Claudio Giovanni Mattera

Complete Curriculum Vitæ

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Education

2015 – 2019

Ph. D. in software engineering, *Maersk McKinney Moller Institute, University of Southern Denmark*, Odense, Denmark, `https://www.sdu.dk/`

My topic was designing and implementing software solutions for fault detection and diagnostics on buildings energy systems. My Ph. D. was part of the project COORDICY, a Danish-American interdisciplinary program aimed at increasing buildings intelligence. The main research partners were NASA Ames Research Center, Lawrence Berkeley National Laboratory, and University of California, Berkeley.

2018

Visiting Ph. D. student, *Center for Supervision, Security and Automatic Control, Polytechnic University of Catalonia*, Terrassa, Spain, `https://www.upc.edu/`

I initiated a collaboration with a research group who had experience with fault detection and diagnostics for water distribution networks, and I worked to apply their approach and techniques to buildings sector.

2017

7th International Summer School on Fault Diagnosis of Complex Systems, *University of Valladolid*, Terrassa, Spain, `https://diagnosis17.cs2ac.upc.edu/`

I took inspiration from methods presented by researchers and field experts, both from academia and industry, for improving my own research.

2013 – 2015

Individual courses, *Coursera Network*, `https://www.coursera.org/`

I took several individual courses to improve my knowledge on specific areas and technologies.

2009 – 2012

Master's degree in engineering mathematics, *Lund University*, Sweden, `https://www.lu.se/`

Scientific computation and software. Focus on numerical calculus.

2009 – 2012

Master's degree in computer engineering, *Polytechnic of Milan*, Italy, `https://www.polimi.it/`

Complex systems analysis and optimization. Focus on modelling and operational research.

2005 – 2009

Bachelor's degree in computer engineering, *Polytechnic of Milan*, Italy, `https://www.polimi.it/`

Work experience

Since 2019

Software & Systems Developer, *Siemens Gamesa Renewable Energy*, Brande, Denmark, `https://www.siemensgamesa.com/`

I work in the team in charge of application diagnostics for the company's wind-turbines fleet. I am responsible for designing and implementing a new monitoring and diagnostics framework unifying Siemens and Gamesa technologies, using modern tools and techniques.

2017 – 2018

Research Assistant, *University of Southern Denmark*, Odense, Denmark, `https://www.sdu.dk/`

I took a six-months leave from my Ph. D. to carry out additional work on the project COORDICY. My tasks included developing libraries and tools, and integrating the data infrastructure at the department.

2015

R&D C++ Developer, *Altran*, Sophia Antipolis, France, `https://www.altran.fr/`

I was a contractor at Amadeus, market leader in IT solutions for airlines. I worked on the backend of the route selection component, which was used for searching combinations of legs from source to destination. My tasks included bug fixing, code refactoring, and implementing new features.

2014 – 2015

Java Developer, *Prisma Telecom Testing*, Milan, Italy, `https://www.prismatelecomtesting.com/`

The company develops physical testing solutions and simulators for radio network equipment. I worked on the graphical interface of the simulator, used for designing testing experiments. My tasks included bug fixing, developing features on existing branches, and implementing a prototype interface for a new network subset

2013 – 2014

IT Assistant Internship, *Carl Zeiss Italy*, Arese, Italy, `https://www.zeiss.it/`

One of the worldwide leading companies in industrial metrology, biotech technology and medical microscopy. I was one of the two members of the IT department at the Italian headquarters. My tasks included daily IT support, system administration, and planning and implementing system migration

Publications (first author)

2020

C. G. Mattera, H. R. Shaker, M. Jradi, M. R. Skydt, and S. S. Engelsgaard. "Fault Detection in Ventilation Units using Dynamic Energy Performance Models". In: *Journal of Building Engineering* 32, p. 101635. ISSN: 2352-7102, **DOI: 10.1016/j.jobe.2020.101635**

2019

C. G. Mattera, J. Quevedo, T. Escobet, H. R. Shaker, and M. Jradi. "Fault Detection and Diagnostics in Ventilation Units Using Linear Regression Virtual Sensors". In: *Proceedings of the International Symposium on Advanced Electrical and Communication Technologies*. International Symposium on Advanced Electrical and Communication Technologies (Kenitra, Morocco, Nov. 21–23, 2018). IEEE, **DOI: 10.1109/ISAECT.2018.8618755**

C. G. Mattera, H. R. Shaker, and M. Jradi. "Consensus-based Method for Anomaly Detection in VAV Units". In: *Energies* 12.3. ISSN: 1996-1073, **DOI: 10.3390/en12030468**

2018

C. G. Mattera, M. Jradi, and H. R. Shaker. "Online Energy Simulator for Building Fault Detection and Diagnostics Using Dynamic Energy Performance Model". In: *International Journal of Low-Carbon Technologies* 13.3, pp. 231–239. ISSN: 1748-1325, **DOI: 10.1093/ijlct/cty019**

C. G. Mattera, J. Quevedo, T. Escobet, H. R. Shaker, and M. Jradi. "A Method for Fault Detection and Diagnostics in Ventilation Units Using Virtual Sensors". In: *Sensors* 18.11. ISSN: 1424-8220, **DOI: 10.3390/s18113931**

2017

C. G. Mattera, S. Lazarova-Molnar, H. R. Shaker, and B. N. Jørgensen. "A Practical Approach to Validation of Buildings' Sensor Data: a Commissioning Experience Report". In: *Proceedings of the Third International Conference on Big Data Computing Service and Applications*. Third International Conference on Big Data Computing Service and Applications (San Francisco, CA, USA, Apr. 6–9, 2017). IEEE, pp. 287–292. ISBN: 978-1-5090-6318-5, **DOI: 10.1109/BigDataService.2017.48**

Publications (co-author)

2020

J. H. Schwee, A. Johansen, B. N. Jørgensen, M. B. Kjærgaard, C. G. Mattera, F. C. Sangogboye, and C. T. Veje. "Publisher Correction: Room-level Occupant Counts Using Heterogeneous Sensing Modalities from a Teaching and Offices Building". In: *Scientific Data* 7.76. ISSN: 2052-4463, **DOI: 10.1038/s41597-020-0416-8**

2019

K. Arendt, A. Clausen, C. G. Mattera, M. Jradi, A. Johansen, C. T. Veje, M. B. Kjægaard, and B. N. Jørgensen. "Multi-Objective Model Predictive Control Framework for Buildings". In: *Proceedings of the 16th IBPSA International Conference Building Simulation 2019* (Rome, Italy, Sept. 2–4, 2019). International Building Performance Simulation Association, pp. 2779–2786, **DOI: 10.26868/25222708.2019.210156**

M. Jradi, N. Liu, A. Johansen, K. Arendt, C. G. Mattera, M. B. Kjærgaard, C. T. Veje, and B. N. Jørgensen. "Dynamic Energy Model-Based Automatic Building Performance Testing for Continuous Commissioning". In: *Proceedings of the 16th IBPSA International Conference Building Simulation 2019* (Rome, Italy, Sept. 2–4, 2019). International Building Performance Simulation Association, pp. 822–829, **DOI: 10.26868/25222708.2019.210200**

J. H. Schwee, A. Johansen, B. N. Jørgensen, M. B. Kjærgaard, C. G. Mattera, F. C. Sangogboye, and C. T. Veje. "Room-level Occupant Counts Using Heterogeneous Sensing Modalities from a Teaching and Offices Building". In: *Scientific Data* 6.287. ISSN: 2052-4463, **DOI: 10.1038/s41597-019-0274-4**

2018

K. Arendt, A. Johansen, B. N. Jørgensen, M. B. Kjærgaard, C. G. Mattera, F. C. Sangogboye, J. H. Schwee, and C. T. Veje. "Room-level Occupant Counts, Airflow and CO2 Data from an Office Building". In: *The 16th ACM Conference on Embedded Networked Sensor Systems*. Proceedings of the First Workshop on Data Acquisition To Analysis (Shenzhen, China, Nov. 4–7, 2018). ACM. New York, NY, USA, pp. 13–14. ISBN: 978-1-4503-6049-4, **DOI: 10.1145/3277868.3277875**

M. Jradi, K. Arendt, F. C. Sangogboye, C. G. Mattera, E. Markoska, M. B. Kjærgaard, C. T. Veje, and B. N. Jørgensen. "ObepME: An Online Building Energy Performance Monitoring and Evaluation Tool to Reduce Energy Performance Gaps". In: *Energy and Buildings* 166, pp. 196–209. ISSN: 0378-7788, **DOI: 10.1016/j.enbuild.2018.02.005**

2017

M. Jradi, F. C. Sangogboye, C. G. Mattera, M. B. Kjærgaard, C. T. Veje, and B. N. Jørgensen. "A World Class Energy Efficient University Building by Danish 2020 Standards". In: *Energy Procedia* 132: *11th Nordic Symposium on Building Physics*, pp. 21–26. ISSN: 1876-6102, **DOI: 10.1016/j.egypro.2017.09.625**

Teaching experience

2018

Examiner (Distributed Computing), *University of Southern Denmark*
I lead five groups of six students to their group exam on their semester project.

2017

Project Supervisor (Distributed Computing), *University of Southern Denmark*
I supervised five groups of six students during their semester project, where they planned, designed and implemented a distributed software application.

2017

Lecturer (Artificial Intelligence), *University of Southern Denmark*
I gave lectures on the topic of local search optimization during the course on artificial intelligence.

2017

Teaching Assistant (Artificial Intelligence), *University of Southern Denmark*
I taught laboratory and exercise sessions for the course on artificial intelligence.

2016

Teaching Assistant (Statistics), *University of Southern Denmark*
I taught laboratory and exercise sessions for the course on statistics.

2016

Supervisor (Decision Support Systems), *University of Southern Denmark*
I supervised two students during a seminar-based course on decision support systems.

2015

Project Supervisor (Distributed Computing), *University of Southern Denmark*
I supervised three groups of six students during their semester project, where they planned, designed and implemented a distributed software application.

Individual courses and certificates

2015

Image and Video Processing: from Mars to Hollywood with a Stop at the Hospital, *Duke University*, United States of America
This course starts with an introduction to basic and critical components in image and video processing and continues with advanced material. It is considered an advanced undergraduate or early graduate class.

2013

Programming Languages, *University of Washington*, United States of America
This course investigates the basic concepts behind programming languages, with a strong emphasis on the techniques and benefits of functional programming along with many other topics.

Linear and Integer Programming, *University of Colorado Boulder*, United States of America
The course introduces the fundamentals of optimization through linear and integer programming. Students learn the material by solving problems using existing solvers and then writing their own solvers to obtain an in-depth knowledge of the techniques involved.

Discrete Optimization, *University of Melbourne*, Australia
This introductory graduate course provides a broad overview of discrete optimization by introducing the core principles of constraint programming, local search, and mixed integer programming. Assessments were based on large scale programming assignments.

Model Thinking, *University of Michigan*, United States of America
This course provided an introduction on how to think using models. Specific topics included, among others, decision-making, tipping points, economic models, crowd dynamics, Markov processes, game theory and predictive thinking.

Functional Programming Principles in Scala, *École Polytechnique Fédérale de Lausanne*, Switzerland
This advanced undergraduate programming course covers the principles of functional programming using Scala, including the use of functions as values, recursion, immutability, pattern matching, higher-order functions and collections, and lazy evaluation.

Awards

2016

Team who has biked the most km together, *University of Southern Denmark*
Our biking team, The Energetic Pedal Stompers, achieved the longest total distance during the "Bike to Work Challenge" to promote usage of bicycles for commuting in May 2016. With about 500 km, I was the proud second-best contributor.

2013

Top Three Placement in Future Ideas European Innovation Master Thesis Competition, *Dialogues Incubator*
My master's thesis was ranked "runner-up" in the Technology/ICT Category.

Personal projects

Available on my GitHub page: `https://github.com/claudiomattera/`

cfei-smap	Python 3 asynchronous and type-annotated library for sMAP data protocol
java-libraries	Collection of Java libraries for sMAP data protocol, pandas-like data-frames and time-series, and EnergyPlus weather file format
rinfluxdb	Rust library for querying and sending data to InfluxDB
house-dashboard	Rust application for displaying environment data on a physical dashboard
wasm4fun	Rust games for the WASM-4 fantasy console

traffic-tracker Rust application to fetch traffic statistics from GSM routers
moderntheses LuaLaTeX / KOMA-Script modern template for a Ph. D. thesis
fixed-point-vector C++11 compile-time packed fixed-point-vector library
naivecoin C++17 test-driven blockchain cryptocurrency implementation
gps-tracker C++ / Qt application for displaying a GPX paths and tracking the total distance
linear-programming Haskell test-driven step-by-step simplex algorithm solver
pandoc-tikz Haskell application for embedding TikZ figures in Markdown documents
qr-encoder PyQt application for generating QR codes
graph-extractor PyQt application for extracting coordinates from charts

Academic projects

Master's thesis **Optimization heuristic for residential energy load management**
I designed and implemented in C++ a heuristic to solve a difficult combinatorial optimization problem applied to residential energy load management. The aim was to find a schedule of all residential appliances over a set of houses, in order to generate a smooth energy demand curve. I employed features from the at-the-time-novel C++11 standard, and I strove to follow the best practices and advanced idioms promoted by the language experts, to achieve better performances and maintainability.

Bachelor's thesis **A RDBMS based Linux filesystem to manage metadata extracted from files**
I developed a filesystem driver in C# that used a RDBMS backend. The driver extracted metadata from files such as images, text, and videos, and stored them in custom tables in order to perform fast searches.

Models for medium emergencies
We created an optimization model and for the local emergency department to distribute injured people to different hospitals based on severity and preferred destination, without exhausting their limited capacity.

Microcode hacking
Modern CPUs support microcode updates. I documented such procedure, investigated encryption in microcode updates, and tried to fool the CPU to accept modified payloads

Functional music composition
We implemented in Haskell an algorithm which automatically generates accompaniment for a song by interpreting a given sequence of chords

Water in urban areas
We made a survey of environmental issues in water urban facilities management, with three large cities study cases

Other experiences

2017 – 2019 **Member of the Academy Council**, *Technical Faculty, University of Southern Denmark*
The council oversees scientific hiring and evaluation of Ph. D. degrees at the faculty.

2015 – 2018 **Volunteer at student association**, *ESN*, Odense, Denmark, `https://esnodense.dk/`
The association welcomes and supports international students and organizes trips and other events.

2012 – 2015 **Volunteer at student association**, *ESEG*, Milan, Italy, `http://www.eseg.it/`
The association welcomes and supports international students and organizes trips and other events.

Languages

Italian	Native	
English	Fluent	*Several years working in international environments in multiple countries*
Swedish	Intermediate	*One year* (*four courses, 30 ECTS*) *full-time study at Lund University*
Danish	Intermediate	*Modultest 3* (*three semesters*) *at Lærdansk*

Computer skills

Platforms Windows, Linux (Gentoo), Raspberry Pi, Arduino, ESP8266
Languages Python, Java, C++, Rust, Haskell, LaTeX
Other Git, Mercurial, Subversion, Qt Library, InfluxDB, Docker

Hobbies and other interests

Cycling I like to make long trips by bike, but also to cycle everyday

Reading	I like to read new stories and new adventures
Homebrewing	I like to brew my own ale and mead (and to drink them, in moderation)