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EDUCATION

- | | |
|---|---------------------------------|
| PhD in Agrivoltaic Systems
<i>Mälardalen University</i> | 2021-Present
<i>Västerås</i> |
| <ul style="list-style-type: none">• Optimizing agrivoltaic systems to find the most efficient system solution.• Incorporating machine learning and probabilistic machine learning to improve the modeling of agrivoltaic systems. | |
| Licentiate in Agrivoltaic Systems
<i>Mälardalen University</i> | 2021-2024
<i>Västerås</i> |
| <ul style="list-style-type: none">• Modeling and simulating agrivoltaic systems with a focus on microclimate.• Developing models for simulation using computational fluid dynamics (CFD) for agrivoltaic systems. | |
| MSc in Sustainable Energy Systems
<i>Mälardalen University</i> | 2019-2021
<i>Västerås</i> |
| <ul style="list-style-type: none">• Focused on modeling, simulation, and optimization of various types of energy systems. | |
| BSc in Energy Systems with a focus on Electrical Engineering
<i>Mälardalen University</i> | 2016-2019
<i>Västerås</i> |
| <ul style="list-style-type: none">• Studied fundamental principles in several types of energy systems, with a particular emphasis on various aspects of the electrical grid such as production, distribution, load management, as well as fault analysis and handling. | |
| Business economics
<i>Mälardalen University</i> | <i>Västerås</i> |
| <ul style="list-style-type: none">• To develop organizations and leadership (7.5 ECTS)• Introduction to financial accounting (7.5 ECTS)• Marketing – Introduction (7.5 ECTS)• Management accounting (7.5 ECTS)• Cross-cultural management (7.5 ECTS)• Marketing communication (7.5 ECTS)• Digitalisation and marketing (7.5 ECTS)• Introduction to financial accounting (7.5 ECTS) | |
| Higher Education Pedagogy
<i>Mälardalen University</i> | <i>Västerås</i> |
| <ul style="list-style-type: none">• Student learning in higher education (3 ECTS)• Teaching in higher education (3 ECTS)• Higher education in its context (3 ECTS) [In progress]• Teaching portfolio (3 ECTS) [In progress] | |

EXPERIENCES

- | | |
|---|---|
| Teacher
<i>Mälardalen University</i> | 2021 – Present
<i>Västerås</i> |
| <ul style="list-style-type: none">• Conducting simulations and experiments in solar cell labs within university courses that include solar energy. | |
| Research Assistant
<i>Mälardalen University</i> | July 2021 – September 2021
<i>Västerås</i> |
| <ul style="list-style-type: none">• Assembly and installation of multiple IoT stations in Hemavan, Sweden. These are intended to predict snow melting and regulate water flow to hydroelectric power plants to minimize excess.• Compared several machine learning algorithms suitable for IoT stations. | |

ADDITIONAL PROJECTS

Solar Car Project - Matlab - Non-linear Optimization

2019-2021

Mälardalen University

Västerås

- The aim of the project was to construct a solar-powered car and compete in the Bridgestone World Solar Challenge in Australia.
- Responsible for solar cell design, optimization, and development of a consumption/production model to forecast the optimal vehicle speed.

Agri-OptiCE

2021 - Present

- The aim has been to develop a fully functional agrivoltaic platform that can be used as a decision-making tool for project developers. The platform will be available online to generate reports for specific agrivoltaic designs, including the PV system and choice of crop at any given location.

PUBLICATIONS

Optimisation of Agrivoltaic Systems within the Water-Energy-Food Nexus

2025

Zainali, Sebastian, Lu, Silvia Ma, Bellone, Yuri, and Campana, Pietro Elia

Preprint

Modelling, simulation, and optimisation of agrivoltaic systems: a comprehensive review

2025

Zainali, Sebastian, Lu, Silvia Ma, Fernández-Solas, Álvaro, Cruz-Escabias, Alejandro, Fernández, Eduardo, Zidane, Tekai Eddine Khalil, Honningdalsnes, Erlend Hustad, Nygård, Magnus Moe, Leloux, Jonathan, Berwind, Matthew, Trommsdorff, Max, Amaducci, Stefano, Gorjian, Shiva, and Campana, Pietro Elia

Applied Energy, Volume 386, p. 125558

Economic evaluation of one-axis, vertical, and elevated agrivoltaic systems across Europe: a Monte Carlo Analysis

2025

Zidane, Tekai Eddine Khalil, Zainali, Sebastian, Bellone, Yuri, Guezgouz, Mohammed, Khosravi, Arash, Lu, Silvia Ma, Tekie, Sultan, Amaducci, Stefano, and Campana, Pietro Elia

Applied Energy, Volume 391, p. 125826

Experimental results, integrated model validation, and economic aspects of agrivoltaic systems at northern latitudes

2024

Campana, Pietro Elia, Stridh, Bengt, Hörndahl, Torsten, Svensson, Sven-Erik, Zainali, Sebastian, Lu, Silvia Ma, Zidane, Tekai Eddine Khalil, De Luca, Paolo, Amaducci, Stefano, and Colauzzi, Michele

Journal of Cleaner Production, Volume 437, p. 140235

Agrivoltaic systems potentials in Sweden: A geospatial-assisted multi-criteria analysis

2024

Elkadeem, Mohamed R, Zainali, Sebastian, Lu, Silvia Ma, Younes, Ali, Abido, Mohamed A, Amaducci, Stefano, Croci, Michele, Zhang, Jie, Landelius, Tomas, and Stridh, Bengt

Applied Energy, Volume 356, p. 122108

Wavelength-selective solar photovoltaic systems to enhance spectral sharing of sunlight in agrivoltaics

2024

Lu, Silvia Ma, Amaducci, Stefano, Gorjian, Shiva, Haworth, Matthew, Hägglund, Carl, Ma, Tao, Zainali, Sebastian, and Campana, Pietro Elia

Joule, Volume 8, pp. 2483–2522

Photosynthetically active radiation separation model for high-latitude regions in agrivoltaic systems modeling

2024

Lu, Silvia Ma, Yang, Dahzi, Anderson, Martha, Zainali, Sebastian, Stridh, Bengt, Avelin, Anders, and Campana, Pietro Elia

Journal of Renewable and Sustainable Energy, Volume 16, p. 013503

- Validation of Vertical Bifacial Agrivoltaic and Other Systems Modelling: Effect of Dynamic Albedo on Irradiance and Power Output Estimations** 2024
Lu, Silvia Ma, Zainali, Sebastian, Sundström, Elin, Nygren, Anton, Stridh, Bengt, Avelin, Anders, and Campana, Pietro Elia
AgriVoltaics Conference Proceedings, Volume 2
- Data on the effects of a vertical agrivoltaic system on crop yield and nutrient content of barley (*Hordeum vulgare* L.) in Sweden** 2024
Lu, Silvia Ma, Zainali, Sebastian, Zidane, Tekai Eddine Khalil, Hörndahl, Torsten, Tekie, Sultan, Khosravi, Arash, Guezgouz, Mohammed, Stridh, Bengt, Avelin, Anders, and Campana, Pietro Elia
Data in Brief, Volume 57, p. 110990
- Microclimate Modelling for Agrivoltaic Systems** 2024
Zainali, Sebastian
Licentiate Thesis, Mälardalen University
- 3D View Factor Power Output Modelling of Bifacial Fixed, Single, and Dual-Axis Agrivoltaic Systems** 2024
Zainali, Sebastian, Lu, Silvia Ma, Potenza, Eleonora, Stridh, Bengt, Avelin, Anders, and Campana, Pietro Elia
AgriVoltaics Conference Proceedings, Volume 2
- Site adaptation with machine learning for a Northern Europe gridded global solar irradiance product** 2024
Zainali, Sebastian, Yang, Dazhi, Landelius, Tomas, and Campana, Pietro Elia
Energy and AI, Volume 15, p. 100331
- Evaluation of the first agrivoltaic system in Sweden** 2023
Campana, Pietro Elia, Stridh, Bengt, Zainali, Sebastian, Lu, Silvia Ma, Andersson, Ulf, Nordström, Josefin, Bergdahl, Pontus, Hörndahl, Torsten, and Svensson, Sven-Erik
Energimyndigheten
- LCOE distribution of PV for single-family dwellings in Sweden** 2023
Zainali, Sebastian, Lindahl, Johan, Lindén, Johan, and Stridh, Bengt
Energy Reports, Volume 10, pp. 1951–1967
- Direct and diffuse shading factors modelling for the most representative agrivoltaic system layouts** 2023
Zainali, Sebastian, Lu, Silvia Ma, Stridh, Bengt, Avelin, Anders, Amaducci, Stefano, Colauzzi, Michele, and Campana, Pietro Elia
Applied Energy, Volume 339, p. 120981
- Computational fluid dynamics modelling of microclimate for a vertical agrivoltaic system** 2023
Zainali, Sebastian, Qadir, Omar, Parlak, Sertac Cem, Lu, Silvia Ma, Avelin, Anders, Stridh, Bengt, and Campana, Pietro Elia
Energy Nexus, Volume 9, p. 100173
- Towards an operational irrigation management system for Sweden with a water–food–energy nexus perspective** 2022
Campana, Pietro Elia, Lastanao, Pablo, Zainali, Sebastian, Zhang, Jie, Landelius, Tomas, and Melton, Forrest
Agricultural Water Management, Volume 271, p. 107734
- Solar irradiance distribution under vertically mounted agrivoltaic systems—Model development, validation, and applications for microclimate assessment** 2022
Campana, Pietro Elia, Scragg, Jonathan Staaf, Lu, Silvia Ma, Zainali, Sebastian, Stridh, Bengt, Amaducci, Stefano, and Colauzzi, Michele
Preprint

Photosynthetically active radiation decomposition models for agrivoltaic systems applications

2022

Lu, Silvia Ma, Zainali, Sebastian, Stridh, Bengt, Avelin, Anders, Amaducci, Stefano, Colauzzi, Michele, and Campana, Pietro Elia

Solar Energy, Volume 244, pp. 536–549

FUNDING ACQUISITIONS

Light Saturation and Compensation Points for Crops Used in Agriculture in Sweden

Internal Call 2022 – Mälardalen University

180 000 SEK

- This project aims to analyse the saturation and compensation points of commonly used crops in Swedish agriculture to improve understanding of their dependence on operational conditions and shading effects. The specific objective is to purchase and use a portable photosynthesis system to develop ACi curves and use photosynthetic measurements to optimise agrivoltaic systems in Sweden.

Advancing Environmental Monitoring: Integrating Apogee Radiometers for Agrivoltaic Systems

Internal Call 2025 – Mälardalen University

150 000 SEK

- This project demonstrates the potential of using Apogee radiometers for agrivoltaic systems and underscores the importance of state-of-the-art measurement techniques for validating agrivoltaic models. Additionally, it includes a 2-month research visit to Italy with Stefano Amaducci's research group to collaborate and plan future research ideas and experimental work.

EXTRACURRICULAR ACTIVITIES

Naturskyddsförening

2025

Presenter

Lund

- Sharing insights on agrivoltaics and its feasibility with a broad audience passionate about nature conservation in Sweden.

Land Lantbruk

2025

Interview

Online

- Providing insights on agrivoltaics and its effects on soil health and quality to help a broader audience understand and address their concerns about agrivoltaics.

Master's degree project

2025

Supervisor for Thiha Thi Ha and Kristian-Nabil El Hajj

Mälardalen University

- A performance analysis and economic assessment on a large-scale agrivoltaic system in Sweden

Bachelor's degree project

2025

Supervisor for Mahmood Tawassulli

Mälardalen University

- Evapotranspiration in agrivoltaic environment: a field study

Agrivoltaics World Conference

2025

Presenter

Germany

- Presenting our recent research in agrivoltaics and exploring opportunities for future collaborations with the international community.

Kunskapsfesten

2024

Interview/Presenter

Eskilstuna

- Participated in a panel debate on our research and my career journey, to inspire high school students to consider studying at Mälardalens University.

Solen runt

2024

Presenter

Sjöbo

- Presented ongoing research on agrivoltaics, lessons learned, and future prospects in Sweden, with a focus on the southern region for local farmers.

Elmia Solar

2024

Exhibitor

Jönköping

- Connected research with industry to explore future collaborations and share knowledge about agrivoltaics. Also presented Mälardalen University to attending students.

Agrivoltaics World Conference 2024
Presenter USA

- Presenting our recent research in agrivoltaics and exploring opportunities for future collaborations with the international community.

Lantbruksnytt 2023
Interview Online

- The interview covered the ongoing progress of agrivoltaics in Sweden and the challenges involved in engaging a wider audience.

Kunskapsgymnasiet Västerås 2023
Presenter Västerås

- A presentation to increase the knowledge about sustainable energy systems and also show high school students what researchers do at the university within the energy domain.

Solenergipriset 2023
Presenter Stockholm

- A short presentation on how the award has helped us and what we have continued to work on in agrivoltaics in Sweden to share further knowledge.

Master's degree project 2023
Supervisor for Olamilekan Kazeem Buari and Kajal Kumari Mälardalen University

- Optimizing agrivoltaics electricity generation in Sweden: A techno-economic analysis of latitude-dependent design systems

Master's degree project 2023
Supervisor for Komail Farid and Ahmad Guleed Mälardalen University

- Shading analysis of agrivoltatic systems: the shading's effect on lettuce and potato from elevated agrivoltaic system in Sweden

Bachelor's degree project 2023
Supervisor for Erik Nordlund Mälardalen University

- Inductive railway switch point heating: improved control algorithm and phase compensation analysis for an inductive turnout heating system, and comparison with a resistive heating system

Agrivoltaics World Conference 2023
Presenter South Korea

- Presenting our recent research in agrivoltaics and exploring opportunities for future collaborations with the international community.

Master's degree project 2022
Supervisor for Omar Qadir and Sertac Cem Parlak Mälardalen University

- Thermal modelling of an agrivoltaic system: 3D performance analysis for bifacial PV-modules

Agrivoltaics World Conference 2022
Presenter Italy

- Presenting our recent research in agrivoltaics and exploring opportunities for future collaborations with the international community.

Brunnby Lantbrukardagar 2022
Presenter Västerås

- A presentation to increase the knowledge among farmers about agrivoltaics.

Solenergipriset 2022
Award Stockholm

- We received the Solar Energy Award for Performance of the Year for the first agrivoltaic project and facility in Sweden.

Inauguration of the Energy Evolution Center 2022
Presenter Eskilstuna

- A presentation to increase industry knowledge in Eskilstuna about agrivoltaics and the ongoing research on it in Sweden.

Study Visit

2022

Guide/presenter

Västerås

- Presenting our agrivoltaic research facilities in detail, highlighting the practical aspects that higher vocational education students need to understand to prepare for the industry.

Sveriges Radio

2021

Interview

Västerås

- This interview occurred at the beginning of agrivoltaic research in Sweden, at the first facility, where we shared our reasons for pursuing this work.

RELEVANT SKILLS

Programming Languages: Python, C, MATLAB, C++, Javascript, R, HTML, CSS

Libraries: PyTorch, NumPy, Huggingface, Pandas
Tools & Technologies: Linux, Git/GitHub, L^AT_EX
Additional: B Driver's License

LANGUAGES

Swedish: Advanced

Native Speaker

English: Advanced

Speak, Read, and Write

REFERENCES

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Supervisor for my PhD studies

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Lecturer

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