



YOUNG NEUROPHYSIOLOGIST-ENGINEER



ABOUT US

- «Brain Development» Ltd. was founded in 2012 in **Saint-Petersburg, Russia**.
- We are the **developer** and the **manufacturer** of the first Russian robotic complex «ROBOTRACK», which is designed for educational system from kindergarten to university.
- We are the **creators** of the network of International Clubs «ROBOTRACK», which has more than 140 clubs in 47 regions and cities of **Russia** and **Kazakhstan**.

WE ARE SUPPORTED BY



OUR ACHIEVEMENTS

- ✔ **More than 140 clubs**, working in Russian and Kazakhstan regions.
- ✔ **More than 40 000 children** are studying in public and private educational institutions of the country on the basis of the developed academic and methodical complex.
- ✔ We are the official representative of the International Youth Robot Association of Robotics in the Pacific and Asian regions (IYRA) in Russia.
- ✔ «Brain Development» company by means of the Robotrack project has been ranked **first** in the nomination of «Personal Contribution to the Development of Social Entrepreneurship in Russia» of VI Award «**Impuls Dobra**» .
- ✔ In March 2016 and 2017 the company **became the winner** of the I Interdepartmental Competition of Manufacturers and Suppliers of Educational Equipment and Teaching Aids for Education «**Teachers' choice**».
- ✔ As a part of the Congress dedicated to the Industry of Goods for Children on September 29, 2017, the awarding ceremony of the best domestic manufacturers took place. According to the results of the Competition top-chart composed by the Ministry of Industry and Trade of Russia, the company «Brain Development» is in **TOP-10 of the best Russian manufacturers** .



ИНДУСТРИЯ
ДЕТСКИХ
ТОВАРОВ



ВСЕРОССИЙСКАЯ ПРЕМИЯ
НАЦИОНАЛЬНАЯ
МАРКА КАЧЕСТВА



RELEVANCE OF DIGITAL COMPLEX "YOUNG NEUROPHYSIOLOGIST-ENGINEER" CREATION

✓ In connection with the introduction of the National Technological Initiative and the definition of new markets that should be formed by 2035 with the aim of Russia's competitiveness in the global technological market and the formation of the digital economy, in connection with the requirements of the NTI RoadMap and the professions of future, "Brain Development" Ltd. has developed and introduced the project "Young neurophysiologist-engineer".

✓ Many professions are still being formed, but today already exist neuromarketologists, neurosurgeons, neuroprogrammers, special "neurotechnologist" groups are being developed. And if the child has such an interest, then the main thing is to understand what he or she wants and can do in the future.



АТЛАС НОВЫХ ПРОФЕССИЙ («АТЛАС НОВЫХ ПРОФЕССИЙ» КАК ОСНОВА РАЗРАБОТКИ ОТРАСЛЕВЫХ И РЕГИОНАЛЬНЫХ КАДРОВЫХ СТРАТЕГИЙ)



RELEVANCE OF DIGITAL COMPLEX “YOUNG NEUROPHYSIOLOGIST-ENGINEER” CREATION

✓ In connection to the growing interest in high technologies, which will be in great demand in the nearest future, or to be exact in the next 5-10 years, there is a need to introduce neurotechnologies now. Thus, the academic and methodical complex (AMC) and equipment that implements the introduction of children from 5 years old into neurotechnology were developed.



✓ **Academic and methodical complex (AMC)** will allow children to get focused on the future professions, related to neuro- and psycho- directions, robotics and related spheres, as well as to form the primary skills of future scientists - neuropsychologists and neurotechnologists.



✓ In preschool and elementary school age, it is necessary to stimulate the interest in the study of neurotechnologies through competitive events. For this purpose, we use the “Robotrack” constructional kit and the “Neurotrack” resource set. In the Russian-wide competition «DETalka», organized by «BrainDevelopment» Ltd., the first competition with neurotechnologies «Neurogonki» was held in 2017.



✓ In the secondary and senior school, a course of education on digital complex “Young Neurophysiologist-Engineer” is introduced.



OBJECTIVE:

TO STUDY THE BASICS OF NEURO AND PSYCHOPHYSIOLOGY OF A HUMAN, TO GET ACQUAINTED WITH MODERN INNOVATIVE TECHNOLOGIES (VIRTUAL REALITY, AUGMENTED REALITY, ARTIFICIAL INTELLIGENCE, ETC.) AIMED AT THE DEVELOPMENT OF MODERN MARKETS FOR SELF-DETERMINATION OF STUDENTS IN CHOOSING A FUTURE PROFESSION.

DIGITAL COMPLEX STRUCTURE AS A TURNKEY SOLUTION



EQUIPMENT



ACADEMIC-AND-METHODOLOGICAL COURSES



CRM
(Data processing center)



Statistics and remote computations block



Teachers' education on career enhancement courses



Ability to participate in international competitions on robotics and neurotechnologies «DETalka»



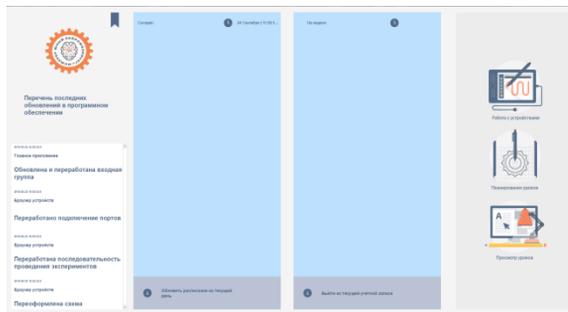
Support of institutions and pedagogical community at complex' introduction



ELECTROENCEPHALOGRAPH



ELECTROHEADSET



YOUNG NEUROPHYSIOLOGIST-ENGINEER

Specifically designed equipment and educational course allow children:

- ✔ To conduct research in the field of neuro- and psychophysiology of a human;
- ✔ To use neurotechnologies for robotic models control based on personal indications bioelectrical activity of the body (brain, muscles, skin, heart);



- ✔ To study basics of psychophysiology and human's functional state;
- ✔ To explore what is the determining factor of the effectiveness of human activity, including the concept of biofeedback and its practical learning;
- ✔ To study the structure of the cardiovascular system, the heart; determine your own pulse, plot your personal axis of the heart, etc. To study the structure and constitution of human's skin, its electrical conductivity;
- ✔ To study the structure of human's muscles and the functional state of muscle tissue and nerves by means of recording myoelectrical activity;
- ✔ To plan your personal learning path.

ACADEMIC AND METHODOICAL COURSE

67 lessons, the duration of one lesson is 100 minutes, lessons attendance two times a week for 1 year or 1 time a week for two years.

12 sections include:

1. Introduction to neurotechnologies (3 lessons).
2. Study of cardiac activity (11 lessons).
3. Study of the muscular activity, the properties of nerves conduction, the electrophysiological activity of the skin (6 lessons).
4. A human's brain, functions and constitution, methods of study, application of electrodes, biorythms, event-related potentials, biofeedback, P300 (27 lessons).
5. Neurocomputer interface «Brain-computer» (6 lessons).
6. Neurotechnologies scope of use, exercise stress tests, , polygraph mode and etc. (8 lessons).
7. Device control (augmented virtual reality, bionics, neuroprogramming) (6 lessons).
8. Career guidance.

Вернуться назад

Перечень доступных уроков

ЭЭГ

Электрическая активность мозга. Методы ее изучения



Электрическая активность мозга



ЭЭГ. Виды отведений для снятия ЭЭГ. Назначение электродов



Схема 10-20



Методы изучения электрической активности мозга

Ритмы ЭЭГ и состояния человека



Биоуправление. Состояние кожно. Пробы на отыживание - закрытие глаз



Сон



Роботацция

РАЗДЕЛ 4
ГОЛОВНОЙ МОЗГ ЧЕЛОВЕКА

ЗАНЯТИЕ 1
СТРОЕНИЕ И ФУНКЦИИ ГОЛОВНОГО МОЗГА ЧЕЛОВЕКА

ЦЕЛЬ ЗАДАЧИ: ИЗУЧИТЬ СТРОЕНИЕ И ОСНОВНЫЕ ФУНКЦИИ ОТДЕЛОВ ГОЛОВНОГО МОЗГА.

СТРОЕНИЕ ГОЛОВНОГО МОЗГА ЧЕЛОВЕКА

Главный мозг человека состоит из множества взаимосвязанных между собой отделов: коры (закорен) и их отростков (спинной мозг, мозжечок).

Скелет не имеет мозговых оболочек и мозжечочных артериальных сосудов.

Главный мозг можно разделить на три отдела:

1. Передний отдел (передний мозг): мозг, мозжечок.
2. Средний отдел.
3. Задний отдел (задний мозг): мозжечок, продолговатый мозг.

Рис. 2. Строение головного мозга человека. Главным мозгом является:

КАРТЫ СБОРКИ

НАЖМИТЕ НА КАРТИНКУ, ЧТОБЫ ОТКРЫТЬ КАРТУ СБОРКИ

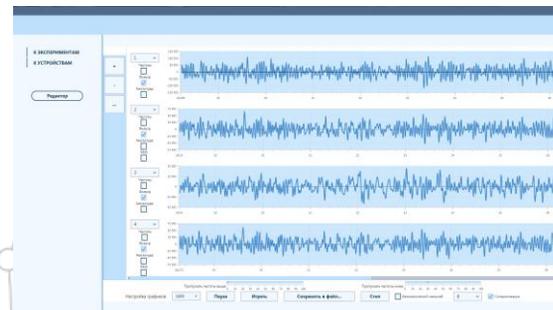
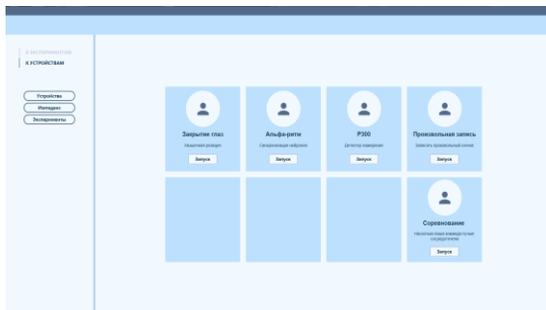
РОБОМОЗГ

- 8 channels of recording EEG;
- «dry» electrodes;
- High-quality signal;
- Wireless data transmission;
- Possibility to record ECG, EMG, EDA, PPG;
- Synchronization with ECG, EMG, EDA, PPG – a polygraph system.

ELECTROENCEPHALOGRAPH

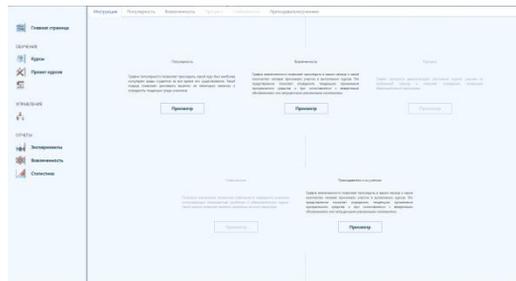
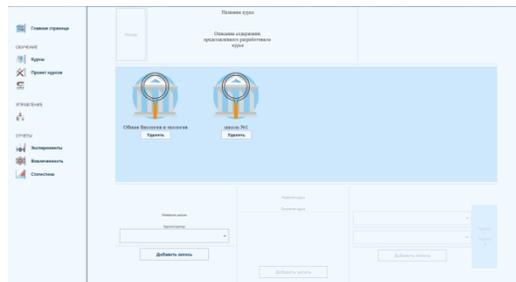


ELECTROHEADSET



The advantages of introducing our system into the learning process can be presented by several basic functionalities:

- ✔ Work realization among large group of students with limited equipment.
- ✔ Provision of distributed access to a multimedia resource or stand (for example, with a robot). This allows educational institutions to reduce their expenses on the purchase of equipment sets.
- ✔ The inverse problem is also solved if there is a large amount of equipment that needs to be used in a single experiment and put in operation all together in a single system.
- ✔ Dynamic development of the system allows teachers get updated information about latest changes in academic methodology course as well as about informational lessons content.

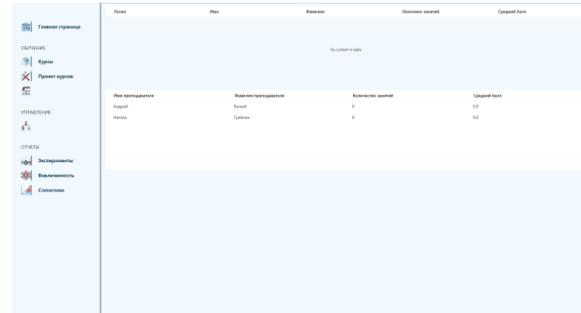


Accumulation, storage and processing of information on the server.

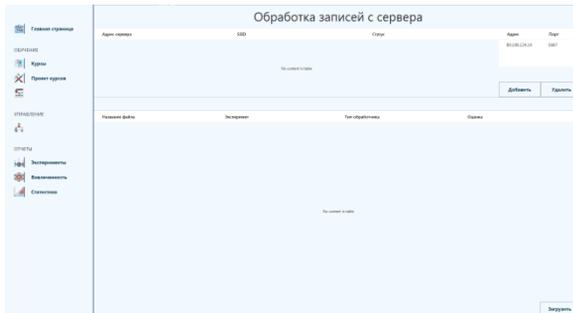
Creation of data base of distinctive pictures (combinations of waves of brain activity) of signals of human's brain activity, as a research data base for conducting lab sessions and tutorials;

Accumulation and storage educational information.

Use of server processing capacity in order to decrease the load on users' PCs.



Имя пользователя	Имя файла	Колонки данных	Строки данных
Иван	Иванов	1	10
Иванов	Иванов	1	10

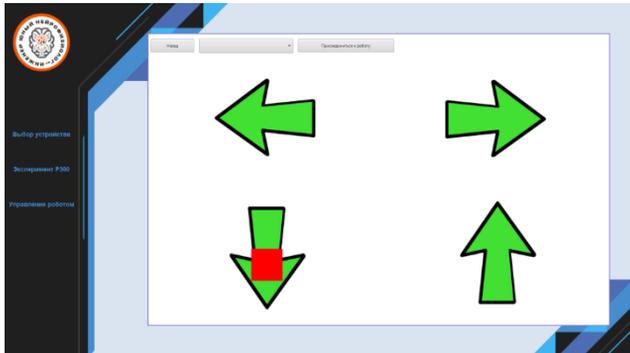


Имя файла	Экспорт	Тип обработки	Опция
-----------	---------	---------------	-------

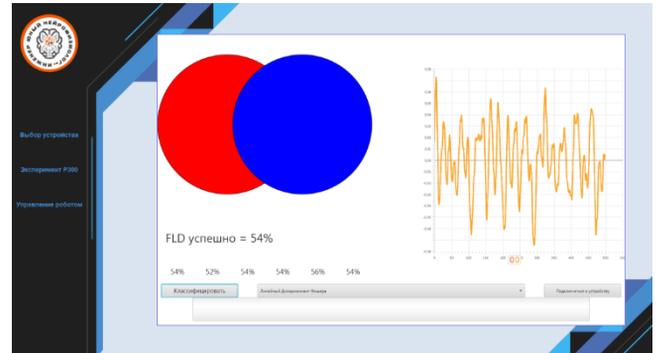


Signal P300 (event-related potential) – electrical brain activity in response to stimulus. In our case stimulus are pictures, presented on the Drawing 1.

If a person sees various symbols in a sequence on the screen, then after 300 ms starting from the moment of presenting a target symbol, in the electrical activity of person's brain (EEG), a short positive flash appears, which is called the P300 component. By the appearance of the P300 components in the continuous EEG recording, you can quickly determine which next symbol the person has in mind. This is a brain-computer technology, as you can see, it allows a person to control models solely by his/her mental efforts. And based on this, the system allows to form an individual categorization.



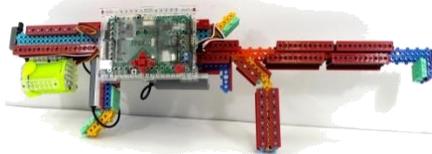
Drawing 1



Drawing 2

DIGITAL COMPLEX “YOUNG NEUROPHYSIOLOGIST-ENGINEER” AS A TURNKEY SOLUTION FOR EARLY CAREER GUIDANCE

Working with a course, children will study how to control the robotic models with the help of **human’s bioelectrical activity**. Also they will explore human’s **neurophysiology** and find out how mental processes can be activated. Students can make a decision about their future profession: a **neurodeveloper-researcher**, or a **neuropilot**, a **neuroprogrammer** or even a **doctor: a neurosurgeon, a neurophysiologists**. In addition students will get acquainted with the associated **high technologies**.



CONTACT INFORMATION

President of the “Robotrack” company groups
Babenkova Nadezhda

General Director of
“Brain Development” Ltd.
Skazochkin Leonid



8 921 330 25 68



mrtrus2014@yandex.ru



8 965 007 40 77



slp10@yandex.ru



Official web-site: robotrack-rus.ru



vk.com/robotrackrus



[instagram.com/robotrackrus](https://www.instagram.com/robotrackrus)

