
Dennis MADSEN, PH.D.
Theilerstrasse 7, Zug, Switzerland
+41 78 881 8905 | EU/EFTA - C Permit
madsen_dennis@icloud.com
github | linkedin
personal | youtube


## SUMMARY


I am a dedicated Machine Learning Engineer who can take projects from raw data to full operation and continuous monitoring. I have a Ph.D. and an M.Sc. in Computer Science and Mathematics, specializing in computer vision and computer graphics, and a B.Sc. in Electrical Engineering.

My focus is on real-world machine-learning applications that add value. I am keen on classical computer vision and machine learning methods, probabilistic methods, and generative models.

I am a continuous learner who likes new challenges and acquiring new skills, e.g., through lecturing, pitch competitions, coding hackathons, and video creation.


## EXPERIENCE

### University of Zürich (Zürich, Switzerland) — *03.2023 - 04.2024*

***Postdoctoral Researcher*** - *Bridge Proof-of-Concept fellow.*

- Computer vision research on CBCT and IOS images for dental applications.

### Dentexion GmbH (Zug, Switzerland) — *01.2022 - 05.2024*

***Founder*** - *Building an AI powered cloud-platform for dentists.*

- Developing a fully automatic SaaS platform to upload and analyze dental images (cloud-based) for preventive care.
- On the technical side I was responsible for all ML aspects and computer graphics (Threejs)

### University of Basel (Basel, Switzerland) — *08.2021 - 02.2023*

***Postdoctoral Researcher***

### University of Basel (Basel, Switzerland) — *09.2017 - 07.2021*

***Research Assistant / Ph.D. Candidate / Lecturer***

- Research in the area of medical computer vision using statistical shape models.
- Lecturing the Pattern Recognition course for bachelor students on probability theory and deep learning.

### Capana (Denmark, remote from Switzerland) — *07.2016 - 12.2019*

***Consultant***

- Developing internal productivity tools for Seimens Wind Power in Python and Web2Py.
- Full application lifecycle, from identifying needs, planning to development and production.

### Siemens Wind Power (Brande, Denmark) — *04.2014 - 08.2015*

***Embedded Software Support Engineer***

- Work task automation of manual procedures; software updates and support of Siemens Wind Turbine Controllers.

### Litepoint (Sunnyvale, California, USA) — *04.2013 - 09.2013*

***Electronic Engineer Intern***

- Creating a test system interface to check cell-phone cellular data signal using a local Django application.

### Microdevelopment (Herning, Denmark) — *11.2009 - 09.2014*

***Founder*** - *Producing electronic speed tables for use in historical reliability races.*

- Software development in C for a PIC microcontroller, web development with payment system and customer contact.

### KK-Electronic (Ikast, Denmark) — *01.2006 - 03.2014*

***Electronic Industrial Technician Trainee / Embedded Software Engineer Student***

- HW design, embedded SW (C/assembler), documentation, prototyping (mechanic, PCB, test scripting), HW coding (VHDL).

## Education

### University of Basel (Basel, Switzerland) *2017 - 2021*

***Ph.D. Computer Science & Mathematics*** *(Summa cum laude)*

- Thesis: A Probabilistic Surface Registration Framework with Applications to Partial Data Analysis
- Model-based medical image analysis focused on registration and modelling using partial data and reconstruction uncertainty.

### University of Basel (Basel, Switzerland) *2015 - 2017*

***M.Sc. Computer Science & Mathematics*** *(6.0 / A)*

- Thesis: Craniofacial modelling by combining statistical models of the face and the skull - Combining independent shape models.

### Aarhus University (Herning, Denmark) *2010 - 2014*

***B.Sc. Electronic Design Engineer*** *(12.0 / A)*

- Thesis: Power quality analysis of wind turbines - Harmonic frequency analysis prototype implementation in a TI DSP.

### Aarhus University (Herning, Denmark) *2009 - 2010*

*University pre-admission course*

### Mercantec (Viborg, Denmark) *2005 - 2009*

*Electronic Industrial Technician*

## Certifications

- Innosuisse Business Creation MEDTECH, Switzerland - 2023
- Innosuisse Start-up Training: Business Concept (Module 2), Switzerland - 2021
- Project Management - A Toolbox for Scientists, Switzerland - 2021

## Awards & Hackaton Participation

- Medical Imaging Summer School (Favignana, Italy) – Best Presentation Award - 2018
- EXCITE Summer school (Zürich, Switzerland) – 2nd Best Presentation Award – 2018
- CopenHacks (Copenhagen, Denmark) – Price winner - 2017
- LauzHack (Lausanne, Switzerland) – Winner of the main sponsor (Logitech) challenge – 2016
- HackZürich (Zürich, Switzerland) – Europe's largest hackaton Participant – 2016, 2017, 2018

## Skills

| | |
|---|---|
| **General** | Artificial Intelligence (AI) \| Machine Learning (ML) \| Computer Vision (CV) \| Statistical Shape Models \| Generative Models \| Entrepreneurship \| Medical Computer Vision \| Probability and Statistics \| Software Engineering \| Linux |
| **Programming Languages** | ***Experienced:*** Python \| Scala \| Javascript ***Knowledgeable:*** C \| Bash \| Java \| VHDL \| SQL |
| **Frameworks & Libraries** | PyTorch \| PyTorch Lightning \| Jupyter \| Matplotplib \| Numpy \| Pandas \| Scikit-learn \| Monai \| VTK \| ITK \| Nibabel \| Scipy \| Pytest \| Tensorflow \| Threejs \| React \| Scalismo |
| **Software Development** | Programming Paradigms \| GIT \| CLI \| Docker \| DVC \| Agile Methodology \| MlOps Lifecycles \| Open-source |
| **Languages** | ***Native:*** Danish ***Fluent:*** English ***Advanced:*** German |

## Open-source Software Maintainer

| | |
|---|---|
| **Scalismo** | Scala library for statistical shape modeling |
| **Scalismo-UI** | Scala library for visualization of statistical shape models |
| **GiNGR** | Scala library for non-rigid registration (based on my PhD Thesis) |

## Publications

### Books

A Probabilistic Surface Registration Framework with Applications to Partial Data Analysis

Dennis Madsen

*University of Basel, 2021*

### International peer-reviewed conferences/proceedings

Sequential gaussian process regression for simultaneous pathology detection and shape reconstruction

Dana Rahbani, Andreas Morel-Forster, Dennis Madsen, Jonathan Aellen, Thomas Vetter

*International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 2021

A closest point proposal for MCMC-based probabilistic surface registration

Dennis Madsen, Andreas Morel-Forster, Patrick Kahr, Dana Rahbani, Thomas Vetter, Marcel Lüthi

*European Conference on Computer Vision (ECCV)*, 2020

Probabilistic joint face-skull modelling for facial reconstruction

Dennis Madsen, Marcel Lüthi, Andreas Schneider, Thomas Vetter

*Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2018

### International peer-reviewed workshops/proceedings

Learning Shape Priors from Pieces

Dennis Madsen, Jonathan Aellen, Andreas Morel-Forster, Thomas Vetter, Marcel Lüthi

*International Workshop on Shape in Medical Imaging (ShapeMi)*, 2020

Probabilistic surface reconstruction with unknown correspondence

Dennis Madsen, Thomas Vetter, Marcel Lüthi

*Uncertainty for Safe Utilization of Machine Learning in Medical Imaging and Clinical Image-Based Procedures (UNSURE)*, 2019

Robust registration of statistical shape models for unsupervised pathology annotation

Dana Rahbani, Andreas Morel-Forster, Dennis Madsen, Marcel Lüthi, Thomas Vetter

*Large-Scale Annotation of Biomedical Data and Expert Label Synthesis and Hardware Aware Learning for Medical Imaging and Computer Assisted Intervention (LABELS)*, 2019

### Other

GiNGR: Generalized Iterative Non-Rigid Point Cloud and Surface Registration Using Gaussian Process Regression

Dennis Madsen, Jonathan Aellen, Andreas Morel-Forster, Thomas Vetter, Marcel Lüthi

arXiv preprint arXiv:2203.09986 *(2022). 2022*