Docent application

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A. Summary

I am writing to formally express my interest in being appointed as a Docent (Reader) at LTH, Faculty of Engineering, Lund University. My research portfolio, developed significantly since obtaining my PhD in 2018, centers on the critical intersection of artificial intelligence (AI) and climate change challenges. I am confident that my demonstrated capacity for independent and innovative research, my experience in supervision and pedagogical development, my track record in securing research funding, and my commitment to disseminating research findings to diverse audiences align well with the qualifications and expectations for a Docent appointment at LTH.

My academic journey post-PhD has been driven by a commitment to leveraging advanced AI techniques for tangible societal benefit, with a primary focus on environmental understanding and climate action. This has led me to establish and lead a research agenda aimed at developing novel computational tools to monitor, model, and ultimately mitigate the impacts of climate change. This work necessitates handling diverse and complex data modalities – from satellite imagery capturing large-scale environmental shifts, to intricate soundscape recordings revealing biodiversity changes, and sensor data from industrial and environmental monitoring systems.

Since completing my doctoral studies, my research has evolved towards increased independence and a focus on large-scale, impactful projects. While my initial postdoctoral work built upon my doctoral expertise, I quickly sought to carve out new research avenues, particularly in applying AI to under-explored environmental data sources and addressing the unique challenges of real-world deployment. This trajectory towards self-directed research is evidenced by my successful acquisition of substantial research funding, exceeding 20 MSEK since 2018. This funding has enabled me to build and lead my own research team tackling complex, interdisciplinary problems. My research contributions, detailed further below, demonstrate a clear progression beyond my doctoral work, establishing distinct lines of inquiry characterized by methodological innovation and practical application. Quantitatively, my publication record, comprising over 40 peer-reviewed papers with more than 2000citations, an h-index of 18 (12 since my PhD defence), and an i10-index of 23 (12 since defence), alongside my leadership in externally funded projects, supports the assessment that my research production post-PhD corresponds to the volume and impact equivalent to more than one additional doctoral thesis.

A significant strand of my research addresses environmental soundscape analysis, recognizing the power of sound as a rich indicator of environmental health. I have made substantial contributions to the field of ecoacoustics through AI, focusing on developing robust tools for biodiversity monitoring and broader environmental understanding. My innovative work in this area includes pioneering unsupervised representation learning for complex sound mixtures, which facilitates analysis with limited manual labelling. I have supervised one PhD candidate in this endeavour, who will defend his thesis in 2027. The work has also included effective few-shot learning techniques for sound event detection and more theoretical work on the effects of human-in-the-loop systems for efficient annotation of acoustic data. This research directly supports climate change adaptation and mitigation efforts by enabling more efficient and scalable monitoring of how ecosystems and biodiversity respond to climate shifts, deforestation, and conservation interventions. In spring 2025, my team and I have initialized a collaboration with Jonas Hentati-Sundberg at Swedish University of Agriculture to study Baltic seabirds using AI-driven soundscape analysis, a project where we have installed a microphone array at Stora Karlsö in the Baltic Sea, enhancing the existing installation of a virtual cliff ledge and camera monitoring.

Addressing the distributed and often sensitive nature of climate and environmental data, another core area of my research investigates the challenges and opportunities of distributed machine learning. Climate and environmental data are frequently generated across disparate locations or held by different organizations, making centralized analysis difficult or undesirable. My research within Federated Learning (FL) has specifically confronted the pervasive issue of statistical heterogeneity, often termed 'non-IID data,' which particularly affects real-world environmental sensing applications due to variations in sensor calibration, location, and observed phenomena. To overcome this, we have developed and evaluated novel aggregation algorithms and personalization techniques designed to enhance the robustness and fairness of FL models in these challenging contexts, as demonstrated in my publication "Efficient Node Selection in Private Personalized Decentralized Learning" (NLDL, 2024). The advancement of FL is crucial for enabling collaborative climate modelling and environmental monitoring without centralizing sensitive data, thereby respecting privacy and data ownership while harnessing collective insights for applications like distributed

weather forecasting or cross-regional pollution monitoring.

My research programme also integrates computer vision techniques, applying them to the invaluable large-scale perspectives offered by visual data, especially from satellite, camera trap, and drone imagery. These methods are employed for critical environmental monitoring tasks. Specific innovations include the development of novel deep learning architectures for detecting deforestation patterns from satellite imagery with limited labelled data, as explored in "Impacts of color and texture distortions on earth observation data in deep learning" (ML4RS, 2024), the application of transfer learning techniques for identifying specific crop diseases exacerbated by climate change from drone footage, and the creation of methods for fusing visual data with other sensor modalities for improved environmental state estimation. Such computer vision tools have direct relevance to climate action, facilitating the tracking of deforestation for mitigation purposes, monitoring glacial melt and coastal erosion for adaptation strategies, enabling precision agriculture to reduce emissions, and assessing damage from climate-related extreme events.

Furthermore, my commitment to translating AI research into actionable climate insights is demonstrated through my active participation as a co-PI in CLIMES (Swedish Centre for Impacts of Climate Extremes). Within this interdisciplinary research centre, I am responsible for leading the AI work. My role encompasses the development of sophisticated AI and machine learning models designed to identify patterns and potential precursors to extreme weather events, such as heatwaves, droughts, and floods, using both climate model outputs and observational data. This work involves exploring methods to generate policy-actionable scenarios and enhance the interpretability of complex climate models through AI techniques. My experience in Natural Language Processing (NLP) is also applied within this context, aiding the analysis of scientific literature and policy documents pertinent to climate adaptation strategies. This research is vital for improving early warning systems, informing the development of resilient infrastructure adaptation plans, and guiding policy decisions to bolster societal resilience against the increasing frequency and intensity of climate extremes.

During my journey developing this research agenda, I have come in contact with many researchers in Sweden, in the Nordics, and in the rest of the world who are contributing to the understanding of climate change and how AI can help fighting it. This realisation drove me and some collaborators to start Climate AI Nordics, a network of Nordic researchers who work in the intersection of AI and climate change. Since its inception in October 2024, more than 199researchers from around the Nordic countries have signed up for the network, and the hopes of what this network could achieve has already been over reached, by the making of new connections and collaborations, organization of webinars and workshops, and the dissemination of important research results through our social media channels and newsletter.

My capacity for research leadership extends beyond defining research questions to successfully securing the resources needed to pursue them. As mentioned, I have been awarded competitive research grants exceeding 20 MSEK since 2018, acting as principal investigator (PI) or key partner on projects funded by prominent bodies such as Vinnova, Formas, SSF and Horizon Europe. Specific projects like Soundscape analysis using AI methods (PhD project, SSF FID20-0028, 2021-2027) and Grey to green: Using AI to detect and prioritize conversion of impervious surfaces to multifunctional nature-based solutions (Formas 2024-01116, 2024-2026) exemplify this success. These grants have been instrumental not only in advancing my research vision but also in enabling me to build and manage research teams, mentor junior researchers effectively, and foster productive collaborations across disciplinary, institutional, and geographical boundaries. This track record underscores my ability to translate compelling research ideas into fully funded, operational scientific endeavors.

Parallel to my research activities, I view research supervision as a crucial pedagogical responsibility, essential for cultivating the next generation of independent researchers. My supervisory approach is fundamentally student-centred, acknowledging the unique strengths, background, and learning requirements of each individual PhD candidate. I am convinced that tapping into the innate creativity and the urge to learn within young bright students is a prerequisite to successful PhD supervision. I prioritize creating a supportive yet intellectually challenging environment where critical thinking is actively encouraged. Central to my supervision style is the provision of constructive feedback, carefully tailored to the student's stage of development and the specific challenges they face. I have served as the institute supervisor (formal assistant supervisor) for Edvin Listo Zec, whose doctoral research on challenges in distributed and federated learning directly aligns with and contributes to my own work in that domain. I also supervise John Martinsson, who is advancing the state-of-the-art in soundscape analysis for ecological applications.

Both of these candidates have been employed in my team at RISE, meaning that I have been the supervisor with the most frequent contact, while both students have also had an academic supervisor each at the degree-awarding university (KTH and LTH, respectively).

My objective in guiding these candidates has been to empower them to become independent, critical, and innovative researchers, fully capable of defining and pursuing their own research agendas. While the supervision needs vary with academic experience, my overarching supervision philosophy extends to the supervision of Master's students; I have guided over twenty MSc candidates through their thesis projects, exposing them to important research problems across diverse AI sub-fields and application areas. Thesis topics have included deep learning for agricultural disease detection, graph neural networks for physics simulations relevant to climate modeling, and automated text summarization applicable to climate report analysis. Beyond technical guidance, my mentorship emphasizes the holistic development of essential academic competencies, including critical reading, scientific writing, effective presentation, and navigating the ethical dimensions of research. My teaching experience extends beyond supervision and guest lectures to include curriculum development and delivery in both academic and industrial settings. A significant recent example is a course on "AI for Environmental Data Analysis" at Uppsala University that I co-developed and taught with my colleague Murathan Kurfali. This course was designed for an international audience of early-career researchers, primarily PhD students and postdocs. I was personally responsible for creating and delivering modules on an introduction to machine learning, AI for climate mitigation and adaptation, AI for nature monitoring, and AI for forecasting and Earth system modeling. The lectures and the practical exercies in the course provided an opportunity for early career researchers to gain hands-on experience in this area. Furthermore, I helped co-develop the curriculum for a specialized summer school focused on Climate Extremes, operating within the framework of the CLIMES project. I encourage active participation in the broader research community through workshops, conferences, and collaborations, aiming to foster resilience and adaptability in navigating the inherent uncertainties of a research career. While my formal teaching experience is presently centered on supervision and delivering guest lectures, I am very keen to contribute more broadly to LTH's teaching programmes. I envision potentially developing and delivering courses related to AI for sustainability, machine learning techniques for environmental data analysis, or the principles of ethical AI development.

Recognizing the imperative for research on critical issues like climate change to reach beyond academic confines, I am actively engaged in communicating the potential and challenges of AI to a wide range of audiences. This commitment includes frequent appearances on national radio and television (SVT Aktuellt 2023-04-03, TV4 Nyhetsmorgon 2025-08-23, Sveriges Radio: P1 Klotet 2025-03-26, SR/UR P1 Fabriken 2024-12-06, Vetenskapsradions nyheter 2023-01-05, 2023-03-27, 2023-04-06, SR P3 Eftermiddag 2022-06-13), where I serve as an expert commentator discussing AI developments and their societal implications, often focusing specifically on environmental applications. Additionally, I have presented my work and its relevance to environmental monitoring and climate action in accessible terms at public events and industry workshops. Furthermore, I am committed to actively building and strengthening the research community in this field. I was the organizer of the recently concluded 2025 Nordic Workshop on AI for Climate Change, the aim of which was to stimulate collaboration among Nordic researchers applying AI to climate change related problems. These initiatives serve the dual purpose of advancing the research field and training the next cohort of researchers equipped to tackle these complex and urgent challenges. This dedication to dissemination ensures that the knowledge generated through my research contributes to broader societal understanding and informs public discourse and potential policy actions concerning climate change.

Looking ahead, my future research vision involves both deepening and expanding my work on AI for climate change mitigation and adaptation. I plan to advance multi-modal AI techniques for Earth observation, aiming to integrate diverse data streams like satellite imagery, soundscape recordings, sensor network data, and climate model outputs using novel fusion methods. This approach promises a more holistic understanding of complex environmental systems and their responses to climate impacts. Concurrently, I intend to focus significantly on developing trustworthy and interpretable AI models specifically tailored for climate science applications. An important part of these endeavours is to make methods easy both to train and to utilize. Current state-of-the-art solutions require large amounts of annotated training data, which may be costly to obtain, especially when annotation needs to be done by domain experts. I will work on techniques where annotation is assisted by AI itself, by incorporating combinations of techniques such as active learning and semi-supervised learning. In summary, I will develop AI-based solutions that are transparent, reliable, and readily usable by domain experts and policymakers. Another

key objective is to further develop and scale federated learning methodologies for global climate initiatives, addressing critical challenges related to scalability and robustness against diverse data conditions, thereby enabling large-scale, privacy-preserving international collaborations on climate data analysis.

Central to my future work is the active pursuit of interdisciplinary collaboration. I aim to build strong ties across RISE, LTH, and Lund University, bridging engineering and AI with climate science, ecology, social sciences, and policy studies. A key example of this is my active and ongoing collaboration with Professor Maria Sandsten at Mathematical Statistics here at LTH. This collaboration spans several research projects and includes the co-supervision of John Martinsson, a PhD student focusing on soundscape analysis within my research group. This collaborative foundation extends internationally, leveraging and strengthening my existing network. For instance, my ongoing collaboration with Professor Tuomas Virtanen at Tampere University is advancing our joint work in soundscape analysis, directly relevant to multi-modal environmental monitoring. Similarly, I collaborate with Jonas Hentati-Sundberg at the Swedish University of Agriculture (SLU) on projects related to AI for environmental monitoring, and with Dr. Oisin Mac Aodha at the University of Edinburgh, focusing on challenges in geographical species distribution modelling which is critical for understanding climate impacts on biodiversity. The goal is to leverage these local and international connections, alongside the exceptionally strong interdisciplinary environment that LTH and Lund University offer, to co-create solutions that possess greater real-world relevance and impact.

In conclusion, my research career since completing my PhD demonstrates a consistent trajectory of independent scientific investigation, methodological innovation, and impactful application, with a particular focus on leveraging artificial intelligence to address climate change. My proven experience in securing research funding, leading complex projects, successfully supervising PhD and MSc students, and actively disseminating research findings to both specialist and general audiences provides a robust foundation for fulfilling the responsibilities and contributing meaningfully as a Reader (Docent) at LTH. I am genuinely enthusiastic about the prospect of contributing to the dynamic research and educational environment at LTH and Lund University. I am confident that my expertise and research vision align well with LTH's strategic directions and would enable me to make significant contributions to the Faculty's ongoing success and future goals.

B. Curriculum Vitae – CV

Senior machine learning researcher and director of deep learning research at RISE since 2018. Expertise in soundscape analysis, computer vision, and federated learning, with extensive experience applying AI to environmental/climate, industrial, and medical challenges using diverse data modalities. Proven leader of successful research projects, securing over 20 MSEK in grants since 2018. Organizes the international RISE Learning Machines Seminar series. My publication record include >40 peer-reviewed papers, >2000 citations, H-index of 18, i10-index of 23[1] and frequent media contributor as an AI expert.

Education

2018: PhD, computer science, Chalmers University of Technology – Ph.D in machine learning. Supervisor Richard Johansson. Thesis title "Representation learning for natural language". Research visit to professor Tapani Raiko and the Deep Learning and Bayesian Modelling group at Aalto University in 2016.

2007: MSc, computer science, Gothenburg University – Specializing in algorithms, artificial intelligence, and machine learning. Master's thesis on efficient routing in realistic small-world networks.

Project experience in selection. I have led a diverse portfolio of projects that apply artificial intelligence to pressing challenges in sustainability and environmental monitoring. These initiatives range from monitoring biodiversity through AI-driven soundscape analysis to enhancing agricultural sustainability by optimizing resource recovery. In my research, I develop and leverage advanced machine learning models to address critical data challenges. A central theme is overcoming data scarcity, for which I employ strategies like transfer, few-shot, and active learning, as well as techniques for handling sparse annotations, while also tackling the complexities of distributional shifts and privacy. Central to my approach is deep interdisciplinary collaboration, bridging fields like environmental science and engineering, as demonstrated by my co-leadership of AI research within the CLIMES center for climate extremes and partnerships with industry on circular business models. Overall, this body of work reflects my ability to lead multi-faceted teams, integrate advanced AI into diverse domains, and deliver impactful, real-world solutions.

PhD Supervision. I have supervised two PhD candidates in applied machine learning, serving as the institute supervisor (formal assistant supervisor), and having the most frequent contact with the student. Edvin Listo Zec (KTH, co-supervised with Prof. Šarūnas Girdzijauskas) successfully defended his thesis on distributional shifts in decentralized learning in 2025. My current student, John Martinsson (Lund University, defending 2027; co-supervised with Prof. Maria Sandsten), is advancing soundscape analysis for biodiversity and environmental monitoring using novel AI techniques. My role involves guiding candidates through their research design and execution while supporting their professional development, reflecting my dedication to mentoring early-career researchers in interdisciplinary fields.

MSc Supervision. I have supervised over 20 MSc students on diverse AI-related thesis projects, covering applied challenges like agricultural disease detection, physics simulations, and text summarization. Other topics have included conversational AI, fashion analysis, and medical data processing, alongside practical applications such as intelligent assistants and recommender systems. These projects have helped students develop technical expertise and tackle real-world problems in both academia and industry.

Examination

Grading committee. Grading committee member for the PhD defence of Joel Oskarsson, Linköping University, 2025.

Discussion leader. Scientific discussion leader for halfway seminar presentation of PhD candidate Nikolas Huhnstock, University of Skövde, 2019-12-06, "Adaptive neural networks for clustering".

Reviewing research proposals. Academy of Finland, The Research Council for Natural Sciences and Engineering, Frontier AI Technologies (2021), Swedish Research Council (external reviewer, 2021), Climate Change AI (CCAI, 2021, 2023), AI tools in the Fram Centre, High North Research Centre for Climate and the Environment (2025).

[1] Google Scholar, October 2025, `https://scholar.google.se/citations?user=m_n28oAAAAAJ&hl=sv`.

Reviewing research papers. SLTC: Swedish Language Technology Conference (2020). Student Research Workshop (SRW) at EACL (2023). ECML-PKDD: European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (2024). IEEE Transactions on Geoscience and Remote Sensing (2025). NLDL: Northern lights deep learning conference (2025). CCAI: Tackling Climate Change with AI Workshop at NeurIPS (2025). AICC: Workshop on AI for Climate and Conservation at EurIPS 2025. AIS25: AI in Science Summit 2025.

Teaching and dissemination. I am actively engaged in teaching and disseminating knowledge about AI and machine learning to a wide range of audiences, from the public to specialized academic and industrial groups. A primary focus of my dissemination is the application of AI to environmental research and climate change, which I have presented at high-profile venues such as TEDxKTH, the Swedish Embassy in Berlin, and as a panelist at the ICLR Climate Change AI workshop. Beyond environmental applications, my lectures also delve into core technical challenges in AI, including the challenge of annotation efficiency, uncertainty quantification, and privacy in deep learning. My teaching experience extends beyond invited lectures to formal curriculum development and course leadership, including co-designing and teaching a 7.5 hp PhD course in Deep Learning at Chalmers University of Technology and a course on AI for environmental data at Uppsala University. I am invited to speak at the LTH CEC workshop on AI for Biodiversity in January 2026. Across all these activities, my teaching philosophy emphasizes a blend of theoretical understanding with hands-on application, fostering interdisciplinary learning and adapting to the individual needs of students of varying backgrounds.

Media appearances. I have appeared in Swedish public service television (SVT) main news program Aktuellt (2023-04-03, Swedish), TV4 Nyhetsmorgon (2025-08-23, Swedish), and in Swedish public service radio (Sveriges Radio, SR) scientific news program Vetenskapsradions nyheter (2023-01-05, 2023-03-27, 2023-04-06), and SR P3 Eftermiddag (2022-06-13).

Awarded grants

2025 FusionSafe: Fusion of dual-modal radar and camera sensors with deep-learning AI for multiple objects tracking in off-road autonomous vehicles safety systems (Co-investigator, Eurostar, €70k, total €1.7M).

2024 Grey to green: Using AI to detect and prioritize conversion of impervious surfaces to multifunctional nature-based solutions co-investigator (Co-investigator, Formas 2024-01116, 1.5MSEK, total 4MSEK, 2024-2026)

2024 FERTITEC: FERTIliser Product Recovery from Secondary Raw Materials Using Available Techniques Duration (Co-investigator, EU Horizon, 1.8MSEK, total 23 MSEK)

2023 Using structural causal models to understand distributional shift in federated learning (Principal investigator, Vinnova, 2023-01359, 1.0 MSEK; total 1.1 MSEK)

2023 Active learning for ecological monitoring (Principal investigator, Vinnova, 2023-01486, 1.0 MSEK; total 1.2 MSEK)

2022 Staff exchange for applied AI-research (Principal investigator, Vinnova, 2022-02822, 335 kSEK)

2022 AI and civil science for porcelain objects (Principal investigator, Swedish National Heritage Board and Region Västra Götaland, F2022-0057, 1 MSEK)

2021 Soundscape analysis using AI, PhD project, Principal investigator (Swedish Foundation for Strategic Research, SSF, FID20-0028, 2.5 MSEK)

2021 Effective knowledge dissemination through AI (Principal investigator, Region Västra Götaland, KUN 2021-00361, 860 kSEK)

2020 Safe and just AI-based drug detection (Principal investigator, Vinnova, 2020-05139, 5 MSEK)

2020 Swedish medical language data lab (Principal investigator, Vinnova, 2019-05156, 2 MSEK)

2021 Predictive maintenance for district heating networks (Co-investigator, ÅFORSK, 21-266, 2 MSEK)

2019 AID-CBM - AI driven financial risk assessment for CBMs (Co-investigator, Vinnova, 2019-03166, 4.4 MSEK)

C. List of selected research publications

J. Martinsson, T. Virtanen, M. Sandsten, **O. Mogren**, The Accuracy Cost of Weakness: A Theoretical Analysis of Fixed-Segment Weak Labeling for Events in Time, Transactions on Machine Learning Research, TMLR (2025) `https://mogren.ml/publications/2025/accuracy-cost/`

> *I was supervising the first author during this work. I wrote parts of the manuscript, reviewed and edited the whole manuscript, and did a large part of the author feedback communication.*

R. Lindholm, O. Marklund, **O. Mogren**, J. Martinsson, Aggregation Strategies for Efficient Annotation of Bioacoustic Sound Events Using Active Learning, European Signal Processing Conference, EUSIPCO (2025) `https://mogren.ml/publications/2025/aggregation/`

> *I was supervising the (two) first authors during this work. I wrote most of the manuscript, reviewed and edited the whole manuscript.*

J. Martinsson, **O. Mogren**, M. Sandsten, T. Virtanen, From Weak to Strong Sound Event Labels using Adaptive Change-Point Detection and Active Learning, European Signal Processing Conference, EUSIPCO (2024) `https://mogren.ml/publications/2024/from/`

> *I was supervising the first author during this work. I wrote parts of the manuscript, and reviewed and edited the whole manuscript.*

M. Willbo, A. Pirinen, J. Martinsson, E. Listo Zec, **O. Mogren**, and M. Nilsson, Impacts of color and texture distortions on earth observation data in deep learning. 2nd Machine Learning for Remote Sensing Workshop at ICLR, ML4RS (2024), `https://mogren.one/publications/2024/impacts/`

> *I was supervising the first author during this work. I wrote parts of the manuscript, and reviewed and edited the whole manuscript.*

E. Listo Zec, J. Östman, **O. Mogren**, D. Gillblad, Efficient Node Selection in Private Personalized Decentralized Learning, Northern Lights Deep Learning Conference, NLDL, 2024, `http://mogren.one/publications/2024/efficient/`

> *I was supervising the first author during this work. I wrote parts of the manuscript, and reviewed and edited the whole manuscript.*

A. Pirinen, **O. Mogren**, M. Västerdal, Fully Convolutional Networks for Dense Water Flow Intensity Prediction in Swedish Catchment Areas, 35th Annual Workshop of the Swedish Artificial Intelligence Society SAIS, 2023, `http://mogren.one/publications/2023/dense-water-flow-intensity-prediction/`

> *I was advising the first author during this work as an active researcher in the project. I wrote parts of the manuscript, and reviewed and edited the whole manuscript.*

J. Martinsson, M. Willbo, A. Pirinen, **O. Mogren**, M. Sandsten, Few-shot bioacoustic event detection using a prototypical network ensemble with adaptive embedding functions, Detection and Classification of Acoustic Scenes and Events 2022, DCASE 2022, `http://mogren.one/publications/2022/fewshot/`

> *I was supervising the first author during this work. I wrote parts of the manuscript, and reviewed and edited the whole manuscript.*

S. Fallahi, A. Mellquist, **O. Mogren**, E. Listo Zec, L. Hallquist, Financing Solutions for Circular Business Models: Exploring the Role of Business Ecosystems and Artificial Intelligence, Business Strategy and the Environment, Business Strategy and the Environment, 2022, `http://mogren.one/publications/2022/financing/`

> *I was supervising Edvin Listo Zec during this work (and I was responsible for the AI work in this project). I wrote parts of the manuscript, and reviewed and edited the whole manuscript.*

J. Martinsson, M. Runefors, H. Frantzich, D. Glebe, M. McNamee, **O. Mogren**, A Novel Method for Smart Fire Detection Using Acoustic Measurements and Machine Learning: Proof of Concept, Journal of

Fire Technology, Fire Technol, 2022, http://mogren.one/publications/2022/smartfiredetection/

I was supervising the first author during this work (and I was responsible for the AI work in this project). I wrote parts of the manuscript, and reviewed and edited the whole manuscript.

J. Martinsson, A. Schliep, B. Eliasson, **O. Mogren**, Blood glucose prediction with variance estimation using recurrent neural networks, Journal of Healthcare Informatics Research, JHIR, 2019, http://mogren.one/publications/2019/blood/

I was supervising the first author during this work. I wrote parts of the manuscript, and reviewed and edited the whole manuscript.

D. Research qualifications portfolio

D.1. Reflection on research activities

My research career since completing my PhD in 2018 has been a journey of increasing independence and impact, driven by a commitment to leveraging artificial intelligence (AI) to address urgent climate and environmental challenges. This path has led me from extending my doctoral work to establishing and leading a distinct, interdisciplinary research agenda at the critical intersection of machine learning, environmental science, and societal resilience. My research is built on the conviction that AI can provide transformative tools to monitor, understand, and mitigate climate change, a vision I have pursued by carving out new research avenues, building a dedicated research team, and securing the necessary funding to turn ideas into results.

My trajectory toward self-directed research is evidenced by my success in attracting over 20 MSEK in competitive research funding since 2018. This has been instrumental in establishing three core, interconnected research pillars:

First, in *environmental soundscape analysis*, I explore the rich information sound holds as an indicator of environmental health. Our work pioneers the use of AI, including unsupervised representation learning and few-shot learning techniques, to analyze complex acoustic data for biodiversity monitoring. This research directly supports climate adaptation and mitigation by offering scalable methods to track how ecosystems respond to environmental shifts. A key collaboration in this area is with Professor Maria Sandsten at LTH and Professor Tuomas Virtanen at Tampere University, which includes the co-supervision of my PhD student, John Martinsson. In spring 2025, this work expanded through a new collaboration with Jonas Hentati-Sundberg at the Swedish University of Agriculture to study Baltic seabirds on Stora Karlsö using an AI-driven microphone array.

Second, I address the inherently distributed nature of environmental data through *distributed and decentralized machine learning*. Much of the world's climate and environmental data is sensitive or geographically dispersed, making centralized analysis impractical or impossible. Our research tackles the fundamental challenge of statistical heterogeneity ('non-IID data') in real-world environmental applications. Our publication, *"Efficient node selection in private personalized decentralized learning"* (NLDL, 2024), showcases the development of novel algorithms to enhance the robustness of decentralized models. This is a crucial step toward enabling collaborative, privacy-preserving climate modeling and monitoring. This research area has been advanced significantly together with my PhD student Edvin Listo Zec, whom I have co-supervised together with Sarunas Girdzijauskas at KTH.

Third, my research integrates *computer vision for large-scale environmental monitoring*, using satellite, drone, and camera trap imagery. My team and I have developed novel deep learning architectures for tasks such as detecting certain types of peatland and identifying crop diseases exacerbated by climate change. We have also worked on explaining inherent biases and limited robustness in Earth observation models as detailed in our 2024 ML4RS paper on the impacts of data distortions. These results have direct applications in tracking deforestation, monitoring glacial melt, and enabling precision agriculture to reduce emissions.

A defining feature of my work is its strong interdisciplinary and collaborative nature. As a co-PI in CLIMES (Swedish Centre for Impacts of Climate Extremes), I lead the AI-focused research to develop models that can identify precursors to extreme weather events. Recognizing the need for a connected research community, I co-founded the Climate AI Nordics network in 2024, which has rapidly grown to over 199researchers, fostering new collaborations and knowledge sharing across the Nordic countries.

Future Research Plan

Looking ahead, my vision is to deepen and expand these research pillars. I will focus on advancing multi-modal AI techniques that can fuse diverse data streams, from satellite imagery and soundscapes to sensor network data and climate model outputs, to create a more holistic understanding of environmental systems. A central goal is to develop trustworthy and robust AI, ensuring that our models are easy and reliable for use both by domain experts and policymakers. Besides designing models that capture

uncertainty in data and predictions, this involves creating methods that are easier to train and utilize, reducing the reliance on massive, manually annotated datasets by incorporating techniques like active and semi-supervised learning. We have already started on the journey by presenting strategies for efficient use of annotators, by making the annotation process active; incorporating people and machines side by side in the annotation process. However, much more needs to be done for this kind of technology to reach its full potential in being helpful to domain experts, and to truly achieve this, their whole workflow needs to be considered. Finally, I plan to further develop and scale my work in decentralized machine learning to support global climate initiatives, enabling large-scale, privacy-preserving international collaborations. Central to this vision is the continuation and expansion of my collaborations with leading researchers like Maria Sandsten (LTH), Tuomas Virtanen (Tampere), Jonas Hentati-Sundberg (SLU), and Oisin Mac Aodha (University of Edinburgh), leveraging the exceptional interdisciplinary environment at LTH and Lund University to co-create solutions with real-world impact.

A central ambition of my future research is to more deeply integrate my work within the rich academic environment of LTH and Lund University. Achieving a readership at LTH is a critical step in this vision, as it would provide the formal standing and institutional integration necessary to build sustained, strategic partnerships. My current collaboration with Professor Maria Sandsten at Mathematical Statistics serves as a powerful blueprint for what I aim to achieve on a broader scale. Our joint work, which includes the co-supervision of PhD student John Martinsson, collaborative and successful research grant proposal writing, the publishing of several co-authored peer-reviewed papers, successfully merges her deep expertise in statistical signal processing with my focus on applied and foundational machine learning, creating a synergy that significantly advances our research in soundscape analysis and provides a richer training environment for our student.

As a Reader, I would be formally positioned to replicate and expand this successful model of collaborative supervision and research across other departments. The readership would empower me to more easily initiate projects, attract joint funding, and co-supervise doctoral students with colleagues in fields critical to my work, such as climate science, ecology, statistics, and computer science. I am convinced that the most impactful solutions to the complex challenges of climate change will emerge from such interdisciplinary efforts, and I see the readership at LTH as the key to unlocking the full potential for these vital collaborations.

D.2. List of research qualifications

Experience of supervision in third cycle studies

- **Formal assistant supervisor** for John Martinsson, PhD student, Lund University (planned defence 2027). Thesis topic: Soundscape analysis for ecological applications. Co-supervised with Professor Maria Sandsten (LTH).
- **Formal assistant supervisor** for Edvin Listo Zec, PhD, KTH Royal Institute of Technology (defended 2025). Thesis title: Decentralized deep learning in statistically heterogeneous environments. (ISBN: 978-91-8106-147-5) Co-supervised with Professor Šarūnas Girdzijauskas (KTH).

I have also supervised over 20 MSc students since 2018 on diverse AI-related thesis projects.

Important national and international research collaborations

- **Prof. Maria Sandsten, Lund University:** Ongoing collaboration on soundscape analysis and co-supervision of PhD student John Martinsson.
- **Prof. Tuomas Virtanen, Tampere University:** Joint work on advanced soundscape analysis.
- **Jonas Hentati-Sundberg, Swedish University of Agriculture (SLU):** Collaboration on AI for environmental monitoring, specifically research on the monitoring of Baltic seabirds using AI-based analysis with video and audio.
- **Prof. Kyunghyun Cho, New York University:** I established a research collaboration with Professor Kyunghyun Cho at New York University to address the critical challenges of continual learning and distribution shifts in AI. This collaboration was realized through a Vinnova-funded

staff exchange for my PhD student, Edvin Listo Zec, which led to a valuable relationship between RISE and NYU's CILVR lab.

- **CLIMES (Swedish Centre for Impacts of Climate Extremes):** Co-principal investigator, leading the AI work within this interdisciplinary research center.
- **International Project Consortia:** Leader and partner in multiple Horizon Europe and Eurostar projects (FERTITEC, FusionSafe) with academic and industrial partners across Denmark, Kenya, and other countries.
- **Climate AI Nordics:** I am one of two co-founders of Climate AI Nordics. We initialized this research collaboration network in October 2024 and it has now grown to more than 199 people across the Nordic countries. This has given us a platform to connect with people working on the important topic of AI applied to climate change related problems, and has enabled more collaboration on this important field. We have created a core-team consisting of:
  - Olof Mogren, Research director, RISE
  - Aleksis Pirinen, Researcher, RISE
  - Alouette van Hove, PhD Student, University of Oslo
  - Nico Lang, Assistant Professor, Global Wetland Center / University of Copenhagen
  - Francesca Larosa, Post Doc, KTH Royal Institute of Technology
  - Stefano Puliti, PhD, Researcher, Norwegian Institute of Bioeconomy Research (NIBIO)
  - Ankit Kariryaa, Assistant Professor, University of Copenhagen
  - Hilda Sandström, Post Doc, Aalto University
  - Sigrid Passano Hellan, PhD, Researcher, NORCE Norwegian Research Centre / Bjerknes Centre for Climate Research
  - John Martinsson, PhD Student, RISE Research Institutes of Sweden

International exchanges

- **Research visit (2016):** Visiting researcher in the Deep Learning and Bayesian Modelling group led by Professor Tapani Raiko at Aalto University, Finland.
- **Hosting research visits:** During 2026, the following PhD students will visit my team.
  - Getnet Jenberia, University of Oulu, 2026
  - Ghjulia Sialelli, ETH Zürich, 2026
  - Kimiya Noor Ali, University of Florence, 2026

Participation in relevant networks

- **Founder, Climate AI Nordics (2024-present):** Initiated and established a network for over 199Nordic researchers at the intersection of AI and climate change.
- **Co-Principal Investigator, CLIMES (2023-2027):** A key member of a national center for research on climate extremes.
- **ELLIS member (2025-ongoing)**: In 2025, I was accepted as a member in the European Laboratory for Learning and Intelligent Systems (ELLIS), after getting endorsements from Professor Devis Tuia (ELLIS Fellow, ETH Zurich) and Oisin Mac Aodha (ELLIS Scholar, University of Edinburgh).
- **Organizer, RISE Learning Machines Seminar series (2019-ongoing):** I organize an international seminar series, with foundational and applied talks about machine learning every two weeks.

Research symposia and conferences

- **Organizer:** Nordic Workshop on AI for Climate Change, 2025.

  As the primary organizer, I planned and executed the first Nordic Workshop on AI for Climate Change, bringing together leading researchers from across the Nordic countries to address the intersection of artificial intelligence and climate action. The full-day event featured prominent international keynotes, a curated program of oral and poster presentations, and successfully fostered collaboration to help define impactful directions for future research in the field. The workshop is now an annual event and is planned to be organized in Copenhagen in 2026.

  More info: `https://climateainordics.com/events/2025-nordic-workshop`

- **Invited Keynotes and Talks (in selection):**
  - *Grand Seminar - AI for Biodiversity and Climate Research* (Jan 2026): *"The development of AI in relation to research on biodiversity and climate"*. (Biodiversity and Ecosystem services in a Changing Climate, Lund University)
  - *MATHMET* (2025): *"From neural networks to nature: trustworthy AI for environmental measurement and climate action"*. MATHMET is the international conference for the European Metrology Network (EMN) for Mathematics and Statistics.
  - *TEDxKTH* (2024): "Tackling climate change using AI"
  - *AI in Biology Conference* (2024): "Supporting ecology with machine learning" (Skövde University)
  - *EUREF Symposium* (2023), "AI for the environment" (Chalmers University of Technology)
  - *CHAIR workshop at Chalmers* (2022), "AI for climate"
  - *AI for climate workshop* (2021), "AI for the environment" (Lund University)
- **Panelist:**
  - Climate Change AI Workshop at ICLR (2024).
  - The Swedish Embassy in Berlin (2024)

Assessment of others' work

- **PhD grading committee member:** Joel Oskarsson, Linköping University, 2025.
- **PhD halfway seminar discussion Leader:** Nikolas Huhnstock, University of Skövde, 2019.
- **External reviewer (research proposals):** Academy of Finland (2021), The Research Council for Natural Sciences and Engineering, Frontier AI Technologies (2021), Swedish Research Council (2021), Climate Change AI (2021, 2023).
- **Peer reviewer (research papers):** IEEE Transactions on Geoscience and Remote Sensing (2025), ECML-PKDD (2024), Tackling Climate Change with AI Workshop at NeurIPS (2025), SLTC (2020), SRW at EACL (2023), NLDL (2025), AICC at EurIPS (2025), Nordic Machine Intelligence (2024, 2025).

Other expert assignments

- **Expert Commentator:** Frequent appearances discussing AI on Swedish national television (SVT Aktuellt, TV4 Nyhetsmorgon) and radio (Sveriges Radio P1 Klotet, Vetenskapsradions nyheter, P3 Eftermiddag) between 2022-2025.

D.3. List of publications

Peer-reviewed published articles

J. Martinsson, T. Virtanen, M. Sandsten, **O. Mogren**, The Accuracy Cost of Weakness: A Theoretical Analysis of Fixed-Segment Weak Labeling for Events in Time, Transactions on Machine Learning Research, TMLR (2025) `https://mogren.ml/publications/2025/accuracy-cost/`

X. Lan, J. Taghia, F. Moradi, M. Ali Khoshkholghi, E. Listo Zec, **O. Mogren**, T. Mahmoodi, A. Johnsson, Federated learning for performance prediction in multi-operator environments, ITU Journal on Future and Evolving Technologies, ITUJ (2023) `https://mogren.ml/publications/2023/multi-operator/`

S. Fallahi, A. Mellquist, **O. Mogren**, E. Listo Zec, L. Hallquist, Financing Solutions for Circular Business Models: Exploring the Role of Business Ecosystems and Artificial Intelligence, Business Strategy and the Environment, Business Strategy and the Environment, 2022, `http://mogren.one/publications/2022/financing/`

J. Martinsson, M. Runefors, H. Frantzich, D. Glebe, M. McNamee, **O. Mogren**, A Novel Method for Smart Fire Detection Using Acoustic Measurements and Machine Learning: Proof of Concept, Journal of Fire Technology, Fire Technol, 2022, `http://mogren.one/publications/2022/smartfiredetection/`

J. Martinsson, A. Schliep, B. Eliasson, **O. Mogren**, Blood glucose prediction with variance estimation using recurrent neural networks, Journal of Healthcare Informatics Research, JHIR, 2019, `http://mogren.one/publications/2019/blood/`

O. Mogren, R. Johansson, Character-based recurrent neural networks for morphological relational reasoning, Journal of language modelling, JLM 2019 (2019) `https://mogren.ml/publications/2019/character-based/`

- **A preliminary version of this work was included in my PhD thesis.**

N. Tahmasebi, L. Borin, G. Capannini, D. Dubhashi, P. Exner, M. Forsberg, G. Gossen, F. D. Johansson, R. Johansson, M. Kågebäck, **O. Mogren**, P. Nugues, T. Risse, Visions and open challenges for a knowledge-based culturomics, International Journal on Digital Libraries, IJDL (2015) `https://mogren.ml/publications/2015/visions/`

Peer-reviewed conference papers

R. Lindholm, O. Marklund, **O. Mogren**, J. Martinsson, Aggregation Strategies for Efficient Annotation of Bioacoustic Sound Events Using Active Learning, European Signal Processing Conference, EUSIPCO (2025) `https://mogren.ml/publications/2025/aggregation/`

J. Martinsson, **O. Mogren**, M. Sandsten, T. Virtanen, From Weak to Strong Sound Event Labels using Adaptive Change-Point Detection and Active Learning, European Signal Processing Conference, EUSIPCO (2024) `https://mogren.ml/publications/2024/from/`

M. Willbo, A. Pirinen, J. Martinsson, E. Listo Zec, **O. Mogren**, and M. NilssonImpacts of color and texture distortions on earth observation data in deep learning. 2nd Machine Learning for Remote Sensing Workshop at ICLR, ML4RS (2024), `https://mogren.one/publications/2024/impacts/`

E. Listo Zec, J. Östman, **O. Mogren**, D. Gillblad, Efficient Node Selection in Private Personalized Decentralized Learning, Northern Lights Deep Learning Conference, NLDL, 2024, `http://mogren.one/publications/2024/efficient/`

A. Pirinen, **O. Mogren**, M. Västerdal, Fully Convolutional Networks for Dense Water Flow Intensity Prediction in Swedish Catchment Areas, 35th Annual Workshop of the Swedish Artificial Intelligence Society SAIS, 2023, `http://mogren.one/publications/2023/dense-water-flow-intensity-prediction/`

M. Toftås, E. Klefbom, E. Listo Zec, M. Willbo, **O. Mogren**, Concept-aware clustering for decentralized deep learning under temporal shift, Federated Learning and Analytics in Practice: Algorithms,

Systems, Applications, and Opportunities workshop at ICML, FL-ICML (2023) https://mogren.ml/publications/2023/concept-aware/

E. Listo Zec, J. Östman, **O. Mogren**, D. Gillblad, Private Node Selection in Personalized Decentralized Learning, arXiv preprint, arXiv (2023) https://mogren.ml/publications/2023/private/

J. Martinsson, M. Willbo, A. Pirinen, **O. Mogren**, M. Sandsten, Few-shot bioacoustic event detection using a prototypical network ensemble with adaptive embedding functions, Detection and Classification of Acoustic Scenes and Events 2022, DCASE 2022, http://mogren.one/publications/2022/fewshot/

E. Ekblom, E. Listo Zec, **O. Mogren**, EFFGAN: Ensembles of fine-tuned federated GANs, IEEE International Conference on Big Data, IEEE Big Data (2022) https://mogren.ml/publications/2022/effgan/

E. Listo Zec, E. Ekblom, M. Willbo, **O. Mogren**, S. Girdzijauskas, Decentralized adaptive clustering of deep nets is beneficial for client collaboration, International Workshop on Trustworthy Federated Learning, FL-IJCAI (2022) https://mogren.ml/publications/2022/decentralized/

J. Martinsson, E. Listo Zec, D. Gillblad, **O. Mogren**, Adversarial representation learning for synthetic replacement of private attributes, IEEE International Conference on Big Data, IEEE BigData (2021) https://mogren.ml/publications/2021/adversarial/

N. Onoszko, G. Karlsson, **O. Mogren**, E. Listo Zec, Decentralized federated learning of deep neural networks on non-iid data, 2021 Workshop on Federated Learning for User Privacy and Data Confidentiality at the 38th International Conference on Machine Learning, FL-ICML 2021 (2021) https://mogren.ml/publications/2021/decentralized/

A. Hilmkil, S. Callh, M. Barbieri, L. René Sütfeld, E. Listo Zec, **O. Mogren**, Scaling Federated Learning for Fine-Tuning of Large Language Models, International Conference on Applications of Natural Language to Information Systems, NLDB 2021 (2021) https://mogren.ml/publications/2021/scaling/

E. Listo Zec, **O. Mogren**, J. Martinsson, L. René Sütfeld, D. Gillblad, Specialized federated learning using a mixture of experts, Arxiv Preprint 2020, Arxiv 2020 (2020) https://mogren.ml/publications/2020/federated/

D. Ericsson, A. Östberg, E. Listo Zec, J. Martinsson, **O. Mogren**, Adversarial representation learning for private speech generation, The Workshop on Self-supervision in Audio and Speech at the 37th International Conference on Machine Learning, ICML-SAS (2020) https://mogren.ml/publications/2020/privatespeech

E. Listo Zec, **O. Mogren**, Grammatical gender in Swedish is predictable using recurrent neural networks, Conference of the Swedish Cognitive Society, SweCog (2019) https://mogren.ml/publications/2019/grammatical/

J. Martinsson, **O. Mogren**, Semantic segmentation of fashion images using feature pyramid networks, Second Workshop on Computer Vision for Fashion, Art and Design at ICCV, CVCREATIVE (2019) https://mogren.ml/publications/2019/semantic/

M. Korneliusson, J. Martinsson, **O. Mogren**, Generative modelling of semantic segmentation data in the fashion domain, Second Workshop on Computer Vision for Fashion, Art and Design at ICCV, CVCREATIVE (2019) https://mogren.ml/publications/2019/generative/

M. Kågebäck, **O. Mogren**, Disentanglement by Penalizing Correlation, NIPS Workshop on Learning Disentangled Features: from Perception to Control, DisentangleNIPS (2017) https://mogren.ml/publications/2017/disentangled-activations-in-deep-networks/

- **This work was included in my PhD thesis.**

O. Mogren, R. Johansson, Character-based recurrent neural networks for morphological relational reasoning, Subword & Character Level Models in NLP (SCLeM) workshop at EMNLP, SCLeM (2017) https://mogren.ml/publications/2017/character-based/

S. Almgren, S. Pavlov, **O. Mogren**, Named entity recognition in Swedish health records with character-based deep bidirectional LSTMs, Fifth workshop on building and evaluating resources for biomedical text mining (BioTxtM) at COLING, BioTxtM (2016) `https://mogren.ml/publications/2016/ner-char-blstm/`

O. Mogren, C-RNN-GAN: Continuous recurrent neural networks with adversarial training, Constructive Machine Learning Workshop (CML) at NIPS, CML (2016) `https://mogren.ml/publications/2016/c-rnn-gan/`

J. Hagstedt P Suorra, **O. Mogren**, Assisting discussion forum users using deep recurrent neural networks, Representation learning for NLP, RepL4NLP at ACL, RepL4NLP (2016) `https://mogren.ml/publications/2016/assisting/`

O. Mogren, M. Kågebäck, D. Dubhashi, Extractive summarization by aggregating multiple similarities, Recent advancements in NLP, RANLP (2015) `https://mogren.ml/publications/2016/assisting/`

- **This work was included in my PhD thesis.**

P. Damaschke, **O. Mogren**, Editing simple graphs, Journal of Graph Algorithms and Applications, JGAA (2014) `https://mogren.ml/publications/2014/editing/`

M. Kågebäck, **O. Mogren**, N. Tahmasebi, D. Dubhashi, Extractive summarization using continuous vector space models, 2nd Workshop on Continuous Vector Space Models and their Compositionality at EACL, CVSC (2014) `https://mogren.ml/publications/2014/extractive/`

- **This work was included in my PhD thesis.**

O. Mogren, O. Sandberg, V. Verendel, D. Dubhashi, Adaptive dynamics of realistic small-world networks, European Conference on Complex Systems, ECCS (2009) `https://mogren.ml/publications/2009/adaptive/`

Technical reports

N/A.

D.4. Research grants

FusionSafe: Fusion of dual-modal radar and camera sensors with deep-learning AI

- **My Role:** AI Training Supervisor, Work Package 2 Lead
- **Total Amount:** EUR 1.7M
- **My Portion:** EUR 70k
- **Funding Body:** Eurostar
- **Period:** 2025-2027

FusionSafe is an international innovation project aimed at creating a next-generation AI-powered safety system for autonomous off-road vehicles. The project's core objective is to develop "FusionSafe," a sophisticated deep learning model that fuses data from multiple camera and radar sensors. This approach will enable superior object detection and tracking in challenging environments such as agriculture and mining, where conditions like dust, rain, and fog limit the effectiveness of current systems. The technology is designed to significantly improve safety, reduce false positives, and lower costs by replacing expensive LiDAR sensors. The project is a collaboration between AgriRobot (Denmark), Danish Technological Institute, Saferadar Research Sweden, and RISE Research Institutes of Sweden. Within this consortium, I serve as the AI Training Supervisor. My responsibility is to lead, coordinate, and oversee the machine learning development across all work packages, ensuring

the AI training is optimized to achieve the highest possible performance. I also lead Work Package 2, which focuses on pre-training the AI network for sensor fusion.

Grey to green: Using AI to detect and prioritize conversion of impervious surfaces

- **My Role:** Co-Investigator, Work Package 3 Lead
- **Total Amount:** SEK 4 M
- **My Portion:** SEK 1.5 M
- **Funding Body:** Formas
- **Period:** 2024-2026

Grey to green is a collaborative project designed to tackle urban environmental challenges. It aims to develop an innovative AI- and GIS-based decision support tool that helps cities become more sustainable and resilient. The tool will analyze complex geographical data—including satellite imagery, heat maps, and infrastructure data—to identify and prioritize the most effective locations for converting hard, impervious surfaces into multifunctional green spaces. The ultimate goal is to enhance climate adaptation, improve biodiversity, manage stormwater, and support urban well-being in a cost-effective manner. The project is a collaboration between key academic and municipal partners: RISE Research Institutes of Sweden (project coordinator), the Swedish University of Agricultural Sciences (SLU), the City of Malmö, and Uppsala Municipality. The two cities serve as crucial case studies for the development, testing, and validation of the tool. Within this project, I am the leader for Work Package 3 (WP3): Machine learning development and analysis. My primary responsibility is to lead the team at RISE in developing the core AI-based tools. This involves selecting the machine learning strategies, overseeing the development and training of models to analyze urban areas, and producing a geographical analysis that suggests where new green spaces should be prioritized to maximize benefits related to climate resilience, biodiversity, and human well-being.

FERTITEC: FERTIliser Product Recovery from Secondary Raw Materials

- **My Role:** Responsible for AI development
- **Total Amount:** SEK 23 M
- **My Portion:** SEK 1.8 M
- **Funding Body:** EU Horizon
- **Period:** 2024-present

FERTITEC s a large-scale international project that aims to create a more sustainable and circular agricultural sector. The project addresses the environmental and economic challenges of relying on conventional mineral fertilisers by promoting the recovery and reuse of nutrients from secondary raw materials, such as agricultural waste, biowaste, and industrial side-streams. Its core mission is to analyze, systematize, and spread knowledge about the most effective and sustainable technologies for creating alternative fertilisers. To achieve this, FERTITEC will map over 150 existing technologies, conduct in-depth assessments of 30 case studies across Europe and Africa, and identify at least 6 Best Available Techniques (BATs). All findings will be shared through a central Knowledge Exchange Platform (KEP), which will include an innovative, AI-powered "EcoFerti" tool to provide farmers with personalized fertilisation advice. The project is coordinated by RISE and involves a consortium of seven partners from six countries, including academic institutions, business advisors, and a farmers' federation in Kenya, ensuring a global perspective. As the project coordinator, RISE leads the overall management and several key technical activities. My role within the project is to lead the socio-economic assessments of the case studies, the cross-case analysis to determine the Best Available Techniques, and the development of the AI algorithms that will power the EcoFerti tool.

Using structural causal models to understand distributional shift in federated learning

- **My Role:** Principal Investigator
- **Total Amount:** SEK 1.1 M
- **My Portion:** SEK 1.0 M
- **Funding Body:** Vinnova
- **Period:** 2023

This project addressed the critical challenge of distributional shifts in federated learning, where models trained on one data distribution fail when deployed on another, and when put in a federation degrade the performance of the resulting aggregated model. To tackle this, the project investigated the use of structural causal models (SCMs) to learn invariant relationships in the data, thereby creating more robust and generalizable AI. In collaboration with Ericsson, these methods were developed and tested on real-world telecommunication datasets to improve the resilience of systems for managing network services.

Active learning for ecological monitoring

- **My Role:** Principal Investigator
- **Total Amount:** SEK 1.2 M
- **My Portion:** SEK 1.0 M
- **Funding Body:** Vinnova
- **Period:** 2023

This project tackled the high cost of manual data annotation, a major barrier to using advanced AI for ecological monitoring with sound and image data. The core innovation involved creating novel hierarchical active learning algorithms that intelligently select the most informative data to be labeled, while also efficiently utilizing annotators with different levels of expertise. Developed in collaboration with Lund University and targeting real-world use cases at the Swedish University of Agricultural Sciences (SLU), the project's goal is to make powerful, data-efficient AI tools more accessible for biodiversity research and conservation.

Soundscape analysis using AI, PhD project

- **My Role:** Principal Investigator
- **Total Amount:** SEK 2.5 M
- **My Portion:** SEK 2.5 M
- **Funding Body:** Swedish Foundation for Strategic Research (SSF)
- **Period:** 2021-2027

This doctoral project addresses the critical bottleneck of data annotation in soundscape analysis by pioneering new methods for annotation efficiency. Key contributions range from fundamental theoretical analyses of weak labelling strategies (Martinsson et al., 2025) to the practical development of few-shot learning for sound event detection (Martinsson et al., 2022) and a novel system using adaptive change-point detection (Martinsson et al., 2024). In collaboration with Lund University and the Swedish University of Agricultural Sciences, these advanced techniques will now be applied to analyze a unique, newly collected dataset of common guillemots in the Baltic Sea during the final years of the project.

Predictive maintenance for district heating networks

- **My Role:** Co-Investigator
- **Total Amount:** SEK 2 M
- **My Portion:** SEK 1M.
- **Funding Body:** ÅFORSK
- **Period:** 2021-2022

As Principal Investigator, I led the preDHiCt project to address the critical challenge of predictive maintenance in aging district heating networks, where individual operators often lack sufficient data to build effective machine learning models. The project pioneered the use of Federated Learning (FL) in the district heating sector, creating a collaborative platform that allows multiple utilities to jointly train a common prediction model without ever sharing their sensitive, proprietary data. The project successfully delivered a proof-of-concept digital platform designed to predict pipe failure risk and remaining lifetime, providing a powerful decision support tool for optimizing maintenance strategies and securing infrastructure investments.

Staff exchange for applied AI-research 2.0

- **My Role:** Principal Investigator
- **Total Amount:** SEK 335 k
- **My Portion:** SEK 335 k
- **Funding Body:** Vinnova
- **Period:** 2022

To deepen our expertise in handling the critical problem of distribution shifts, I secured this grant for my PhD student, Edvin Listo Zec, to collaborate with Professor Kyunghyun Cho's leading research group at New York University. This international collaboration specifically explored continual learning as a complementary approach to our work on structural causal models, investigating how to build AI systems that can adapt to new data over time without suffering from catastrophic forgetting. The exchange successfully established a valuable long-term collaboration between RISE and NYU, directly enhancing our team's capacity to develop robust, adaptive AI and enriching the theoretical foundations of our broader research on distribution shifts.

AI and civil science for porcelain objects

- **My Role:** Principal Investigator
- **Total Amount:** SEK 1 M
- **My Portion:** SEK 1 M
- **Funding Body:** Swedish National Heritage Board and Region Västra Götaland
- **Period:** 2022

As Principal Investigator, I led this follow-up project to enhance our AI tool for Rörstrand Museum, specifically tackling the challenges of model robustness and adding the critical new capability of analyzing porcelain stamps. This was accomplished through a major data collection and annotation effort, which included gathering new images from the web, the museum, and a purpose-built citizen science platform. The project delivered a significantly improved system with robust models for both decor recognition and a novel two-stage process for detecting porcelain stamps and accurately identifying their production decade.

Effective knowledge dissemination through AI

- **My Role:** Principal Investigator
- **Total Amount:** SEK 860 k
- **My Portion:** SEK 860 k
- **Funding Body:** Region Västra Götaland
- **Period:** 2021

As Principal Investigator, I led this project to develop an AI-powered tool for Rörstrand Museum, aiming to automate the identification of porcelain objects from user-submitted images and make cultural heritage information more accessible. Leveraging deep convolutional neural networks, the project involved training a model on thousands of images from the museum's own collections and other cultural heritage databases to recognize attributes like artist, decade, and decor. The project resulted in a functional proof-of-concept web application, while also providing critical insights into the real-world challenge of domain adaptation, highlighting the performance gap between curated museum data and diverse, user-submitted images.

Safe and just AI-based drug detection

- **My Role:** Principal Investigator
- **Total Amount:** SEK 5 M
- **My Portion:** SEK 5 M
- **Funding Body:** Vinnova
- **Period:** 2020-2022

As Principal Investigator for the AI analysis, I led RISE's contribution to this project, which aimed to develop safe and fair methods for detecting drug impairment by analyzing video recordings of the eye region. A central part of the project was a unique collaboration with Sahlgrenska University Hospital to collect a novel dataset, filming the eyes of individuals undergoing clinical drug testing to ground our AI models in real-world data. My team and I developed and refined deep learning algorithms to identify subtle, drug-induced changes in pupil size and eye movement, while guiding and providing knowledge transfer to the growing in-house machine learning development team at the collaboration startup (Sightic). The work culminated in a demonstrator that showcases a non-invasive, high-accuracy screening tool with significant potential to improve traffic safety.

Sightic were so happy with the collaboration so that they funded a continuation project with direct funding, where we further refined the solutions.

Swedish medical language data lab

- **My Role:** Responsible for AI development
- **Total Amount:** SEK 2 M
- **My Portion:** SEK 2 M
- **Funding Body:** Vinnova
- **Period:** 2020-2021

I led the technical development within the Swedish Medical Language Data Lab, a national initiative aimed at making sensitive medical free-text from patient journals accessible for research and innovation. In close collaboration with healthcare providers like Region Halland and Sahlgrenska

University Hospital, we developed specialized privacy-enhanced Swedish language models for the medical domain, alongside the crucial technical, legal, and ethical processes for secure data sharing. The project successfully delivered a number of models and processes to analyse Swedish medical language, creating a vital foundation for future data-driven applications in the Swedish life science sector.

AID-CBM - AI driven financial risk assessment for CBMs

- **My Role:** Co-Investigator
- **Total Amount:** SEK 4.4 M
- **My Portion:** SEK 2 M
- **Funding Body:** Vinnova
- **Period:** 2019-2021

The AID-CBM project was designed to accelerate the transition to a circular economy by addressing a key barrier for financiers: the uncertainty surrounding the future residual value of products in circular business models. As the leader of the AI development, my responsibility was to design and implement a machine learning system that could predict this residual value by collecting and analyzing vast amounts of open data from online marketplaces. This work culminated in the delivery of a functional AI model and an application prototype, developed in close collaboration with banking partners, which successfully demonstrated a data-driven approach to estimation of residual value in second-hand stock, a crucial help for financing in the circular economy.

E. Teaching qualifications portfolio

E.1. Introduction and pedagogical philosophy

My engagement with teaching and supervision stems from a long-held enjoyment of explaining complex concepts and fostering understanding in others, an interest sparked during my own undergraduate studies when I first worked as a teaching assistant. This early experience solidified my belief in the importance of clear communication and tailored support in the learning process. Over years of research and supervision, primarily at the postgraduate level, this foundation has evolved into a pedagogical philosophy centred on facilitating student growth, critical thinking, and independence within a supportive and stimulating environment.

My core pedagogical stance, particularly relevant in the rapidly evolving field of artificial intelligence, is rooted in a student-centred approach. I believe that effective learning, especially at the master and doctoral levels, requires adapting guidance to individual needs, backgrounds, and learning styles. While rigour and critical evaluation are paramount in research training, I strive to deliver feedback constructively, focusing on development rather than mere judgment. My goal is not just to impart technical knowledge, but to cultivate the skills necessary for students to become independent, innovative, and responsible researchers capable of navigating complex problems and contributing meaningfully to their field and society. This involves fostering not only analytical capabilities but also communication skills, ethical awareness, and collaborative abilities.

During the course of a PhD project, a student typically go through a number of phases. In my experience, the most successful approach has been to make it clear that you are there to guide the student, but to also be responsive to the individual needs for independence. Quality research (and the most effective research) occurs when the exact right amount of creative freedom allows the student to explore the right directions, while a supervisor may be important to help avoid the most time-consuming mistakes. In general, in the early days, a PhD student will need more guidance, and after a couple of years, they can start taking on more responsibility. It is important to let this process take place, and not stand in the way. In particular, in a field such as computer science, and in this case machine learning, the early phases of a PhD project may include learning the breadth of the technologies in the toolbox, while the latter phases may include delving deep into a specific area of interest, and develop it further.

E.2. Reflection on supervision practice

Supervision forms the cornerstone of my pedagogical experience. It is here that the long-term development of a young researcher unfolds, which I believe requires a deeply reflective and adaptive approach from the supervisor. Important goals of the supervision include supporting student learning, reflecting on practice, and seeking development through interaction.

PhD supervision – a reflective approach

My experience supervising PhD candidates provides the most significant opportunity for deep pedagogical engagement and reflection. Each PhD journey is unique, demanding a personalized supervisory relationship that evolves over several years.

PhD Student A (defended 2025): Supervising *PhD Student A* through to their successful defence was an amazing experience. Their research focused on decentralized deep learning, an area intersecting with my expertise (deep learning), and their academic supervisor at KTH, Sarunas Girdzijauskas (decentralized algorithms). Initially, the student worked on a number of diverse applications of machine learning, including predicting residual values of second hand clothing, analyzing grammatical properties of words in Swedish, and privacy-preserving processing of speech data. As their PhD studies progressed, they worked more and more on decentralized applications and data distribution shifts. I organized a six months research visit to Professor Kyunghyun Cho at NYU, allowing the student to dive deeper into probabilistic graphical modeling. *PhD Student A* was always independent, yet they were always welcoming input from me and the academic supervisor. When some of the work on distribution shifts turned out to not give the results that we were hoping for, we had to change priorities slightly. I think many other students may have been put off by the adversity and having a PhD journey containing many diverse tasks. This

is something that I tried to manage in my supervisory role, such that the student could get the right amount of challenge, yet be able to focus to be able to progress as a young researcher. My reflective practice involved regularly assessing the needs of the student and adjusting my guidance. For example, their ability to quickly adapt to new situations made me allow them to pursue more diverse directions, yet when the work on distributional shifts and graphical models turned out to not be the success story we had hoped for, I tried to guide them to take the useful parts of that period and use them in other ways. Their motivation may have dipped within this process, but I believe that we were able to recover it. My goal was always to provide the necessary scaffolding while pushing the student towards greater independence and critical self-assessment. While the success of the student is a rewarding confirmation of our adaptive process, I also reflect on the more challenging periods. They have provided a valuable lesson for my own practice, highlighting how I can be an even stronger guide for my next student when they face the inevitable adversities of research. The thesis was defended in January 2025.

PhD Student B(Licentiate 2024, PhD planned 2027): The work from *PhD Student B* on soundscape analysis represents a different set of challenges and opportunities. They defended their Licentiate degree in 2024 and are planning to defend their PhD in 2027. While I have been very lucky with the recruitment of both my PhD students, they are together a perfect demonstration of how different individuals work differently and require different approaches in the supervision. Both students were working in my research group before starting their PhD journey, and both started working on small research projects with diverse requirements and technical prerequisites. In *PhD Student B's* case, this meant a number of projects on different applications in image processing and privacy-preserving techniques. After obtaining a grant which covers most of their working time during the whole PhD project, their work has converged towards soundscape analysis for biodiversity monitoring. This is a topic which has suited both them and me very well. I have been co-supervising the student with Professor Maria Sandsten (LTH) in the Statistical Signal Processing Group, an expert in time-frequency representations. This collaboration has been an integral part of my pedagogical development leveraging complementary expertise; ultimately benefiting the student by exposing them to different perspectives and skill sets. Our reflective discussions, both with the student and between supervisors, focus on aligning expectations, identifying developmental needs, and planning the trajectory towards the PhD. While I think that having many diverse themes suited *PhD Student A*[2], I believe that for *PhD Student B*, it has been essential to help them staying focused. At the same time, this is most certainly their super power; when they are "in their zone", this student can achieve almost anything. In their case, however, I have felt a need to help maintain focus by buffering them from the stress of competing priorities not directly aligned with their core research. This is a balancing act, as learning to navigate and manage competing priorities is, in itself, a crucial part of becoming an independent researcher. *PhD Student B* successfully defended their Licentiate thesis in October 2024.

I typically have regular supervision meetings with my PhD students. Early on in their PhD projects, we had these once per week, later in the process, we changed this to biweekly meetings. Supervising these two students has taught me that no PhD journey is the same as another. During my own PhD process, my first year felt like I didn't know anything. After that phase, I started to understand how to obtain the supervision that I needed, and what was required of me to obtain the results that I was aiming for. At several times during this transition I doubted that the end result was worth the effort. In the last two years of my PhD trajectory, I developed a more independent way of working, and I learned to use several different senior researchers for my different needs. While I don't think that my students will have the same experience, my own experience has made me humble and open to exploring what kinds of support is required for each student. Therefore, I try to encourage my students to have more senior researchers available for guidance. This has included helping them to form contacts abroad and obtaining funding for sending them on research visits (*PhD Student A* to Kyunghyun Cho at NYU; *PhD Student B* to Tuomas Virtanen at Tampere University).

During our weekly (or biweekly) supervision meetings we review research progress, strategize our publication pipeline, and define clear, actionable next steps. My supervisory philosophy is rooted in fostering an open, two-way dialogue. While rigorous feedback is essential for scientific growth, I find that a climate of mutual respect and shared understanding often precludes the need for harsh, corrective criticism. Effective communication, in my view, is as much about listening as it is about speaking; I make it a priority to understand the student's perspective and to ensure my feedback is both constructive and well-timed.

[2]At one point we did have to start limiting the exploration as described in previous sections.

This approach cultivates a partnership where both the student and I are aligned on our common goal: to produce a thesis of the highest possible quality, delivered on schedule.

MSc supervision

I have had the privilege of supervising over 20 MSc students since 2018. This experience has provided a rich ground for understanding the transition from coursework to independent research. MSc projects, while shorter, require careful guidance in defining scope, methodology, and realistic goals. My approach involves initial structured support, gradually encouraging students to take ownership of their projects, troubleshoot problems, and present their findings clearly. The diversity of topics (e.g., deep learning for coffee berry disease, graph neural networks for physics simulations, text summarization) reflects my own research breadth but also necessitates adapting my technical guidance and expectations to varied student backgrounds and project aims.

While similar principles apply for master's students (compared to PhD students), the fact that the students are much less experienced and that the project is much shorter requires the supervision to be more direct, with frequent supervision meetings and clearly set goals and expectations from the beginning. However, allowing the students the right amount of independence is important for their learning process. I follow similar strategies for master's students as described in previous section: supervision meetings are times when you can give feedback, but also when the students can express their difficulties and challenges. As stated before, supervisor and student share the same goal: to produce a high quality thesis by the end of the project.

Supervising master's theses has provided further opportunities for pedagogical reflection. Two common issues have been particularly instructive for my practice:

First, a recurring challenge is the development of scientific communication skills. Some students, despite their technical strengths, struggle with academic writing or varying levels of proficiency in academic English. In these cases, I have found it effective to dedicate specific supervision sessions to the craft of writing itself. By working through sections of their draft together, we move beyond the research content to focus on rhetorical structure, clarity, and argumentation. This hands-on, iterative support provides the necessary scaffolding for them to build confidence and competence in this crucial skill.

Second, I have learned the importance of correctly diagnosing the root cause of slow progress. I supervised one student who, working alone, struggled to maintain momentum. Despite possessing the necessary technical background, their weekly progress stalled. After several weeks, a frank and supportive discussion revealed that the project's initial scope, while exciting, was too open-ended and lacked the structure the student needed to proceed. We collaboratively decided to redefine the topic with more clearly delineated goals and a structured methodology. This adjustment proved pivotal; the student regained traction and successfully completed their thesis, albeit with a slight delay. This experience underscored the importance of adapting the project's structure to fit the student's needs and of recognizing that a request for clarity is a sign of engagement, not a lack of ability. Another take-away from this example is the fact that the student was working on their own. I have always encouraged students to work in pairs during their master's thesis, and this example made me even more convinced that this is the best way for most students to work.

E.3. Connecting research dissemination and teaching

My substantial experience in popular science communication (TEDx talks, appearances on SVT and SR, industry presentations, invited talks, panel discussions) directly informs and enhances my pedagogical practice. The ability to distill complex AI concepts into accessible language for diverse audiences is fundamentally a teaching skill. It requires understanding the audience's prior knowledge, identifying the core message, and using clear analogies and examples – techniques directly transferable to lecturing, explaining concepts to students, and framing research problems. This practice has reinforced my ability to bridge the gap between intricate research and broader understanding, a skill vital for both effective supervision and potential future classroom teaching. Furthermore, engaging with non-expert audiences often forces me to reflect on the societal relevance and ethical implications of my research, enriching the perspectives I bring to student discussions. Similarly this experience has helped me in my interaction in cross-disciplinary research consortia, where collaborators have vastly varying experience in machine

learning and AI.

E.4. Future pedagogical development

Looking ahead, I am eager to contribute to the teaching environment at LTH. I would be happy to leverage my expertise in machine learning and its applications, particularly concerning climate change and environmental science, to develop and potentially teach courses at the MSc or PhD level (e.g., "AI for Sustainability" or "Machine Learning for Environmental Data"). I plan to design such courses incorporating principles of active learning and connecting theory to practical, real-world problems.

I intend to continue refining my supervision practices through ongoing reflection, seeking feedback from students and peers. Collaboration is key to pedagogical growth, and I look forward to interacting with experienced colleagues at both RISE and LTH to share experiences and learn from diverse teaching and supervision styles within the Faculty of Engineering. My established collaboration with Prof. Maria Sandsten provides a strong starting point for further pedagogical integration within LTH.

F. Qualifications portfolio for leadership and administrative assignments

My leadership capacity is most clearly demonstrated through the establishment and development of my research team, the RISE Deep Learning Research Group (RIDR). After starting my position at RISE after my PhD defense in 2018, it was a clear expectation both from myself and from my manager that I would build up a research team. During the first year, two junior researchers were hired and from its origins as a small group centered on my post-doctoral research agenda, I have guided its evolution into a dynamic and collaborative team with a distinct scientific identity. Seven years later, the group consists of three senior researchers with PhD degrees, two PhD students, and two junior researchers. My primary role as group leader is to cultivate an environment of intellectual curiosity, scientific rigor, and psychological safety, where every member can thrive both academically and personally. This is achieved through a combination of setting a clear, mission-driven vision (such as developing and leveraging AI for tangible societal benefit) and implementing a supportive operational structure with regular group meetings for scientific exchange and dedicated one-on-one sessions for personalized mentorship.

A cornerstone of my leadership philosophy is the dedicated development of junior researchers, most of whom do not yet hold a PhD. I work with them in a manner akin to my doctoral students, guiding them on a deliberate path toward becoming independent researchers. This process begins with structured involvement in existing projects and gradually transitions to granting them ownership of a specific research question, mentoring them through literature review, experimental design, and the crucial milestone of authoring their first scientific papers. Some of the junior researchers in the group have later started their PhD journey, in collaboration with an academic supervisor at a university. With my senior colleagues, the dynamic is one of peer collaboration and shared responsibilities. We work as partners in shaping the group's future, co-authoring grant proposals, advising each other's projects, and jointly organizing external-facing activities like workshops and international collaborations. This dual approach ensures that while junior talent is carefully nurtured, the group's strategic direction benefits from the collective experience and expertise of its senior members.

The work of RIDR is made tangible through the successful execution of a diverse portfolio of research initiatives. I have served as principal investigator on numerous projects, securing over 20 MSEK in funding since 2018. My leadership also extends to large-scale national and international consortia, where I have acted as coordinator and work package leader for major funding agencies such as Horizon Europe and Eurostar. This has involved responsibility for project vision, team coordination, budget management, and the timely delivery of results across diverse partnerships with academia and industry. A comprehensive list of these projects, detailing my specific leadership roles from principal investigator to work package leader, is available in the Research Grants section of this portfolio and in my Curriculum Vitae.

My commitment to building collaborative environments extends beyond my own team to the broader scientific community. Recognizing a need for greater connectivity among researchers in my field, I co-founded the Climate AI Nordics network, an initiative I have led from its inception to a thriving community of over 199 researchers. This platform now serves as a vital hub for fostering new collaborations across the Nordic countries. I further contribute to community building through the organization of scientific events, such as the upcoming Nordic Workshop on AI for Climate Change and the international RISE Learning Machines Seminar series, which I convene every two weeks.

Since 2020, I have served as one of five research leaders in *RISE Center for applied AI*. Responsible for the deep learning research area, and applications related to environmental monitoring and protection, this has included the planning of a research budget and the development of a comprehensive research program, guiding the development and implementation of AI within the whole organization, spanning five different divisions and more than 3,400 employees. As one of the activities within the center, I have been leading a working group developing our ways of working to ensure our scientific impact. After three years of work, including the organization of six workshops with an external reference group, we have produced a report with guidelines for how the impact of our research output can be improved. Guidelines include the tracking of scientific impact, communication and dissemination of important research results, open publishing of papers, code, and data, and national and international collaboration and networking. The implementation of these guidelines are now being carried out around the organization.

Finally, my leadership contribution includes active service to the broader academic community to uphold the quality and integrity of research. I regularly serve as an expert external reviewer for major national and international funding bodies, including the Swedish Research Council and the Academy of Finland. My administrative duties also involve extensive peer review for top-tier journals and conferences and participation in formal academic examinations, where I have acted as both a PhD grading committee member and a halfway seminar discussion leader. The specifics of these academic service roles are further detailed in my Curriculum Vitae and throughout this application.

G. Qualifications portfolio for innovation, entrepreneurship and external engagement

My research philosophy is fundamentally rooted in the conviction that scientific progress must be connected to real-world challenges and societal needs. This principle has guided my career towards a model of active external engagement, where collaboration with industry, the public sector, and the wider community serves as both the inspiration for and the ultimate destination of my work. My commitment is demonstrated by translating fundamental AI research into tangible innovations, fostering a spirit of scientific initiative, and engaging broadly to ensure the knowledge we generate creates meaningful impact.

This philosophy is put into practice through deep, collaborative innovation with external partners. A significant part of my work involves co-creating solutions with leading industrial players, such as our collaboration with *Ericsson* to develop more robust federated learning systems using causal models for telecommunication networks. Similarly, my pioneering work on the preDHiCt project brought decentralized learning to the district heating sector, developing a proof-of-concept with multiple utility companies to advance their predictive maintenance capabilities from a low to a high Technology Readiness Level (TRL). This model of partnership extends to the public and health sectors, as shown in the "Safe and just AI-based drug detection" project, where a close collaboration with *Sahlgrenska University Hospital* was essential for collecting a unique clinical dataset to develop a novel screening tool. My work with the startup *Sightic* on this project further demonstrates my commitment to supporting the full innovation cycle, helping to bring new technologies from research to market.

Beyond collaborating on specific projects, I believe in proactively building the networks and teams necessary for sustained innovation. My position at a research institute is defined by the principle of bridging fundamental research with applied impact. This means I actively identify real-world challenges with partners in industry and the public sector, and then build new scientific initiatives from the ground up to address them. This is best exemplified by my role as a co-founder of the Climate AI Nordics network. Identifying a critical need for a more connected research community, I took the initiative to establish this platform, which has rapidly grown to over 199 members and is now a vital hub for collaboration and knowledge sharing across the Nordic countries. This act of community-building is mirrored in my approach to my own research group, which I have built by successfully securing over 20 MSEK in competitive funding. This process of articulating a vision, attracting resources, and leading a team to execute that vision is fundamentally entrepreneurial and has been central to establishing my independent research agenda.

For research to create meaningful impact, its findings must be shared beyond academic circles to contribute to public discourse and understanding. I am a frequent expert commentator on AI for major national media outlets, including appearances on SVT's *"Aktuellt"* and programs on Sveriges Radio, where I explain the societal implications of AI developments to a broad audience. My commitment to public outreach is also demonstrated through accessible presentations at venues like TEDxKTH, the Swedish Embassy in Berlin, and industry forums. Furthermore, my projects with cultural institutions like Rörstrand Museum are a form of direct public engagement, creating AI-powered tools that make cultural heritage more accessible and involving the public through citizen science initiatives. This continuous dialogue with industry, public institutions, and society at large ensures my research remains relevant, impactful, and aligned with the needs it seeks to address.