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
Sep 2025 – Present

MS in Robotics (Bolashak Scholarship, GPA: 3.89/4.00) *Twin Cities, MN*

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

Nazarbayev University (NU, Leading University in Kazakhstan)
Aug 2018 – Jun 2023

BS in Robotics and Mechatronics (Full Scholarship) *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
May 2026 – Present

Tactile Robotics Laboratory, NU *Astana, Kazakhstan*

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

Senior Research Assistant
Nov 2023 – Apr 2025

Center of Excellence in Medical Robotics & Research, NU *Astana, Kazakhstan*

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

Robotics Laboratory Assistant
Nov 2023 – Jul 2025

School of Engineering and Digital Sciences, NU *Astana, Kazakhstan*

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

Undergraduate Research Assistant
Apr 2022 – Nov 2023

School of Engineering and Digital Sciences, NU *Astana, Kazakhstan*

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

Research & Project Experience

UR5 Tactile Surface Mapping *(URScript, Python, ICP)*
May 2026 – Present

Tactile Robotics Laboratory, NU *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)*
Oct 2025 – Dec 2025

College of Science & Engineering, UMN *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)*
Nov 2023 – Apr 2025

Center of Excellence in Medical Robotics & Research, NU *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.

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.

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.