Pepe Tan

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Linkedin Profile Google Scholar
https://zpetan.github.io/ (Personal Homepage)

Profile

Engineer with programming skills in applied mathematics, looking for opportunities in developing data-driven solutions.

PhD in Engineering with five years of research and teaching experience within the topics of thermal energy storage, energy systems and building physics. I enjoy solving challenging open problems from material to process level by (1) performing a situation analysis from different stakeholder viewpoints (2) model selection and (3) implementation/verification using programming and experimentation. During my work, I collected and analyzed large amounts of experimental and simulated data and I developed a strong interest for creating data-driven decision tools. I am especially fascinated with using discrete and non-discrete ***Optimization*** algorithms from applied mathematics for improving processes and control strategies. In addition, I have studied ***Machine Learning*** and ***Data Science*** techniques for my own personal development. I am a quick learner and continuously explore new mathematical and programming techniques in order to fill my problem solving toolbox and I enjoy every possibility, where I can share and discuss ideas.

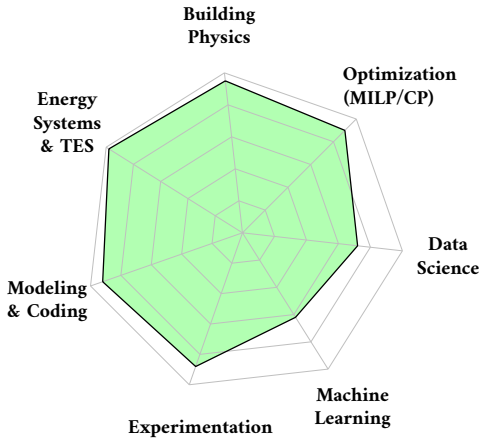
Career Goal

I took a leap of faith and declined an offer to pursue a PostDoc in my original research field in order to find a job within Optimization, Data Science and Machine Learning. Research in these areas has progressed extremely fast and I am passionate about the amount of still unexplored potential for improving our status quo by harnessing the data that is available to us. My goal is to built up more experience and become an expert for turning data into valuable optimization and prediction models. Through my work, I want to contribute shaping the transition towards Industry 4.0 by establishing standard practices that help engineers navigate through the requirements of these methods more efficiently. With my combined engineering and modeling background, I can work myself into the technical details of different industry partners and then optimize their processes using the right method depending on the application. In addition, I can bring in my experience with measurements in order to make sure that the collected data is of high quality and of causal relevance for the modeling task.

Skills

General Programming	Python • Matlab/Simulink • R • Julia
Mathematical Optimization	Mixed Integer Linear Programming (MILP) • Constraint Programming (CP) • Discrete Optimization • MiniZinc/Gecode (open-source) • Python/Gurobi • AMPL/CPLEX • Heuristic algorithms
Machine Learning	Supervised- & Unsupervised Classification • Feature Engineering & Selection • scikit-learn • Tensorflow (all open-source)
Data Science	Regression • Inference • Dimensionality Reduction (PCA, PLS) • Mixture Models • Markov Chain Monte Carlo Sampling • SQL • Neo4j
Energy Topics	Energy Storage • Building Energy Simulations Demand Side Management • Renewable Energies
Discrete Event Systems	Supervisory Control • Automata Theory
Experimentation	Power and energy measurements • Design of experimental setups • Improving measurement accuracy & precision
Others	Know-how in Building Physics & Chemical Engineering

Experience



Professional Work

06/2020 - 06/2015 — **Research in Thermal Energy Storage from Material to System Level at Chalmers** (Sweden)

- **Development of operational schedule optimization model for maximizing effectiveness of a thermal energy storage used for peak shaving cooling demand in an office building.** The MILP model optimizes the operational schedule of the storage and maximizes the economic benefits using the hourly building energy demand, storage measurements and energy tariff as input variables. It can also be used to estimate the required technical and economic conditions for when the expected payback time of the storage investment costs gets feasible.
- **Benchmarking of thermal energy storage installations in an office building and in a self-built experimental setup.** Performing of benchmarks on a commercial cold storage in full scale and in a smaller test bed. The focus was on making the measurements accurate, reproducible and representative for the system. The results are feeded to the optimization model and translated to key performance indicators that enable a comparison of different storage technologies and control strategies for the studied system.
- **Identification and reduction of systematic measurement errors for thermal analysis of storage materials using modeling and experimentation.** Development of a simulation model quantifying transient heat flux though insulation layers of the T-History method. I showed that (1) a fundamental discrepancy between heat flux and method assumptions is a root cause for systematic measurement errors and (2) how to correct them.
- **Development of algorithm for robust differentiation of noisy data for thermal analysis of storage materials.** Design of a methodology that reduces the root causes for additional large inaccuracies when calculating the outcome variables from measured temperature over time data containing apparent noise. The algorithm allows a higher accuracy and precision of the measurements.
- **Simulation of melting and solidification of latent heat storage materials in heat exchangers.** Programming of a simulation model that involves melting and solidification of a storage material in various heat exchanger geometries. The model can be used to find the optimum heat exchanger geometry given different storage applications and operational conditions.
- Participation in IEA ECES Annex 30 working groups and conferences related to thermal energy storage systems.
- Joint collaborations with ZAE Bayern, ÅF Pöyry and Akademiska Hus resulting in four journal publications.

02/2015 - 02/2014 — **Research assistant at Fraunhofer UMSICHT** (Germany)

- Programming of a process model for methanol synthesis from carbon dioxide and hydrogen as thesis project resulting in one journal publication.
- Evaluation of ways for hydrodeoxygenation of biomass-derived pyrolysis oils, summarized in a technical report.

Education

06/2020 - 06/2015 — **PhD** in **Thermal Energy Storage with Phase Change Materials**
Chalmers University of Technology (Sweden) • Building Physics Modeling Group
Supervisors: Prof. Angela Sasic Kalagasidis and Prof. Pär Johansson

09/2014 - 10/2012 — **MSc** in **Energy Technologies** (double-degree programme)
Karlsruhe Institute of Technology (Germany) • *Uppsala University (Sweden)*
Main subjects: "Renewable Energy and Energy Storage" and "Chemical Energy Carriers"
GPA: 1,3 (German grading system)

09/2012 - 10/2009 — **BSc** in **Energy Technology** (Energietechnik)
University of Erlangen-Nuremberg (Germany)
Interdisciplinary programme in Process-, Electrical- and Material Engineering (with approx. 65-20-15% weights)
GPA: 1,4 (German grading system)

Certificates are available upon request.

Honors

2014 - 2012 — Scholarship of the European Institute of Innovation & Technology: InnoEnergy Programme
2014 - 2011 — Scholarship and fellow of the German Academic Scholarship Foundation

Media Communications

11/2019 — Magazine article about the cold storage installation in my PhD work by **NyTeknik** (in Swedish). ***(Link)***
07/2018 — Interview with the **Phase Change Matters Newsletter** about my work on thermal analysis of PCMs. ***(Link)***

Teaching Experience

06/2020 - 06/2015 — **Teaching assistant in the Division of Building Technology at Chalmers** (Sweden)

- Held lectures, computer- and experimental labs in four courses on graduate and undergraduate level on energy-, heat- and mass transfer topics within building physics and building materials. The courses ranged from 20 to 200 students.
- Supervised groups of 4-5 students in a project based course. Provided feedback on presentations and hand-ins.
- Continuous improvement of existing- and development of new course content based on student feedback.
- Supervision of an international internship student.
- Initiated visualization of teaching activities and learning outcomes in research group using graph databases.

Summer-term/2012 — **Student tutor in the Dept. of Bio- and Chemical Engineering at Univ. of Erlangen-Nuremberg** (Germany)

- Held tutorial sessions in the course "Chemical Thermodynamics" with ca. 100 students.

Languages

German	Mother tongue
English	Fluent
Swedish	Conversational: ca. A2 Level • Reading and Writing: ca. B1 Level
Chinese	Conversationally fluent • Reading ability ca. HSK2 Level

Personal Interests

Climbing | Hiking | Photography (Link to a small gallery) | Chalmers rowing club (retired)

Journal Publications (with links)

2020 — **P. Tan**, P. Lindberg, K. Eichler, P. Löveryd, P. Johansson, A. Sasic Kalagasidis, "Thermal energy storage using phase change materials: Techno-economic evaluation of a cold storage installation in an office building" in **Applied Energy**, Vol 276 (2020).

P. Tan, P. Lindberg, K. Eichler, P. Löveryd, P. Johansson, A. Sasic Kalagasidis, "Effect of phase separation and supercooling on the storage capacity in a commercial latent heat thermal energy storage: Experimental cycling of a salt-hydrate PCM" in **Journal of Energy Storage**, Vol 29 (2020).

2018 — **P. Tan**, M. Brütting, S. Vidi, H.-P. Ebert, P. Johansson, A. Sasic Kalagasidis, "Characterizing phase change materials using the T-History method: On the factors influencing the accuracy and precision of the enthalpy-temperature curve" in **Thermochimica Acta**, Vol 666, pp. 212-228 (2018).

2017 — **P. Tan**, M. Brütting, S. Vidi, H.-P. Ebert, P. Johansson, H. Jansson, A. Sasic Kalagasidis, "Correction of the enthalpy temperature curve of phase change materials obtained from the T-History method based on a transient heat conduction model" in **International Journal of Heat and Mass Transfer**, Vol 105 (2017).

2016 — J. Meyer, **P. Tan**, A. Apfelbacher, R. Daschner, A. Hornung, "Modeling of a methanol synthesis reactor for storage of renewable energy and conversion of CO_2: Comparison of two kinetic models" in **Chemical Engineering & Technology**, Vol 39 (2016).

Manuscripts are available upon request.

Relevant Coursework

PhD education, Chalmers	Linear and Integer Optimization with Applications
	Discrete Event Systems - Control and Optimization (2 courses)
	Analysis of Panel Data
Chalmers Professional Education	Introduction to Data Science and AI
	Introduction to Machine Learning
Univ. of Melbourne & CUHK (Coursera)	Advanced Modeling and Solving Algorithms for Discrete Optimization (3 courses)
Imperial College (Coursera)	Mathematics for Machine Learning (3 courses)
Stanford University (Coursera)	Machine Learning
deeplearning.ai (Coursera)	Deep Learning-, Tensorflow- and NLP Specialization (5 + 3 + 3 courses)
Johns Hopkins University (Coursera)	Data Science Specialization (10 courses)
UC Santa Cruz (Coursera)	Bayesian Statistics (3 courses)
Cloudera (Coursera)	Modern Big Data Analysis with SQL Specialization (3 courses)