

# Panda

The robot for everyone  
sensitive, interconnected, adaptive and cost-efficient.



FRANKA EMIKA



**FRANKA EMIKA**

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## Cutting-edge German engineering accessible to everyone

Even today, robotics remains a technology accessible only to few. The reasons for this are the high costs, difficult programming and the separation of humans and robots by safety fences. So how can this technology be made accessible to the general population?

Franka Emika GmbH, a young high-tech company from Munich, solved this problem. Panda is a interactive tool that can be used by anybody and that supports humans in carrying out unpleasant or even dangerous tasks. Panda is the first system of an entirely new generation of tools, which are developed as colleagues in factories, as research robots and ultimately, as assistants in daily life.

The system can be operated via Apps like a smartphone and be taught new Tasks within a few minutes, without requiring any programming skills. At the same time the system is sensitive to such an extent, that it can take over assembling, testing or inspection tasks.

The system was developed based on the globally leading German robot technology, and is now produced in series in Bavaria, Germany.

*Designed, developed and made in Germany.*

Gerd Hirzinger, the most recognized pioneer in robotics and the first researcher to receive every international robotics and automation award, says, "Worldwide, robotics researchers are convinced that sensitive torque controlled robots are the future; in particular when considering the large scale future topics such as robotic assistance, safe human-robot collaboration in production or service robotics. Interestingly, this novel technology was often considered to be far too complex to be realized. However, the Franka Emika robot is the perfect exemplar of the synergies between mechatronics and digitalization in the context of Industry 4.0, and I believe it is the long yearned for breakthrough."



DEUTSCHER ZUKUNFTSPREIS  
Preis des Bundespräsidenten  
für Technik und Innovation

2017 Award Winners



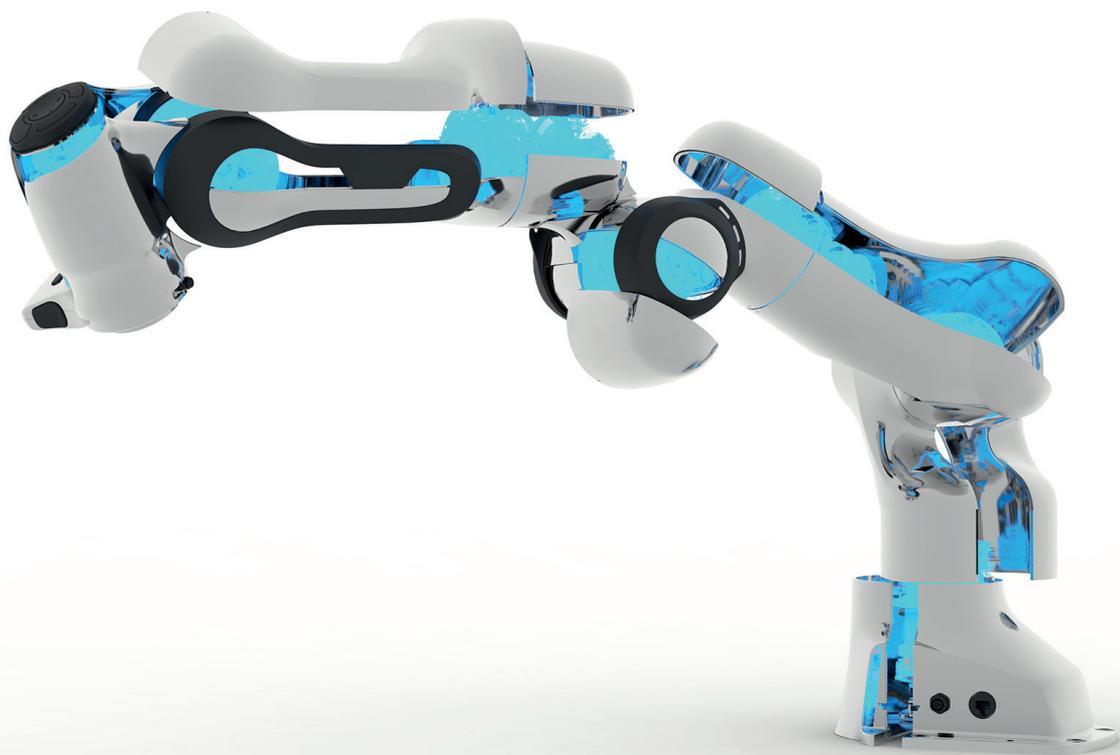
GERMAN  
INNO  
VATION  
AWARD







agile like a human arm  
with a human-like sense of touch  
a fully smart interactive solution  
easy to setup and intuitive to use



#### Joint torque controlled with a sense of touch

Panda is a first-generation, collaborative robot system designed specifically to assist humans. The complete modularity, ultra-lightweight construction, highly integrated mechatronic design, sensitive torque sensors in all joints, and human-like kinematics, make the system unique. Based on the „soft-robotics-control“, inspired by human beings, Panda is able to recognize and process even the slightest touch by using its artificial reflex system to react within milliseconds.

# What makes Panda revolutionary?



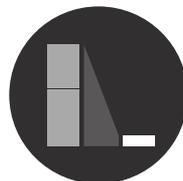
## Human-like capabilities

Artificial reflex system to work among humans  
High resolution sense of touch in all 7 joints for various assembly tasks  
Complete workspace covering kinematics and excellent precision



## Smartphone-like programming within minutes

Useable and accessible for everybody  
Using modular and reusable powerful Robot Apps  
Cloud connection for global access  
Runs on any web-browser



## Disruptively low hardware, software and integration cost

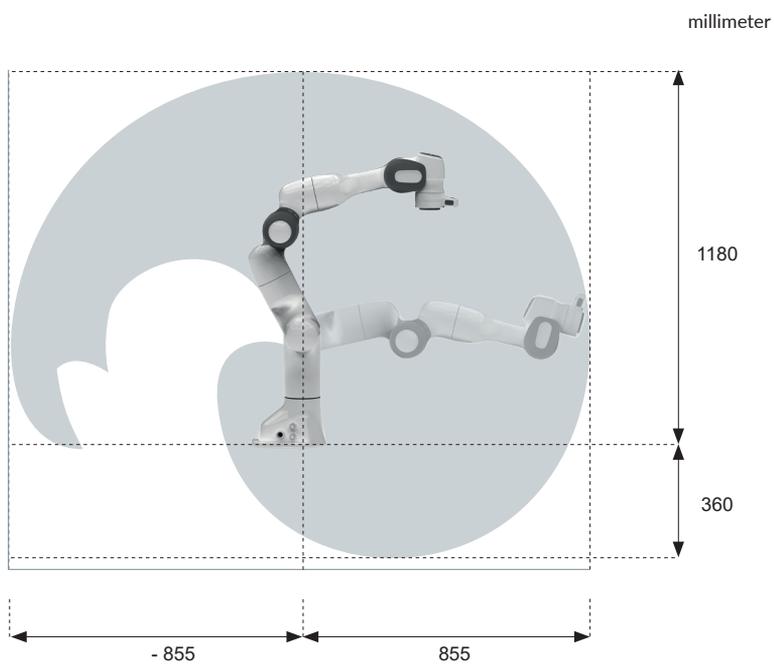
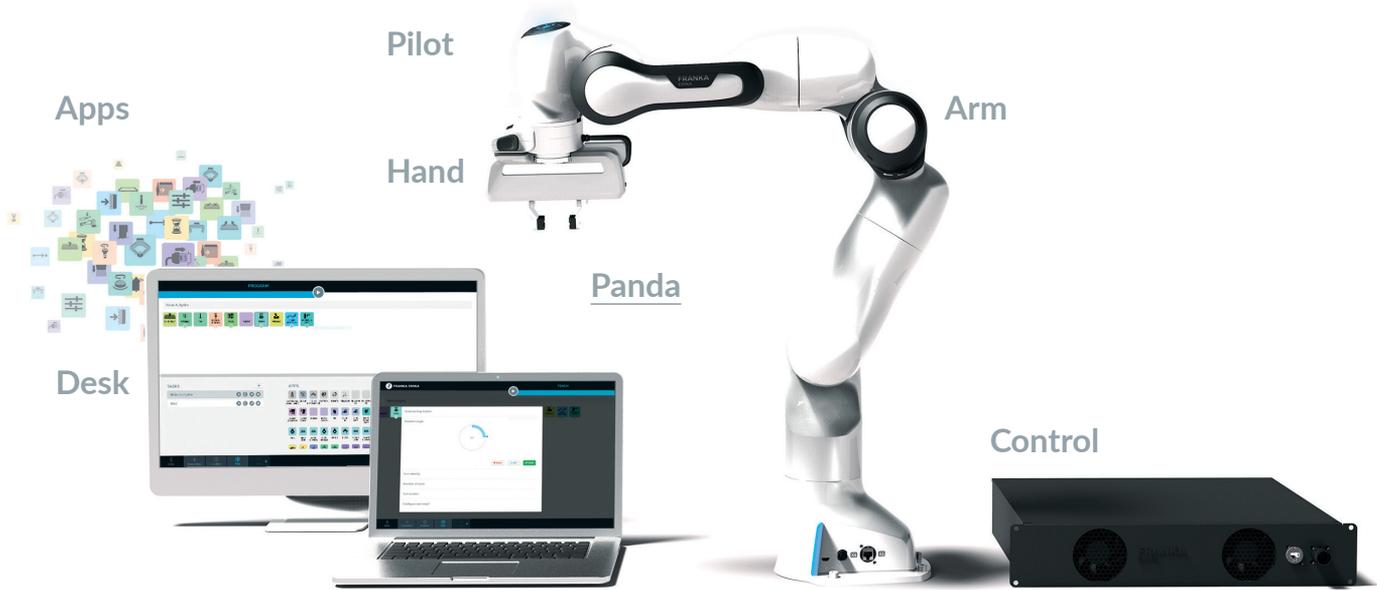
Compatible with existing infrastructures  
Flexible shopfloor integration in no time  
Effortless multi robot deployment





**Democratization of automation:**

The ideal robot of the future can be used by everyone and assists people by reliably and quickly executing unpleasant or even dangerous tasks. The democratization of such a key technology can only take place when the solution is powerful, affordable, flexible and globally available.



## Technical Data

**Arm:** The Arm is inspired by the agility of the human arm. It is a sensitive and extraordinarily versatile power tool. The torque sensors in all seven axes enable Panda to skillfully and delicately manipulate objects.

degrees of freedom	7 DOF	mounting flange	DIN ISO 9409-1-A50
payload	3 kg	installation position	upright
sensitivity	joint torque sensors in all 7 axes	weight	18 kg
maximum reach	855 mm	protection rating	IP30
Cartesian velocity limits	up to 2 m/s end effector speed	ambient temperature	15 - 25 °C (typical)
repeatability	+/- 0.1 mm (ISO 9283), even improves by using sensitivity features	air humidity	20 % to 80 % non-condensing
interfaces	Ethernet (TCP/IP)		

**Control:** The slim 19" Control unit can be mounted in server racks or placed anywhere else. It connects Panda to the cloud or to your local shopfloor network.

interfaces	Ethernet (TCP/IP) for Internet/network-connection
controller size (19")	355 x 483 x 89 mm (D x W x H)
supply voltage	100 V <sub>AC</sub> - 240 V <sub>AC</sub>
mains frequency	47 - 63 Hz
power consumption	max. 600 W; average: ~ 300 W
active power factor correction (PFC)	yes
weight	~ 7 kg
protection rating	IP20
ambient temperature	15 - 25 °C (typical)

**Pilot:** Pilot is the direct user interface on the Arm. It provides quick-buttons to customize the Apps and to execute their features in Desk.

**Hand:** The Hand can grasp firmly and quickly for high performance and flexible pick and place. The fingers can be exchanged to optimally grasp a wide variety of objects.

parallel gripper	with exchangeable fingers
grasping force	force up to 70N
travel (travel speed)	80 mm (30 mm/s)

**Desk:** A Task can be set up in Desk by arranging different Apps, which are then parametrized directly in the work area.

**Apps:** Apps are modular Robot programs and always represent a partial step of a Task. Each App contains a context menu in which the user is lead through the process parameters interactively.

**World:** The online platform Franka World is the center of the ecosystem, where the community will be able to exchange ideas and developers will get assigned to customers allowing them to introduce new solutions and applications.

**FCI:** It is Franka Emika's tailor-made response to the needs of training and research institutions. It has an open interface (FCI) that is programmable via C++ and ROS.

## Installation and Task creation in no time.

Panda can be set up extremely quickly. After delivery, it takes only a few minutes to install, run and write your own programs.

**1** Single box delivery

**2** Quick setup

**3** Easy programming

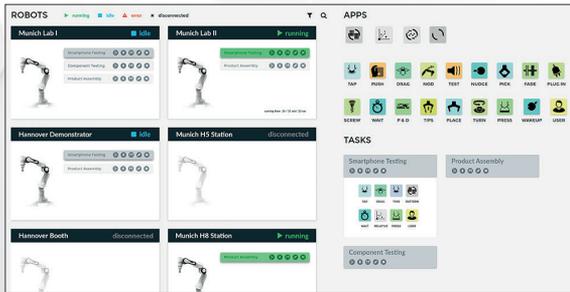
10 minutes

10 minutes

Teach me what to do!

## 4 Load a Task

Load the Task from the Franka Cloud and deploy it on your Panda or open it from your Desk Library.



## 5 Create or re-arrange a Task

Add, delete or re-arrange Apps according to your needs.



## 6 Train and test

Teach positions by taking Panda by the hand. Adjust the Apps and edit parameters by using the Pilot guided by a step-by-step dialog...

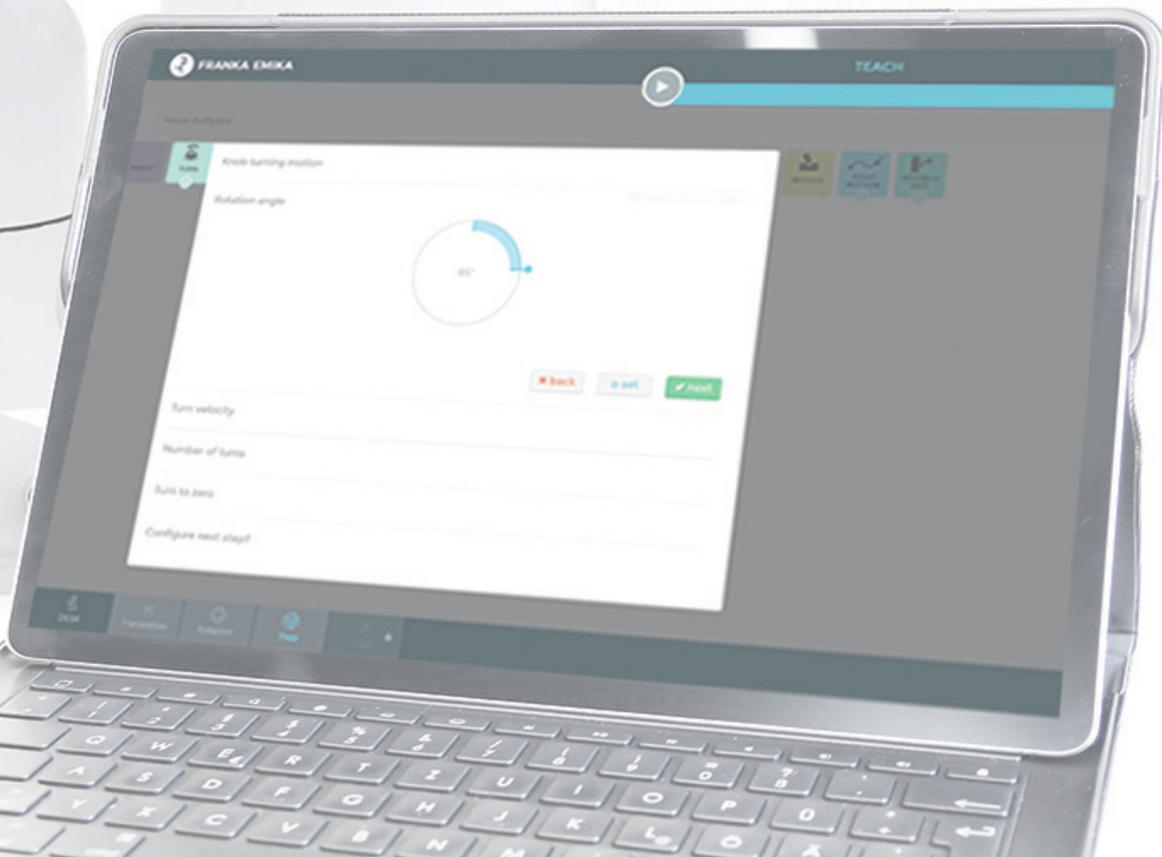
...test your Task in original speed ...

...re-teach if necessary.

## 7 Deploy your robots

**and let them work automatically**

Lean back and think about next Tasks for Panda.

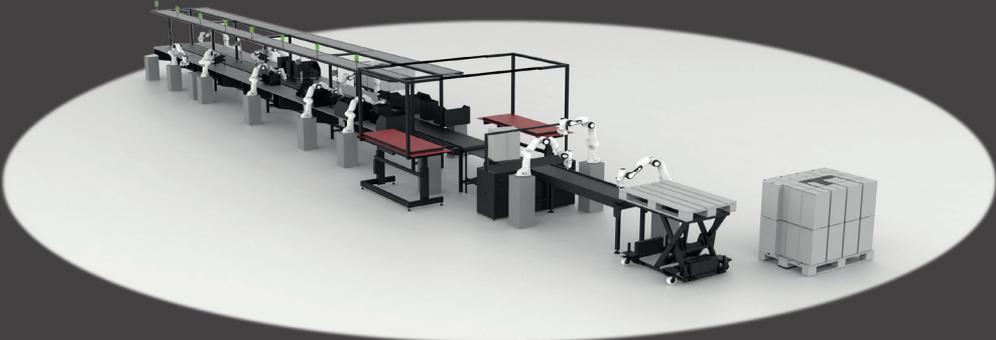
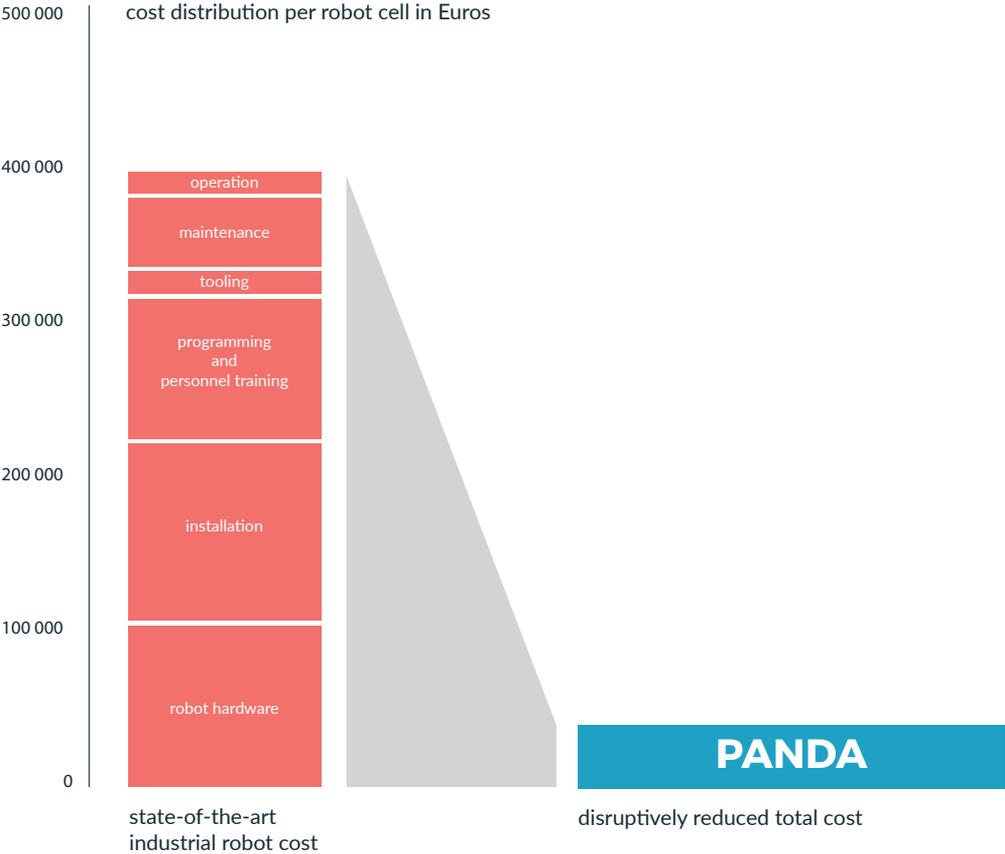


## Industries seek robotic solutions

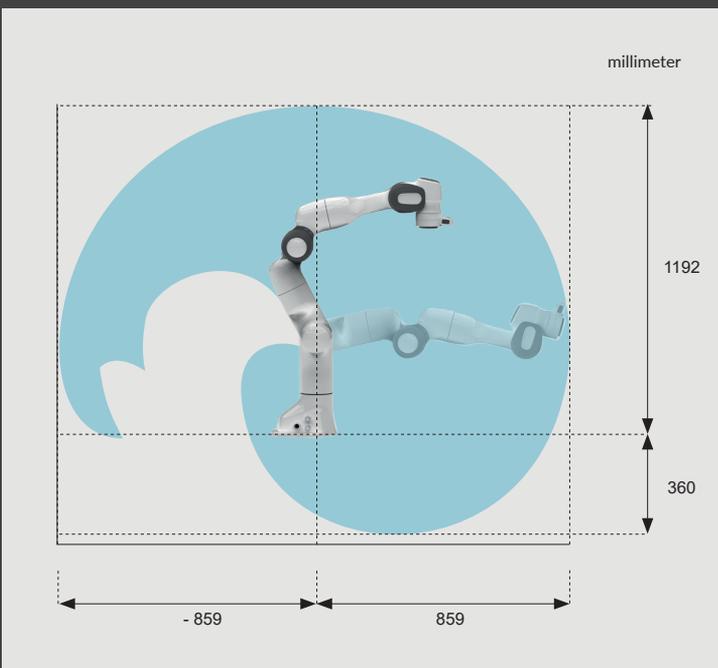
Unprecedented areas of application and new markets for intelligent robot assistants are emerging. However, nowadays all industries still face the restrictions of the current state-of-the-art robotic technology in manufacturing and assembly:

- ▶ Integration, programming and tooling is **too expensive and extremely time consuming**.
- ▶ Solutions are custom-made and **lack reusability and adaptability**. Consequently, investment is project specific and cannot be depreciated over several projects.
- ▶ **Complicated** programming procedures **limit accessibility** as industries depend on highly skilled experts with increasingly short product life cycles.
- ▶ The current robotic solution costs **cannot compete with labor costs** at production sites.
- ▶ **Deployment by existing staff** at the production facility is not possible.
- ▶ **Lack of sensitivity** severely limits the robot's product assembly capabilities.
- ▶ **Safety fences are very expensive**, take up a lot of valuable workspace and restrict the accessibility of the production space and **limit the flexibility** of the application.

# Towards commodity automation

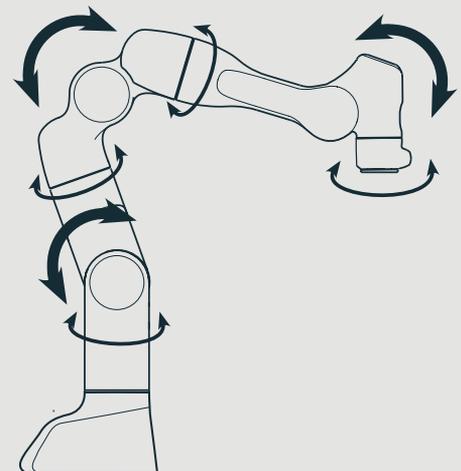


## Panda's unique skills



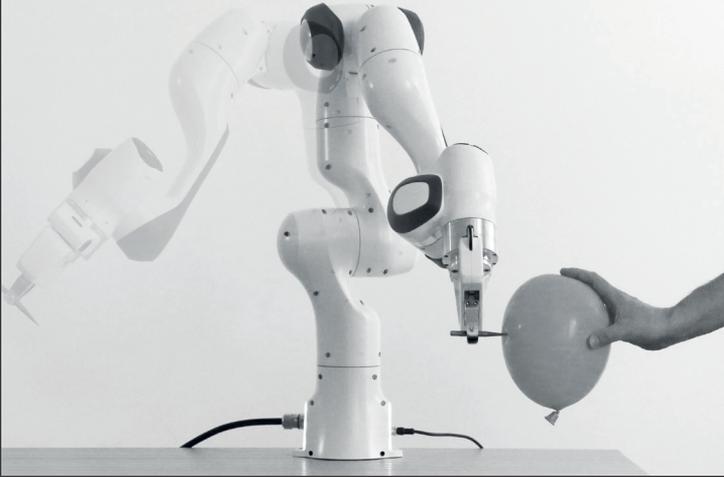
### 7 degrees of freedom

Agile and sensitive like a human arm.



### Unique sensitivity

Immediate stop in case of collision.  
Most accurate contact detection, interpretation and reaction.



### Sensitive insertion

Wiggling for robust assembly and insertion.



### Adjustable force

Exact control of contact force.



### Wide-range workspace

Close-range workspace, even near the base



### Repeatability

Positional repeatability in every direction.



### Follow contours

Precise, agile and weightless with soft robotics control.











