

**Report on the work of the Dissertation Council  
on robotics and mechatronics (on the educational programmes 6D071600 - Instrument  
Engineering, 8D07106 - Robotics and Mechatronics, 8D07105 - Biomedical Engineering) at  
IJSC " KazNRTU them. K. I. Satbayev»**

**The report contains the following information:**

1. Data on the number of meetings held.

Six meetings were held during the reporting period:

On October 6, 2023, a meeting of the dissertation council was held to accept documents, approve official reviewers on the dissertation work of doctoral student Zhetenbayev Nursultan Talgatuly and approve the date of defense of the dissertation work on the topic: "Design of the exoskeleton of ankle joint with artificial muscles", submitted for the degree of Doctor of Philosophy PhD in the specialty 6D071600 - "Instrument engineering".

On October 11, 2023, a meeting of the dissertation permanent council was held on the selection and approval of the temporary dissertation composition for further evaluation of the research of the dissertation work of the doctoral student of the department of "Robotics and Automation Equipment" Zhetenbayev Nursultan Talgatuly on the topic "Design of the exoskeleton of ankle joint with artificial muscles".

November 13, 2023, meetings of the dissertation council for the defense of the dissertation work of Zhetenbayev Nursultan Talgatuly were held on the topic: "Design of the exoskeleton of ankle joint with artificial muscles".

2. There are no names of council members who attended less than half of the meetings.

3. List of doctoral students indicating the organization of training.

№	Full name of the doctoral student	Organization of training
1	Zhetenbayev Nursultan Talgatuly (6D071600 - "Instrument engineering")	Satbayev University

4. A brief analysis of the dissertations reviewed by the council during the reporting year, with the following sections highlighted:

4.1 Analysis of the subject of the reviewed works.

Analysis of the work of Zhetenbayev Nursultan Talgatuly:

Dissertation topic "Design of the exoskeleton of ankle joint with artificial muscles" specialty 6D071600 - "Instrument engineering".

The dissertation was completed at Satbayev University.

The language of protection is Kazakh.

Scientific consultants:

- Balbayev, Gani K. – PhD., Associate professor Satbayev University, Almaty, Kazakhstan.

- Ceccarelli, Marco M. – PhD., Professor, University of Rome "Tor Vergata", Rome, Italy..

The defense took place on November 13, 2023.

The number of people with limited mobility is increasing every year. This factor affects the quality of life of people and their dependence on others. Physical therapy is necessary to treat these

conditions. With the help of robotic devices, it is possible to rehabilitate a person through exercises that control his movements. The shortcomings of existing robotic rehabilitation solutions revealed the need to develop inexpensive devices that allow the rehabilitation of patients with limb injuries. The ankle joint exoskeleton, consisting of an artificial muscle, helps people to rehabilitate the functions of the ankle joint, which is successfully used for the rehabilitation of patients after injuries. In addition, muscles can play a connecting role between the human body and sensors that can be used to create a new generation of prostheses. The ankle joint exoskeleton, which consists of artificial muscles, is important in several areas, including health, rehabilitation, and sports achievements.

4.2 The relationship of the topic of dissertations with national state programs, as well as Republican and regional scientific and scientific-technical programs.

The dissertation work of a PhD student in the specialty 6D071600 – "Instrument engineering" Zhetenbayev Nursultan Talgatuly on the topic "Design of the exoskeleton of ankle joint with artificial muscles", was not carried out within the framework of grants.

4.3. Analysis of the level of implementation of the results of dissertations in practice.

The results of the dissertation work on the topic "Design of the exoskeleton of ankle joint with artificial muscles" will be used in the future "AlmAnkleExo" is the development and prototype assembly of an ankle joint exoskeleton equipped with a complex kinematic system of three degrees of freedom (3-DOF) for the rehabilitation of the ankle joint. This innovative system represents a paradigm shift in the field of exoskeleton rehabilitation technologies, bringing a hitherto rarely studied level of complexity and accuracy. By offering not only flexion and extension movements, but also lateral and rotational degrees of freedom, AlmAnkleExo sets a new standard in the comprehensive rehabilitation of the ankle joint. This unique kinematic configuration allows you to repeat the natural movements of the ankle more accurately, providing a high degree of therapeutic accuracy for people undergoing rehabilitation, thereby celebrating significant progress in this area.

«IFTToMM Asian Mechanisms and Machine Science Conference – 2021» (December 15-18, Hanoi University of Science and Technology, Vietnam).

«55th International Conference on VIBROENGINEERING – 2022» (April 21, 2022, in Almaty, Kazakhstan).

«2022 International Conference on Communications, Information, Electronic and Energy Systems», CIEES 2022, (24 – 26 November 2022, Veliko Tarnovo, Bulgaria).

«The Joint International Conference of the 13th IFTToMM International Symposium on Science of Mechanisms and Machines (SYROM 2022) and the XXV International Conference on Robotics (ROBOTICS 2022) » Iasi, Romania (November 17 - 18, 2022,).

«8th International Workshop on New Trends in Medical and Service Robots, MESROB 2023 Craiova» 7-10 June 2023.

5. Analysis of the work of official reviewers (with examples of the most low-quality reviews) - no.

6. There are no proposals for further improvement of the system of training scientific personnel.

7. Number of dissertations for the degree of Doctor of Philosophy (PhD), doctor by profile in the context of specialties (areas of training):

1) 1 dissertation accepted for defense including doctoral students from other Universities-no.

2) no dissertations withdrawn from consideration (including doctoral students from other Universities).

3) there are no dissertations that received negative reviews from reviewers (including doctoral students from other Universities).

4) there is no dissertation with a negative decision based on the results of the defense (including doctoral students from other Universities).

Chairman of the dissertation council  Ozhikenov A.K.

Academic Secretary of the dissertation council  Baktybayev M.K.

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