REACHY TECHNICAL DOCUMENTATION

REVISIONS

Date	Revision	Author(s)	Comment(s)
22/11/2017	1.0	Simon BAUDRY	First draft. Work in progress
15/01/2018	1.1	Simon BAUDRY	New dimension specs.

SUMMARY

1. Introduction

Reachy is a full-size 7-dof prosthetic robotic arm. It can be programmed intuitively by demonstration or via an easy-to-use programming library.
It provides direct and inverse kinematics.

2. General specifications

Weight: ~1400 g

Height: ~660 mm to ~800 mm (according to type of hand).

Degrees of freedom: 7

Power requirement:
Minimum one power supply 12V 5A. Suggested two power supplies 12V 5A (one for the upper motor in the shoulder, one for the other motors in the arm).

Payload:
WIP

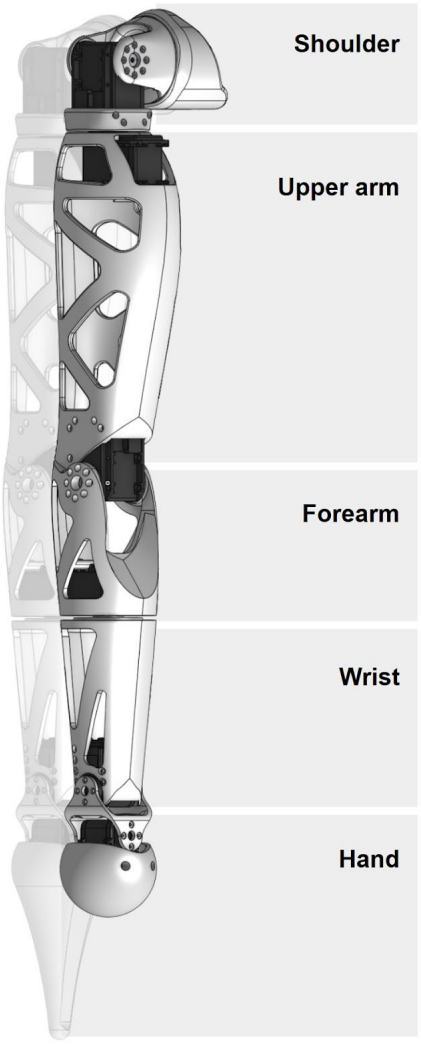
Fixation method:
The arm can be fixed to a T-slotted bar.

Reproducibility of movements and delta:
WIP

3. Joints' specifications

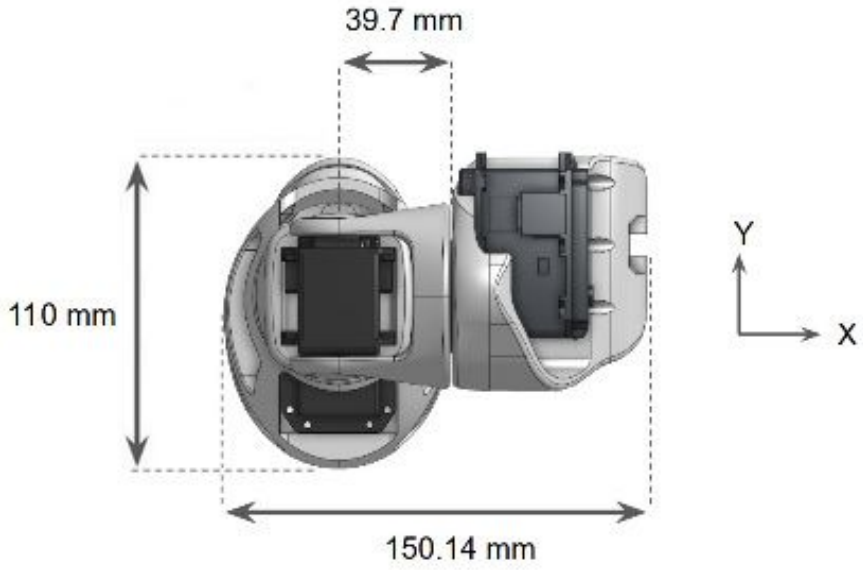
Reachy is divided in 5 parts and 7 joints.

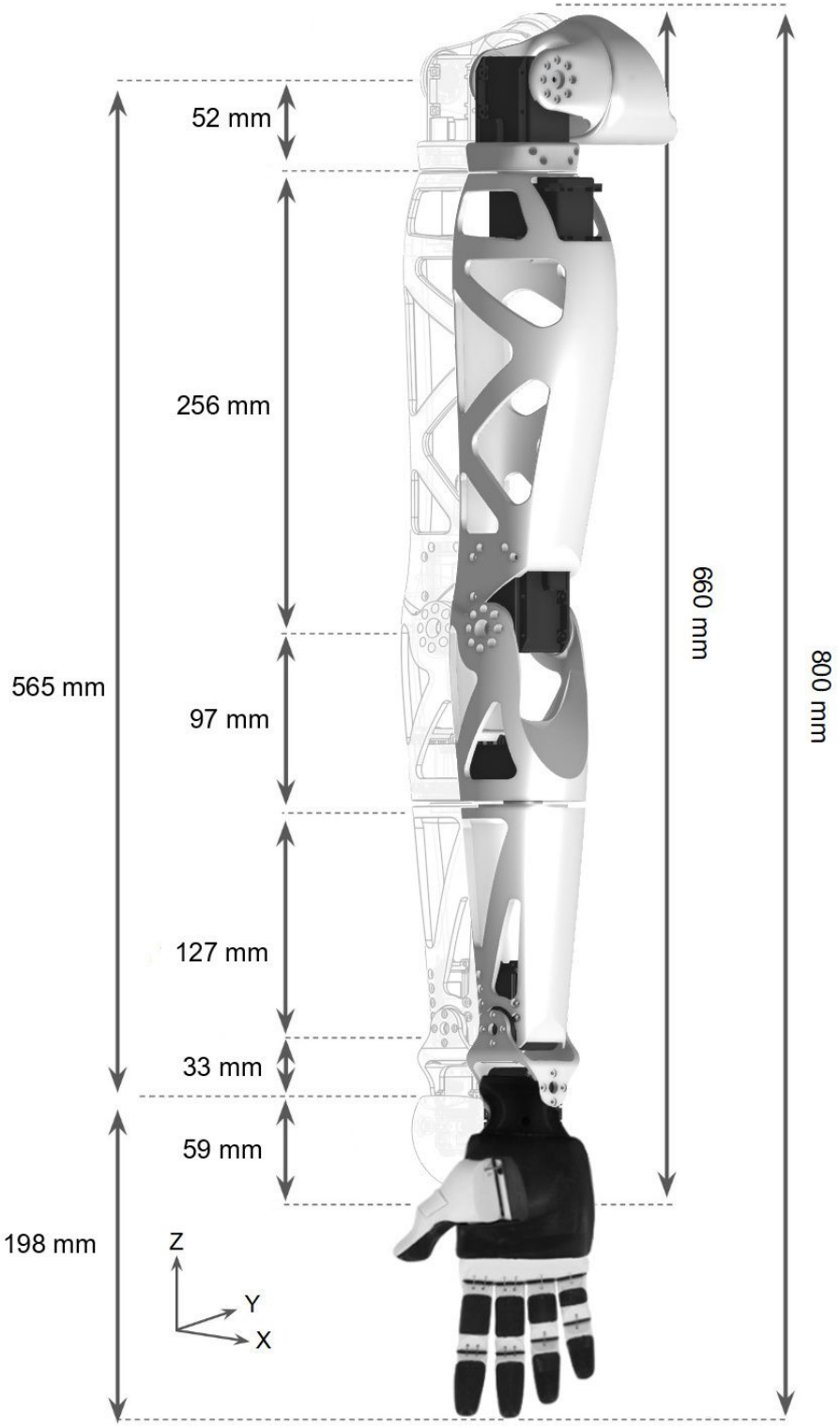
A part is composed of an actuator and a shell. Parts are roughly the same than in human body (*e.g.* shoulder, wrist, …).
A joint is the location where a motion is allowed (*e.g.* rotation point between forearm and wrist); each joint is associated to a degree of freedom.



4. Dimensions

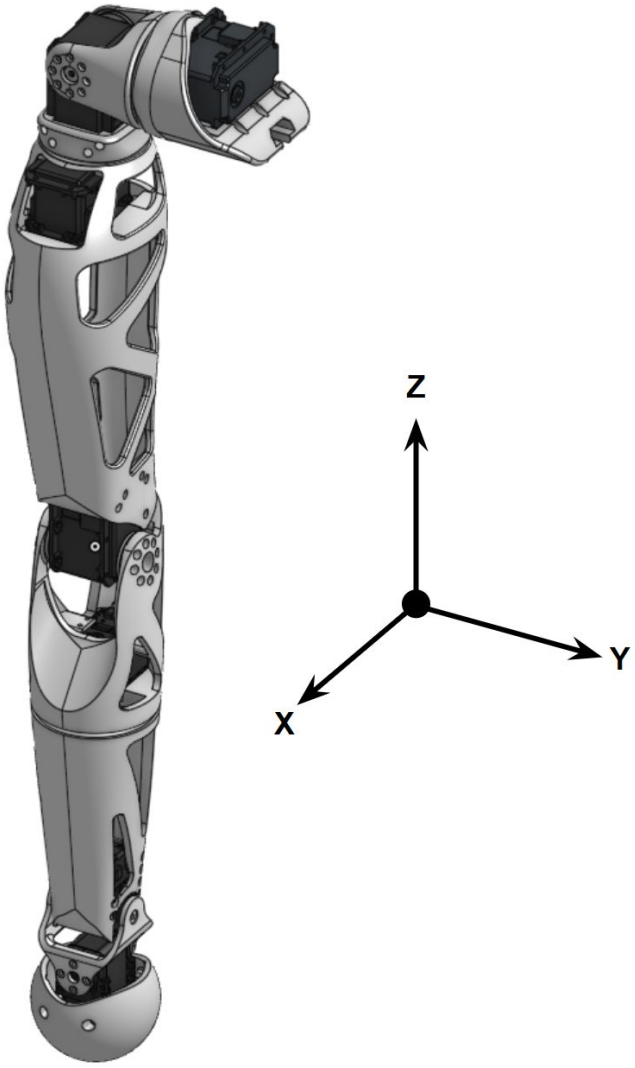
Dimensions on the top in the figure X and left of the figure Y below are provided from one rotation point (joint) to another. Dimensions on the bottom and on the right are general maximal dimensions (according to two different types of hand).




52 mm
256 mm
97 mm
127 mm
33 mm
59 mm
565 mm
198 mm
660 mm
800 mm
Z
Y
X

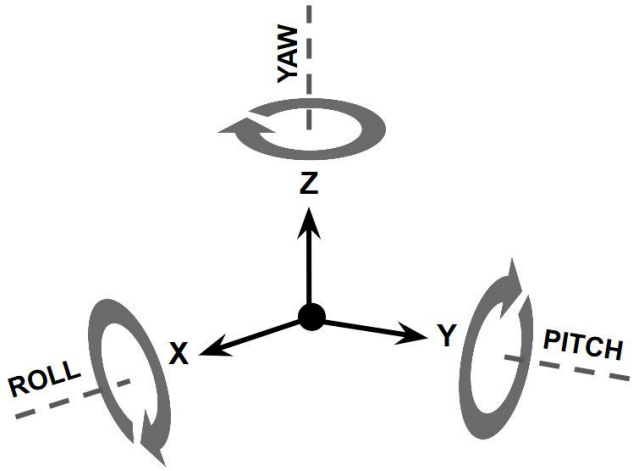
5. Initial position

Reachy's initial position is as shown:

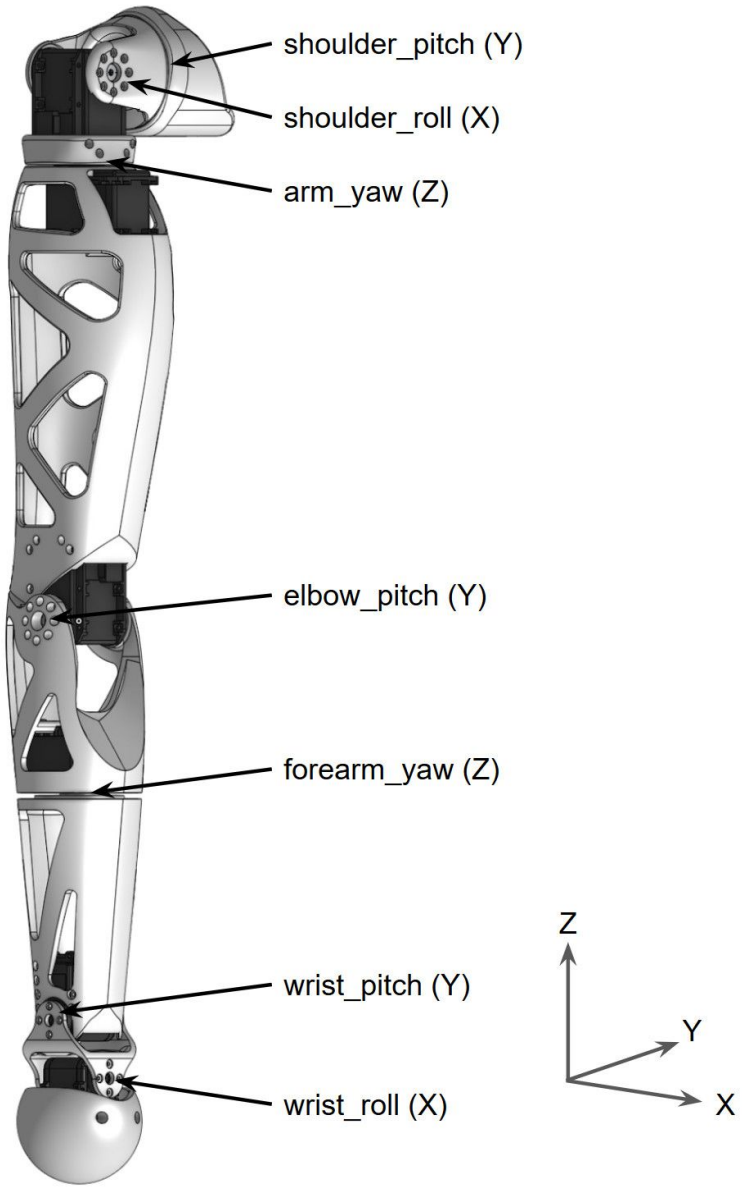


6. Joints' rotation

Each joint rotates around an axis, based from 0-position of Reachy. A rotation around X axis is called **Roll**, a rotation around Y axi is called **Pitch**, and a rotation around Z axis is called **Yaw**.



According to this, the joint's names are composed of the place of the joint (shoulder, elbow, ...) and the rotation allowed (pitch, roll, or yaw). Each joint has a limited range angle (no endless rotation).



The following tables show servo-motors' name, ranges of angles and initial angle of each joint.

	Right arm			
	Motor type	**Origin angle °**	**Min angle °**	**Max angle °**
shoulder_pitch	MX-106T	-90	-180	90
shoulder_roll	MX-64AT	-90	-100	90
arm_yaw	MX-64AT	0	-90	90
elbow_pitch	MX-64AT	0	0	125
forearm_yaw	AX-18A	0	-150	150
wrist_pitch	AX-18A	0	-70	70
wrist_roll	AX-18A	0	-60	60

	Left arm			
	Motor type	**Origin angle °**	**Min angle °**	**Max angle °**
shoulder_pitch	MX-106T	-90	-180	90
shoulder_roll	MX-64AT	-90	-100	90
arm_yaw	MX-64AT	0	-90	90
elbow_pitch	MX-64AT	0	0	125
forearm_yaw	AX-18A	0	-150	150
wrist_pitch	AX-18A	0	-70	70
wrist_roll	AX-18A	0	-60	60

7. Servo-motors' specifications

Servo-motors are from the company Robotis, Dynamixel type.

	Resolution °	**Dimension** *LxDxH mm*	**Weight** *g*	**Running degrees** °	**Reduction ratio**	**Link**
MX-106T	0.088	40.2x65.1x46	153	0-360, endless	225	TTL
MX-64AT	0.088	40.2x61.1x41	135	0-360, endless	200	
AX-18A	0.29	32x50x40	54.5	0-300, endless	254	

	Voltage		**Stall torque** *(N.m)*			**No-load speed** *(RPM)*			**Stall current** *(A)*			**Standby current** *mA*
	Range (V)	*Nominal (V)*	*11.1V*	*12V*	*14.8V*	*11.1V*	*12V*	*14.8V*	*11.1V*	*12V*	*14.8V*	
MX-106T	10-14.8	12	8	8.4	10	41	45	55	4.8	5.2	6.3	100
MX-64AT	10-14.8	12	5.5	6	7.3	58	63	78	3.9	4.1	5.2	100
AX-18A	9-12	11.1	-	1.8	-	-	97	-	-	2.2	-	-