFL RoboGen™ LIS

How to build your robot

Video tutorials for mechanics, electronics and 3D printing are available
YouTube channel [RoboGen Project](#) or [http://robogen.org/docs/video-tutorials/](#)

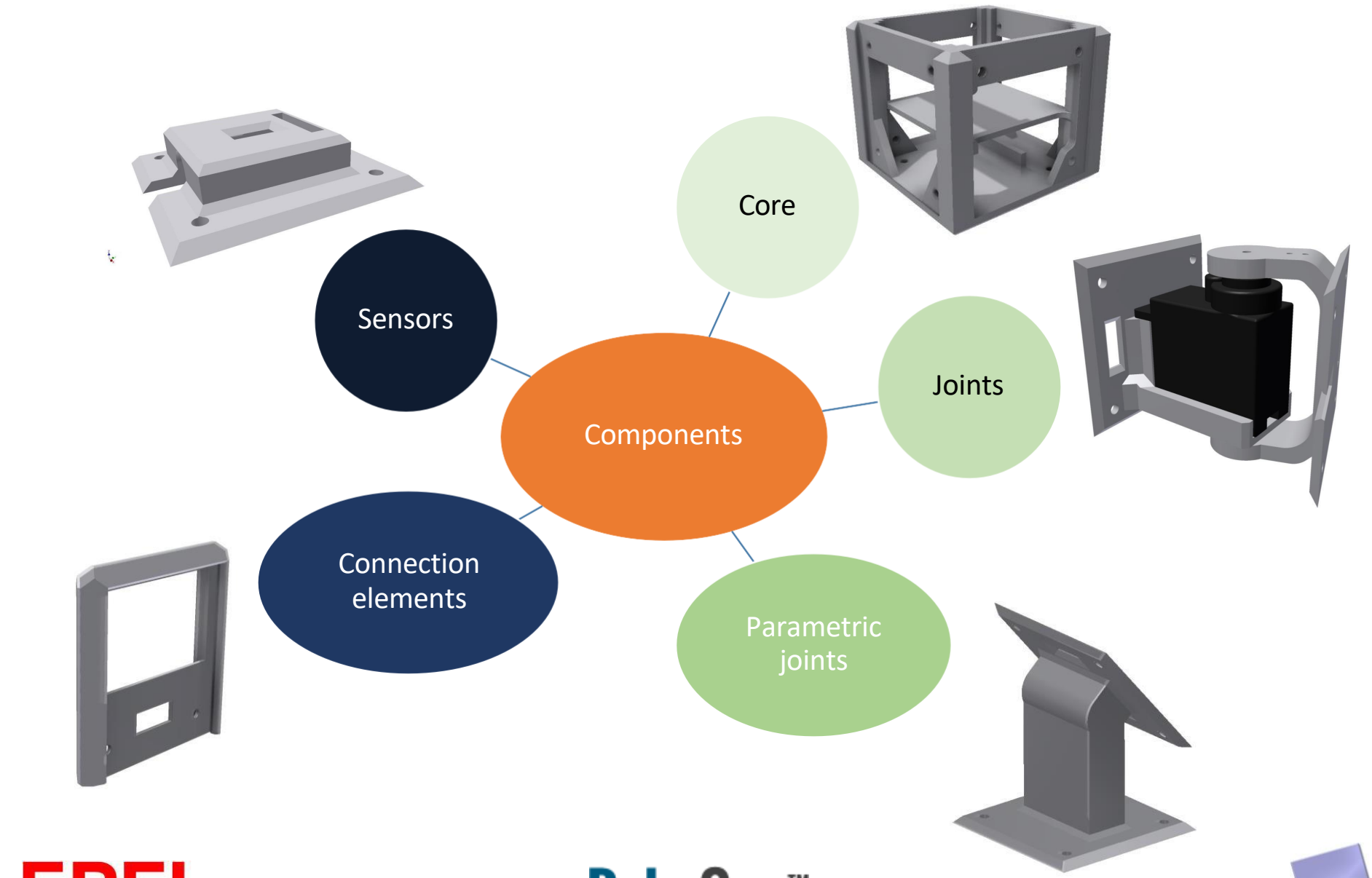


More information in the next slides and on the [RoboGen](#) website

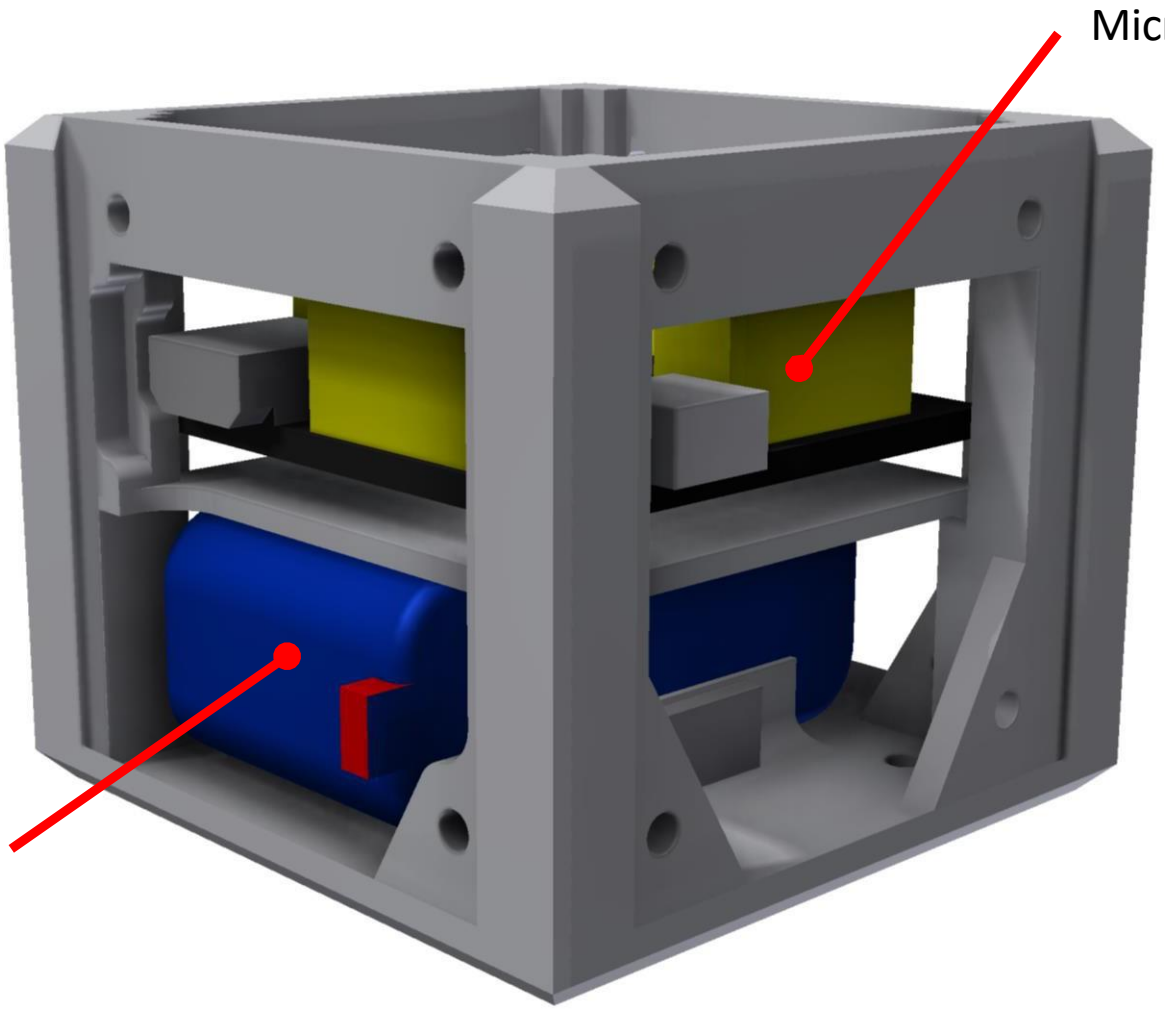
EPFL RoboGen™ LIS

Mechanics

Types of components

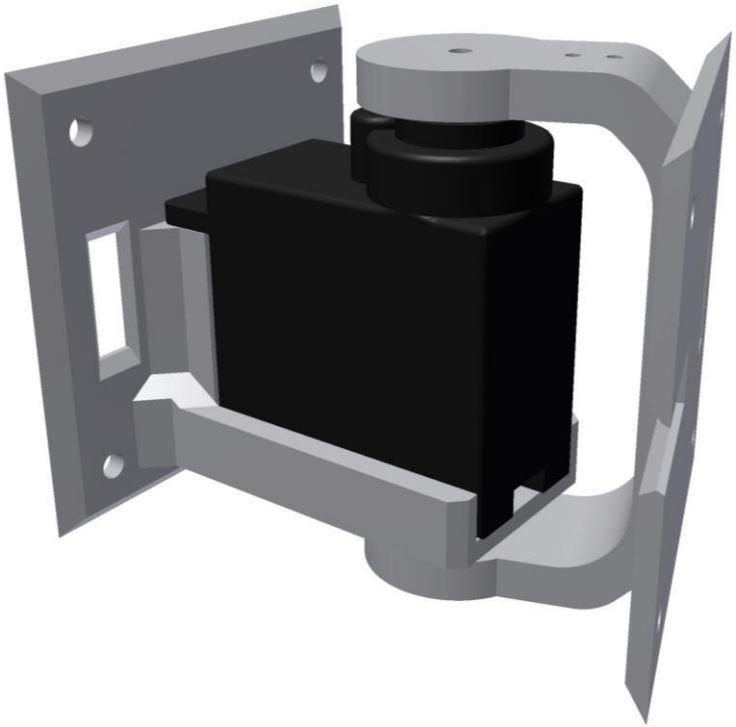


Core component

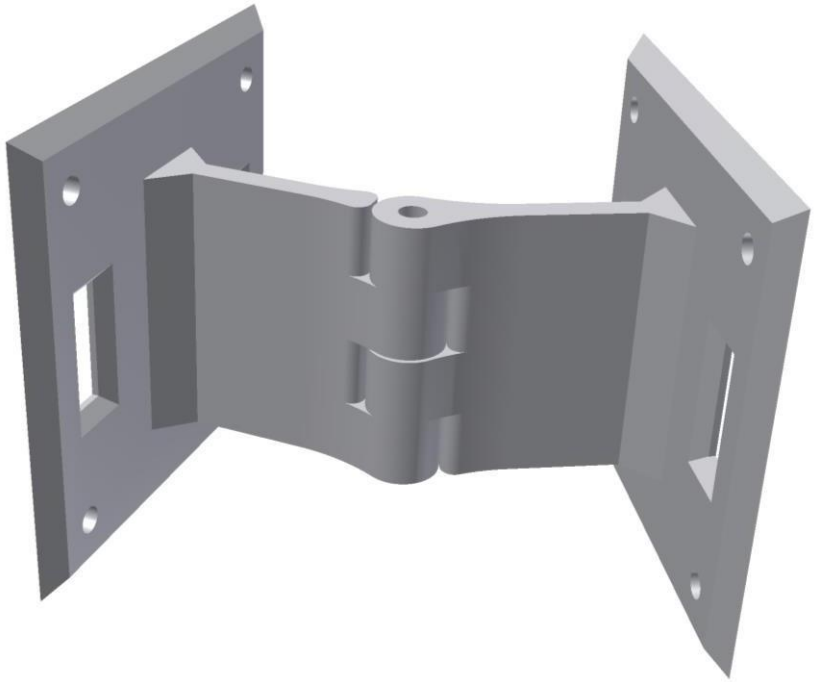


Joints

Active

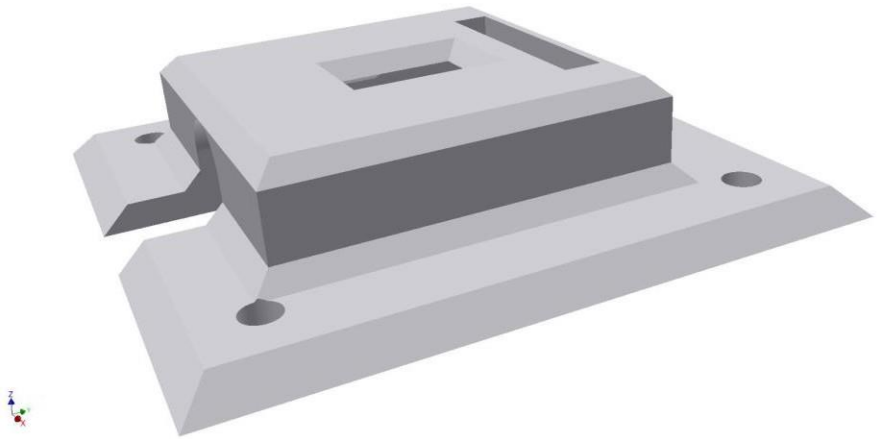


Passive



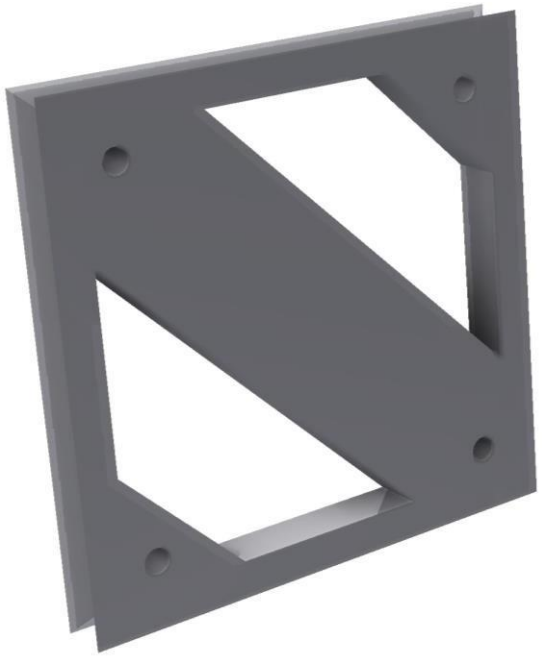
Sensors

IR distance sensor



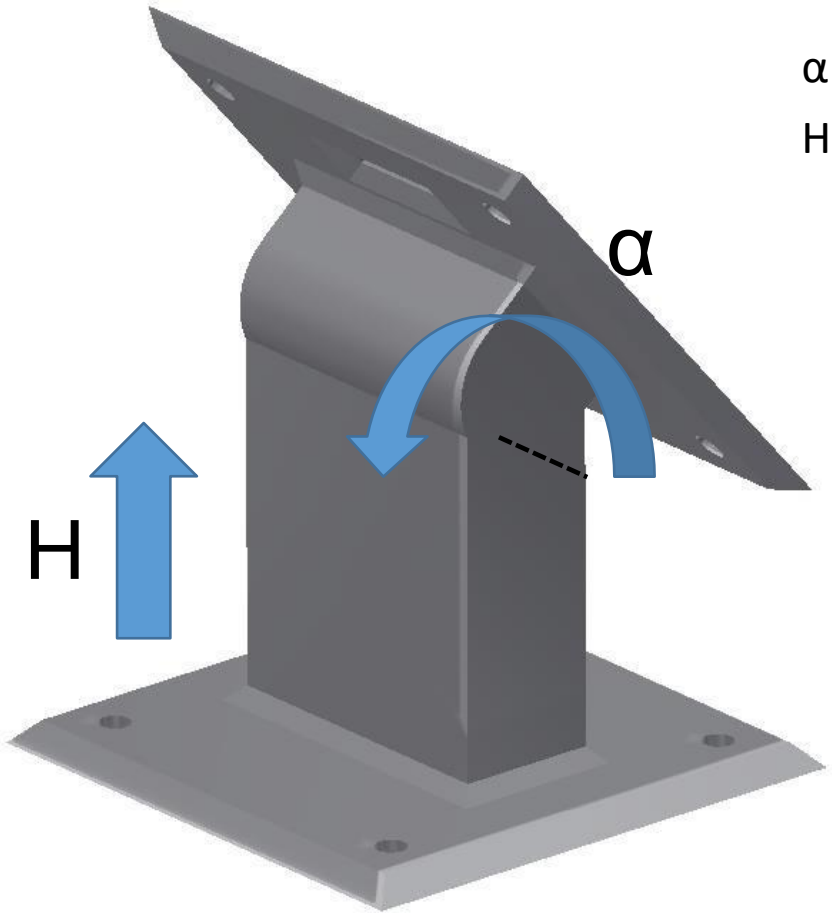
Connection elements

Between Cores



Between Joints

Parametric joint



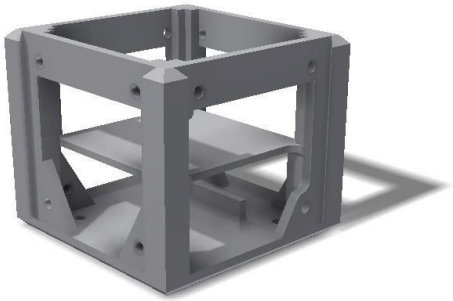
α - angle

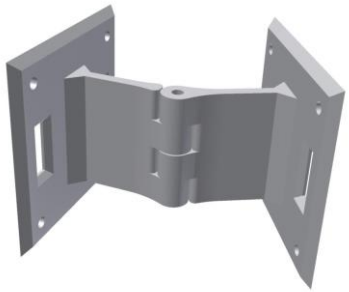
H – height

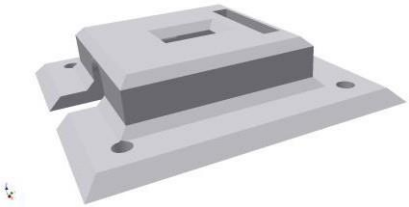
3D printed elements

You will be given a set of:

- 7x FixedBrick
- 8x Active Hinge (including servo motors)
- 1 passive hinge
- 3x IR sensor housing
- 5 or 6 connecting part of each type







EPFL

RoboGen

LIS

3D printed elements (2)

The part that you may have to 3D print yourself
(depending on your evolved robot) is the parametric joint

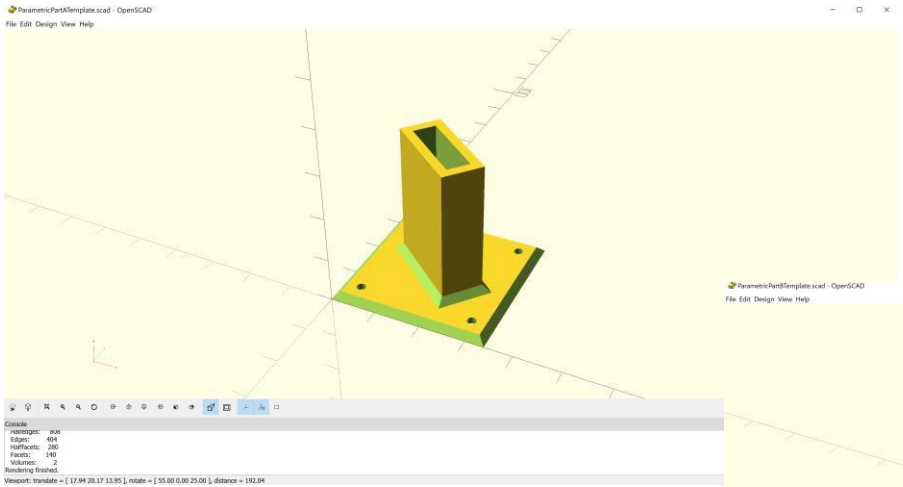
The printing files for all parts are on GitHub, those for the parametric joints will be generated by the software using OpenSCAD

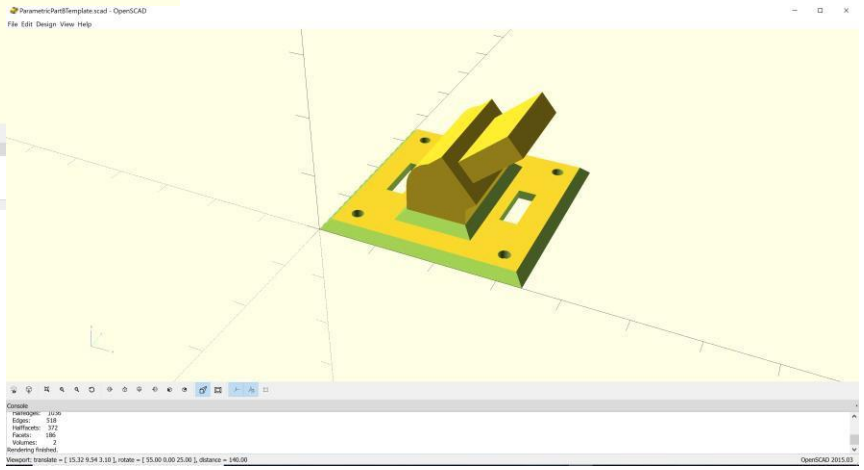
https://github.com/lis-epfl/robogen/tree/cutting_edge/printing-3D

For more information:
http://robogen.org/docs/building-your-robot/#3D-print

Parametric parts

- Genetically defined parametric parts will be automatically generated by OpenSCAD scripts to *.stl files
- Change angle and length parameters of the joint





https://www.openscad.org/

Electronics

Electronic elements

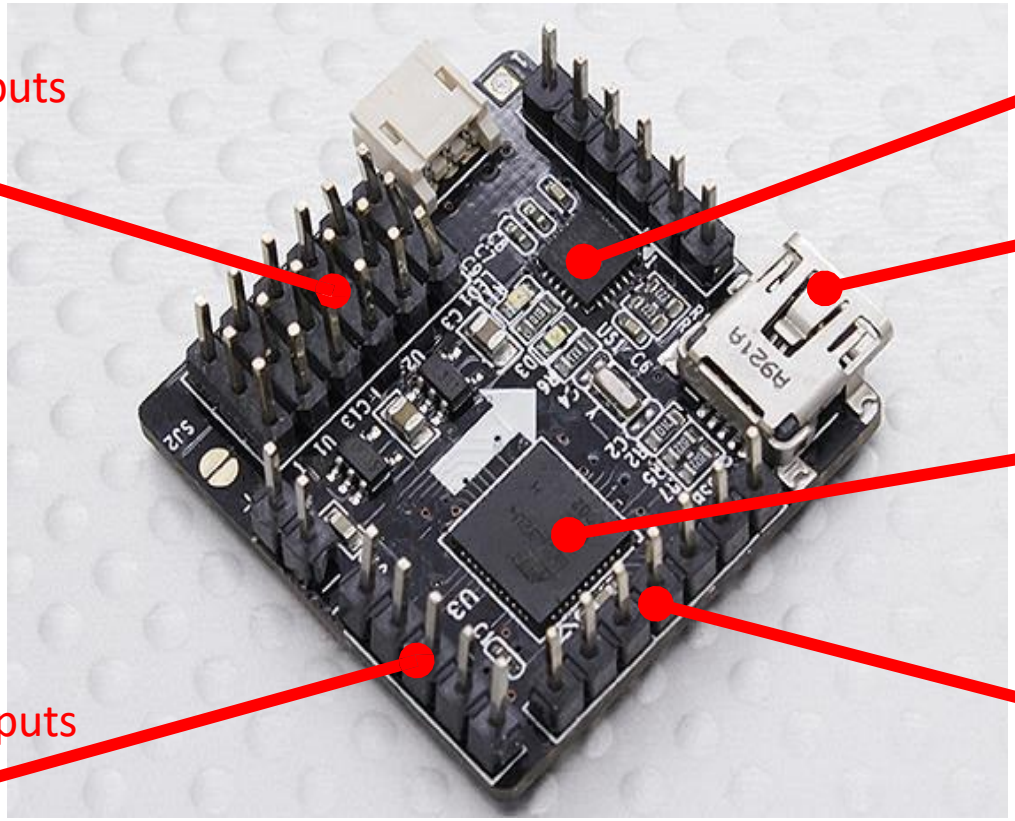
You will be given a set of:

- 1x NanoWii flight controller board (microcontroller + IMU)
- 1x USB cable
- 8x Servo motor (integrated in active hinges)
- 3 IR sensor

Soldering and wiring equipment available at DLL

Microcontroller

- NanoWii flight controller board (Arduino based)



6 servo outputs

On board accelerometer and gyroscope

USB

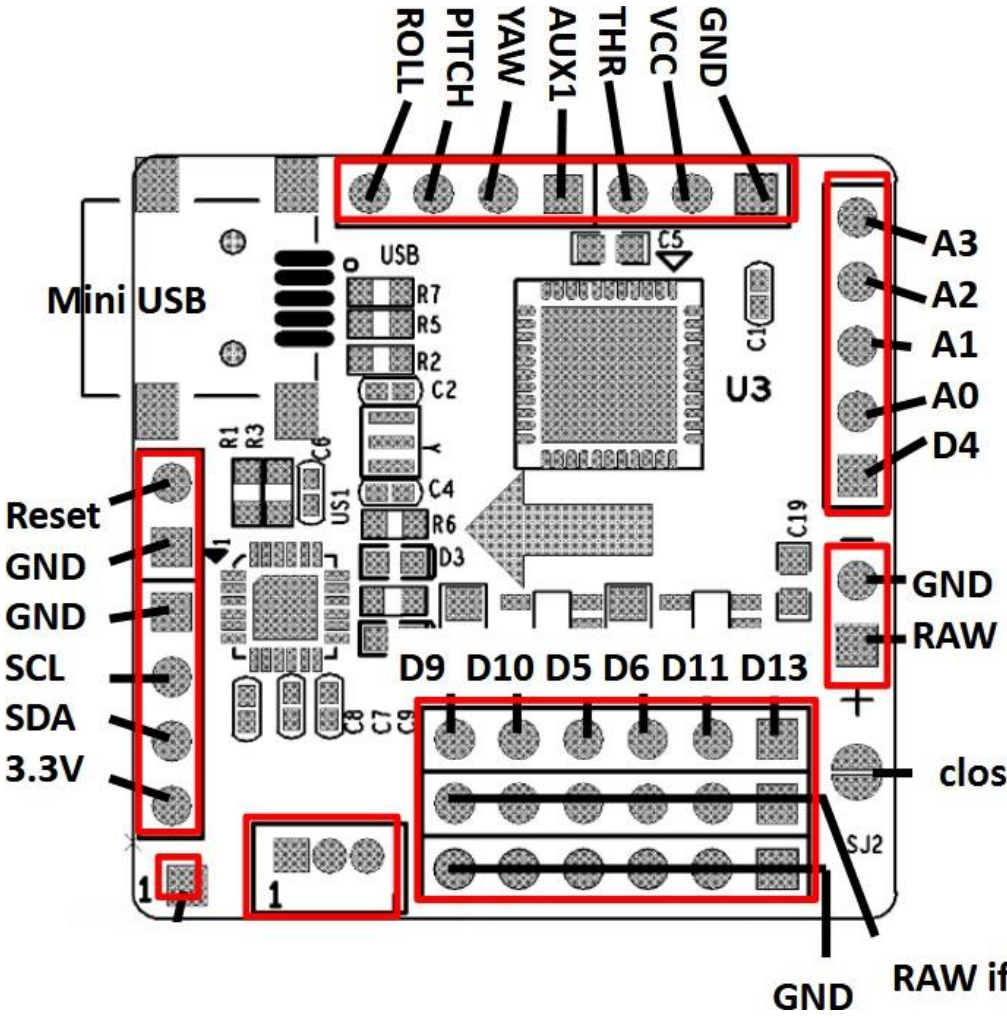
Atmel MEGA32U4 MCU (same as Arduino Leonardo)

4 Analog inputs

6 digital inputs

Dimension: 30x30x16mm
Weight : 6.5g

Microcontroller – add comments



D9,D10,D5,D6,D11,D13 – direct servo motor output connections (mind the orientation)

A0-A3 – sensor inputs

D4,ROLL,PITCH,YAW – additional digital IOs (for connecting more than 6 servo motors, for example)

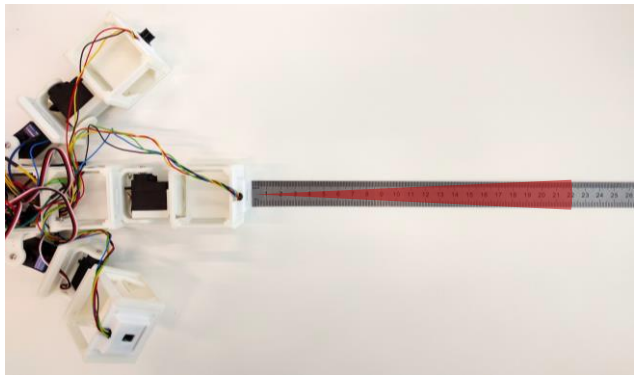
SCL,SDA – I2C bus for IR distance sensor connection

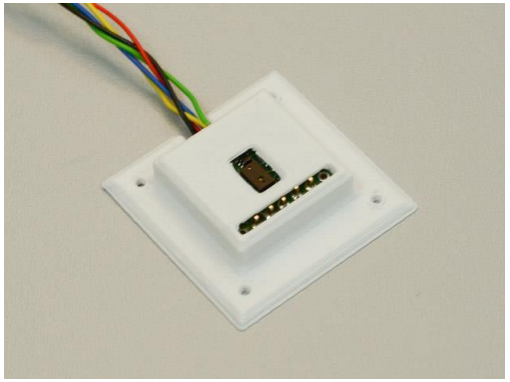
GND,RAW – connect the power supply here

Sensors

IR distance sensor

(ST's VL6180X)





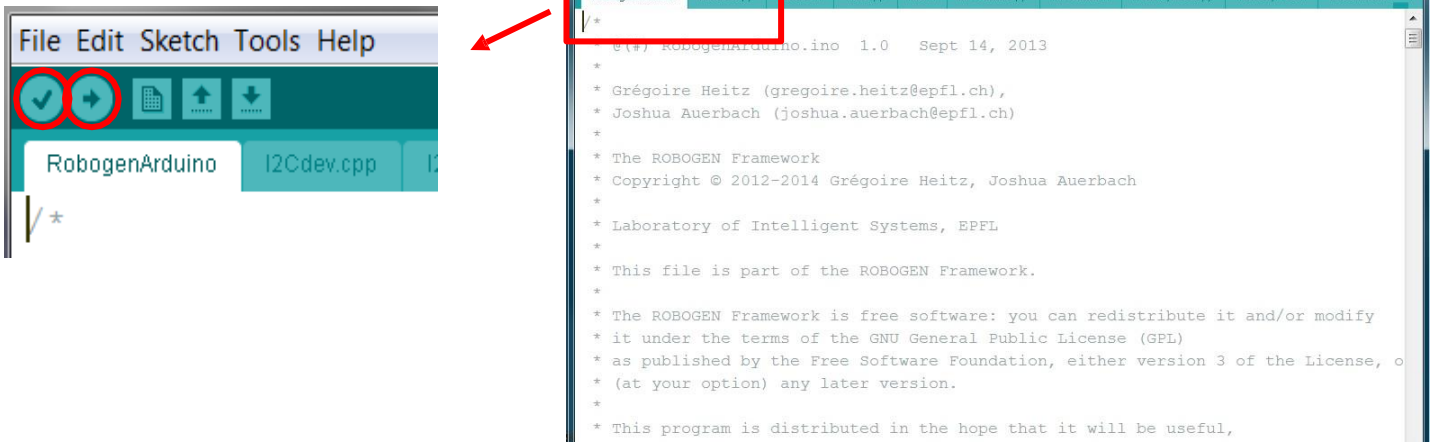
Range:
5 - 210 mm

Tutorial videos showing the wiring of the sensors or complete assembly of a robot: http://robogen.org/docs/video-tutorials/

The **Gyroscope** and **Accelerometer** MEMS sensors are combined in the MPU-6050 chip on the NanoWii flight controller board

Programming with Arduino

You will need to download and install the Arduino IDE from www.arduino.cc



- Place your generated “NeuralNetwork.h” file to robogen/arduino/RobogenArduino/
- Open file robogen/arduino/RobogenArduino/RobogenArduino.ino
- Tools/Board : Arduino Leonardo
- Tools/Port : select the correct COM port
- Compile and upload with 

EPFL RoboGen™ LIS

Thank you!

If you have any questions, please write to

Shuhang Zhang
shuhang.zhang@epfl.ch
Euan Judd
euan.judd@epfl.ch

EPFL RoboGen™ LIS