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Research & Development Engineer                              Viktor Martinek
M.Sc. Mechanical Engineering                                 Mannheim, Germany

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========== EXPERIENCE ========================================================


03/22 - today   Associate Researcher at Heidelberg University
     (~3y)          > work on the project "Machine Learning and Optimal Experimental Design
                      for Thermodynamic Property Modeling"
                    > publish novel approaches & findings in journals & conferences
                    > develop open-source software tools
                    > assist in teaching classes & supervising student theses
                    > organize & teach workshops & summer schools


05/21 - 11/21   Master thesis at Process Automation Solutions, Ludwigshafen
     (~6m)          > developed a simulation environment for the virtual commissioning of
                      an OPC UA gateway
                    > conducted performance tests using the simulation environment
                    > tested interfaces of package units & MES
                    > verified an automation concept for an industry project


02/22 - 03/22   Research Assistant at Chemnitz University of Technology
     (~2m)          > improved & generalized a post-processing algorithm for molecular
                      dynamics simulations


05/19 - 01/21   Working student at IAV GmbH, Stollberg
     (~2y)          > modeled a fleet of hybrid electric vehicles focusing on thermal
                      aspects of the power train
                    > optimized the hybrid operation strategy of a fleet of vehicles in
                      terms of efficiency, emissions, & wear
                    > utilized neural networks to model emissions of internal combustion
                      engines
                    > designed & modeled a novel metal foam heat exchanger, which lead to
                      a patent


09/18 - 04/19   Bachelor thesis at IAV GmbH, Stollberg
     (~8m)          > developed a thermal model of a hybrid electric vehicle power train
                    > extended an online operation strategy to account for the warm-up
                      behavior of the power train
                    > modified a MATLAB script to do the same in 5 min instead of 4 weeks
                    > presented my work to customers


01/17 - 07/17   Internship at Daimler AG, Sindelfingen
     (~6m)          > assisted planning & preparing development vehicle tests
                    > ensured the thermal safety employing vehicle tests & simulations
                    > analyzed & assisted validating vehicle test data


06/15 - 09/15   Internship at Friatec AG, Mannheim
     (~2m)          > metalworking basics
                    > electrical engineering basics


                Miscellaneous
                    > tutored groups of children in mathematics & physics (~2y)
                    > delivered pizza (~1y)
                    > grinded knives at the weekly market (~6y)
                    > distributed brochures (~2y)


========== EDUCATION =========================================================


03/22 - today   Ph.D. Computational Science and Engineering at Heidelberg University
                    > evolutionary algorithms   > symbolic regression
                    > constrained optimization  > thermodynamic equations of state
                    > dynamic programming       > optimal experimental design
                    > reinforcement learning


04/19 - 02/22   M.Sc. Mechanical Engineering at Chemnitz University of Technology
                    > thermodynamics            > process engineering
                    > optimization              > automation
                    > graduated with 1.7
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09/15 - 04/19  B.Sc. Mechanical Engineering at Hochschule Mannheim
                    > control theory              > mechatronic modeling
                    > turbomachinery              > applied numerical analysis
                    > graduated with 2.1

========== PUBLICATIONS ===========================================================

---------- Journal articles (peer reviewed)

V. Martinek, I. Bell, R. Herzog, M. Richter, & X. Yang (2025). "Entropy scaling of
viscosity IV—application to 124 industrially important fluids". In: Journal of Chemical &
Engineering Data. doi: 10.1021/acs.jced.4c00451

O. Frotscher, V. Martinek, R. Fingerhut, X. Yang, J. Vrabec, R. Herzog, & M. Richter
(2023). "Proof of concept for fast equation of state development using an integrated
experimental-computational approach". In: International Journal of Thermophysics 44.7.
doi: 10.1007/s10765-023-03197-z

---------- Conference proceedings (peer reviewed)

V. Martinek (2025). "Fast Symbolic Regression Benchmarking". (accepted, tbd)

J. Reuter, V. Martinek, R. Herzog, & S. Mostaghim (2024). "Unit-aware genetic programming
for the development of empirical equations". In: Parallel Problem Solving from Nature –
PPSN XVIII, pp. 168–183. doi: 10.1007/978-3-031-70055-2_11

---------- Preprints

V. Martinek, J. Reuter, O. Frotscher, S. Mostaghim, M. Richter, & R. Herzog (2024).
"Shape constraints in symbolic regression using penalized least squares". In:
arXiv:2405.20800

V. Martinek, O. Frotscher, M. Richter, & R. Herzog (2023). "Introducing
thermodynamics-informed symbolic regression—a tool for thermodynamic equations of state
development". In: arXiv:2309.02805

---------- Theses

Development of a Simulation Environment to Perform a Virtual Commissioning and a
Performance Test of an OPC UA Gateway for a Batch Processing Plant (master thesis)

Development of a Post-Processing Algorithm to Evaluate Convergence of Molecular Dynamics
Simulations (pre master thesis)

Erweiterung und Optimierung einer Online-Hybrid-Betriebsstrategie im Hinblick auf
Thermomanagement zur Verbrauchsminimierung (bachelor thesis)

Simulation einer Magnetschwebebahn - Dynamik und Regelung (pre bachelor thesis)

========== TALKS & POSTERS ========================================================

07/25  16th International Conference on Swarm Intelligence, Yokohama, Japan
          > Fast Symbolic Regression Benchmarking (talk)

09/24  Thermodynamik Kolloquium, University of Stuttgart
          > Thermodynamics-informed Symbolic Regression → TiSR (poster)

09/24  European Conference on Machine Learning and Principles and Practice of Knowledge
       Discovery in Databases, Vilnius, Lithuania
          > Shape Constraints in Symbolic Regression Using Penalized Least Squares
            (poster)

09/24  18th International Conference on Parallel Problem Solving From Nature, Hagenberg,
       Austria
          > Unit-Aware Genetic Programming for the Development of Empirical Equations
            (poster) (not in person)

07/24  22nd Symposium on Thermophysical Properties and Eighteenth International
       Conference on the Properties of Water and Steam, NIST, Boulder, CO, USA
          > Thermodynamics-informed Symbolic Regression → TiSR (talk)
          > Entropy Scaling of Viscosity IV: Application to 124 Industrially Important
            Fluids (talk)
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                > Efficient Calibration of a Vibrating Tube Densimeter based on Optimal
                  Experimental Design (poster)

09/23   Thermodynamik Kolloquium, Leibniz University Hannover
                > Comparison of Strategies for the Development of a Helmholtz Equation of State
                  for Solid Benzene I (poster) (not in person)

09/22   Thermodynamik Kolloquium, Chemnitz University of Technology
                > Effiziente Kalibrierung eines Biegeschwinger-Dichtemessgerätes basierend auf
                  optimaler Versuchsplanung (poster)

06/22   32nd European Symposium on Applied Thermodynamics, Graz, Austria
                > Molecular Dynamics Simulation and Optimal Experimental Design for Efficient
                  Data Acquisition (poster) (not in person)
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========== OPEN-SOURCE SOFTWARE ==========================================================

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TiSR (Thermodynamics-informed Symbolic Regression)
  > https://github.com/scoop-group/TiSR
  > developed & maintain
  > symbolic regression library tailored to thermodynamic equations of state

FastSRB (Fast Symbolic Regression Benchmarking)
  > https://github.com/viktmar/FastSRB
  > developed & maintain
  > symbolic regression benchmarking library designed to improve the efficiency &
    pragmatism of ground-truth rediscovery benchmark
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========== TEACHING =======================================================================

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2024   Mathematical Machine Learning - Reinforcement Learning seminar at Heidelberg
       University

2024   Workshop week at the Computational Science Summer School at King Mongkut's
       University of Technology North Bangkok, Bangkok

2023   Workshop week at the Computational Science Summer School at King Mongkut's
       University of Technology Thonburi, Bangkok

2022   Introductory Python course for mathematicians at Heidelberg University

---------- Theses co-supervision

2025   working title: inverse reinforcement learning (ongoing master thesis)

2025   working title: reinforcement learning for electricity trade (ongoing master thesis)

2023   Der PageRank-Algorithmus und dessen Verbesserungen (bachelor thesis)
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========== ABROAD =========================================================================

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08/23 - 09/23   University of Western Australia, Perth
    (~7w)           > utilized symbolic regression to develop a fundamental equation of
                      state for Benzene I formulated in the Helmholtz energy
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========== SKILLS =========================================================================

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Software               neovim (btw), git, Linux (basics), MS Office (basics), GT-Power

Programming languages  Julia, Python, MATLAB

Languages              German (native), English (fluent), Bulgarian (raised bilingually)
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