

# Rui Li

PHD STUDENT · AALTO UNIVERSITY

✉ [rui.li@aalto.fi](mailto:rui.li@aalto.fi) |  [ruili-pml](#) |  [ruili-pml](#) |  Rui Li



## Summary

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- Ph.D. student at Aalto University, supervised by [Prof. Arno Solin](#). Published on [ICLR](#), [ICML](#), and [WACV](#).
- Research focuses on uncertainty quantification, probabilistic ML, and few-shot learning, with experience on LLMs and VLMs.
- Interned at [Amazon Web Services](#) (KV-cache compression) and [Nokia Bell Labs](#) (uncertainty for robotics foundation models).
- Proficient in Python and Pytorch. Developed [SUQ library](#). Strong mathematical skills in linear algebra, calculus, and probability.

## Experience

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### Aalto University, Ph.D.

2022 - Present

- Advised by [Prof. Arno Solin](#) and [Dr. Martin Trapp](#)
- Research interests: uncertainty quantification, probabilistic machine learning, few-shot learning
- Final year: published on ICML, ICLR, WACV and four NeurIPS workshops

### Amazon Web Services, Research Internship

Oct 2025 - Present

- KV cache compression with [Dr. Matthias Seeger](#)

### Nokia Bell Labs, Research Internship

March 2025 - May 2025

- Uncertainty quantification for robotics foundation models with [Dr. Mikko Honkala](#)

### University College London, M.Sc. in Machine Learning, Distinction (84%), Dean's List

2020 - 2021

- Thesis: Learning Input-conditional Invariances via the Marginal Likelihood  
Supervised by [Prof. Marc Deisenroth](#), [Dr. So Takao](#), and [Prof. Mark van der Wilk](#)

### Tokyo University, Research Student

2019 - 2020

- Researched aligning contextual word embedding in a probabilistic manner with variational autoencoder.
- Supervised by [Prof. Yoshimasa Tsuruoka](#)

### Sun Yat-sen University, B.Sc. in Physics, GPA: 3.8 / 4.0

2015 - 2019

- Thesis: Deep Learning for Vertex Reconstruction in JUNO Experiment, supervised by [Prof. Zhengyun You](#)

## Selected Publications

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### [Streamlining Prediction in Bayesian Deep Learning. ICLR 2025](#)

[Rui Li](#), [Marcus Klasson](#), [Arno Solin](#), [Martin Trapp](#).

In BDL, how to make predictions efficiently is overlooked. We examine streamlining prediction in BDL through a single forward pass without sampling. We showcase our approach for both MLP and transformers, such as ViT and GPT-2.

### [Post-hoc Probabilistic Vision-Language Models. Under Review](#)

[Anton Baumann](#), [Rui Li](#), [Marcus Klasson](#), [Santeri Mentu](#), [Shyamgopal Karthik](#), [Zeynep Akata](#), [Arno Solin](#), [Martin Trapp](#).

To make VLMs more reliable, we present the first direct Bayesian formulation. We propose a post-hoc uncertainty quantification method based on Laplace approximation, which provides useful predictive uncertainties and better calibration.

### [Flatness Improves Backbone Generalisation in Few-shot Classification. WACV \(Oral\) 2025](#)

[Rui Li](#), [Martin Trapp](#), [Marcus Klasson](#), [Arno Solin](#).

In few-shot classification most efforts focus on adapting the backbone to the target domain without considering the importance of backbone training. We show flatness-aware backbone training can lead to better generalization through theoretical and empirical results.

### [Improving Hyperparameter Learning under Approximate Inference in Gaussian Process Models. ICML 2023](#)

[Rui Li](#), [ST John](#), [Arno Solin](#).

Variational inference and expectation propagation are two commonly used approximate inferences in Gaussian process models with complementary advantages. We developed a hybrid training procedure to bring the best of both worlds.

## Programming Languages and Tech Skills

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- Python, PyTorch, NumPy, TensorFlow, GPFlow, GitHub
- Developed [SUQ](#), a lightweight PyTorch library for uncertainty quantification

I use PyTorch and GitHub on a daily basis for my research. I run experiments on GPU clusters such as LUMI, the fifth fastest supercomputer in the world.

## Academic Service

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- Organizer of workshop on [Uncertainty Quantification for Computer Vision](#)

Together with colleagues, I co-organized the second and third workshops on Uncertainty Quantification for Computer Vision at ICCV 2023 and ECCV 2024, top venues for computer vision.

- Reviewed for NeurIPS, ICML, ICLR and ECCV workshop.

## Awards

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- Dean's list at University College London, 2021

The Dean's List is awarded to the top 5% of graduating students.

- First, third, and second price scholarship at Sun Yat-sen University, 2019, 2018, 2017

Scholarship is awarded every year based on grades and publications.

- Meritorious Winner of Interdisciplinary Contest in Modeling, 2017

Organizer: COMAP.

## Referees

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- [Prof. Arno Solin](#) (arno.solin@aalto.fi), Arno is my Ph.D. supervisor.
- [Dr. Martin Trapp](#) (martin.trapp@aalto.fi), I work with Martin during my Ph.D. on few-shot learning and Bayesian deep learning.
- [Dr. ST John](#) (ti.john@aalto.fi), I work with Ti during my Ph.D. on approximate inference in Gaussian processes.

## Full List Publications

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- [Rui Li](#), Marcus Klasson, Arno Solin, Martin Trapp. [Streamlining Prediction in Bayesian Deep Learning](#). *International Conference on Learning Representations (ICLR)*, 2025.
- Anton Baumann, [Rui Li](#), Marcus Klasson, Santeri Mentu, Shyamgopal Karthik, Zeynep Akata, Arno Solin, Martin Trapp. [Post-hoc Probabilistic Vision-Language Models](#). *Under Review*
- [Rui Li](#), Martin Trapp, Marcus Klasson, Arno Solin. [Flatness Improves Backbone Generalisation in Few-shot Classification](#). *Winter Conference on Applications of Computer Vision (WACV)*, Oral Presentation, 2025.
- [Rui Li](#), Marcus Klasson, Arno Solin, Martin Trapp. [Posterior Inferred, Now What? Streamlining Prediction in Bayesian Deep Learning](#). *NeurIPS Workshop on Bayesian Decision-making and Uncertainty* 2024.
- Anton Baumann, Marcus Klasson, [Rui Li](#), Arno Solin, Martin Trapp. [Probabilistic Active Few-Shot Learning in Vision-Language Models](#). *NeurIPS Workshop on Bayesian Decision-making and Uncertainty* 2024.
- Marlon Tobaben, Marcus Klasson, [Rui Li](#), Arno Solin, Antti Honkela. [Differentially Private Continual Learning using Pre-Trained Models](#). *NeurIPS workshop on Scalable Continual Learning for Lifelong Foundation Models* 2024.
- [Rui Li](#), ST John, Arno Solin. [Improving Hyperparameter Learning under Approximate Inference in Gaussian Process Models](#). *International Conference on Machine Learning (ICML)*, 2023.
- [Rui Li](#), ST John, Arno Solin. [Towards Improved Learning in Gaussian Processes: The Best of Two Worlds](#). *NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems*, 2022.
- Arno Solin, [Rui Li](#), Andrea Pilzer. [A Look at Improving Robustness in Visual-inertial SLAM by Moment Matching](#). *International Conference on Information Fusion (FUSION)*, 2022.
- Chuan Chen, [Rui Li](#), Lin Shu, Zhiyu He, Jining Wang, Chengming Zhang, Huanfei Ma, Kazuyuki Aihara, Luonan Chen. [Predicting Future Dynamics From Short-term Time Series Using an Anticipated Learning Machine](#). *National Science Review*, 2020.
- [Rui Li](#), Fanghua Ye, Shaoan Xie, Chuan Chen and Zibin Zheng. [Digging into It: Community Detection via Hidden Attributes Analysis](#). *Neurocomputing*, 2019.
- [Rui Li](#), Zhengyun You and Yumei Zhang. [Deep Learning for Signal and Background Discrimination in Liquid based Neutrino Experiment](#). *International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT)*, 2018.