П14-20.04.2021

TECHNOLOGICAL ADVANCE OF SPA “ANDROID TECHNICS”

Key development directions on the robotics market

Moscow

ABOUT COMPANY

Android Technics

SPA “Android Technics” specializes in development, production and maintenance of robotic complexes for different purposes.

150
> more than
specialists in the field of robotics

110
> more than
robotic systems have been developed for 10 years

50
> more than
scientific publications in highly rated issues

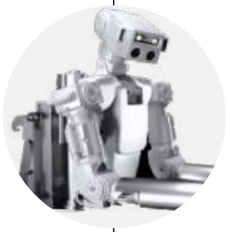
12 ths.m²
> more than
scientific production infrastructure

60
> more than
patents and know-how in robotics

110
> more than
cooperation agreements with universities

EXPERIENCE IN THE FIELD OF ROBOTICS

Industrial RC



Canyon

Robot for sorting radioactive wastes at RosRao's landfields

CR

Collaborative manipulator for collaborative work with people at manufacturing plants

Anthropomorphic RC

FEDOR

RC for working out robotics technologies. On the 22nd of August 2019 the robot executed a spaceflight on board of Soyuz MS-14 being in working condition

SAR-401

RC for research of interaction of captures with space infrastructure elements

Medical RC

M-304 “MedBot”

RC for autonomous disinfection of premises

M-201 “MedBot”

RC for definition of person's health status

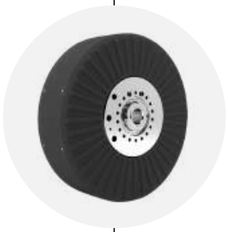
RC - robotic complexes

EXPERIENCE IN THE FIELD OF ROBOTICS

Components

“AT - Drive”

Series of high torque brushless electric motors for robotic complexes, medicine, military technics and another equipment



“AX Drive”

Series of axial brushless electric motors with permanent magnets

Service RC

“SR - 201R”

Robot for automatization of control of filling the retail space with required products, and control of correctness of price tags

Medical RC

“JUNIOR”

Rehabilitation complex for treatment of children with cerebral palsy

“Orthesis-1”

Rehabilitation robotic complex for motion activity reactivation

RC - robotic complexes

MEDBOT M-201

Robot for remote definition of person's health status

Functionality:

1

Telepresence: online remote communication in real-time mode

2

Transmitting the information about person’s health status in real-time mode

MEDBOT M-304

Robot for disinfection of premises

Functionality:

1

Disinfection of premises with use of UV irradiators of a closed/open/hybrid type

2

Possible operation in **presence of people** (outfitted with a protection cover)

3

Autonomous moving around the medical facility with possibility of setting rout, duration and operation intervals

4

Easy setting the system operation with use of a specialized application

LINE–UP OF MEDBOTS

Medical robotic systems

MedBot M-201

RC for remote definition of patient’s health status

MedBot M-302

RC for automatic material, drug and food delivery

MedBot M-303

RC for contact interaction with patients

MedBot M-304

RC for disinfection of premises

ORTHESIS-1

Software and hardware platform of robotic orthoses for post stroke rehabilitation

Functionality:

1

Passive opening a human hand based on the commands from the brain-computer interface in order to give a proprioceptive and touch feedback while imagining hand opening

2

Individual setting the position of orthesis fixing, **control of an angular position** of an orthesis module drive link and torque

3

Opening and closing a graspless human hand based on commands transmitted by a doctor using the interface of a specialized software

4

The essence of the rehabilitation process consists in **assisting** to functionality of an imaginary movement with use of orthesis

JUNIOR

Hand exoskeleton complex with an external programme control and biological feedback. «Junior»is designed for **abilitation of children with cerebral palsy.**

Functionality:

1

Passive opening a human hand based on the commands from the brain-computer interface in order to give a proprioceptive and touch feedback while imagining hand opening

2

The complex provides acceleration of the motor activity, because the children's brain of patients with cerebral palsy up to 12 – 14 years of age is neuroplastic and keeps a long-term ability to recover

3

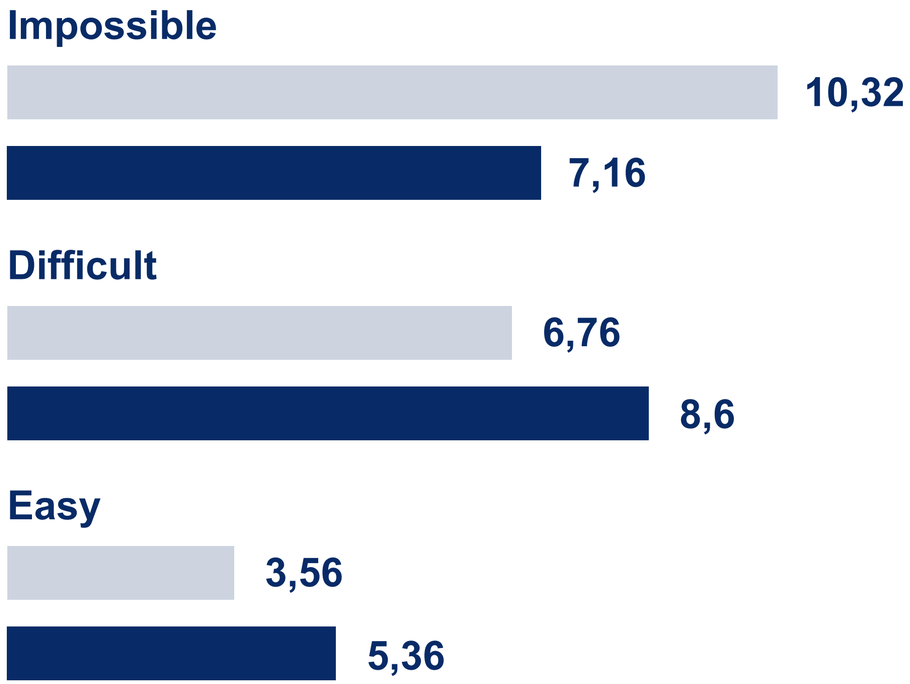
Opening and closing a graspless human hand based on commands transmitted by a doctor using the interface of a specialized software

4

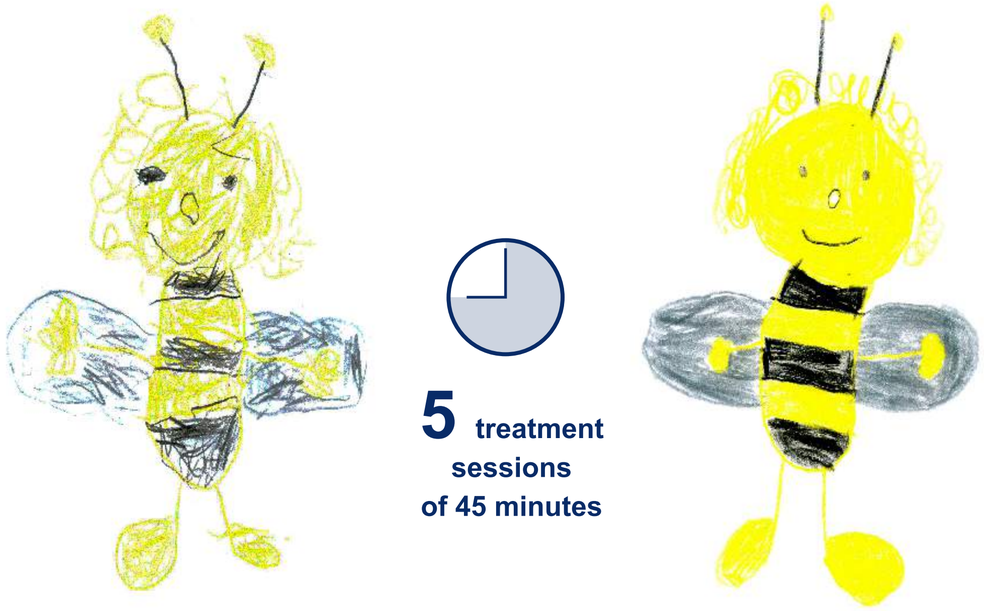
The abilitation process consists in stimulation of mechanisms of the brain neuroplasticity **activated while imagining movements**

JUNIOR. IMPLEMENTATION RESULTS

After 10 – 12 treatment sessions, children with cerebral palsy increase the volume of movement in all joints and the ability to perform isolated movement in a separate joint



Household skills on the ABILHAND-kids scale (n=32)



5 treatment sessions of 45 minutes

Drawing of a 6 year old girl

HEPHAESTUS

Serial robotic complex

Functionality:

1

Possibility of an individual adjustment , including multiple seat width settings

2

Biomechanical wheelchair back prevents friction with parallel armrests and leg support

3

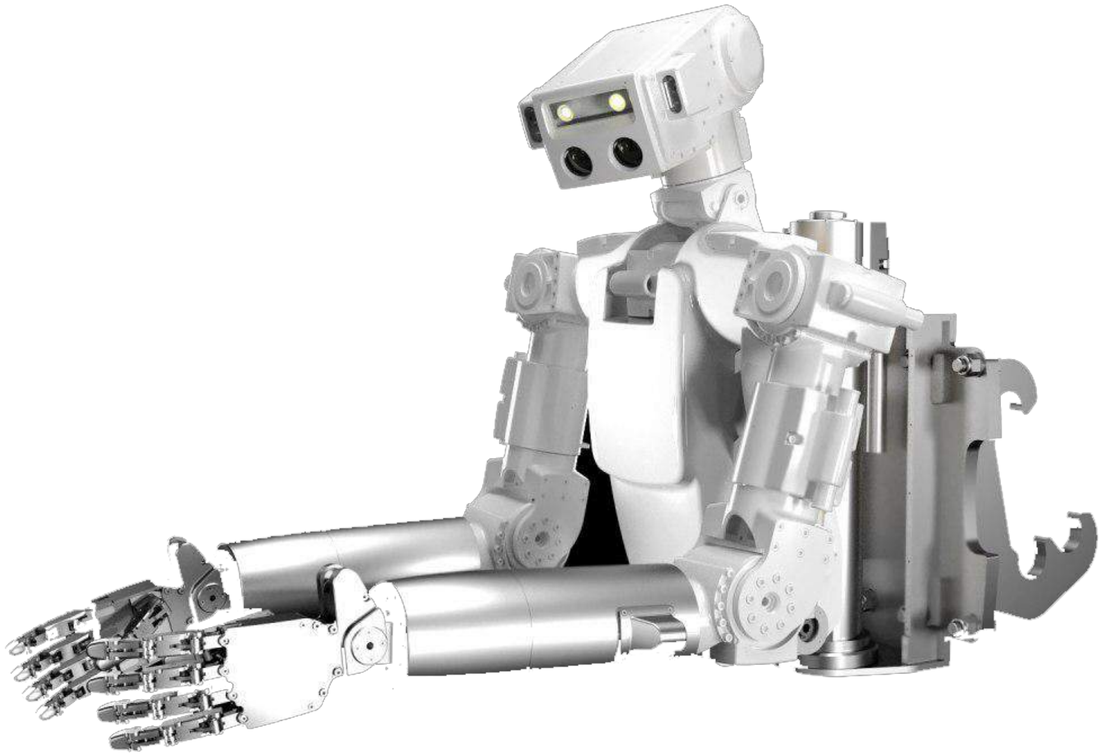
Independent autonomous movement with a power reserve of up to 35 km on a single charge and an average speed of 6 km/h

4

Excellent maneuverability in small spaces combined with exceptional stability

CANYON

Mobile RC controlled by an operator for removing radioactive wastes from RW depository



Functionality:

1

Machine vision and visualization module provide remote control at the distance of 100 km with use of a fiber link

2

Five-fingered gripper allows performing accurate operations with different objects (hand units are made with use of additive technologies)

3

The robot repeats the operator's movements with use of a set up copying type device at the distance of 100 km

4

The robot is capable **to manipulate with one hand** objects weighing up to 15 kg including general-purpose industrial tools

SR-201R

Robotic complex for automatization of control of price tag correctness and display of goods in retail stores

Functionality:

1

Identification of goods and price tags

2

Autonomous navigation and movement along a predetermined route with obstacle avoidance

3

Analysis of the availability of goods on store shelves and the relevance of price tags in conjunction with the generation of a management impact on personnel

4

System for transmitting commands to employees to replenish goods

COLLABORATIVE ROBOT CR

RC for automatization of cyclic production processes that collaborates with a man

Functionality :

1

Possible **collaborative operations** with a man in a common workspace

2

Possible installation of additional components. Three-fingered gripper is a multi-purpose industrial gripper

3

Manipulating unpositioned objects of different forms, sizes, weights, and hardness

4

Workspace square in a horizontal plane is 1.8 m², **radius** is 825 mm

MARKER

Double-purpose robotic complex. The project considers two platform types: full-track and wheeled. A series of five vehicles will be manufactured for working out the technology

Functionality:

1

Modular construction – creation of integrated intelligent systems for different purposes

2

System of a robotic platform group control making groups, navigation, planning united trajectories and others

3

Autonomous control and information processing

4

Machine vision for providing independence, detection of targets and other objects

AT DRIVE

A line-up of synchronous brushless electric motors with permanent magnets

Functionality:

1

High reliability, including at high speeds due to the absence of a brush-collector unit

2

The product is compact. It may be used in mobile and autonomous systems

3

No sliding contacts - the ability to work in fire-hazardous environments

4

It was **successfully tested as a part of the robotic complex** FEDOR on the ISS

AT DRIVE. CHARACTERISTICS

	50		70		85		115	
	08	14	10	18	13	23	25	50
Capacity, W	150	230	300	300	410	410	540	550
Nominal voltage, V	48	48	48	48	48	48	48	48
Nominal torque, Nm	0.25	0.47	0.7	1.1	1.68	2.8	4.1	7. 8
Peak torque, Nm	0.79	1.8	3.0	3.9	6.7	7.5	16.4	24
Rotation rate (at no load), rpm	5600	5150	4200	2650	2360	1410	1350	700
Nominal current, A	6	6	8	8	11	11	15	15
Constant torque, Nm/A	0.060	0.078	0.088	0.138	0.150	0.258	0.275	0.544
Winding resistance, phase-phase, mOhm	552	611	314	443	339	474	136	235
Winding inductance phase-phase, uH	390	423	415	586	535	945	412	802
Number of terminal pairs, pcs	10	10	10	10	10	10	15	15
Efficiency, %	85	87	87	87	88	88	89	90
Diameter of the stator (D), mm	50	50	68.5	68.5	85	85	115	115
Length of the stator (L+Hall sensor), mm	18(+4)	24(+4)	23.7(+4)	31(+4)	28(+4)	37(+4)	42(+4)	66.8(+4)
Inner diameter of the rotor (d), mm	30	30	42	42	52	52	73	73
Length of the rotor (l), mm	17	23	20.8	28.7	25	34.2	39.5	65
Weight, kg	0.102	0.145	0.229	0.332	0.433	0.663	1.23	2.2

EXPERIENCE OF USING MOTORS AT DRIVE IN SPA AT'S ROBOTICS

Anthropomorphic robot FEDOR

Collaborative robot CR

Robotic devices for medicine

AX DRIVE

A line-up of high-capacity axial brushless electric motors with permanent magnets

Functionality:

1

Possible **control of the rotation** speed in a wide range

2

Low weight, which does not significantly increase the spring weight

3

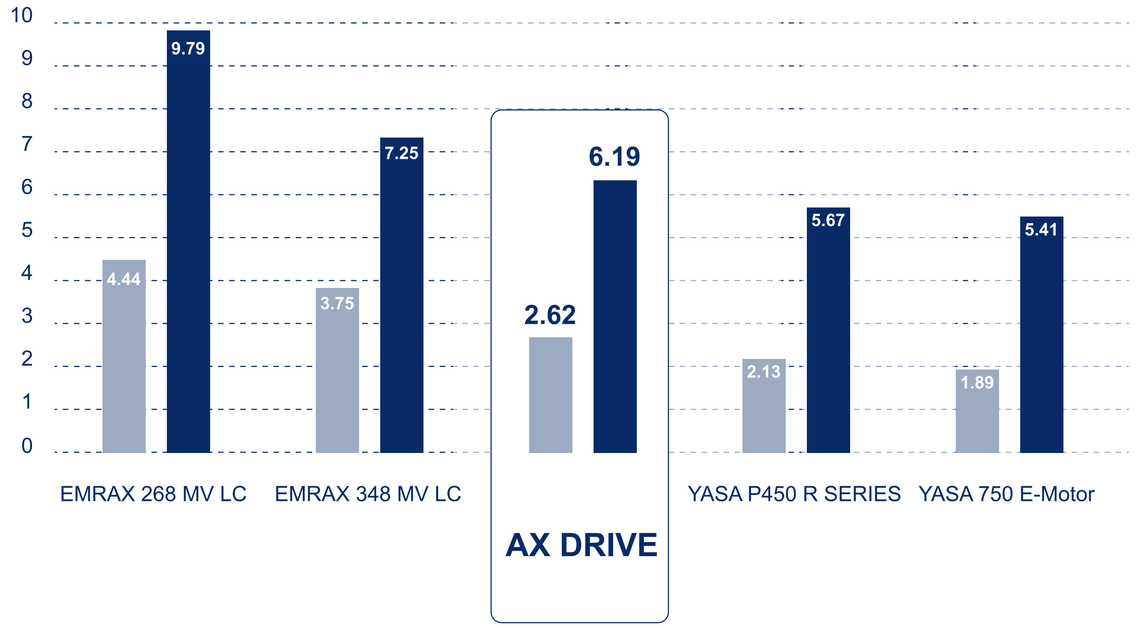
High specific capacity and efficiency values

4

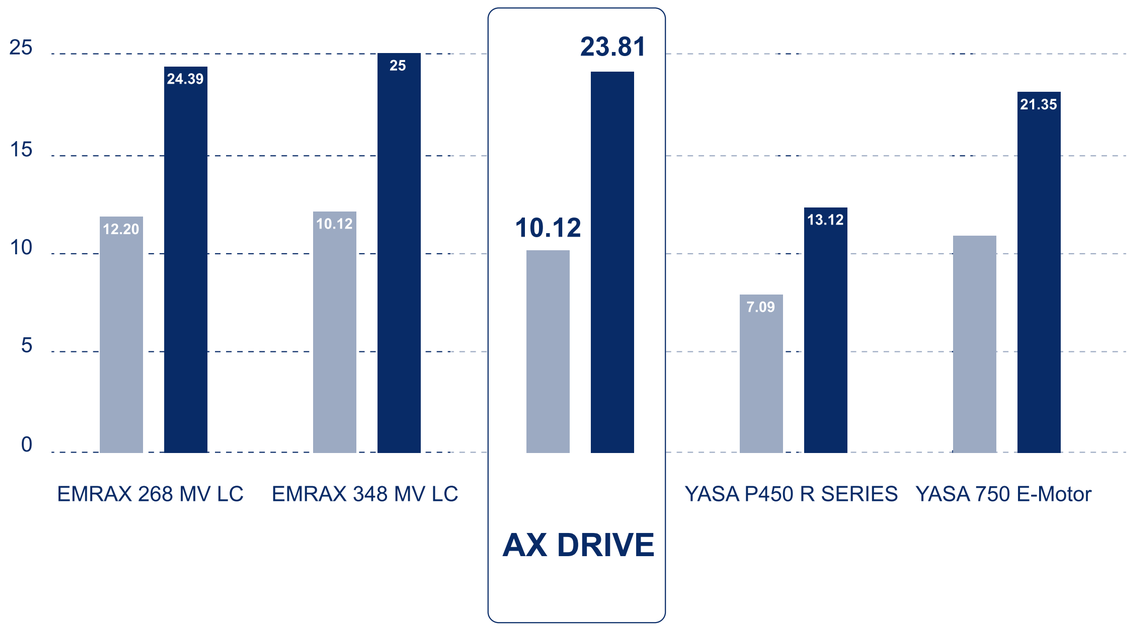
Possible **frameless use**

AX DRIVE. COMPARISON WITH ANALOGUES

Capacity (nominal, maximum), kW/kg



Torque (nominal, maximum), Nm/kg



nominal

maximum

FEDOR

Robot-cosmonaut that took a flight into space in operative condition (on board of Soyuz MS-14, on the ISS and in a landing section while coming back), successfully performed the planned scientific program and came back to the Earth

August 22, 2019

FEDOR’s flight to the ISS. On the 7th of September 2019 it came back to the Earth

MECHATRONICS 2.2

Stand of mechatronic systems with a specialized software **for universities and research institutes**

Functionality:

Research of kinematics and dynamics of multiple-link anthropomorphic systems with possibility of an autonomous remote control.

Debugging settings of regulators and algorithms for regulating the positioning accuracy of electric drives of anthropomorphic manipulators and grippers.

Research of the **combined control system** of anthropomorphic manipulators and grippers.

MECHATRONICS 2.2

Use areas:

1. Universities that have subjects in the field of robotics and mechatronics:
— Conducting research work of graduate students with the ultimate goal of PhD defense;
— Conducting laboratory work for students;
— Tool for research, testing algorithms and programs.

2. Research institutes:
— Conducting basic research in the field of robotics and mechatronics;
— Conducting applied research to perform tasks from customer enterprises;
— Developing platform-based industry solutions.

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