# EDUCATIONAL-METHODICAL COMPLEX «ROBOTRACK»

✓ **Brain Development Ltd. (St. Petersburg)** is a system integrator in the sphere "Development of robotics in Russia" and a resident of the cluster "Development of information technologies, radioelectronics, instrumentation, communications and telecommunications of St. Petersburg".

✓ May 17, 2017 Brain Development Ltd. became a winner of the annual Prize "The Impulse of Goodness" for its contribution to the development and promotion of social entrepreneurship in Russia. The prize was established by the Foundation for Regional Social Programmes "Our Future".

✓ On October 21, 2015 Brain Development Ltd. was awarded the National Quality Mark Prize; the latter was presented at the special awards ceremony, in recognition of the achievements "ECONOMIC SUPPORT OF RUSSIA", with award of an honorary title "HIGH QUALITY STANDARD".

ВСЕРОССИЙСКАЯ ПРЕМИЯ
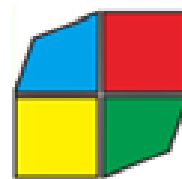НАЦИОНАЛЬНАЯ
МАРКА КАЧЕСТВА

Brain Development is a developer and producer of the robotic complex ROBOTRACK for the educational system, from kindergarten to the university, being a managing company for institution of International network of Robotrack educational robotics centers.
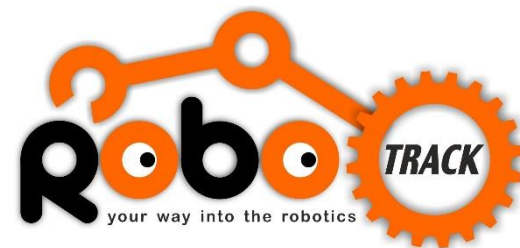
Within the framework of the Children's Goods Industry Congress, on September 29, 2017, a ceremony of awarding the best national producers took place. By the results of the Rating competition of the Ministry of Industry and Trade of the Russian Federation, the company Brain Development entered the TOP-10 of the best Russian producers.

Brain Development Ltd. is an official representative of the International Youth Robotic Association IYRA in Russia.

The Robotrack project was supported by the Agency for Strategic Initiatives (ASI) (Moscow).

Brain Development Ltd. is a winner of the International Competition "Innovations and Development" in the nomination "Innovations in education" and entered the list of top 100 enterprises and organizations of Russia.

In March 2016, Brain Development Ltd. became a winner of the 1st cross-sectoral competition of producers and suppliers of educational equipment and teaching aids for supplementary education, extracurricular, cultural and leisure activities "The Teachers' Choice". The Robotrack robotic complex was awarded the status of "Recommended by the pedagogical community". In 2017, the Resource kits NEUROTRACK and VIDERETRACK got a mark of distinction "Recommended by the pedagogical community".

Brain Development Ltd. (St. Petersburg) is a resident of the cluster "North-West Federation of Innovative Educational Projects".

ФОНД СОДЕЙСТВИЯ ИННОВАЦИЯМ

The project is implemented with the support of the Foundation for assistance to small business in the scientific and technical sphere.

Brain Development Ltd. (St. Petersburg) is an official organizer of the All-Russian stage of robotic competitions for preschoolers and schoolchildren "DETAL'KA" within the framework of International competitions IYRC.

1. Construction kits

ROBOTRACK (RUSSIA) PRESCHOOLERS
- KIDDY KIT 1 (5-6 y.o.)
- KIDDY KIT 2 (6-7 y.o.)
- Resource Kit «Kiddy Project» (6+ y.o.)

ROBOTRACK (RUSSIA) SCHOOLCHILDREN
- INTERN A KIT (7-9 y.o.)
- YOUNG DISCOVERY KIT (10-11 y.o.)
- ROBOTRACK BASE KIT + TFT DISPLAY, TEMPERATURE SENSOR, WORM GEAR (12+ y.o.)
- RESOURCE KIT: NEUROTRACK; VIDERETRACK; SENSORS; METAL; SHAFTS AND GEARS; WHEELS AND CATTERPILLARS; FASTENERS

"HUNA-MRT" (RUSSIA - SOUTH KOREA), including for children with health limitations
- HAND (4-7 y.o.)
- BRAIN A (6-9 y.o.)
- BRAIN B (6-9 y.o.)

2. Learning kit

ROBOTRACK PRESCHOOLERS
- KIDDY KIT 1 (40 classes)
- KIDDY KIT 2 (40 classes)

ROBOTRACK SCHOOLCHILDREN
- INTERN A KIT (74 classes)
- YOUNG DISCOVERY KIT (20 classes)
- ROBOTRACK BASE (62 classes)
- VIDERETRACK (30 classes)

"HUNA-MRT", including for visually impaired children, children with autism, children with developmental delay
- MRT 1 HAND (40 classes)
- MRT 1 BRAIN A + Brain B (58 classes)

3. Training

- Training of coaches and teachers in the online mode
- Advanced training courses with issuance of a standard certificate; the training takes place as based on the STEM-Park of Moscow City Pedagogical University.

4. Technical support

- Daily technical support (SKYPE, e-mail, phone, webinars)

5. Competitions

- Preparation for participation in competitions, including "DETAL'KA", participation in IYRC international competitions.

6. Perspective

Starting from 2019, it is planned to launch a new educational hardware/software complex *Young Neurophysiologist-Engineer*, which is complementary to ROBOTRACK kits and other robotic construction kits LEGO, ARDUINO, aimed at preparing children for the perspective professions of Neuronet market within the framework of NTI road map.

EDUCATIONAL-METHODICAL COMPLEX «ROBOTRACK»: DESIGNATION, STRUCTURE, ADVANTAGES

The learning kit is designed according to FSES requirements, is oriented at continuity of learning through project-specific activities, has a clear structure (described below on the slides according to the age of learners).

The learning kit is intended for children aged from 4 to 16 years old. It realizes the programmes able to plan and achieve the learners' metadisciplinary and personal results, enabling them to acquire primary knowledge in the field of physics, mathematics, computer science, integrating theoretical knowledge with practical skills.

All classes for working with children having health disabilities are designed in accordance with the Federal State Educational Standards, based on the **methods of inclusive education** for children with sensory impairments (children with amblyopia, squint, impaired vision) and for children with intellectual disabilities. The educational inclusive-education kits are aimed at socialization of children with health limitations and formation of primary competencies in the fields of physics, mathematics, biology, computer science, mechanics, that will let them master successfully the professions connected with technologies of the future.

Pre-school education

1. Kiddy Kit I - 40 classes

2. Kiddy Kit II - 40 classes

3. MRT 1 Hand (40 models).
   MRT 1 Brain A (16 models) + MRT 1 Brain B (16 models) + developed tasks for development of algorithmic logic (at least 10 sets of tasks)

The developed learning kit is intended for children with sensory impairments (children with impaired vision), children with autism, with intellectual development disorders, developmental delay:

- MRT 1 Hand (40 classes)
- BRAIN A + Brain B (58 classes)
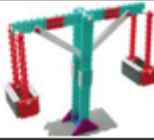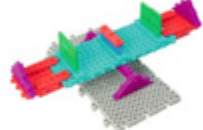
Pre-school education (children aged 4-6)

THE LEARNING KIT FOR CHILDREN AGED 4-6 FOR THE CONSTRUCTION KIT ROBOTRACK «KIDDY KIT»

Class	Description	Model
1	Chair	
1	Table	
1	TV	
2	Mini-mill	
2	Snail	
2	Rabbit-warrior	
3	Mini swings	
3	Elephant	

Class	Description	Model
4	Mini helicopter	
4	Mouse	
4	Machine	
5	Beach lounger	
6	Bookend	
7	Wolf	
7	House	
8	Roulette	

TABLE OF MODELS

9	Swing	
10	Mill	
11	Required	
12	Swing	
13	Swing	
14	Hill	
15	Crane	

16	Wrecker	
17	Elevator	
18	Rabbit	
19	Fishing rod	
20	Fish	
21	Ostrich Racing	

TABLE OF MODELS

22	Dancing	
23	Mixer	
24	Volchok	
25	flying ship	
26	Carousel	
27	Bumper machine	

28	Stroller	
29	Motorcycle	
30	Racing car	
31	Humanoid Robot	
32	Excavator	
33	Train	
34	Crab	

TABLE OF MODELS

35	Biplane	
36	Car lift	
37	Cleaner	
38	Rink	
39	Forklift Truck	
40	Game Workshop	--

FOR CHILDREN FROM 4 Y.O.
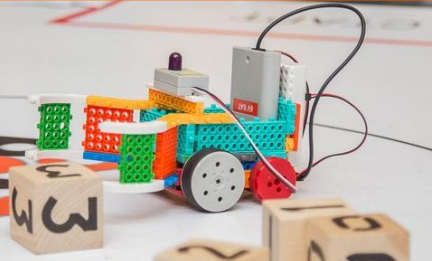
The line of construction kits is supported by methodological recommendations, containing:

1. Theoretical material from the subject areas adjacent to robotics (physics, mechanics, biology, etc.).
2. Material explaining the basic principles of robotics.
3. Detailed description of the main components of the construction kit, their functional features and the principles of connecting the electronic elements construction kit.
4. Detailed assembly charts for each model.

EXAMPLE OF EDUCATIONAL MATERIALS ON THE THEORY OF PHYSICS AND THEORETICAL MECHANICS

The principle of lever

● **What is a lever?**

Lever is… **a tool for strengthening and flow of force.**
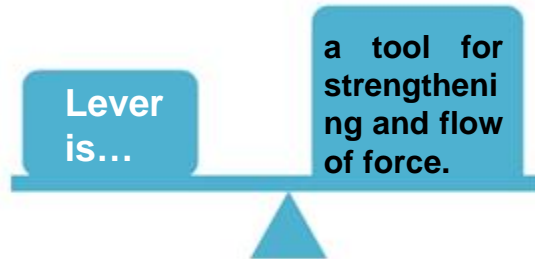
● **Find the use of the principle of lever around us.**

● The lever has three points: the point of force application, the point of bearing and the point of action.

A man can easily lift a heavy thing if he applies force at a distance from the point of bearing.

the point of force application

the point of action

the point of bearing
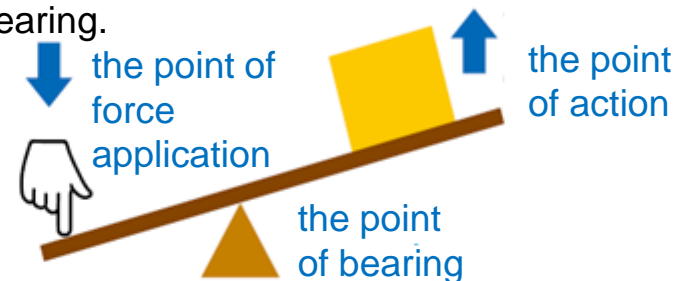
● **Find out the point of force application, the point of bearing and the point of action and enter them into the rectangles.**

EXAMPLES OF MODEL ASSEMBLY CHARTS

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EXAMPLES OF MODEL ASSEMBLY CHARTS

A LEARNING KIT FOR TEACHING CHILDREN WITH HEALTH LIMITATIONS (4-9 YEARS OLD)

1. **A learning kit designed** for children aged 4-7 with sensory impairment, including children with impaired vision, amblyopia and squint, autistic children **(40 classes)**.
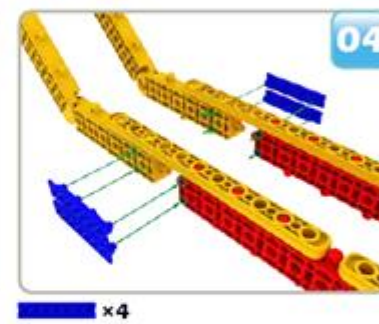
2. **A learning kit is designed** to teach children aged 5-9 having intellectual development disorders and developmental **delay (58 classes)**.

LEARNING KIT FOR CHILDREN AGED 4-7 HAVING SENSORY IMPAIRMENTS comprises the following

WORK PROGRAMME for development of constructive skills, correction of visual perception of children with sensory impairments by means of a robotic construction kit. The programme is realized through a continuous educational activity, organized as working with 2-6 children. The models intended for assembly in constructive activity are grouped into 4 thematic modules.

GUIDANCE MANUAL Development of Constructive Skills and Correction of Visual Perception of Children with Sensory Impairment by Means of the Construction Kit "MRT1 HAND" (children with impaired vision, amblyopia, squint). A total of 40 classes have been developed, with specified didactic games, applications in the form of electronic presentations separately for every lesson.

DIDACTIC MATERIAL

PEDAGOGUE'S AID:

a table of models for designing and modelling in educational activities involving children having sensory impairment, aged 5-6 years (40 models).

LEARNER'S AID:

model assembly charts (assembly charts for 40 models).

A number of unique unparalleled methods have been designed for inclusive education in the sphere of educational robotics.

II. LEARNING KIT INTENDED FOR CHILDREN AGED 5-8 HAVING HEALTH LIMITATIONS, INCLUDING SPECIFIC METHODS FOR CHILDREN WITH INTELLECTUAL DISABILITIES, DEVELOPMENTAL DELAY)

The learning complex "Designing Based on Robotic Construction Kits "MRT 1 BRAIN A", "MRT 1 BRAIN B" for children aged 5 - 8 was developed on the basis of the Federal State Educational Standard of Pre-school Education (FSES for pre-school education 2013) and the Federal State Educational Standard of Primary General Education for learners with disabilities (FSES for health limitations learners - 2014); is intended for use in pre-school institutions of inclusive character, as well as in inclusive classes of primary school.

THE LEARNING KIT COMPRISES THE FOLLOWING

WORK PROGRAMME: Acquaintance with the surrounding world within the framework of this programme supposes formation of a holistic view of children in the subjects to be constructed.

GUIDANCE MANUALS

1. «Teacher's Workbook for working with Construction Kit MRT 1 BRAIN A» (basic level).
2. «Teacher's workbook for working with Construction Kit MRT 1 BRAIN A + MRT 1 BRAIN B» (advanced level).

DIDACTIC MATERIALS:

PEDAGOGUE'S AID:

1. Table of models for designing and modelling for children aged 5-8 years
(16 models of entry level + 16 models of basic level).
2. Table of models for designing and modelling for children aged 5-8 years
(16 models of entry level + 16 models of basic level + 16 models of advanced level).

LEARNER'S AID:

1. Model assembly charts. Basic level (assembly charts for models MRT 1 BRAIN A).
2. Model assembly charts. Advanced level (assembly charts for models "MRT 1 BRAIN A + MRT 1 BRAIN B").

KIT MODULES

Module 1 - preparatory. **Formation of ability to work with a system of sensory standards, development of motor skills necessary for a robotic complex. The classes include the work within sensory education, aimed at development of visual-efficient, visual-figurative thinking, extension of knowledge about the surrounding world, formation of ability to combine construction kit parts in a simple structure, 16 classes 25-30 minutes each, for normally developing children and those with health limitations (32 hours), execution of elementary structures.**
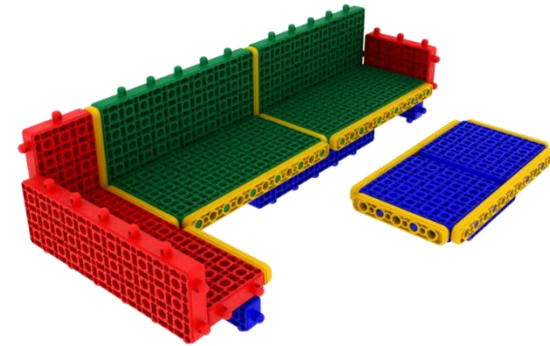
Module 2 - initial. **Formation of ability to connect the construction kit parts in accordance with the chart, with the pedagogue's help. The classes included the work within sensory education, development of visual-figurative thinking, extension of the knowledge how to use the finished structure in playing, 16 classes for normally developing children and those with health limitations (32 hours), construction according to the chart on the basis of the construction kit.**

KIT MODULES
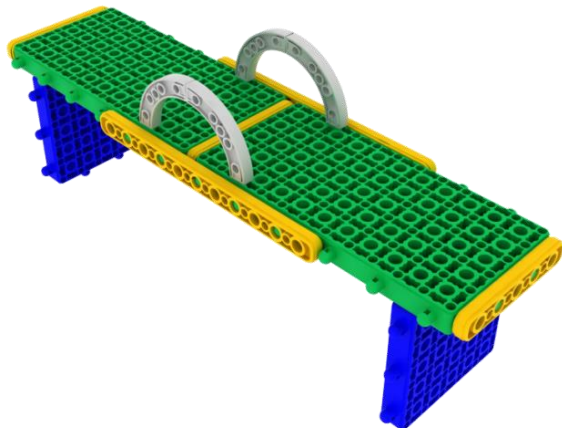
Module 3 - basic. Formation of ability to work according to the chart with the construction kit. The classes include the work aimed at development of visual, imaginative and logical thinking, formation of ideas about the dynamic use of the finished structure in playing, 32 classes 40-60 minutes each, for normally developing children and those with health limitations, aged 7–8; construction is made according to the charts based on the models of the construction kit MRT 1 BRAIN A, MRT 1 BRAIN B.
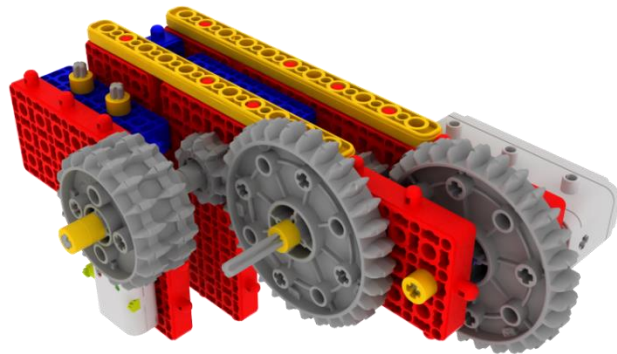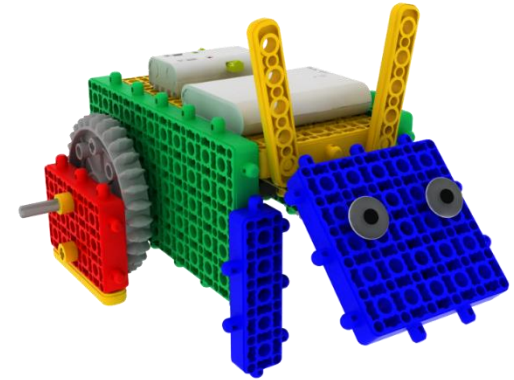
Module 4 – creative. The construction is made in accordance with the joint creative plan designed with the parents, is carried out without a chart, the specification of structures will be designed with the parents.
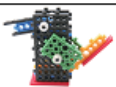
Junior schoolchildren (children aged 7 to 9)
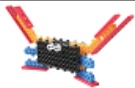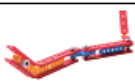
THE LEARNING KIT FOR CHILDREN AGED 7-9 FOR THE CONSTRUCTION KIT ROBOTRACK «INTERN A»
In total, **74 classes** have been developed.

Structure of the learning kit:
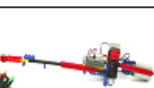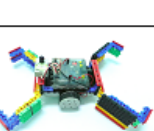
1. Explanatory note.
2. Summary plan.
3. Educational video.
4. Materials for the pedagogue.
5. Assembly charts for robots models, for every lesson.
6. Examples of programmes for programming robots.
7. Video materials with demonstration of projects operation.

TABLE OF MODELS
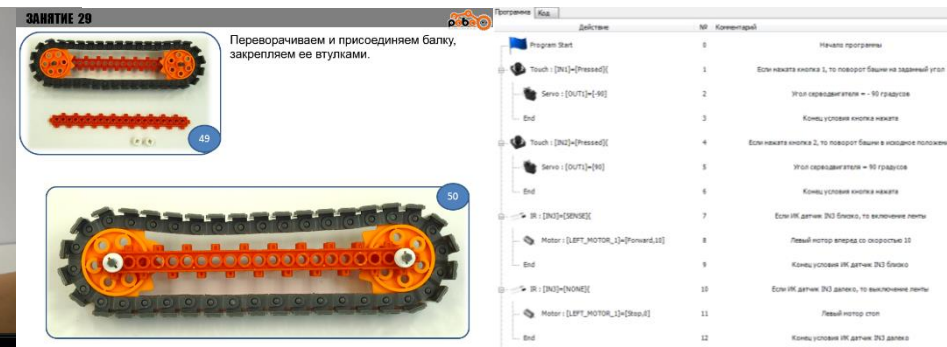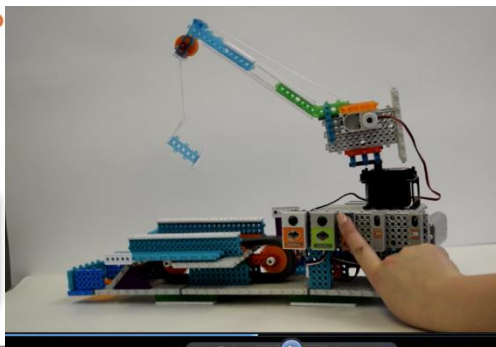
Lesson	Model	Description
1		Turtle
		Scorpio
		Crab
		Snake
		Elephant
2		Helicopter Apache
		Glasses
		Bird
		House
3		Swing
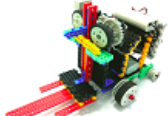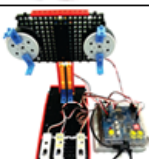
Lesson	Model	Description
4		flying ship
		Water Mill
		Bell
5		Catapult
		The machine on rubber tires
		Robot-scissors
6		Hand fan
		Excavator
		Acrobat
7		Biplane

TABLE OF MODELS

Lesson	Model	Description
8		Turntable
9		Thomas the Trailer
10		Fighting machine
11		Huna E
12		Scorpio
13		Footballer 1
14		Penguin show
15		Tower crane
16		Mantis
17		Dancing
18		Mini-formula 1
19		Funicular
20		Fishing rod
21		X-football player
22		London Bridge
23		Crocodile
24		Racing motorcycle
25		Crane 2

TABLE OF MODELS

Lesson	Model	Description
26		3 in 1
27		Android
28		Lift
29		Sniper
30		Automatic doors
31		Two-motor trolley
32		Bumper machine
33		Fan

Lesson	Model	Description
34		Pendulum
35		Turtle
36		Insect
37		Hammer
38		Dumper
39		Knight
40		A vacuum cleaner

TABLE OF MODELS

Lesson	Model	Description
41		The Bumbo Machine
42		Self-propelled catapult
43		Robot beetle
44		Robot-forceps
45	---	Creative project
46		Motorcycle
47		Segway

Lesson	Model	Description
48		Ferris wheel
49		Ferris wheel
50		Loader
51		Motorcycle
52		Robot puppy
53		Robot puppy

TABLE OF MODELS
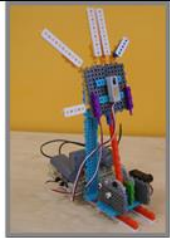
Lesson	Model	Description
54		Valley
55		Quadruple
56		Stirrer for cubes
57		Quad bike
58		Formula 1
59		Formula 1
60		Tank
61		Pterosaur

Lesson	Model	Description
62		Robot-golfer
63		Bulldozer
64		Loader
65		Helicopter simulator
66		Helicopter simulator
67		Goliath
68		Robot-snake

TABLE OF MODELS

Lesson	Model	Description
69		Combat Top
70	---	Creative project
71		Transformer
72		The Grantor
73		Boxer
74, 75	---	Creative graduation project
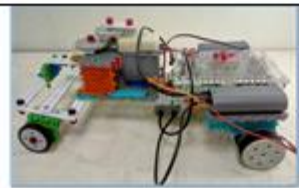
Junior schoolchildren (children aged 10 to 11)

CLASS No.	TRAINING TIME	PROJECT	SUBJECT OF LEARNING
Class 1	2 HOURS	**Droid-astromechanic**	Introductory class. Forming the idea of a construction kit and the principles of working with it. **Lesson plan:** 1. Where we have found ourselves. 2. What robots are. 3. How to assemble robots correctly. 4. How to teach robots to move. 5. How to assemble your own astrodroid.
Class 2	2 HOURS	**Robobowling**	Forming the learner's knowledge of the principles of mechanical motion. **Lesson plan:** 1.Mechanical motion. 2. Trajectory. 3. Speed, time, path. 4. Sequential algorithm. 5. Robobowling.
Class 3	2 HOURS	**TREASURE HOUSE**	Forming the understanding of branching algorithms by example of operation of a touch sensor. **Lesson plan:** 1. What the Algorithm is. 2. How the Flow chart is executed. 3. What kinds of algorithms exist. 4. How the touch sensor operates.
Class 4	2 HOURS	**HIGH-FIVE**	Getting acquainted with the basic principles of operation of IR sensor; learning the concept of "Operator" in the context of the theory of algorithms. **Lesson plan:** 1. Algorithm operators. 2. How the infrared sensor works. 3. The notion of "Anthropomorphism of robots".
Class 5	2 HOURS	**ANTHROPOMORPHIC ROBOT**	Learning the concept of "anthropomorphic robot"; studying cyclic structures from the point of view of programming. **Lesson plan:** 1. Types of anthropomorphic robots. 2. Why robots are made to resemble humans. 3. Cyclic structures. 4. The concept of subroutine.

TABLE OF MODELS

Class 6, 7	4 HOURS	**VENDING MACHINE**	Learning the types of automated systems by example of vending machines. **Lesson plan:** 1. The concept of "vending". 2. The history of vending machines. 3. The structure of a vending machine.
Class 8	2 HOURS	**ECHOLOCATION SPECTACLES**	Learning the principles of echolocation and its use by humans and animals. **Lesson plan:** 1. Sound and its types. 2. What ultrasound is. 3. What biomimetics is. 4. Echolocation.
Class 9	2 HOURS	**STEELYARD WEIGHING SCALES**	Learning the principle of the lever and getting acquainted with sensor encoder. **Lesson plan:** 1. The principle of the lever. 2. The history of levers. 3. Lever scales. 4. Encoder. 5. Circumference. 6. Steelyard weighing scales.
Class 10	2 HOURS	**MECHANICAL TRANSMISSION**	Learning the principles of operation of mechanical transmission and its types. **Lesson plan:** 1. Mechanical transmission. 2. Cogged wheels. 3. Reducer. 4. Winch.

TABLE OF MODELS

Class 11	2 HOURS	**TACKLE PULLEY**	Learning the principles of operation of mechanical blocks. **Lesson plan:** 1. Gravity. 2. Weight. 3. Block operation principle. 4. Movable and fixed block. 5. Tackle pulley.
Class 12	2 HOURS	**REMOTE CONTROL**	Learning the principle of operation of LED, getting acquainted with remote control programming by example of a remotely-controlled automobile with specialized signals. **Lesson plan:** 1. Light and lighting. 2. Semiconductor. 3. Light-emitting diode. 4. Remote control. Constructing a company car.
Class 13	2 HOURS	**SOLAR ELECTRIC POWER STATION**	Learning the operation of light sensor (photoresistor) by example of a model of solar electric power station. **Lesson plan:** 1. Sources of light. 2. The Sun and its energy. 3. Light sensor. 4. Solar electric power stations. 5. Solar battery.
Class 14	2 HOURS	**DRAWBRIDGE**	Learning the principles of operation of the colour sensor. **Lesson plan:** 1. Access control systems. 2. Colour sensor. 3. Drawbridge.
Class 15	2 HOURS	**ARTIFICIAL HORIZON**	Learning the principles of operation of a gyro sensor. **Lesson plan:** 1. Automatic regulator. 2. Gyroscope. 3. Artificial horizon.

TABLE OF MODELS

Class 16	2 HOURS	**TFT-SCREEN**	Learning the basics of work with a TFT-screen. **Lesson plan:** 1. Principles of operation of monitors and screens. 2. The concept of pixel and resolution. 3. Coordinate system. 4. TFT-screens.
Class 17	2 HOURS	**ANIMATION. AGILE BALL**	Continuing the study of displays. Learning the principles of animation programming. **Lesson plan:** 1. Principles of animation and animated imaging. 2. Computer animation. 3. Vector. 4. Collision analysis.
Class 18	2 HOURS	**VIRTUAL PING-PONG**	Learning the principles of computer games programming. **Lesson plan:** 1. Types of games. 2. Computer games. 3. Gadgets for computer games. 4. Ping pong.
Class 19	2 HOURS	**SERVODRIVE**	Learning the structure of electric motors, servomotors. **Lesson plan:** 1. How the electric motor operates. 2. Types of electric motors. 3. Structure of the servomotor.
Class 20	2 HOURS	**STEERING CONTROL**	Learning the steering control mechanism. **Lesson plan:** 1. Structure of a car. 2. Steering control. 3. Types of steering mechanisms.

Class	Description
1. Droid-astromechanic	Introductory lesson which focuses on the rules of conduct in the Club, the work procedures, as well as the technology of working with the construction kit. One can pre-programme the boards for robots using ready-made programmes.
2. Robobowling	Getting acquainted with the concept of programming. Linear programming as an example of the simplest type of algorithms (the very concept of algorithm is introduced at the next lesson).
3. Treasure house	Getting acquainted with the concept of the algorithm and its types, learning the "branching" (IF-THEN operator).
4. High-five	Learning in detail the principles of work with the sensors by example of infrared sensors, introducing the term "Operator". It is recommended to draw the learners' attention separately to the difference between the "sensors" and "operators" (input and output devices).
5. Anthropomorphic robot	Learning the programming of cycles, consolidating the understanding of work with IR sensors.
6. Vending machine	Getting acquainted with the types of automated systems, the notion of "Vending", the use of robots in trade.
7. Vending machine	Learning to find and fix errors in programmes. It is recommended to pay special attention to work with the tools "debugging" and "port monitor"
8. Echolocation spectacles	Getting acquainted with the distance sensor and the principles of echolocation; drawing attention to the fact that the ultrasonic sensor can produce "noise" (erroneous signals) that must be eliminated during the programming and debugging.
9. Steelyard weighing scales	Learning the principles of the lever and the programming of encoders. The subsequent three classes deal with the principles of mechanics in robotics.
10. Mechanical transmission	Continuing the study of encoders. Exploring the operation of gears, drawing attention to the fact that the learners should study the idler gears and multiple gearing more closely.

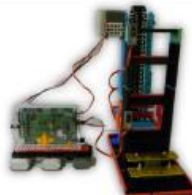|	
11. Tackle pulley	Learning the block mechanics. It is desirable to explain to the learners the common features of operation of levers, blocks and gears in mechanics.
12. Remote control	Classes 12-14 are devoted to the study of the colour sensor; at this lesson we master the light emitting diode as a component of the sensor. In the course of work over the project, we study the programming of remote control with the help of a smartphone (the application *Robotrack Remote Control Sensor* for Android).
13. Solar electric power station	This project uses a part of the colour sensor - the photoresistor. The system control programme is quite complicated; it can be simplified at the discretion of the pedagogue, or you can use a ready-made programme.
14. Drawbridge	The colour sensor as such is explored, its operational principles and functions, on the basis of the experience gained in the course of previous classes.
15. Artificial horizon	At this lesson, it is important to pay attention to the principles of feedback systems; it is important that this is the first project where algorithms involving conditions are replaced by algorithms using control functions. The programme itself seems "quite simple", as the number of actions in it is minimal, however it is of fundamental importance to achieve due *comprehension* of the programme by the learner.
16. TFT-screen	In this lesson, the focus is made on programming; classes 16-18 are not complicated constructively, but require complex programming of virtual objects. At the 16th lesson, it is important to achieve understanding of the display coordinate system, since this knowledge is fundamental for the study of the following topics.
17. Agile ball	In this topic, the animated motion is studied through changing the objects coordinates in each new frame; it is important to reach understanding of the coordinate change rules (displacement vector, reflection).
18. Virtual ping-pong	Using the knowledge gained at classes 16, 17 and 9, we construct a game console.
19. Servodrive	Learning the principles of operation of electric motors; it is desirable, for understanding the servomotor programming, to understand the principles of feedback studied at the lesson 15.
20. Steering control	The steering control mechanics is studied. During the classes 19-20, a model of a car with a steering gear is assembled; the average time for assembling the model is 1,5 classes + half of a class for model testing; in case the model is collected within the 1st lesson, it is recommended to offer a more complicated task on programming of a model at the second lesson.

Schoolchildren (children aged 12+)
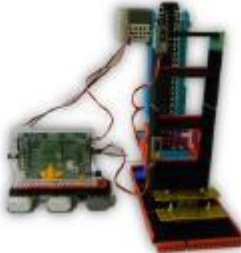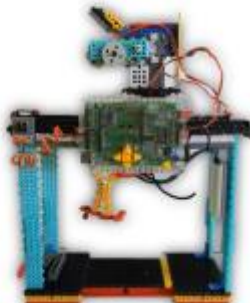
The learning kits structure:

• a short Work Programme Robotrack Base with a table of models;

•presentations for a pedagogue (coach) for each lesson in PPT format - 70 pcs.;

•robot models assembly charts for the learners, for every lesson;

•examples of robot programming applications;

•files "Additional Materials for the Lesson";

•video materials demonstrating the work over the projects;

•training videos (resources in open access on the Internet) on the theoretical material studied at the lessons;

•draft plan for every lesson;

•explanatory note to every lesson.

TABLE OF MODELS

1		6		12	
2		7		13	
3		8		14	
4		9		15	
5		10			
		11			

ROBOTRACK BASE KIT

TABLE OF MODELS

16	
17	
18	
19	

20	
21	
22	
23	
24	

25	
26	
27	
28	
29	
30	

Secondary and senior school

A training course (self-instruction) in programming for children aged 11 years up.

42 assignments in programming of a mobile platform for children from 11 years old up; this may serve as a summer intensive course after completion of a training course u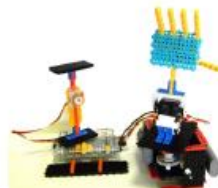nder Robotrack INTERN A or as a preparatory (intermediate) course upon transition to Robotrack Base course. The kit includes assignments for programming of

a mobile platform with the use of a code and with additional complicated tasks; the programming is made in ROBOTRACK IDE environment. The set of assignments is on the disk to the ROBOTRACK BASE constructor.
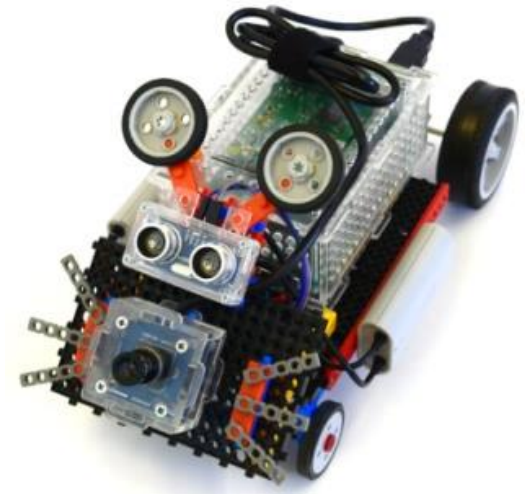
Secondary and senior school
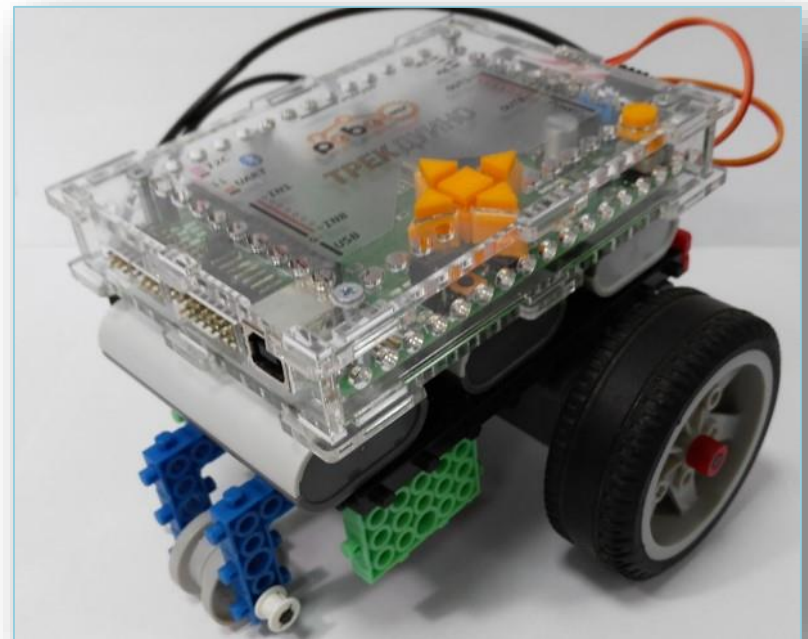
A learning kit for study of computer vision (15 models). The learning kit is structured as 30 classes.

All classes are grouped into 5 modules - 3 models for each operational mode. The classes are designed for children from 12 years up.

**The learning kit includes the tasks in the following modules:**

- Recognition of objects (faces);
- Tracking the guide line;
- Detection of graphic primitives (circumferences);
- QR-codes recognition;
- Detection of movement;
- Analysis of the color chart of a frame;

The structure of the learning kit: explanatory note to every lesson; draft plan; a video "How it works" with demonstration of the project operation, a training video, model assembly chart, programming assignments, an example of programmes for the lesson, additional material for the pedagogues, material for a pedagogue to every lesson in .pptx format - to explain the new theoretical material to the trainees.

Starting from **2019**, after the ROBOTRACK "Base kit" course, will be available a package for training sessions called "**Young Neurophysiologist-Engineer**" designed for studying human neurophysiology, collecting and processing biosignals (EEG, ECG, CGR, EMG) and controlling robotic models.
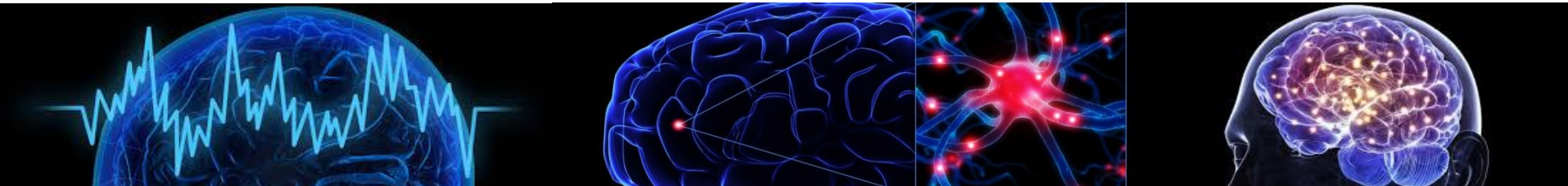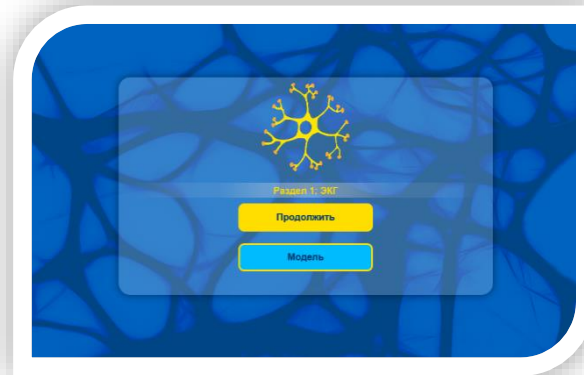
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