Personal Information

Name	Dr.-Ing. Nils Gumpfer
Date of Birth	May 9, 1994
Place of Birth	Witzenhausen, Germany
Nationality	German

Academic and Professional Experience

06/2025 – present	Research Associate (PostDoc), TimeXAI Group, Centre of Competence for Information Technology, Technische Hochschule Mittelhessen (THM), Friedberg, Germany **Focus Areas:** - Applied Explainable AI for time series data - Supervision of doctoral students
05/2019 – 05/2025	Research Associate (Doctorate), Cognitive Information Systems Group, Centre of Competence for Information Technology, Technische Hochschule Mittelhessen (THM), Friedberg, Germany **Focus Areas:** - Applied Explainable AI (medical and industrial applications) - Supervision of students
12/2018 – present	Lecturer, Technische Hochschule Mittelhessen, StudiumPlus, Wetzlar, Germany **Courses taught:** - Machine Learning - Predictive Analytics - Operating Systems - Fundamentals of Computer Science
06/2018 – 04/2019	Inhouse Consultant for Business Analytics, B. Braun Melsungen AG, Melsungen, Germany **Focus Areas:** - Business Intelligence - Project Management - Machine Learning - IT Service Management
07/2016 – 05/2018	Working Student, B. Braun Melsungen AG, Melsungen, Germany **Focus Areas:** - Business Intelligence - Project Management - IT Service Management

Education

05/2019 – 06/2025	Doctor of Engineering (Dr.-Ing.), Graduate Centre for Engineering Sciences, Research Campus of Central Hessen, Giessen **Grade:** 0.7 (summa cum laude) **Thesis:** *Explainable Artificial Intelligence for Detection of Structural Changes in Myocardium*
10/2016 – 01/2019	M.Sc. in Business Informatics, Technische Hochschule Mittelhessen, Friedberg **Grade:** 1.0 (very good) **Thesis:** *Prediction of Myocardial Tissue Condition using 12-Lead ECG and Deep Learning*
08/2013 – 06/2016	B.A. in Business Administration (dual program), specialization in Business Informatics, THM StudiumPlus, Bad Wildungen **Grade:** 1.2 (very good) **Thesis:** *Future Scenarios for Analytical Applications at B. Braun Melsungen AG*
08/2010 – 06/2013	Technical Secondary School (IT track), Max-Eyth-Schule, Kassel **Grade:** 1.1 (very good) **Graduation:** Abitur (A-levels) Certificate **Special Project:** *Development of an Autonomous Chain Robot*
08/2004 – 07/2010	Comprehensive School, Valentin-Traudt-Schule, Grossalmerode **Grade:** 1.0 (very good) **Graduation:** Secondary School Certificate

Qualifications and Trainings

12/2020	Training: Good Scientific Practice
09/2020	Training: Designing Scientific Presentations
01/2020	Training: Writing Scientific Publications
09/2017	Training: Project Management
03/2017	Training: Design Thinking
07/2015	Certification: ITIL® (Foundation Level)
09/2014	Certification: SAP® Enterprise Data Warehousing (BW310)
04/2010	Certificate: Cambridge ESOL PET (B1)

Arwards and Honors

01/2025	Erasmus+ Mobility Scholarship (IIIT Allahabad, India)
02/2023	Idea Competition, Philipps-University of Marburg: 2nd Prize
11/2021	HessenIdeen Start-Up Competition: 2nd prize
10/2021	Idea Slam, Justus-Liebig- University of Giessen: 2nd Prize
09/2022	Hessian Founder's Award: Semi-Finalist
09/2021	Startup Competition, Technische Hochschule Mittelhessen: 1st Prize
05/2021-11/2021	HessenIdeen Start-Up Scholarship
07/2019	Best Thesis Award (M. Sc. Business Informatics), Technische Hochschule Mittelhessen

Publications (selective)

1. Gumpfer N., Prim J., Keller T., Seeger B., Guckert M., and Hannig J. (2023). “SIGNed Explanations: Unveiling Relevant Features by Reducing Bias.” *Information Fusion* 99, p. 101883. DOI: 10.1016/j.inffus.2023.101883.

2. Gumpfer N., Dinov B., Sossalla S., Guckert M., and Hannig J. (2024a). “Towards Trustworthy AI in Cardiology: A Comparative Analysis of Explainable AI Methods for Electrocardiogram Interpretation.” In: *22nd International Conference on Artificial Intelligence in Medicine, AIME 2024, Salt Lake City, UT, USA, July 9 - 12, 2024, Proceedings*. Ed. by J. Finkelstein, R. Moskovitch, and E. Parimbelli. Vol. 14845. Lecture Notes in Computer Science. Springer Nature Switzerland AG. Chap. 36, pp. 350–361. DOI: 10.1007/978-3-031-66535-6_36.

3. Gumpfer N., Grün D., Hannig J., Keller T., and Guckert M. (2020c). “Detecting Myocardial Scar Using Electrocardiogram Data and Deep Neural Networks.” *Biological Chemistry* 402.8, pp. 911–923. DOI: 10.1515/hsz-2020-0169.

4. Guckert M., Gumpfer N., Hannig J., Keller T., and Urquhart N. (2021). “A Conceptual Framework for Establishing Trust in Real World Intelligent Systems.” *Cognitive Systems Research* 68, pp. 143–155. DOI: 10.1016/j.cogsys.2021.04.001.

5. Powers S. T., Linnyk O., Guckert M., Hannig J., Pitt J., Urquhart N., Ekárt A., Gumpfer N., Han T. A., Lewis P. R., Marsh S., and Weber T. (2023). “The Stuff We Swim in: Regulation Alone Will Not Lead to Justifiable Trust in AI.” *IEEE Technology and Society Magazine* 42.4, pp. 95–106. DOI: 10.1109/MTS.2023.3341463.

6. Gumpfer N., Prim J., Gruen D., Hannig J., Keller T., and Guckert M. (2021d). “An Experiment Environment for Definition, Training and Evaluation of Electrocardiogram-Based AI Models.” In: *19th International Conference on Artificial Intelligence in Medicine, AIME 2021, Virtual Event, June 15 - 18, 2021, Proceedings*. Ed. by A. Tucker, P. H. Abreu, and J. Cardoso. Vol. 12721. Lecture Notes in Computer Science. Springer Nature Switzerland AG. Chap. 45, pp. 384–388. DOI: 10.1007/978-3-030-77211-6_45.

7. Gumpfer N. (2024b). *Explainable Artificial Intelligence for Detection of Structural Changes in Myocardium*. Ed. by B. Seeger and M. Guckert. Doctoral Thesis. Philipps-Universität Marburg. DOI: 10.17192/z2025.0472.

Oral Presentations and Invited Talks (selective)

- Gumpfer N. (2025b). *From Saliency to Semantics: XAI for ECG Time Series Analysis*. Invited talk, IEEE SPS Cycle 2 Seasonal School on Explainable AI and Applications to Biometric Signal Processing, IIIT Allahabad, Prayagraj, India, July 17, 2025.
- Gumpfer N. (2025c). *KI-gestützte EKG-Analyse*. Invited talk, KI made in Hessen, ZukunftsRaum Friedberg, Friedberg, Hesse, Germany, June 17, 2025.
- Gumpfer N. (2025a). *Balancing Explanations with SIGN*. Oral presentation, 2nd Colloquium on Business Informatics, Indo-German Workshop on XAI & Federated Learning, IIIT Allahabad, Prayagraj, India, January 21–23, 2025.
- Gumpfer N. (2024a). *Erklärbare Künstliche Intelligenz*. Invited talk, Digitalkonferenz des Wetteraukreises 2024, Ortenberg, Hesse, Germany, November 27, 2024.
- Gumpfer N., Dinov B., Sossalla S., Guckert M., and Hannig J. (2024b). *Towards Trustworthy AI in Cardiology: A Comparative Analysis of Explainable AI Methods for Electrocardiogram Interpretation*. Oral presentation, 22nd International Conference on Artificial Intelligence in Medicine, AIME 2024, Salt Lake City, UT, USA, July 9 - 12, 2024.
- Gumpfer N. (2024c). *Opening the AI Black Box to Build Trust in Cardiology*. Poster presentation, Get-together of the Graduate Centre for Engineering Sciences at the Research Campus of Central Hessen, April 24, 2024, Gießen, Germany.
- Gumpfer N. (2021). *Erklärbare Künstliche Intelligenz zur Erkennung von Herzmuskelschädigungen*. Oral presentation, 9th Interdisciplinary Doctoral Colloquium at Technische Hochschule Mittelhessen, Gießen, Germany, October 28, 2021.
- Gumpfer N., Wegener S., Grün D., Stützner E., Prim J., Hannig J., Guckert M., and Keller T. (2022). *Explainable artificial intelligence for detection of STEMI*. Oral presentation, Justus-Liebig-University Gießen Science Day 2022, Gießen, Germany, November 11, 2022.
- Gumpfer N, Gruen D., Hannig J., Keller T., and Guckert M. (2020a). *Detecting Myocardial Scar Using Electrocardiogram Data and Deep Neural Networks*. Oral presentation, 36th German Conference on Bioinformatics, Frankfurt (Main), Germany, September 14 - 17, 2020.

Open Source Software

- Experiment environment proposed in paper "An Experiment Environment for Definition, Training and Evaluation of Electrocardiogram-Based AI Models" (Gumpfer et al., 2021d), available at:
  https://github.com/nilsgumpfer/experiment-environment-ecg-ai
- Experiment code related to paper "SIGNed explanations: Unveiling relevant features by reducing bias" (Gumpfer et al., 2023), available at:
  https://github.com/nilsgumpfer/SIGN
- Python package including all XAI methods used in paper "SIGNed explanations: Unveiling relevant features by reducing bias" (Gumpfer et al., 2023), available at:
  https://pypi.org/project/signxai/
  https://github.com/nilsgumpfer/SIGN-XAI
- Experiment code related to paper "Towards Trustworthy AI in Cardiology: A Comparative Analysis of Explainable AI Methods for Electrocardiogram Interpretation" (Gumpfer et al., 2024a), available at:
  https://github.com/nilsgumpfer/AIME2024
- Experiment code related to tutorial "From Saliency to Semantics: XAI for ECG Time Series Analysis" (Gumpfer, 2025b), available at:
  https://github.com/nilsgumpfer/ieee_sps_xai_2025
- Experiment code related to lecture "Machine Learning", available at:
  https://github.com/nilsgumpfer/machine_learning_stplus