

**Report**  
**about the scientific activities of the department**  
**Communication systems technologies**  
**for the 2nd half of 2023**

**1. Current scientific work**

1) Title of the topic: “Study of signals and features of their transmission in monitoring systems for construction sites and environmental monitoring.”

*Reason for execution:* initiative theme for 2023-2025.

Scientific supervisor: Kaliaskarov N.B.

*Direct results:* Computer modeling was carried out in the MATLAB/Simulink software environment and a study was carried out of the nature of the influence of interference on the generated signal for remote monitoring of the technical condition of military facilities.

Calculations were carried out to implement traffic protection for remote access based on ipsec vpn technology and network modeling in the ensp software environment.

The development of a block diagram of the project “Remote information processing via mobile phone for remote objects” has begun.

*Indirect results:*

Scope of work performed on this topic:

- a) Number of submitted articles – 1 (No. 2.2 1)
- b) Number of published articles – 2 (No. 2.3 1.3)
- c) Number of patents for utility models – 0
- d) Number of prepared applications for utility models – 0
- e) Number of copyrights for SIS – 1 (No. 4.3 1)
- f) Number of reports at conferences – 5 (No. 2.4 1,3,4,7,8)

2) Topic name: “Electrical engineering and electronics”

*Reason for execution:* Research plan of the department for the 2022-2023 academic year

Scientific supervisor: Kaliaskarov N.B.

*Direct results:* the illumination system for the tips of the blades of unmanned aerial vehicles was modeled; work is underway to develop a fiber-optic sensor to monitor the identification of geotechnical conditions; a microprocessor was developed and assembled for equipment for testing the quality of groundwater drainage.

*Indirect results:*

Scope of work performed on this topic:

- a) Number of submitted articles – 0
- b) Number of published articles – 3 (No. 2.3 2,3,4)
- c) Number of patents for utility models – 0
- d) Number of prepared applications for utility models – 0
- e) Number of copyrights on SIS – 0
- f) Number of reports at conferences – 2 (No. 2.4 3.5)

3) Title of the topic: “Increasing the technical level of structural parts of electromechanical equipment in order to ensure their reliability and service life”

Reason for implementation: research plan of the department for the 2022-2023 academic year

Scientific supervisor: Kaliaskarov N.B.

*Direct results:* A fiber-optic sensor for monitoring the identification of geotechnical conditions has been modeled: an option for providing comprehensive monitoring in the MATLAB/Simulink software environment.

A fiber-optic system for monitoring the deformation and displacement of roof rocks in an explosive environment has been developed and simulated in the MATLAB/Simulink software environment.

*Indirect results:*

- a) Number of submitted articles – 0
- b) Number of published articles –2 (No. 2.3 3.4)
- c) Number of patents for utility model – 1 (No. 4.2 1)
- d) Number of prepared applications for utility models – 0
- e) Number of copyrights on SIS – 0
- f) Number of reports at conferences – 1 (No. 2.4 6)

4) Topic name: “Use of energy-saving and high-tech technologies in energy supply systems”  
Reason for implementation: research plan of the department for the 2022-2023 academic year  
Scientific supervisor: Yesenzholov U.S.

*Direct results:*the illumination system for the tips of the blades of unmanned aerial vehicles was modeled; work is underway to develop a telecommunication system for managing a country house based on wireless energy-saving sensors.

*Indirect results:*

Scope of work performed on this topic:

- a) Number of submitted articles – 0
- b) Number of published articles – 1 (No. 2.3 2)
- c) Number of patents for utility models – 1 0
- d) Number of prepared applications for utility models – 0
- e) Number of copyrights for SIS – 1 (No. 4.3 1)
- f) Number of reports at conferences – 2 (No. 2.4 2.6)

## 2. Publication of research results

### 2.1 Monographs(only recommended NTS) no

### 2.2 Submitted articles for publication in journals

No.	FULL NAME. author(s)*	Article title	A country, magazine name	Scientometric indicators of the journal
1	Kaliaskarov N. B., Yesenzholov U.S., Kokkoz M.M. (ITB), Baiseitov G.N., (Center for Research and Development “Engineering of Kazakhstan”), Zhantlesov A.U. Center for Research and Development "Engineering of Kazakhstan"), Share A.V. (National Defense University named after the First President of the Republic of Kazakhstan - Elbasy)	Remote monitoring of the technical condition of military facilities using the capabilities of the national military radio communication system	England - Migration Letters	Scopus 50+ percentile  WoS Q2

Total articles prepared, 1 in total, of which: 1 in rating journals

CIS –  
 RK – , including KSTU –  
 By students / with students –  
 Master's students / with master's students –  
 Doctoral students / with doctoral students -

### 2.3 Published articles in journals

No.	FULL NAME. author(s)*	Article title	Country, magazine name, number, year	Scientometric indicators of the journal
1	US Yessenzholov; NB Kaliaskarov.	Implementation of traffic protection based on ipsec vpn technology and network modeling on ensp software environment	RK, KazATK Bulletin No. 3 (126)	COXON 0.028 KazBC base
2	Vadim Carev(Ostrava Technical University, Czech Republic), Sergey Tkachenko(IKBFU named after Immanuel Kant, Russian Federation), Andrey Shpilevoy(IKBFU named after Immanuel Kant, Russian Federation), Aleksandr Kaychenov (MSTU, Murmansk, Russian Federation), Dmitriy Ozhigin (MDiG), Nurbol Kaliaskarov	The System of Rotor Blade Tip's Illumination for Unmanned Aerial Vehicles	Italy, International Review of Aerospace Engineering (I.RE.AS.E), Vol. 16, N. 3	Scopus 67th percentile
3	Vladislav Yurchenko (ITB), Galina Vavilova (TPU, Tomsk, Russian Federation), Sergey Bobuyok (master's student at TPU, Tomsk RF), Galina Belik, Pavel Bezkorovainyy (Department of Mechanics)	Development of Microprocessor Hardware for Drainage Quality Monitoring by the Level Ground Water	RF, Emerging Trends in Materials Research and Manufacturing Processes	Scopus 20th percentile
4	Mekhdiev A.D. (Kazakh AIU named after Seifullin, Astana); Neshina E.G. (ES); Aimagambetova R. Zh. (KISM, Astana) Kaliaskarov N.B.	Development of a fiber optic sensor for monitoring geotechnical condition identification	RK, Proceedings of the University	COXON 0.059 KazBC base

	Yurchenko A.V. (TPU, Russian Federation, Tomsk)			
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Total articles published, 4 in total, of which 4 were published in rating journals

D/Z – 1

CIS –1

RK-2, including KSTU 1

By students / with students –

Master's students / with master's students – /1

Doctoral students / with doctoral students -

#### 2.4 Published reports (abstracts) at conferences

No.	FULL NAME. author(s)*	Title of the report	Country, status, name of the conference, venue and date
1	Gavrilova M.A., Kazanbaeva A.S. (NAO SKU named after M. Kozybaev	Remote information processing via mobile phone	RK, International Scientific and Practical Conference “XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov
2	Gavrilova M.A.	Telecommunication system for managing a country house	RK, International Scientific and Practical Conference “XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov
3	Yesenzholov U.S.	Ensp neg_zinde Dhcp functionson configurationlau	RK, International Scientific and Practical Conference “XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov
4	Yesenzholov U.S.	Mpls negizinde computerl zhelilerdin kakuipsizdigin arttyru	RK, International Scientific and Practical Conference “XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov
5	Yesenzholov U.S., Manbetova Zh.D. (Astana, KazATU named after Seifullin)	Implementation of authentication on based on Faceid	RK, International Scientific and Practical Conference “XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov
6	Zhantuganova T.S.	Classification of external factors affecting the reliability of optical cables of telecommunication systems	RK, International Scientific and Practical Conference “XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov

7	Razinkin V.P. (NSTU, (Novosibirsk, Russian Federation); Kaliaskarov N.B.	Using wireless technologies for remote monitoring of buildings	RK, International Scientific and Practical Conference "XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov
8	Sagyndyk A.B. (Pavlodar, Toraigyrov University), Aldoshina O.V.	Wireless sensor networks: opportunities and current problems	RK, International Scientific and Practical Conference "XV Saginov Readings. Integration of education, science and production", June 16-17, 2023, Karaganda Technical University named after Abylkas Saginov

Total reports published, total 8  
of which in conference proceedings: D/Z –  
CIS –  
RK 8, including KSTU 8  
By students / with students –  
Master's students / with master's students –  
Doctoral students / with doctoral students -

### 3. Participation in exhibitions – no

### 4. Inventive activity

#### 4.1 Filing patent applications - no

#### 4.2 Obtaining patents

No.	FULL NAME. author(s)*	Name of invention	Patent owner	Patent number
1	Mehtiev Ali Javanshirovich (KazATU) Alkina Aliya Dauletkhanovna (ES) Neshina Elena Gennadievna (ES) Kaliaskarov Nurbol Baltabaevich Madi Perizat Shaimuratkyzy (ES) Malikov Nurbol Muratovich (ES) Yugay Vyacheslav Viktorovich (APP)	Fiber-optic system for monitoring deformation and displacement of roof rocks in explosive atmosphere	Alkina Kamazhay Yusupovna	No. 8699

#### 4.3 Obtaining certificates of state registration of rights on objects of copyright

No.	FULL NAME. author(s)*	Copyright title	Copyright owner(s)	Certificate number, date
1	Dzhantasova Damira Dulatovna (department of Foreign Languages), Azimbaeva Zhanat	Assessment of the system of scientific training of engineering and technical personnel: materials from a comprehensive study of the needs of teachers	Dzhantasova Damira Dulatovna (department of Foreign Languages), Azimbaeva Zhanat Amantaevna (department of the Russian Academy of	No. 40183 from November 6, 2023 -

Amantaevna (department of the Russian Academy of Science and Technology), Kaliaskarov Nurbol Baltabaevich		Science and Technology), Kaliaskarov Nurbol Baltabaevich	
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**5. Academic degrees, titles, election to the Academy of Sciences and awards received by teaching staff and department staff - no**

**6. Participation in competitions for R&D financing – no**

**7. Results of scientific work on cooperation agreements with organizations of Kazakhstan - no**

**8. Results of scientific work within the Corporate University**

1) Together with Korfeldisova G.E., EX generalist EX support service Association "Division "Network" branch of Kazakhtelecom JSC, a methodological manual "Teletraffic zhane zhappay kyzmet korsetu theories" was published (co-authors Belik G.A., Zhumanbetova M.A. ., Nygimetzhanova S.K.).

2) Together with Korfeldisova Gulnar Erezhepovna (leading HR specialist of the HR service of the Central RDT of Kazakhtelecom JSC), work is being carried out on the initiative topic of the department “Development of a wireless system for monitoring ecology and construction sites”, the result of which will be an article of the same name for publication in incoming magazines to the KOKSON database.

3) The list of proposed topics for the joint release of SIS and patents has been approved:

- Copyright "Results of a study of measurements using wireless technology, environmental conditions";
- Copyright “Results of monitoring the technical condition of research laboratories”;
- Patent for utility model “Laboratory Security Alarm”;
- Patent for utility model “Automatic thermostat”;
- Patent for utility model “Electronic measuring device”.

4) A list of proposed topics for theses has been agreed upon, taking into account the issues of the enterprise discussed earlier:

- 1) Identification of straight edge segments in radar images.
- 2) Modern methods of compression and transmission of digital data.
- 3) Development and optimization of antenna systems.
- 4) Electronics for building and infrastructure management systems.
- 5) Application of GNSS signals for diagnostics of high-latitude ionospheric disturbances.
- 6) Manufacturing and performance monitoring of a multi-channel charger.
- 7) X-band microstrip antenna.
- 8) Design of a semiconductor device parameter meter.
- 9) Analysis of the performance of the tcp and sctp protocols under overload conditions.
- 10) Research on methods for constructing a high-definition 3dtv digital broadcasting system.

**9. Results of scientific work on projects and contracts about international cooperation - no**

## 10. Scientific work with students and undergraduates

1) Student gr. RET 21-2 Bakirov E., advanced to the second stage, Youth business project competition. Project "AR 2.0", head Gavrilova M.A.

2) There are 4 student clubs:

1) Problems of improving transport and communication systems

**Supervisor:** head Department of CST, Doctor PhD Kaliaskarov N.B.

**Characteristics of SSRW:** Work is underway to develop laboratory and practical work on the topic of improving transport and communications systems, and the development of reference materials. Training is being conducted to conduct literary analysis on problems of transport and communication systems.

2) Introduction of high technology in telecommunications systems, energy and energy saving

**Supervisor:** senior teacher Yesenzholov U.S.

**Characteristics of SSRW:** A virtual model of a DHCP server in a corporate network based on virtual machines was built; We are working on calculation data to improve the operating principle of the server. The interim results of the research work were published in the form of abstracts at the International Scientific and Practical Conference "Integration of Science, Education and Production - the Basis for the Implementation of the Nation's Plan" (Saginov Readings No. 14).

3) Improvement of technology and communication systems

**Supervisor:** senior teacher department CST Gavrilova M.A.

**Characteristics of SSRW:** An experimental model of a network with dynamic distribution of new generation routing is being developed; the interim results of the research work have been published in the form of abstracts at the International Scientific and Practical Conference "Integration of Science, Education and Production - the Basis for the Implementation of the Nation's Plan" (Saginov Readings No. 14).

4) Collective station UN7PWA

**Supervisor:** head Department of CST, Doctor PhD Kaliaskarov N.B.

**Characteristics of SSRW:** Work is underway to set up a radio channel using the frequencies of the collective station of the department UN7PWA and radio equipment. Materials are being prepared for scientific projects with students.

## 11. Implementation of the Comprehensive University Development Program for 2023 based on the results of scientific activities for 2-half year 2023

Comprehensive Program Indicator university development for 2023	Planned indicator for 1st half of 2023	Actual condition	Completion percentage
Provide financing for contractual research in the amount of 8 million tenge	8 million tenge.	0	0%
Ensure effective participation in competitions for grants to carry out research work on at least 2 projects	2	0	0%
Ensure the participation of at least 2 young scientists in the competition for a university grant for research activities	2	3	150%

Provide preparation of articles for publication in scientific journals, included in the database	Clarivate Analytics,no less	2	2	100%
	Scopusno less	6	7	117%
	COXON,no less	7	8	114%
Ensure the publication of monographs,no less		1	0	0%
Ensure the number of citations of published articles in the Clarivate Analytics MB,no less		3	0	0%
Ensure filing of patent applications,no less		3	3	100 %
Ensure registration of rights to copyrighted objects(obtaining certificates), no less		6	6	100 %
The share of projects financed by local executive bodies and business representatives is 80%		1	0	0%
Ensure the implementation of 1 projects financed by local executive bodies and business partners				

**Paragraph** "Provide financing for commercial contractual research in the amount of 8 million tenge" is not completed due to unfinished negotiations with the company Koliseum sro (Prague, Czech Republic). Negotiations are ongoing to determine the theme of the project.

**Paragraph** "Ensure effective participation in competitions for grants to carry out research on at least 2 projects" was not completed due to the fact that a working group was not assembled for the announced competitions, since the participants did not meet the criteria. Work is underway to form a working group together with other departments and universities.

**Paragraph** "According to the CP, the publication of 1 monograph is planned for August 2023." has not been completed, so the translation of the material into Kazakh is currently delayed. Preparatory work is underway to document the monograph for submission to the Scientific and Technical Council.

**Paragraph** "Ensure 3 citations of publications / per year" is not achieved due to the lack of articles published in journals with a +50 percentile in collaboration with foreign scientists over the past three years. The article published in October 2023 will be cited next year.

**Paragraph** "Ensure the implementation of 1 projects financed by local executive bodies and business partners" is not completed due to the lack of topics for the projects, and the lack of business partners who could provide co-financing for the projects. Work is underway to select other scientific topics and areas.

## 12. Analysis of the work of Research Groups

The working group of the CST department for the implementation of the initiative topic "Research of signals and features of their transmission in monitoring systems for construction sites and environmental monitoring" for 2023-2025 includes 32 people, of which: 7 people from teaching staff, 25 people from students. In this area, the following work was carried out in the second half of 2023:

- during the work, laboratory studies and literary, article and patent reviews were carried out, components were prepared to create a test sample.

- 2 articles were published:

1) By US Yessenzholov; NB Kaliaskarov; Implementation of traffic protection based on ipsec vpn technology and network modeling on ensp software environment (RK, KazATK Bulletin No. 3 (126); KOKSON 0.028 (KazBC database));

2) Authored by Vladislav Yurchenko (ITB), Galina Vavilova (TPU, Tomsk, RF), Sergey Bobuyok (master's student at TPU, Tomsk RF), Galina Belik, Pavel Bezkorovainyy (Department of Mechanics)  
- Development of Microprocessor Hardware for Drainage Quality Monitoring by the Level Ground



Water; (RF, Emerging Trends in Materials Research and Manufacturing Processes; Scopus 20th percentile);

- based on the research results, an article was sent:

1) Author: Kaliaskarov N.B., Yesenzholov U.S., Kokkoz M.M. (ITB), Baiseitov G.N., (Center for Research and Development “Engineering of Kazakhstan”), Zhantlesov A.U. Center for Research and Development "Engineering of Kazakhstan"), Dolya A.V. (National Defense University named after the First President of the Republic of Kazakhstan - Elbasy) - Remote monitoring of the technical condition of military facilities using the capabilities of the national military radio communication system (England - Migration Letters; Scopus 50+ percentile, WoS Q2);

- based on the results of scientific activities, participation took place in the international scientific and practical conference “XV Saginov Readings. Integration of education, science and production”, which took place on June 16-17, 2023, in the NAO Karta named after Abylkas Saginov. 5 abstracts were published.

- based on the results of the research, a certificate of state registration of rights to copyrighted objects was obtained:

1) Authors: Dzhantasova Damira Dulatovna (department of Foreign Languages), Azimbaeva Zhanat Amantaevna (department of Russian Language and Culture), Kaliaskarov Nurbol Baltabaevich; SIS - Assessment of the system of scientific training of engineering and technical personnel: materials of a comprehensive study of the needs of teachers, No. 40183 dated November 6, 2023.

### 13. Other scientific information - no

Head of the department \_\_\_\_\_ **Kaliaskarov N.B.**  
*(signature) (full name)*

Head of SRL \_\_\_\_\_ Gavrilova M.A.  
*(signature) (full name)*