

# Fredrik K. Gustafsson

POSTDOCTORAL RESEARCHER · KAROLINSKA INSTITUTET

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## Education

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### Uppsala University

2018 - 2023 | *Doctor of Philosophy (PhD), Machine Learning*

### Linköping University

2016 - 2018 | *Master of Science (MSc), Electrical Engineering*

### Stanford University

2016 - 2017 | *Graduate Exchange Student, Electrical Engineering*

### Linköping University

2013 - 2016 | *Bachelor of Science (BSc), Applied Physics and Electrical Engineering*

## Professional Experience

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### Postdoctoral Researcher

*Karolinska Institutet, Department of Medical Epidemiology and Biostatistics*

• Machine learning and computer vision for computational pathology, in the group of Mattias Rantalainen.

*Stockholm, Sweden*

*Dec. 2023 - present*

### PhD Student

*Uppsala University, Department of Information Technology*

- Thesis: *Towards Accurate and Reliable Deep Regression Models.*
- Supervisors: Thomas Schön & Martin Danelljan.

*Uppsala, Sweden*

*Oct. 2018 - Nov. 2023*

### Contingent Worker

*Facebook Reality Labs, FRL Research Pittsburgh*

- Part-time internship extension.

*Remote*

*Sep. 2021 - Dec 2021*

### Research Intern

*Facebook Reality Labs, FRL Research Pittsburgh*

- 3D human pose estimation, working with Weipeng Xu (remote due to COVID-19).

*Remote*

*Jun. 2021 - Sep. 2021*

### Software Engineer

*BMW Group*

- Feature development for autonomous driving and advanced driver assistance systems.

*Munich, Germany*

*Aug. 2018*

### MSc Thesis Student

*Zenuity*

- 3D detection of vehicles in LiDAR and/or image data, using deep learning.

*Gothenburg, Sweden*

*Jan. 2018 - Jun. 2018*

### Summer Intern

*Zenuity*

- Developed a deep learning demo/test platform based on a standard 1/10 scale RC car.

*Gothenburg, Sweden*

*Jun. 2017 - Aug. 2017*

### Summer Intern

*T Engineering*

- Developed a web tool for visualization of car engine sensor data for a fleet of test vehicles.

*Trollhättan, Sweden*

*Jun. 2016 - Aug. 2016*

### Teaching Assistant

*Linköping University, Department of Mathematics*

*Linköping, Sweden*

*Aug. 2014 - Dec. 2015*

## Publications

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### PREPRINTS

- [P5] **Multi-Stain Modelling of Histopathology Slides for Breast Cancer Prognosis Prediction**  
*Abhinav Sharma, [Fredrik K. Gustafsson](#), Johan Hartman, Mattias Rantalainen*  
Preprint, 2024
- [P4] **Automated Segmentation of Synchrotron-Scanned Fossils**  
*Melanie A.D. During, Jordan K. Matelsky, [Fredrik K. Gustafsson](#), Dennis F.A.E. Voeten, Donglei Chen, Brock A. Wester, Konrad P. Körding, Per E. Ahlberg, Thomas B. Schön*  
Preprint, 2024
- [P3] **Evaluating Computational Pathology Foundation Models for Prostate Cancer Grading under Distribution Shifts**  
*[Fredrik K. Gustafsson](#), Mattias Rantalainen*  
Preprint, 2024
- [P2] **Evaluating Deep Regression Models for WSI-Based Gene-Expression Prediction**  
*[Fredrik K. Gustafsson](#), Mattias Rantalainen*  
Preprint, 2024
- [P1] **Taming Diffusion Models for Image Restoration: A Review**  
*Ziwei Luo, [Fredrik K. Gustafsson](#), Zheng Zhao, Jens Sjölund, Thomas B. Schön*  
Preprint, 2024

### JOURNAL PAPERS

- [J3] **Evaluating Regression and Probabilistic Methods for ECG-Based Electrolyte Prediction**  
*Philipp Von Bachmann, Daniel Gedon, [Fredrik K. Gustafsson](#), Antônio H. Ribeiro, Erik Lampa, Stefan Gustafsson, Johan Sundström, Thomas B. Schön*  
Scientific Reports, 2024
- [J2] **How Reliable is Your Regression Model's Uncertainty Under Real-World Distribution Shifts?**  
*[Fredrik K. Gustafsson](#), Martin Danelljan, Thomas B. Schön*  
Transactions on Machine Learning Research (TMLR), 2023
- [J1] **Uncertainty-Aware Body Composition Analysis with Deep Regression Ensembles on UK Biobank MRI**  
*Taro Langner, [Fredrik K. Gustafsson](#), Benny Avelin, Robin Strand, Håkan Ahlström, Joel Kullberg*  
Computerized Medical Imaging and Graphics, 2021

### CONFERENCE PAPERS

- [C6] **Controlling Vision-Language Models for Multi-Task Image Restoration** [\[Cited by 60\]](#)  
*Ziwei Luo, [Fredrik K. Gustafsson](#), Zheng Zhao, Jens Sjölund, Thomas B. Schön*  
International Conference on Learning Representations (ICLR), 2024
- [C5] **Image Restoration with Mean-Reverting Stochastic Differential Equations** [\[Cited by 140\]](#)  
*Ziwei Luo, [Fredrik K. Gustafsson](#), Zheng Zhao, Jens Sjölund, Thomas B. Schön*  
The International Conference on Machine Learning (ICML), 2023
- [C4] **Learning Proposals for Practical Energy-Based Regression**  
*[Fredrik K. Gustafsson](#), Martin Danelljan, Thomas B. Schön*  
The International Conference on Artificial Intelligence and Statistics (AISTATS), 2022
- [C3] **Deep Energy-Based NARX Models**  
*Johannes Hendriks, [Fredrik K. Gustafsson](#), Antônio Ribeiro, Adrian Wills, Thomas B. Schön*  
The 19th IFAC Symposium on System Identification (SYSID), 2021
- [C2] **How to Train Your Energy-Based Model for Regression** [\[Cited by 40\]](#)  
*[Fredrik K. Gustafsson](#), Martin Danelljan, Radu Timofte, Thomas B. Schön*  
The British Machine Vision Conference (BMVC), 2020
- [C1] **Energy-Based Models for Deep Probabilistic Regression** [\[Cited by 70\]](#)  
*[Fredrik K. Gustafsson](#), Martin Danelljan, Goutam Bhat, Thomas B. Schön*  
The European Conference on Computer Vision (ECCV), 2020

## CONFERENCE WORKSHOP PAPERS

- [W4] **Photo-Realistic Image Restoration in the Wild with Controlled Vision-Language Models**  
*Ziwei Luo, Fredrik K. Gustafsson, Zheng Zhao, Jens Sjölund, Thomas B. Schön*  
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2024
- [W3] **Refusion: Enabling Large-Size Realistic Image Restoration with Latent-Space Diffusion Models** [Cited by 80]  
*Ziwei Luo, Fredrik K. Gustafsson, Zheng Zhao, Jens Sjölund, Thomas B. Schön*  
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2023
- [W2] **Accurate 3D Object Detection using Energy-Based Models**  
*Fredrik K. Gustafsson, Martin Danelljan, Thomas B. Schön*  
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2021
- [W1] **Evaluating Scalable Bayesian Deep Learning Methods for Robust Computer Vision** [Cited by 350]  
*Fredrik K. Gustafsson, Martin Danelljan, Thomas B. Schön*  
The IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPR Workshops), 2020

## THESES

- [T2] **Towards Accurate and Reliable Deep Regression Models**  
*Fredrik K. Gustafsson*  
PhD Thesis in Machine Learning, Uppsala University, 2023
- [T1] **Automotive 3D Object Detection Without Target Domain Annotations**  
*Fredrik K. Gustafsson, Erik Linder-Norén*  
MSc Thesis in Electrical Engineering, Linköping University, 2018

## Supervision Experience

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### Ziwei Luo, PhD student at Uppsala University

Co-supervisor, since Feb 2024  
Main supervisor: Thomas Schön, other co-supervisor: Jens Sjölund

Erik Thiringer, MSc Thesis student at Karolinska Institutet

Co-supervisor, since Sep 2024  
Main supervisor: Mattias Rantalainen

## Teaching Experience

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### UPPSALA UNIVERSITY

- Spr. 2023 **1RT495 Automatic Control II (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2022 **1RT700 Statistical Machine Learning (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2022 **1RT890 Empirical Modelling (MSc)**, Teaching Assistant (*problem-solving sessions, labs, grading*)
- Spr. 2022 **1RT700 Statistical Machine Learning (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2021 **1RT890 Empirical Modelling (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Spr. 2021 **1RT495 Automatic Control II (MSc)**, Teaching Assistant (*computer labs, labs*)
- Spr. 2021 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2020 **1RT890 Empirical Modelling (MSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Spr. 2020 **1RT700 Statistical Machine Learning (MSc)**, Lab Assistant
- Spr. 2020 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Aut. 2019 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)
- Spr. 2019 **Deep Learning (PhD)**, Teaching Assistant (*help desks, grading*)
- Spr. 2019 **1RT700 Statistical Machine Learning (MSc)**, Lab Assistant
- Spr. 2019 **1RT490 Automatic Control I (BSc)**, Teaching Assistant (*problem-solving sessions, grading*)

## LINKÖPING UNIVERSITY

- Aut. 2015 **TATA24 Linear Algebra (BSc)**, Teaching Assistant (*mentor sessions*)
- Aut. 2015 **TATM79 Found. Course in Mathematics (BSc)**, Teaching Assistant (*supervisor sessions, grading*)
- Aut. 2014 **TATA24 Linear Algebra (BSc)**, Teaching Assistant (*mentor sessions*)
- Aut. 2014 **TAIU10 Calculus One Variable, Prep. Course (BSc)**, Teaching Assistant (*problem-solving sessions*)

## Academic Service

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### REVIEWING

#### **AISTATS**

2025 (2 Papers), 2024 (5 Papers), 2023 (3 Papers), 2022 (3 Papers)

**TMLR, 2024**, 3 Papers

#### **NeurIPS**

2024 (6 Papers), 2023 (6 Papers, *recognized as one of the top reviewers*)

**ICML 2024**, 6 Papers

**ICLR 2024**, 5 Papers

**BRAVO Workshop at ICCV 2023**, 1 Paper

#### **BMVC**

2023 (5 Papers), 2022 (6 Papers), 2021 (6 Papers), 2020 (1 Paper)

**ICCV 2023**, 4 Papers

#### **AAAI**

2023 (3 + 4 Papers), 2022 (4 + 2 Papers)

**ECCV 2022**, 8 Papers

**CVPR 2022**, 2 Papers

**EBM Workshop at ICLR 2021**, 3 Papers

**ICRA 2021**, 1 Paper

**IFAC World Congress 2020**, 2 Papers

## Talks

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### INVITED TALKS

#### ***How Reliable is Your Regression Model's Uncertainty Under Real-World Distribution Shifts?***

RISE Learning Machines Seminars, *Online*, Mar 2024 [slides] [video]

#### ***How Reliable is Your Regression Model's Uncertainty Under Real-World Distribution Shifts?***

DFKI Augmented Vision Workshop, *Online*, Oct 2023 [slides]

#### ***Accurate 3D Object Detection using Energy-Based Models***

Zenseact, *Online*, Jan 2021 [slides]

#### ***Evaluating Scalable Bayesian Deep Learning Methods for Robust Computer Vision***

Zenuity, *Gothenburg, Sweden*, Jun 2019 [slides]

### CONTRIBUTED TALKS

#### ***On the Use and Evaluation of Computational Pathology Foundation Models for WSI-Based Prediction Tasks***

The Scandinavian Seminar on Translational Pathology (ScanPath), *Uppsala, Sweden*, Nov 2024 [slides]

#### ***Evaluating Computational Pathology Foundation Models for Prostate Cancer Grading under Distribution Shifts***

The 30th Mayo-KI Annual Scientific Research Meeting, *Stockholm, Sweden*, Oct 2024 [slides]

## Awards

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The Tryggve Holm medal for “*outstanding student achievements*” at Linköping University, 2018.

## Open Source Contributions

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[github.com/fregu856/deeplabv3](https://github.com/fregu856/deeplabv3), 770 Stars

[github.com/fregu856/papers](https://github.com/fregu856/papers), 400 Stars

[github.com/fregu856/3D0D\\_thesis](https://github.com/fregu856/3D0D_thesis), 280 Stars

[github.com/fregu856/segmentation](https://github.com/fregu856/segmentation), 240 Stars

[github.com/fregu856/evaluating\\_bdl](https://github.com/fregu856/evaluating_bdl), 130 Stars

[github.com/fregu856/2D\\_detection](https://github.com/fregu856/2D_detection), 130 Stars

[github.com/fregu856/ebms\\_regression](https://github.com/fregu856/ebms_regression), 90 Stars

[github.com/fregu856/CS224n\\_project](https://github.com/fregu856/CS224n_project), 60 Stars

[github.com/fregu856/ebms\\_3dod](https://github.com/fregu856/ebms_3dod), 50 Stars

## Academic Network

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### CO-AUTHORS

**Thomas Schön**, Professor at Uppsala University  
14 papers. Years with papers: 2024 - 2020

**Martin Danelljan**, Senior Research Engineer at Apple  
6 papers. Years with papers: 2023 - 2020

**Ziwei Luo**, PhD student at Uppsala University  
5 papers. Years with papers: 2024, 2023

**Zheng Zhao**, Assistant professor at Linköping University  
5 papers. Years with papers: 2024, 2023

**Jens Sjölund**, Assistant professor at Uppsala University  
5 papers. Years with papers: 2024, 2023

**Mattias Rantalainen**, Associate professor at Karolinska Institutet  
3 papers. Years with papers: 2024

**Antônio H. Ribeiro**, Assistant professor at Uppsala University  
2 papers. Years with papers: 2024, 2021

## Languages

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Swedish (native), English (fluent).