

# Bota Duisenbay

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**AI and Robotics** Engineer with hands-on experience in both industry and research, with a focus on developing **AI**-driven end-to-end pipelines and implementing advanced control and manipulation strategies for **UAV** and **UR10** robotic platforms. Skilled in **Python/C++**, **ROS**, and **deep learning frameworks**. Inspired by the challenge of turning research ideas into real-world robotics and AI systems.

## SELECTED WORK EXPERIENCE

<b>Robotics Research Fellow</b> <i>ISTC-CNR (Consiglio Nazionale delle Ricerche)</i>	Jan 2024 – Present Rome, Italy
<ul style="list-style-type: none"><li><b>UAV:</b> Planned and executed outdoor drone missions, enabling autonomous navigation by integrating onboard computers (Jetson) with flight controllers (PX4). Developed services for real-time monitoring and control, establishing IP/TCP and UDP protocols for state feedback, camera streaming, and command transmission from an offboard computer.</li><li><b>Path Planning:</b> Studied and developed an information-gain-based path planning method for mapping, leveraging real aerial imagery from drones to optimize autonomous navigation and improve efficiency of field monitoring. Accepted at IAS-19 (oral presentation).</li><li><b>Peer Review Contributions:</b> Co-reviewed submissions for <i>Communications Engineering</i> (Nature) and <i>Artificial Life Journal</i> (MIT Press), focusing on drone swarm technologies and collective learning methods.</li><li><b>Industrial Collaboration:</b> Facilitated technical coordination with industry partners, including supporting technical exchanges with UVify for drone operations, and contributing to preliminary discussions with Leonardo regarding swarm research collaboration.</li></ul>	
<b>Artificial Intelligence Engineer</b> <i>Botshelf.ai</i>	Sept 2022 – Sept 2023 Rome, Italy
<ul style="list-style-type: none"><li><b>Document Segmentation:</b> trained <b>classification</b> and <b>layout analysis</b> models for document types of varying format, and <b>segmentation</b> model for images with a cluttered background and overlapping document pages.</li><li><b>Key Information Extraction:</b> experimented with OCR (MS Azure, GCP, Paddle) and LLM to extract required fields for unstructured (83%) and structured documents (98%). Redesigned the pipeline, boosting from 67% to 89% by proposing and training end2end three models that leveraged image crop, spatial position and the text.</li><li><b>License Plate:</b> collected and curated open source datasets of European plates and trained YOLOv5 for <b>detection</b> in cluttered environments and <b>recognition</b> for license number with 98% and 96.5% accuracy respectively.</li></ul>	
<b>AI and Robotics Intern</b> <i>Baker Hughes</i>	Nov 2020 – Jul 2021 Florence, Italy
<ul style="list-style-type: none"><li><b>Optical Character Recognition (OCR)</b> for the engraved character on a metal: collected and annotated relevant data set, performed image processing, implemented state-of-the-art OCR algorithms and fine-tuned available open source libraries to achieve 91% accuracy;</li><li><b>Industrial robot arm UR10:</b> developed a simulation of the task and motion planning of the UR10 robot to perform grip and placement of objects.</li></ul>	
<b>Robotics Research Assistant</b> <i>Robotics lab, Nazarbayev University</i>	Jun 2017 – May 2018 Astana, Kazakhstan
<ul style="list-style-type: none"><li><b>Robotics pick and place:</b> built ROS based control of the UR10 robotic manipulator with a mounted anthropomorphic hand grippers and localised grasp affordance from 3D Kinect Image;</li><li><b>Hand prosthesis:</b> developed a finger position control algorithm for several grasp types using Arduino and Simulink. Implemented tele-operation using gloves with flex sensors;</li><li><b>Permanent Magnet Synchronous Motor (PMSM) control:</b> implemented the Direct-Torque control method together with the Maximum Torque Per Ampere technique for PMSM using MATLAB/Simulink. Presented the resulting paper at ELEKTRO 2018 IEEE conference DOI:10.1109/ELEKTRO.2018.8398286.</li></ul>	

## EDUCATION

<b>MSc Artificial Intelligence and Robotics</b> <i>La Sapienza University of Rome ("Don't miss your chance" full merit-based scholarship)</i> Selected coursework: Neuroengineering, Computer Vision, Reinforcement Learning, Cloud Computing	July 2023 Rome, Italy
<b>BSc Robotics and Mechatronics</b> <i>Nazarbayev University (State full merit-based scholarship)</i> Selected coursework: Embedded Systems, Power Electronics, Robotic System Design	June 2018 Astana, Kazakhstan

## TECHNICAL SKILLS

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**Programming:** Python, C/C++

**AI/ML:** TensorFlow, PyTorch, AWS (S3, SageMaker), CI/CD

**Robotics:** ROS, Gazebo, MATLAB, Simulink

**Hardware:** UR10, PX4, NVIDIA Jetson, Kinect, Arduino

## PUBLICATIONS

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**Duisenbay, B.**, Ognibene, D., Toscano, P., Boschetti, M., Berton, A., & Trianni, V. (in press). Information gain-based informative path planning for UAVs in agriculture: Towards field deployment. In \*Proceedings of the 19th International Conference on Intelligent Autonomous Systems (IAS-19)\* (June 30–July 4, 2025), Genoa, Italy.

Nurtay, B., **Duisenbay, B.**, & Do, T. D. (2018, May). Direct-torque control system design using maximum torque per ampere method for interior permanent magnet synchronous motors. In \*Proceedings of the 12th International Conference ELEKTRO 2018\* (May 21–23, 2018), Mikulov, Czech Republic. IEEE. (ISBN 978-1-5386-4760-8)