

Alberta Longhini

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Division of Robotics, Perception, and Learning (RPL)

KTH Royal Institute of Technology, Stockholm, Sweden

RESEARCH STATEMENT

I envision a future where robots, as assistive agents, seamlessly operate in dynamic, unstructured environments, equipped with the ability to perform complex reasoning and manipulation tasks. My research, at the intersection of robotics and machine learning, focuses on the adaptive manipulation of deformable objects, an area that requires novel approaches for characterization, perception, modeling, and control. I explore object-centric world models to enable inference, planning, and reasoning, alongside developing methods for object characterization, physics-informed representations, and interactive perception. Recently, I have been investigating how to enhance the physical and semantic reasoning of foundation models, with the goal of equipping agents to handle diverse and variable tasks in real-world settings.

Keywords: Deformable Object Manipulation · Representation Learning · Interactive Perception · Object-centric World Models

SELECTED PUBLICATIONS

- [S1] Alberta Longhini, Michael C Welle, Ioanna Mitsioni, and Danica Kragic. *Textile taxonomy and classification using pulling and twisting*. In: 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). IEEE. 2021, pp. 7564–7571 [\[pdf\]](#)
- [S2] Alberta Longhini[†], Marco Moletta[†], Alfredo Reichlin, Michael C Welle, David Held, Zackory Erickson, and Danica Kragic. *EDO-Net: Learning Elastic Properties of Deformable Objects from Graph Dynamics*. In: 2023 IEEE International Conference on Robotics and Automation (ICRA). 2023 [\[pdf\]](#)
- [S3] Alberta Longhini, Michael C Welle, Zackory Erickson, and Danica Kragic. *AdaFold: Adapting Folding Trajectories of Cloths via Feedback-loop Manipulation*. In: IEEE Robotics and Automation Letters, 2024 [\[pdf\]](#) [\[website\]](#)
- [S4] Alberta Longhini, Marcel Büsching, Bardienus Pieter Duisterhof, Jens Lundell, Jeffrey Ichnowski, Mårten Björkman, and Danica Kragic. *Cloth-Splatting: 3D State Estimation from RGB Supervision for Deformable Objects*. In: 8th Annual Conference on Robot Learning [\[pdf\]](#) [\[website\]](#)

Note: The symbol [†] denotes shared first-authorship.

EXPERIENCE

- | | |
|---|---------------------------------|
| • Ph.D. Candidate
KTH Royal Institute of Technology | 2021–(expected 01/25)
Sweden |
| • Teaching Assistant
KTH Royal Institute of Technology | 2021–now
Sweden |
| • Visiting Researcher
Carnegie Mellon University | 2023
USA |

EDUCATION

- | | |
|--|-----------|
| • Ph.D. Computer Science
Division of Robotic Perception and Learning (RPL), KTH Royal Institute of Technology, Sweden
· Supervisors: Prof. Danica Kragic, Michael C. Welle, Jens Lundell | 2021–now |
| • Degree Project Abroad
Division of Robotic Perception and Learning (RPL), KTH Royal Institute of Technology, Sweden
· Scholarship: Erasmus Mundus. | fall 2020 |
| • M.Sc. Automation Engineering
Department of Information Engineering (DEI), University of Padua, Italy
· Thesis Title: Fabric Material Classification by Combining Force Sensing and Vision.
· Supervisors: Prof. Alessandro Chiuso, Prof. Danica Kragic. | 2018–2021 |

- International Studies fall 2017
Facultat Informàtica de Barcelona (FIB), Universitat Politècnica de Catalunya (UPC), Spain
 - *Scholarship:* Erasmus Mundus.
- B.Sc. Information Engineering 2015–2018
Department of Information Engineering (DEI), University of Padua, Italy
 - *Thesis Title:* Experimental and computational applications of semantic networks.
 - *Supervisor:* Prof. Leonardo Badia.

PUBLICATIONS

Note: The symbol [†] denotes shared first-authorship.

PEER-REVIEWED CONFERENCE PAPERS (6)

- [C6] Alberta Longhini, Marcel Büsching, Bardienus Pieter Duisterhof, Jens Lundell, Jeffrey Ichnowski, Mårten Björkman, and Danica Kragic. *Cloth-Splatting: 3D State Estimation from RGB Supervision for Deformable Objects*. In: 8th Annual Conference on Robot Learning [\[pdf\]](#) [\[website\]](#)
- [C5] Irene Garcia-Camacho, Alberta Longhini, Michael C Welle, Guillem Alenyà, Danica Kragic, and Júlia Borràs. *Standardization of cloth objects and its relevance in robotic manipulation*. In: 2023 IEEE International Conference on Robotics and Automation (ICRA). 2024 [\[pdf\]](#) [\[website\]](#)
- [C4] Alberta Longhini[†], Marco Moletta[†], Alfredo Reichlin, Michael C Welle, David Held, Zackory Erickson, and Danica Kragic. *EDO-Net: Learning Elastic Properties of Deformable Objects from Graph Dynamics*. In: 2023 IEEE International Conference on Robotics and Automation (ICRA). 2023 [\[pdf\]](#)
- [C3] Alberta Longhini, Marco Moletta, Alfredo Reichlin, Michael C Welle, Alexander Kravberg, Yufei Wang, David Held, Zackory Erickson, and Danica Kragic. *Elastic Context: Encoding Elasticity for Data-driven Models of Textiles*. In: 2023 IEEE International Conference on Robotics and Automation (ICRA). 2023 [\[pdf\]](#)
- [C2] Alberta Longhini, Michael C Welle, Ioanna Mitsioni, and Danica Kragic. *Textile taxonomy and classification using pulling and twisting*. In: 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). IEEE. 2021, pp. 7564–7571 [\[pdf\]](#)
- [C1] Alberta Longhini, Michele Perbellini, Stefano Gottardi, Shenglun Yi, Hao Liu, and Mattia Zorzi. *Learning the tuned liquid damper dynamics by means of a robust EKF*. in: 2021 American Control Conference (ACC). IEEE. 2021, pp. 60–65 [\[pdf\]](#)

JOURNAL ARTICLES (2)

- [J2] Alberta Longhini, Yufei Wang, Irene Garcia-Camacho, David Blanco-Mulero, Marco Moletta, Michael Welle, Guillem Alenyà, Hang Yin, Zackory Erickson, David Held, et al. *Unfolding the Literature: A Review of Robotic Cloth Manipulation*. In: Annual Review of Control, Robotics, and Autonomous Systems, 2024 [\[pdf\]](#)
- [J1] Alberta Longhini, Michael C Welle, Zackory Erickson, and Danica Kragic. *AdaFold: Adapting Folding Trajectories of Cloths via Feedback-loop Manipulation*. In: IEEE Robotics and Automation Letters, 2024 [\[pdf\]](#) [\[website\]](#)

PEER-REVIEWED WORKSHOP PAPERS (3)

- [W3] Alberta Longhini, Marcel Büsching, Bardienus Pieter Duisterhof, Jeffrey Ichnowski, Mårten Björkman, and Danica Kragic. *Distilling Semantic Features for 3D Cloth Representations from Vision Foundation Models*. In: ICRA 2024 Workshop on 3D Visual Representations for Robot Manipulation [\[pdf\]](#)
- [W2] Robert Gieselmann, Alberta Longhini, Alfredo Reichlin, Danica Kragic, and Florian T. Pokorny. *DLO@Scale - A Large-Scale Meta Dataset for Learning Non-Rigid Object Pushing Dynamics*. In: Workshop on Physical Reasoning and Inductive Biases for the Real World, NeurIPS, 2021 [\[pdf\]](#) [\[website\]](#)
- [W1] Alberta Longhini, Marco Moletta, Michael C Welle, Ioanna Mitsioni, and Danica Kragic. *Perceiving and Handling Textiles: a Robotics Perspective*. In: Workshop on Representing and Manipulating Deformable Objects, ICRA, 2021 [\[pdf\]](#)

HONORS AND DISTINCTIONS

- "Mille e una lode" Award 2017
Awarded a selective scholarship by the University of Padova to excellent students in each degree programme.

TEACHING AND SUPERVISION

COURSES

- Introduction to Robotics 2022–now
School of Electrical Engineering and Computer Science KTH Royal Institute of Technology
- Image Analysis and Computer Vision 2021–2023
School of Electrical Engineering and Computer Science KTH Royal Institute of Technology

M.SC. STUDENTS

- Noel Johansson, "Benchmarking Sentence-Transformers for Duplicate Bug Detection on Novel Dataset" 2024
M.Sc. Computer Science, KTH Royal Institute of Technology
- Mark Bergrahm, "Explanation methods on a partially trained model" 2024
M.Sc. Computer Science, KTH Royal Institute of Technology

PROGRAMMING LANGUAGES

- Python Proficient
- ROS Proficient
- C++ Competent

LANGUAGES

- Italian Native
- English Fluent
- Spanish Conversational

PROFESSIONAL SERVICE

RESEARCH COMMUNITY SERVICE

- PhD Representative - Member of the EECS PhD school council. 2023-Now

ORGANIZATIONAL ROLES

- Fourth workshop on Representing and Manipulating Deformable Objects (ICRA) 2024-Now

REVIEWER

- Conference on Robot Learning (CoRL) 2024-Now
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2021-Now
- IEEE International Conference on Robotics and Automation (ICRA) 2022-Now
- IEEE Robotics and Automation Letters (RA-L) 2024-Now

REFERENCES

- Danica Kragic, *KTH Royal Institute of Technology, Sweden* dani@kth.se
- Zackory Erickson, *Carnegie Mellon University, USA* zerickso@andrew.cmu.edu
- Michael C. Welle, *KTH Royal Institute of Technology, Sweden* mwelle@kth.se
- Jense Lundell, *KTH Royal Institute of Technology, Sweden* jelundel@kth.se