RETHINK ROBOTICS | SAWYER

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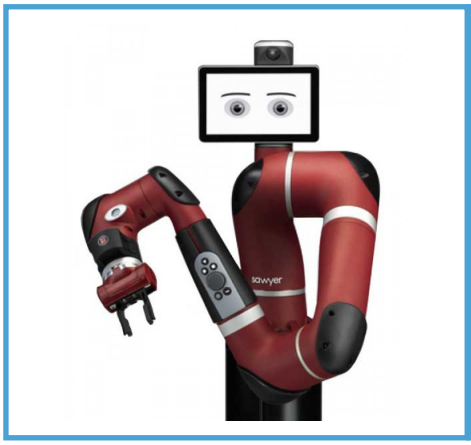
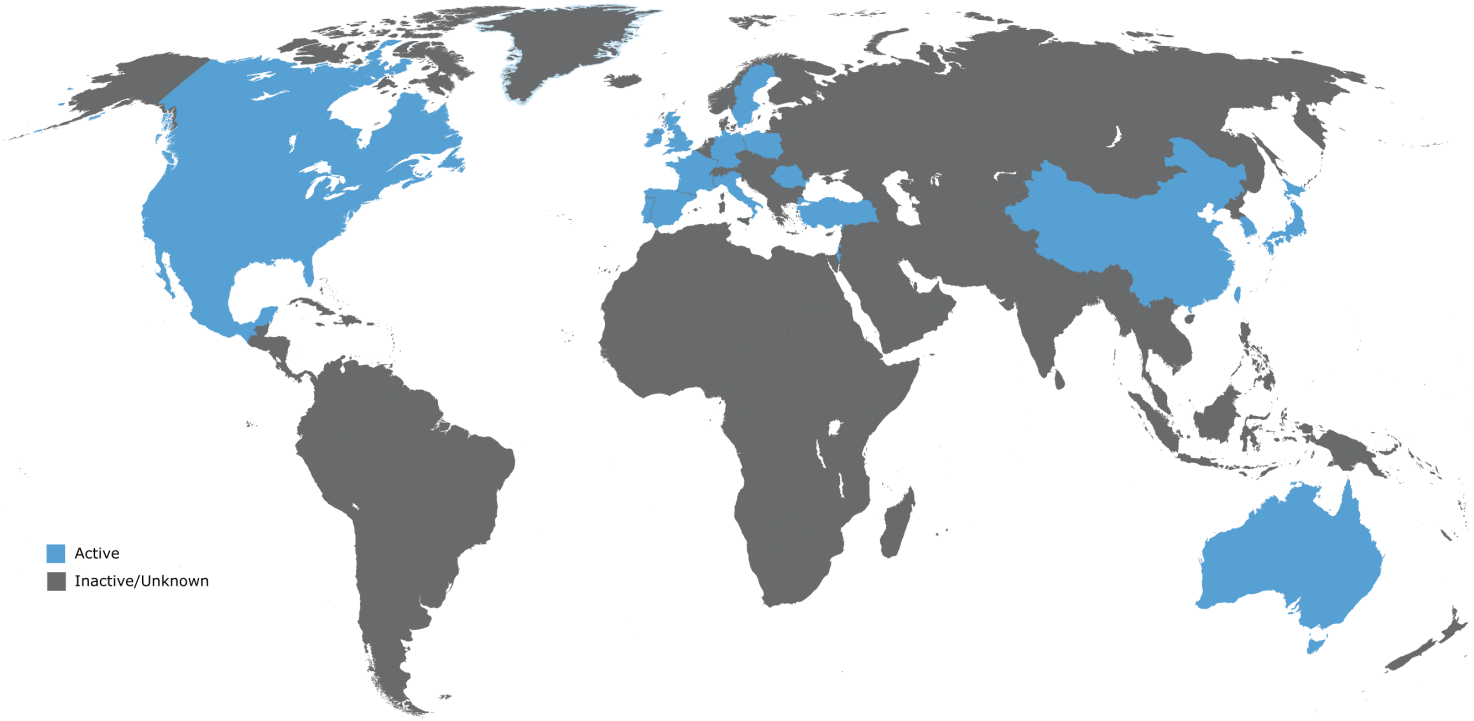


PRODUCT SUMMARY

Sawyer is a collaborative robot made in the USA. The robot is trying to be differentiated from other industrial robots with embedded vision and elastic actuators.

Unfortunately, the excessive differentiation results in the poor motion control and limited functionality. The robot would be attractive for researchers and students but may not be welcome from the industry.

ACTIVE REGION



SALES INFORMATION

	LIST PRICE	INSTALL BASE	CHANNEL MODEL	SUPPORT
EMEA	35k EUR	n/a	**Indirect** Distributor information is not available*	Rethink offers three different levels of warranty. If customers needs **phone & email tech support**, they **should purchase an additional package** called SawyerCare Plus/Complete. The service policy would vary depending on the region because they provide customer support through their partners. Rethink also provides Intera Online User Guide, Sawyer SDK Wiki and User Forum. The the online user guide for their software *Intera* includes a free training but it is a combination of manual and video.
APAC	35k EUR	n/a	**Indirect** Distributor information is not available*	
AMERICAS	37k USD	<1000**	**Indirect** Distributor information is not available*	

* Distributor information is not available on the website. To contact local distributors, the information should be submitted in the form on the website.
** Information in Sep 2016

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STRENGTHS

	COMPETITOR CLAIM	COUNTER RESPONSE
INTEGRATED SOLUTION	*Rethink Sawyer offers a fully integrated robotic solution with embedded vision, ClickSmart grippers, and high resolution force control.*	It seems that Rethink believes a single standard solution can deal with all the industrial tasks. In reality, however, each of industrial applications requires different solutions. It is **impossible to cover all different automation requirements by the single vision system and limited gripper options**. UR offers the UR+ platform, in which integrators and users can find customized software and hardware products for UR robots, greatly reducing integration time and costs. Customers can easily find the right solution among a variety of UR+ options. **UR+ is a key differentiator**.
EASY TO TRAIN	*The robot can be trained by simply moving its arm and demonstrating the movements*	Rethink claims that it is super easy to train the robot. However, it is **only for very simple tasks** and their user interface is **not proper to cover universal industrial applications**.
SDK	*Sawyer SDK (Software Development Kit) is available*	Saywer SDK is designed **for researchers and students** to build and test programs on the Sawyer robot. It would not be used to develop industrial plug and play solutions. UR offers the URCap SDK to support UR+ platfrom. By using the URCap SDK, developers can **customize their industrial solutions for UR robots**.

WEAKNESSES

ACHILLES' HEEL

Motion

The compliant motion control, a selling points, is also one of its weaknesses as the robot is not able to follow a precise path compared to other industrial robots including UR robots. Motion is **visibly wobbly** and **needs "time to rest"** before it finds its target position, due to the mechanical design using elastic actuators in joints.

The motion performance is affected by the complex relationship between speed, acceleration, reach and payload. It makes the setup complicated and limited. For instance, if a payload is heavier than 2 kg, the usable reach and speed are reduced. With a **800mm of reach and 3.5kg of payload**, the speed should be **lower than 30% of the maximum speed**. Users may experience the actual performance is much lower than the technical specifications.

Usability

Cartoonish face on touch-screen is more disturbing than intuitive. The user interface is mainly designed **for very simple tasks** and is **not proper to cover universal industrial applications**. The motion features are very limited and does not give you the option to define joint/linear/circular motions as well as blends, thus virtually making it **impossible to optimize a given task** where low cycle time is essential.

New software called *Intera* introduces visual decision-making interface, intended for complex tasks. However, it appears complex to use and understand itself. In addition, the external PC is needed to use the software.

Connectivity	Sawyer supports only Modbus TCP and general TCP/IP communications. Other industrial standards such as EthernetIP (Allen Bradley) and Profinet (Siemens) are not available. Digital I/O signals are also limited.
Accessories	In addition to embedded Cognex vision system, Rethink offers grippers and mobile pedestal as options. However, options are not sufficient to cover industrial applications. In particular, the mobile pedestal would be useful for demonstration but does not work for the real production.
Use Case	Sawyer lacks presence in major global manufacturing companies and generally the robot is not recognized as a product useful in real industrial applications requiring high-performance and high-reliability. UR is widely used in the industry and has a long reference list containing recognized global companies such as BMW, Valeo, Flextronix, Renault, PSA, Whirlpool, and so on. In addition, the **built-in F/T sensor in tool** enables UR e-Series robots to be used **even for a wider range of applications**.

COMPETITIVE DIFFERENTIATION

TECHNOLOGY	UR5e	Sawyer
Gears/Drives	Harmonic drives	Harmonic drives & Elastic actuators
Encoders	Absolute	Incremental
F/T Sensor	6 DoF F/T sensor in Tool	Torque sensors in joint
Vision	none	Built-in vision
End-Effector	none	Optional
PERFORMANCE		
DoF (Degrees of Freedom)	6 axes	7 axes
Payload	5 kg	4 kg
Reach	850 mm	1260 mm
Repeatability	+/- 0.03 mm, with payload, per ISO 9283	+/-0.1 mm
Tool Speed	1 m/s (higher in certain motions)	1.5 m/s, typical
Joint Speed	J0-J5: 180°/s	n/a
Mounting	Floor, wall, ceiling, any	Floor, wall, ceiling, any
Working Range	J0-J5: +/-360°	J0-J3: 350°, J4-J5: 340°, J6: 540°
Weight	20.6 kg	19 kg
SAFETY		
Safety Rating	PL d, Cat 3	PL d, Cat 3
Certification	TÜV (ISO 13849-1 & ISO 10218-1)	TÜV (ISO 13849-1 & ISO 10218-1)
Power/Force Limit Technology	By inherent design	By inherent design
3-Position Enabling Device	External device can be configured	none
Adjustable Stopping Time/Distance	Yes	none
Elbow Limit	Yes	none
CONNECTIVITY		
I/O Ports	20 digital in, 16 digital out	8 digital in, 8 digital out
	2 analog in, 2 analog out	4 analog in, 4 analog out
I/O Power Supply	24V, 2A	n/a
Communication, Fieldbus	Modbus TCP, Ethernet/IP, Profinet, TCP/IP	Modbus TCP, TCP/IP
Tool I/O Ports	2 digital in, 2 digital out, 2 analog in	4 digital in, 4 digital out, 2 analog in
Tool I/O Power Supply	12V/24V, 0.6A continuous, 2A peak	24V, 2A
Tool UART Interface	RS-485, 5Mbps	none
Power Consumption	Approx. 200W using a typical program	n/a
High Speed Conveyor Tracking	Yes	none
ENVIRONMENT		
Protection Class	IP54	IP54
Cleanroom Class	ISO class 6	n/a
Acoustic Noise Level	< 65 dB (A)	small
Ambient Temp. Range	0-50°	5-40°
Humidity	90%RH (non-condensing)	80%
SOFTWARE		
Software Updates	Free, quarterly	Lifetime license for free updates*
Supported Languages	23 languages	English, Chinese, Japanese, German
Offline Programming	Free	Intera Studio, log in required to download
SERVICE		
Std. Warranty	15 months	12 months
Lifetime Support	8 years	n/a
Easy to Replace Joints	Yes	n/a
Free Training	UR Academy	Yes, combination of manual and video

* Software update is part of warranty package

