Sebastian Zainali

Date of Birth: 1995-09-29
Phone: (+46)72 250 24 75
Address: Kamomillvägen 6, 191 64
Sollentuna, Sweden

Email: sebastiazainali@gmail.com
Linkedin: sebastian-zainali-32a478173
ORCID: 0000-0003-2225-029X
Website: sebastianzainali.github.io

EDUCATION

PhD in Agrivoltaic Systems
2021-Present

Mälardalen University — *Västerås*

- Optimizing agrivoltaic systems to find the most efficient system solution for Sweden.
- Incorporating machine learning and probabilistic machine learning to improve the modeling of agrivoltaic systems.

Licentiate in Agrivoltaic Systems
2021-2024

Mälardalen University — *Västerås*

- 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
2019-2021

Mälardalen University — *Västerås*

- Focused on modeling, simulation, and optimization of various types of energy systems.

BSc in Energy Systems with a focus on Electrical Engineering
2016-2019

Mälardalen University — *Västerås*

- 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

Mälardalen University — *Västerås*

- 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

Mälardalen University — *Västerås*

- 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
2021 – Present

Mälardalen University — *Västerås*

- Conducting simulations and experiments in solar cell labs within university courses that include solar energy.

Research Assistant
July 2021 – September 2021

Mälardalen University — *Västerås*

- 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
Lu, Silvia Ma, Zainali, Sebastian, Sundström, Elin, Nygren, Anton, Stridh, Bengt, Avelin, Anders, and Campana, Pietro Elia
AgriVoltaics Conference Proceedings, Volume 2

2024

Data on the effects of a vertical agrivoltaic system on crop yield and nutrient content of barley (Hordeum vulgare L.) in Sweden
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

2024

Microclimate Modelling for Agrivoltaic Systems
Zainali, Sebastian
Licentiate Thesis, Mälardalen University

2024

3D View Factor Power Output Modelling of Bifacial Fixed, Single, and Dual-Axis Agrivoltaic Systems
Zainali, Sebastian, Lu, Silvia Ma, Potenza, Eleonora, Stridh, Bengt, Avelin, Anders, and Campana, Pietro Elia
AgriVoltaics Conference Proceedings, Volume 2

2024

Site adaptation with machine learning for a Northern Europe gridded global solar irradiance product
Zainali, Sebastian, Yang, Dazhi, Landelius, Tomas, and Campana, Pietro Elia
Energy and AI, Volume 15, p. 100331

2024

Evaluation of the first agrivoltaic system in Sweden
Campana, Pietro Elia, Stridh, Bengt, Zainali, Sebastian, Lu, Silvia Ma, Andersson, Ulf, Nordström, Josefin, Bergdahl, Pontus, Hörndahl, Torsten, and Svensson, Sven-Erik
Energimyndigheten

2023

LCOE distribution of PV for single-family dwellings in Sweden
Zainali, Sebastian, Lindahl, Johan, Lindén, Johan, and Stridh, Bengt
Energy Reports, Volume 10, pp. 1951–1967

2023

Direct and diffuse shading factors modelling for the most representative agrivoltaic system layouts
Zainali, Sebastian, Lu, Silvia Ma, Stridh, Bengt, Avelin, Anders, Amaducci, Stefano, Colauzzi, Michele, and Campana, Pietro Elia
Applied Energy, Volume 339, p. 120981

2023

Computational fluid dynamics modelling of microclimate for a vertical agrivoltaic system
Zainali, Sebastian, Qadir, Omar, Parlak, Sertac Cem, Lu, Silvia Ma, Avelin, Anders, Stridh, Bengt, and Campana, Pietro Elia
Energy Nexus, Volume 9, p. 100173

2023

Towards an operational irrigation management system for Sweden with a water–food–energy nexus perspective
Campana, Pietro Elia, Lastanao, Pablo, Zainali, Sebastian, Zhang, Jie, Landelius, Tomas, and Melton, Forrest
Agricultural Water Management, Volume 271, p. 107734

2022

Solar irradiance distribution under vertically mounted agrivoltaic systems– Model development, validation, and applications for microclimate assessment
Campana, Pietro Elia, Scragg, Jonathan Staaf, Lu, Silvia Ma, Zainali, Sebastian, Stridh, Bengt, Amaducci, Stefano, and Colauzzi, Michele
Preprint

2022

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

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.

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 agrivolatic 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

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

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, LaTeX
Additional: B Driver's License

Languages

Swedish: Advanced

English: Advanced

Native Speaker

Speak, Read, and Write

References

Pietro Elia Campana
Senior Lecturer
Supervisor for my PhD studies
Mälardalen University
pietro.campana@mdu.se
(+46) 21 101 469

Anders Avelin
Head of the department
Lecturer
Mälardalen University
anders.avelin@mdu.se
(+46) 21 151 798