

# Daulet BAIMUKASHEV

## PERSONAL

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ACCOUNTS: *Personal Website, Google Scholar, GitHub, LinkedIn*

## EDUCATION

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JAN 2022 - CURRENTLY PhD studies in ROBOT LEARNING  
**Aalto University**, Helsinki

AUG 2017 - MAY 2019 Master of Science in ROBOTICS  
**Nazarbayev University**, Astana  
Thesis: "Stabilization of Inverted Pendulum with Two-Axis Reaction Wheels"

AUG 2013 - MAY 2017 Bachelor of Science in ROBOTICS and MECHATRONICS  
**Nazarbayev University**, Astana  
Thesis: "Self-balancing Electric Drive Wheelchair with DC Motor Control"

## SELECTED PUBLICATIONS

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- **D. Baimukashev**, Sh. Azam, T.N. Le, V. Kyrki, "Harnessing Suboptimality: Weakly Supervised Imitation Learning with Diverse Demonstrations" in *In Review*, 2024.
- **D. Baimukashev**, G. Alcan, K.S. Luck, V. Kyrki, "Learning Transparent Reward Models via Un-supervised Feature Selection," in *8th Annual Conference on Robot Learning*, 2024.
- K. Kujanpaa, **D. Baimukashev**, S. Zhu, S. Azam, F. Munir, G. Alcan, V. Kyrki, "Challenges of Data-Driven Simulation of Diverse and Consistent Human Driving Behaviors," in *AAAI workshop*, 2024.
- **D. Baimukashev**, B. Rakhim, H. A. Varol, M. Rubagotti, "End-to-End Deep Fault Tolerant Control," in *IEEE/ASME Transactions on Mechatronics*, vol 27, no. 4, 2224-2234, 2020.
- **D. Baimukashev**, Z. Kappasov, H.A. Varol, "Shear, Torsion and Pressure Tactile Sensor via Plastic Optofiber Guided Imaging," in *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 2618-2625, April 2020.
- Z. Kappasov, **D. Baimukashev**, Zh. Kuanyshuly, Y. Massalin, A. Urazbayev, H. Atakan Varol, "Color-Coded Fiber-Optic Tactile Sensor for an Elastomeric Robot Skin," *2019 International Conference on Robotics and Automation (ICRA)*, Montreal, QC, Canada, 2019, pp. 2146-2152.
- Z. Kappasov, **D. Baimukashev**, O. Adiyatov, S. Salakchinov, Y. Massalin and H. A. Varol, "A Series Elastic Tactile Sensing Array for Tactile Exploration of Deformable and Rigid Objects," *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, 2018, pp. 520-525.
- **D. Baimukashev**, A. Zhilisbayev, A. Kuzdeuov, A. Oleinikov, D. Fadeyev, Z. Makhataeva, and H. A. Varol, "A Deep Learning Object Recognition Engine Using Physically-Realistic Synthetic Depth Scenes," in *Machine Learning and Knowledge Extraction*, vol. 1, no. 3, pp. 883-903, Aug. 2019.

## SKILLS

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| Programming | Python, PyTorch, C++, Matlab, ROS, Git   |
| Hardware    | Solidworks, Autocad, 3D Printing, Mechanical design  |
| Others      | Model Training on NVIDIA-DGX Servers/Clusters, Robot Control (UR10, KUKA youBot, Franka Emika), Microcontrollers |

## RELATED COURSES

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Machine Learning, Deep Learning, Computer Vision, Reinforcement learning, Image Processing, Embedded Systems, Micro-controllers, Robot Manipulation, Optimal Control, Electric Circuits, Mechanical Design.

## EXPERIENCE

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JAN 2022 - CURRENTLY

Doctoral Researcher at AALTO UNIVERSITY, Finland  
*Intelligent Robotics Group*

- Learning Reward Models: Learning explicit and compact rewards functions using inverse reinforcement learning from observational data to model demonstrator behavior.
- Learning from suboptimal data: Learning confidence values of trajectory optimality and incorporating into imitation learning framework to learn well-performing policies in the presence of substantial suboptimal data.
- Learning World Models: Developing algorithms for learning world model from Carla simulator data to design better architectures for planning.
- Learning Driving Behaviours: Developing software for learning diverse driver styles and evaluating in reactive simulation environment.

SEP 2019 - SEP 2021

Data Scientist at NAZARBAYEV UNIVERSITY, Astana  
*Institute of Smart Systems and Artificial Intelligence*

- Smart City Project: Implementing the reinforcement learning algorithms for surveillance camera and PTZ system for optimal coverage of the area.
- Optical Tactile Sensor: Designed the sensor prototype and developed a deep-learning model using Python/Pytorch for detecting contact locations and predicting continuous shear/torsion and normal forces from the image data. Programmed the UR10 industrial robot for conducting various experiments using ROS/C++.
- Inverted Pendulum Stabilization: Developed the fault tolerant control algorithm for stabilization of inverted pendulum with recurrent neural networks using Python/PyTorch. The model takes the time series data and outputs the continuous control actions. Deployed the model for real-time closed-loop control on real-setup using C++.
- Epidemic Simulator: Contributed to the development of software for simulating the SEIR stochastic model with network transition using Python.

JAN 2018 - AUG 2019

Research Assistant at NAZARBAYEV UNIVERSITY, Astana  
*School of Science and Technology*

- Object Detection with Depth Images: Trained the state-of-the-art deep learning models for object detection from depth images in TensorFlow using NVIDIA DGX-1 system. Deployed the model for real-time object detection using depth camera.
- Magnetic Tactile Sensor: Designed the magnetic tactile sensor and assembled the prototype. Programmed industrial robot UR10 for experiments using ROS framework.
- RGB Tactile Sensor: Implemented data acquisition, synchronization and pre-processing pipeline for signals from different sensors using ROS. Developed machine learning algorithms and deep CNN models using PyTorch/Python for classification of sensor deformation with image data.
- Inverted Pendulum Stabilization: Designed the hardware and implemented the MPC and PID control algorithms for stabilization of the inverted pendulum with dual-axis reaction wheels.

JAN 2018 - FEB 2019

Teaching Assistant at NAZARBAYEV UNIVERSITY, Astana  
*School of Science and Technology*

Assisted students in courses as Micro-controllers with Lab and Linear Control Theory with Lab during the lab sessions and graded homework assignments.