

# Aigerim Keutayeva

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## EDUCATION

### Nazarbayev University

Astana, Kazakhstan

*Master of Science in Robotics, Graduated with Honors (top 10%)*

*Aug. 2021 – June 2023*

**Thesis:** Robust Subject-Independent BCIs using Attention Mechanism based Deep Learning models

### Nazarbayev University

Astana, Kazakhstan

*Bachelor of Science in Robotics and Mechatronics*

*Aug. 2017 – June 2021*

**Graduate project:** Shoulder Rehabilitation Exoskeleton: Biomechanics, Design and Control

## RESEARCH INTERESTS

Deep Learning, Brain-Computer Interfaces, Signal Processing, Computer Vision, Robotics, Digital Twin

## PROFESSIONAL EXPERIENCE

### Full-time Research Assistant

July 2023 – Present

*Brain-Machine Interfaces Lab*

*Nazarbayev University, KZ*

- Implemented and tested deep learning models for EEG signal classification in BCIs.
- Performed comprehensive literature reviews to synthesize state-of-the-art BCI research, contributing to publications in high-impact journals and conferences.

### Graduate Research Assistant

June 2022 – June 2023

*Digital Manufacturing Lab*

*Nazarbayev University, KZ*

- Implemented and tested ML models for digital twin systems, focusing on real-time defect detection.
- Executed data preprocessing and feature engineering for additive manufacturing systems.
- Co-authored publication in IEEE Access on ML in digital twin systems.

### Undergraduate Research Assistant

January 2021 – January 2022

*Brain-Machine Interfaces Lab*

*Nazarbayev University, KZ*

- Implemented and tested deep learning models for EEG signal classification in BCIs.
- Analyzed EEG datasets for feature extraction and model training.
- Conducted literature reviews and analyzed findings related to BCI

### Undergraduate Research Assistant

May 2019 – November 2020

*Power Conversion and Motion Control Lab*

*Nazarbayev University, KZ*

- Assisted in the design and real-time implementation of control strategies for dynamic systems.
- Developed MATLAB simulations for inverted pendulum stabilization.
- Awarded Young Researchers Alliance funding for project development.

## PUBLICATIONS

### Journal Articles (peer-reviewed)

- [1] **A. Keutayeva** and B. Abibullaev, "Exploring the Potential of Attention Mechanism-Based Deep Learning for Robust Subject-Independent Motor-Imagery Based BCIs," in IEEE Access, vol. 11, pp. 107562-107580, 2023, doi: 10.1109/ACCESS.2023.3320561.
- [2] B. Abibullaev, **A. Keutayeva** and A. Zollanvari, "Deep Learning in EEG-Based BCIs: A Comprehensive Review of Transformer Models, Advantages, Challenges, and Applications," in IEEE Access, doi: 10.1109/ACCESS.2023.3329678.
- [3] N. Jyeniskhan, **A. Keutayeva**, G. Kazbek, M. H. Ali and E. Shehab, "Integrating Machine Learning Model and Digital Twin System for Additive Manufacturing," in IEEE Access, vol. 11, pp. 71113-71126, 2023, doi: 10.1109/ACCESS.2023.3294486.

### Conference Presentations

- [4] **A. Keutayeva** and B. Abibullaev, "Subject-Independent Brain-Computer Interfaces: A Comparative Study of Attention Mechanism-Driven Deep Learning Models," in 15th International Conference on IHCI-2023, EXCO Daegu, Korea, November 8 - 10, 2023.

## ACADEMIC AND INDUSTRY EXPERIENCE

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### Teaching Assistant

Fall 2022

*Course: Robotics II: Control, Modeling and Learning with Laboratory*

*NU, Department of Robotics*

- Assisted students with carrying out experiments in class size of 20
- Marked weekly assignments from students

### Teaching Assistant

Spring 2022

*Course: Microcontrollers with Laboratory*

*NU, Department of Robotics*

- Assisted students with carrying out experiments in class size of 50
- Prepared lab equipment before each lab and proof-read lab scripts
- Marked weekly assignments from students

### Electrical and Electronics Engineering Intern

June 2019 – August 2019

*Kazakhstan Aselsan Engineering (KAE)*

*Astana, KZ*

- Produced and tested of military and commercial components and systems
- Assisted in product specifications design and creation
- Assisted in performing routine product design and supporting fabrication of new mechanical or electromechanical components, subsystems, and systems

## HONORS & AWARDS

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### NU Scholarship

Aug. 2021 – June 2023

*Competitive merit-based Government-funded Scholarship for 2 years*

### Shell Eco-marathon Asia 2020 (team SunQar)

March 2020 – May 2021

*Success in Phase 3*

### Young Researchers Alliance, FRIP Funding

December 2019

*Fostering Research and Innovation Potential program*

### Dean's List

Fall 2022, Fall 2018

*Nazarbayev University*

### NU Scholarship

Aug. 2017 – June 2021

*Competitive merit-based Government-funded Scholarship for 4 years*

## ACADEMIC SERVICE & VOLUNTEERING EXPERIENCE

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### Peer Review

*Institute of Electrical and Electronics Engineers (IEEE)*

*May 2023 – Present*

### Professional membership

*Young Researchers Alliance (YRA)*

*Jan. 2020 – Present*

### Student Volunteer

*AIFC Astana Finance Days organization*

*July 2018*

*25th World Mining Congress 2018, Registry Operator*

*June 2018*

*EXPO Volunteer Cup, sport event organization*

*Oct. 2017*

## TECHNICAL SKILLS

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**Programming Languages:** Python, C/C++, Java, JavaScript, HTML/CSS, ROS

**Frameworks:** TensorFlow, Keras, PyTorch, Scikit-learn, Transformers

**Tools:** Git, Docker, VS Code, Eclipse, MATLAB, SolidWorks, CUDA, Jupyter, Anaconda, CoppeliaSim

**Libraries:** MNE, BBCI, NumPy, Pandas, Matplotlib, Seaborn

**Languages:** English (Fluent), Kazakh (Native), Russian (Fluent)

## REFERENCES

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### Dr. Berdakh Abibullaev

*Associate Professor, Robotics Engineering Department*

[berdakh.abibullaev@nu.edu.kz](mailto:berdakh.abibullaev@nu.edu.kz)

*Nazarbayev University*

### Dr. Essam Shehab

*Professor and Head of Mechanical and Aerospace Engineering Department*

[essam.shehab@nu.edu.kz](mailto:essam.shehab@nu.edu.kz)

*Nazarbayev University*

### Dr. Zhanat Kappasov

*Assistant Professor, Robotics Engineering Department*

[zhkappasov@nu.edu.kz](mailto:zhkappasov@nu.edu.kz)

*Nazarbayev University*