

Azamat Turganbayev

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Summary

Robotics MS student and mechatronics engineer specializing in robotic manipulation, mechanical design, and control, with three peer-reviewed publications in robotics and mechanical design.

Education

University of Minnesota (UMN), Twin Cities

MS in Robotics (Bolashak Scholarship, GPA: 3.89/4.00)

Sep 2025 – Present

Twin Cities, MN

- Coursework: Machine Learning Fundamentals, Robotics, Robot Vision, Introduction to Intelligent Robotics Systems, 3D Bioprinting

Nazarbayev University (NU, Leading University in Kazakhstan)

BS in Robotics and Mechatronics (Full Scholarship)

Aug 2018 – Jun 2023

Astana, Kazakhstan

- Graduation Project: Shoulder Rehabilitation Robotic Exoskeleton
- Coursework: Electromechanical Systems, Mechanical Design with CAD, Image Processing, Linear Control Theory, Microcontrollers, Robotics: Kinematics and Dynamics

Skills

Programming Languages & Libraries: Python, C/C++, MATLAB, OpenCV

Robotics Frameworks & Tools: ROS/ROS2, UR5, URScript, RoboDK, Gazebo, Linux, Git, Docker

Modeling & Simulation: SolidWorks, MATLAB/Simulink, QUARC, 3D Printing

Control Systems: PID Control Optimization, Real-Time Systems, Motion Planning

Work Experience

Research Assistant

Tactile Robotics Laboratory, NU

May 2026 – Present

Astana, Kazakhstan

- Develop automated UR5 tactile exploration software and protocols for the lab's experiments

Senior Research Assistant

Center of Excellence in Medical Robotics & Research, NU

Nov 2023 – Apr 2025

Astana, Kazakhstan

- Led shoulder-exoskeleton development from concept to working, validated hardware

Robotics Laboratory Assistant

School of Engineering and Digital Sciences, NU

Nov 2023 – Jul 2025

Astana, Kazakhstan

- Developed and co-led experimental setups to demonstrate robotic control concepts

Undergraduate Research Assistant

School of Engineering and Digital Sciences, NU

Apr 2022 – Nov 2023

Astana, Kazakhstan

- Designed and built a 3D-printed prototype of a robotic shoulder exoskeleton

Research & Project Experience

UR5 Tactile Surface Mapping (*URScript, Python, ICP*)

Tactile Robotics Laboratory, NU

May 2026 – Present

Astana, Kazakhstan

- Aligned 3,000 CAD points to the robot base frame via translation-only ICP (mean error under 5 mm)
- Programmed joint-space URScript transits and normal presses, logging force (ATI Nano17) and TCP pose

TurtleBot3 Navigation & Obstacle Avoidance (*ROS 2, OpenCV, Python*)

College of Science & Engineering, UMN

Oct 2025 – Dec 2025

Twin Cities, MN

- Integrated and calibrated Raspberry Pi camera for ArUco marker-based tracking
- Built a ROS2 pipeline to detect hazards and execute reactive maneuvers within 20 cm

Real-Scale Robotic Shoulder Exoskeleton (*SolidWorks, MATLAB/Simulink, QUARC*)

Center of Excellence in Medical Robotics & Research, NU

Nov 2023 – Apr 2025

Astana, Kazakhstan

- Built a full-scale 5-DOF shoulder rehabilitation exoskeleton
- Conducted P/PI controller tuning for linear and rotational drives

Publications & Conferences

A. Niyetkaliyev, A. Turganbayev, M. Karasheva, R. Zhylkaidarov and Y. Turlybek, "Exploring the Potential of Four-Bar Linkages in Robotic Exoskeletons: A Comprehensive Review," in *Journal of Mechanical Design*, vol. 147, no. 10, April 2025, doi: [10.1115/1.4068107](https://doi.org/10.1115/1.4068107).

M. Karasheva, A. Turganbayev, A. Aimysheva and A. Niyetkaliyev, "Design of a 3D Printed Miniature Model for Human-Robot Mechanism Coupling for Shoulder Rehabilitation," *2023 8th International Conference on Robotics and Automation Engineering (ICRAE)*, Singapore, Singapore, 2023, pp. 58-65, doi: [10.1109/ICRAE59816.2023.10458641](https://doi.org/10.1109/ICRAE59816.2023.10458641).

S. Omirbayev, I. Issa, Z. Kuangaliyev, A. Turganbayev and A. Niyetkaliyev, "The Use of Four-Bar Mechanisms in Robotic Exoskeletons," *2022 International Conference on Advanced Mechatronic Systems (ICAMechS)*, Toyama, Japan, 2022, pp. 149-156, doi: [10.1109/ICAMechS57222.2022.10003280](https://doi.org/10.1109/ICAMechS57222.2022.10003280).