Dr. rer. nat. Narmin Ghaffari Laleh

Contact

- Born on 13/06/1993
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- WelkenratherStr.67
  52074 Aachen, Germany
- narmin-ghaffari-laleh
- Driving License B
- German Citizenship

Strengths and Qualities

- Ambitious and hardworking
- Effective communicator and educator
- Strong time management
- Solution-driven mindset
- Analytical proficiency
- Great team player

Google Scholar Metrics

- h-index: 20
- Total citations: 2,300+

Short Introduction

- I am a postdoctoral researcher currently contributing to two interdisciplinary teams: one within the Clinical AI group at TU Dresden and another in the R&D department of GlaxoSmithKline (GSK) in London.

- Specialized in cutting-edge AI technologies with strong proficiency in multiple programming languages and a high adaptability to emerging tools and frameworks.

- Experienced in communicating complex scientific ideas through invited talks and presentations at international conferences and educational programs.

- Actively involved in organizing high-level international summer schools and workshops, showcasing strong coordination and event management skills.

- Fluent in German (C1), English (IELTS 7.5), Persian (native speaker), Azerbaijani (native speaker), and Turkish (fluent).

- Passionate about impactful, outcome-driven research and enthusiastic about embracing my next career step with all the opportunities it brings.

Dr. rer. nat. Narmin Ghaffari Laleh

Researcher | AI-Expert in Computational Pathology

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- Driving License B
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Languages

- English - Professional Knowledge (Ielts: 7.5)
- German - Professional Knowledge (C1)
- Turkish - Fluent
- Azerbaijani - native speaker
- Farsi - native speaker

Programming Languages

- Python - Highly Specialised
- MATLAB - Advance
- C# - Advance
- R - Intermediate

Patents

Segmentation of OCT B-scans of human eye using (deep) Machine Learning for biometry applications-2021D00519-13.07.2021

💼 PROFESSIONAL EXPERIENCE

Present - 10.2023

Postdoctoral Researcher
KatherLab Clinical AI team @ EKFZ - TU Dresden, Germany

- Supervising a team of Ph.D. candidates in training an open-source vision-language model for histopathology.
- Mentoring Master's thesis students in statistically comparing the effectiveness of deep learning models for biomarker prediction.
- Organizing hackathons and summer schools for interdisciplinary participants from around the world.

Present - 04.2024

Postdoctoral Researcher
NCT-Med. Oncologie & GSK, Heidelberg, Germany

- Contributing to a project focused on designing and implementing state-of-the-art deep learning techniques to automate workflows in the Neuropathology Department at Heidelberg University Hospital.
- Developing novel deep learning approaches for various private and data-sensitive projects for GSK.

10-2023 - 10.2020

Research Associate
University Hospital of RWTH, Aachen, Germany

- Designed and implemented an automated workflow for preprocessing digital pathological whole slide images.
- Developed a weakly-supervised deep learning model to directly predict molecular alterations from digital pathological whole slide images.
- Conducted benchmarking of various state-of-the-art deep learning models across a range of cancer types.
- Evaluated the robustness of deep learning models against adversarial attacks in the field of digital pathology.
- Collaborated on decentralized learning initiatives.
- Managed the development and coordination of ML-(Dev)Ops infrastructure essential for conducting experiments.
- Demonstrated strong teamwork skills through publications and the establishment of productive collaborations.
- Organized and communicated scientific knowledge by designing and leading educational programs for interdisciplinary groups.
- Engaged in international collaborations to advance research objectives.
- Coordination of international Research teams.
- Mentored and supervised Master's students, contributing to their academic and research growth.

07.2020 - 08.2019

Research Associate (Master's Thesis)
Carl Zeiss Meditec AG, Jena, Germany

- Developed a novel workflow for segmenting OCT B-scan images acquired from the IOLMaster700, resulting in a patented solution.
- Conducted an in-depth comparative analysis of the final segmentation results, benchmarking them against internally developed segmentation methods.
- Successfully obtained a patent for the developed algorithms for segmentation of OCT B-scans Images of human eye.

Dr. rer. nat. Narmin Ghaffari Laleh

Researcher | AI-Expert in Computational Pathology

Soft Skills and Strengths

Creativity · Curiosity · Flexibility
Self Confidence · Ability to Plan and Organize
Autonomy · Adaptability · Detail-oriented
Problem Solving · Team Working
Enthusiasm for learning · Leadership
Good Communication · Managing Information
Patience

Soft Skills and Strengths

- **Microsoft Office**
  Word; PowerPoint; Excel; Teams

- **Python Packages**
  PyTorch; Fastai; Keras; Scikit-Learn; Matplotlib; Numpy; SciPy ; Seaborn; OpenCV; OpenSlide; Pillow; PathLib; Pandas

- **Machine Learning Methods**
  Supervised Learning: Linear Regression; Logistic Regression; Decision Trees; SVM; KNN; Random Forests
  Unsupervised Learning: K-Means Clustering; Hierarchical Clustering; PCA; t-SNE
  Deep Learning: MLP; CNN; RNN; LSTM; GAN; MIL; Autoencoders
  Natural Language Processing: Transformer Models
  Other Techniques: Dimensionality Reduction

- **LaTeX**
  Document typesetting and technical writing

Other Interests

- Reading 📚
- Writing 🖊
- Theater 🎭
- Collage 🖼

My Publications

Signature

Narmin Ghaffari Laleh
May 30, 2025
Aachen, Germany

💼 PROFESSIONAL EXPERIENCE

07.2019 - 08.2018

Graduate Student Assistant
Carl Zeiss Meditec AG, Jena, Germany

- Created an evaluation pipeline to assess the performance of internally developed segmentation methods for IOLMaster700, with the aim of enhancing patients' biometry measurements.
- Designed a user-friendly GUI for calculating and analyzing biometric parameters generated by IOLMaster700, improving data analysis and interpretation.

06.2018 - 04.2018

Graduate Student Assistant
Leibniz Institute of Photonic Technology (IPHT), Jena, Germany

- Analyzed spectroscopy data to assess material properties and detect baseline values and artifacts within the data.

05.2018 - 03.2018

Graduate Student Assistant
Medical Physics Group of Prof. Dr. Jürgen R. Reichenbach, Jena, Germany

- Specialized in MRI image processing and customized tools to enhance MRI image analysis efficiency.

🎓 EDUCATION

2020-2024

Ph.D. in Computational Pathology
RWTH University of Aachen, Germany
Supervisors: Prof. Dr.-Ing. Volkmar Schulz
Prof. Dr. med. Jakob Nikolas Kather
Dissertation Title: Prediction of Tumor Properties from Diagnostic Pathology Whole Slide Image Using Weakly-Supervised Deep Learning Methods
Research Focus: Development of deep learning algorithms to predict the molecular alterations directly from the whole slide images with the main focus on weakly-supervised algorithms.
Grade: Summa cum laude

2017-2020

Master of Science in Medical Photonics
Friedrich Schiller University of Jena, Germany
Selected Courses: Image processing I & II, Biomedical Imaging I & II, Medical statistics, Chemometric with the focus on machine learning application, Light matter interaction and Microscopy
Thesis: : Lens Segmentation of OCT B scan of Human Eye using Machine (Deep) Learning
Supervisor: Prof. Dr. Ing. Joachim Denzler
Grade: 1.5

2012-2016

Bachelor of science in Electrical Engineering-Bioelectric
Sahand University of Technology of Tabriz, Iran
Selected Courses: Fundamentals of computer and programming , Computational Intelligence, Signals and systems, Electrical Circuits I&II, Engineering Mathematics
Thesis: : Analyze of human footprint images taken by planter pressure estimation system
Supervisor: Prof. Dr. Afshin Ebrahimi
Grade: 1.7

Appendices:

- A - List of Publications

- B - Organized Educational Events, Summer schools, Conferences

- C - References

- D - Reference Letters

- E - Certificates

- F - Education Degrees

[1] Narmin Ghaffari Laleh, Daniel Truhn, Gregory Patrick Veldhuizen, Tianyu Han, Marko van Treeck, Roman D Buelow, Rupert Langer, Bastian Dislich, Peter Boor, Volkmar Schulz, et al. "Adversarial attacks and adversarial robustness in computational pathology". In: *Nature communications* 13.1 (2022), p. 5711.

[2] Jan Clusmann, Fiona R Kolbinger, Hannah Sophie Muti, Zunamys I Carrero, Jan-Niklas Eckardt, Narmin Ghaffari Laleh, Chiara Maria Lavinia Löffler, Sophie-Caroline Schwarzkopf, Michaela Unger, Gregory P Veldhuizen, et al. "The future landscape of large language models in medicine". In: *Communications medicine* 3.1 (2023), p. 141.

[3] A Echle, N Ghaffari Laleh, P Quirke, HI Grabsch, HS Muti, OL Saldanha, SF Brockmoeller, PA van den Brandt, GGA Hutchins, SD Richman, et al. "Artificial intelligence for detection of microsatellite instability in colorectal cancer—a multicentric analysis of a pre-screening tool for clinical application". In: *ESMO open* 7.2 (2022), p. 100400.

[4] Dyke Ferber, Georg Wölflein, Isabella C Wiest, Marta Ligero, Srividhya Sainath, Narmin Ghaffari Laleh, Omar SM El Nahhas, Gustav Müller-Franzes, Dirk Jäger, Daniel Truhn, et al. "In-context learning enables multimodal large language models to classify cancer pathology images". In: *Nature Communications* 15.1 (2024), p. 10104.

[5] Narmin Ghaffari Laleh, Hannah Sophie Muti, Chiara Maria Lavinia Loeffler, Amelie Echle, Oliver Lester Saldanha, Faisal Mahmood, Ming Y Lu, Christian Trautwein, Rupert Langer, Bastian Dislich, et al. "Benchmarking weakly-supervised deep learning pipelines for whole slide classification in computational pathology". In: *Medical image analysis* 79 (2022), p. 102474.

[6] Oliver Lester Saldanha, Philip Quirke, Nicholas P West, Jacqueline A James, Maurice B Loughrey, Heike I Grabsch, Manuel Salto-Tellez, Elizabeth Alwers, Didem Cifci, Narmin Ghaffari Laleh, et al. "Swarm learning for decentralized artificial intelligence in cancer histopathology". In: *Nature medicine* 28.6 (2022), pp. 1232–1239.

[7] Peter Leonard Schrammen, Narmin Ghaffari Laleh, Amelie Echle, Daniel Truhn, Volkmar Schulz, Titus J Brinker, Hermann Brenner, Jenny Chang-Claude, Elizabeth Alwers, Alexander Brobeil, et al. "Weakly supervised annotation-free cancer detection and prediction of genotype in routine histopathology". In: *The Journal of pathology* 256.1 (2022), pp. 50–60.

[8] Narmin Ghaffari Laleh, Chiara Maria Lavinia Loeffler, Julia Grajek, Kateřina Staňková, Alexander T Pearson, Hannah Sophie Muti, Christian Trautwein, Heiko Enderling, Jan Poleszczuk, and Jakob Nikolas Kather. "Classical mathematical models for prediction of response to chemotherapy and immunotherapy". In: *PLoS computational biology* 18.2 (2022), e1009822.

[9] Julien Calderaro, Narmin Ghaffari Laleh, Qinghe Zeng, Pascale Maille, Loetitia Favre, Anaïs Pujals, Christophe Klein, Céline Bazille, Lara R Heij, Arnaud Uguen, et al. "Deep learning-based phenotyping reclassifies combined hepatocellular-cholangiocarcinoma". In: *Nature communications* 14.1 (2023), p. 8290.

[10] Raquel Perez-Lopez, Narmin Ghaffari Laleh, Faisal Mahmood, and Jakob Nikolas Kather. "A guide to artificial intelligence for cancer researchers". In: *Nature Reviews Cancer* (2024), pp. 1–15.

[11] Artem Shmatko, Narmin Ghaffari Laleh, Moritz Gerstung, and Jakob Nikolas Kather. "Artificial intelligence in histopathology: enhancing cancer research and clinical oncology". In: *Nature cancer* 3.9 (2022), pp. 1026–1038.

[12] Amelie Echle, Narmin Ghaffari Laleh, Peter L Schrammen, Nicholas P West, Christian Trautwein, Titus J Brinker, Stephen B Gruber, Roman D Buelow, Peter Boor, Heike I Grabsch, et al. "Deep learning for the detection of microsatellite instability from histology images in colorectal cancer: a systematic literature review". In: *ImmunoInformatics* 3 (2021), p. 100008.

[13] Narmin Ghaffari Laleh, Marta Ligero, Raquel Perez-Lopez, and Jakob Nikolas Kather. "Facts and hopes on the use of artificial intelligence for predictive immunotherapy biomarkers in cancer". In: *Clinical Cancer Research* 29.2 (2023), pp. 316–323.

[14] Chiara Maria Lavinia Loeffler, Nadina Ortiz Bruechle, Max Jung, Lancelot Seillier, Michael Rose, Narmin Ghaffari Laleh, Ruth Knuechel, Titus J Brinker, Christian Trautwein, Nadine T Gaisa, et al. "Artificial intelligence–based detection of FGFR3 mutational status directly from routine histology in bladder cancer: a possible preselection for molecular testing?" In: *European urology focus* 8.2 (2022), pp. 472–479.

[15] Scarlet Brockmoeller, Amelie Echle, Narmin Ghaffari Laleh, Susanne Eiholm, Marie Louise Malmstrøm, Tine Plato Kuhlmann, Katarina Levic, Heike Irmgard Grabsch, Nicholas P West, Oliver Lester Saldanha, et al. "Deep learning identifies inflamed fat as a risk factor for lymph node metastasis in early colorectal cancer". In: *The Journal of pathology* 256.3 (2022), pp. 269–281.

[16] Qinghe Zeng, Christophe Klein, Stefano Caruso, Pascale Maille, Daniela S Allende, Beatriz Mínguez, Massimo Iavarone, Massih Ningarhari, Andrea Casadei-Gardini, Federica Pedica, et al. "Artificial intelligence-based pathology as a biomarker of sensitivity to atezolizumab–bevacizumab in patients with hepatocellular carcinoma: a multicentre retrospective study". In: *The Lancet Oncology* 24.12 (2023), pp. 1411–1422.

[17] Joao Gorgulho, Christoph Roderburg, Felix Heymann, Maximilian Schulze-Hagen, Fabian Beier, Mihael Vucur, Jakob N Kather, Narmin Ghaffari Laleh, Frank Tacke, Tim H Brümmendorf, et al. "Serum levels of soluble B and T lymphocyte attenuator predict overall survival in patients undergoing immune checkpoint inhibitor therapy for solid malignancies". In: *International Journal of Cancer* 149.5 (2021), pp. 1189–1198.

[18] Chiara Maria Lavinia Loeffler, Nadine T Gaisa, Hannah Sophie Muti, Marko van Treeck, Amelie Echle, Narmin Ghaffari Laleh, Christian Trautwein, Lara R Heij, Heike I Grabsch, Nadina Ortiz Bruechle, et al. "Predicting mutational status of driver and suppressor genes directly from histopathology with deep learning: a systematic study across 23 solid tumor types". In: *Frontiers in Genetics* 12 (2022), p. 806386.

[19] Jakob Nikolas Kather, Narmin Ghaffari Laleh, Sebastian Foersch, and Daniel Truhn. "Medical domain knowledge in domain-agnostic generative AI". In: *NPJ digital medicine* 5.1 (2022), p. 90.

[20] Qinghe Zeng, Christophe Klein, Stefano Caruso, Pascale Maille, Narmin Ghaffari Laleh, Daniele Sommacale, Alexis Laurent, Giuliana Amaddeo, David Gentien, Audrey Rapinat, et al. "Artificial intelligence predicts immune and inflammatory gene signatures directly from hepatocellular carcinoma histology". In: *Journal of Hepatology* 77.1 (2022), pp. 116–127.

[21] Lukas Buendgens, Didem Cifci, Narmin Ghaffari Laleh, Marko van Treeck, Maria T Koenen, Henning W Zimmermann, Till Herbold, Thomas Joachim Lux, Alexander Hann, Christian Trautwein, et al. "Weakly supervised end-to-end artificial intelligence in gastrointestinal endoscopy". In: *Scientific Reports* 12.1 (2022), p. 4829.

AI in Medicine Summer School (Tangerine Consortium) - Organizer

🏛 Else Kröner Fresenius Center for Digital Health (EKFZ), Dresden, Germany

📅 19.08.2024 - 23.08.2024

👥 This summer school brought together 50 international participants to explore AI applications in medicine, with a focus on immunotherapy response prediction. The program included expert talks on multimodal AI, explainability, and clinical integration, fostering interdisciplinary exchange among researchers and clinicians.

Clinicum Digitale Course- Co-Organizer

🏛 Technical University of Dresden, Else Kröner Fresenius Center (EKFZ) for Digital Health, Dresden, Germany

📅 March, annually from 2022 to 2025 (4 editions)

👥 The Clinicum Digitale Spring School brings together medical and non-medical students for interdisciplinary learning. Participants gain hands-on experience in topics such as programming, AI, robotics, emergency medicine, and digital health innovation.

AI for Pathology Course- Co-Organizer

🏛 Henri-Mondor University Hospital, Paris, France

📅 June, annually from 2021 to 2025 (5 editions)

👥 This course introduces pathologists to the fundamentals of artificial intelligence applied to histopathology. It covers digital slide analysis, study design, and evaluation of AI models used in computational pathology.

AI Applications in Endoscopy- Co-Organizer

🏛 Gesellschaft für Gastroenterologie und Hepatologie, Berlin, Germany

📅 21.01.2022 - 22.01.2022

👥 This two-day workshop in Berlin brought together clinicians and researchers to explore practical AI applications in endoscopy. I co-led multiple hands-on sessions on Python programming, image classification, and object detection for medical imaging.

👤 **Prof. Dr. med. Jakob Nikolas Kather**

💼 Physician/Scientist and Full Professor for Clinical Artificial Intelligence

🏛 Else Kröner Fresenius Center for Digital Health (EKFZ), Dresden University of Technology

📍 Fetscherstraße 74, 01307 Dresden, Germany

✉ jakob_nikolas.kather@tu-dresden.de

🤝 PhD Supervisor

👤 **Prof. Dr.-Ing. Volkmar Schulz**

💼 Head of the Chair of Imaging and Computer Vision

🏛 Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University

📍 Templergraben 55, 52062 Aachen, Germany

✉ schulz@pmi.rwth-aachen.de

🤝 PhD Supervisor

👤 **Prof. Dr. med. Dipl.-Phys. Daniel Truhn**

💼 Professor for AI in Radiology

🏛 Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University

📍 Pauwelsstraße 30, 52074 Aachen, Germany

✉ dtruhn@ukaachen.de

🤝 Research collaborator and co-author

👤 **Prof. Dr. Julien Calderaro**

💼 Professor/Practitioner Specialized in Medical and Tumoral Liver Pathology

🏛 Department of Pathology, Centre Hospitalier Universitaire Henri Mondor

📍 51, Avenue du Maréchal de Lattre de Tassigny, 94000 Créteil, Paris, France

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🤝 Research collaborator, co-author and co-organizer of academic courses

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Dresden, 15.04.2025

To whom it may concern

Dr. rer. nat. Narmin Ghaffari Laleh, born on June 13, 1993, in Tabriz, has been an integral member of our Clinical AI Research Group since October 1, 2020. She initially joined the team as a Ph.D. candidate and successfully defended her dissertation titled **"Predicting Tumor Properties from Diagnostic Pathology Whole Slide Images Using Weakly Supervised Deep Learning Methods"** with the highest distinction, **summa cum laude**. Following this accomplishment, she continued her impactful work as a postdoctoral researcher in our group.

Our research group applies cutting-edge deep learning techniques to extract actionable insights from clinical routine data, with a particular focus on precision oncology for solid tumors, including immunotherapy. Backed by over **€6.5 million** in third-party funding since 2019, we work at the forefront of clinical AI.

Throughout her tenure in our lab, Dr. Ghaffari Laleh has taken on an impressive array of responsibilities, which include:

- **Development of end-to-end AI pipelines** for predicting molecular properties and genetic alterations from histopathology images, covering the full technical

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Member of:

stack from data preprocessing, model development, fine-tuning, optimization, deployment, and robust evaluation.

- **Pioneering multimodal AI approaches**, she has combined computer vision with large language models (LLMs) to advance the field of computational pathology. She designed and executed multimodal training pipelines, including data scraping, cleaning, and preprocessing, model architecture selection, and training. Additionally, she evaluated the performance of multiple multimodal LLM models across various projects, such as stress-level evaluation from patient videos, morphological characteristics description of whole slide images, and utilization of text feature bags for multiple clinically relevant targets.
- **Broad scientific contributions** beyond her core focus, including work on adversarial attacks, decentralized learning, response prediction using classical mathematical models, and the application of LLMs in unstructured medical text data.
- **Authoring highly influential review papers**, offering structured, insightful overviews of AI applications in medicine — several of which are already extensively cited within the field.
- **Leading international collaborations** with renowned experts and institutions in the field from the US, Germany, the UK, France and Italy which has resulted in collaborative high-impact publications. In these collaborations, she has been instrumental in experimental design, data analysis, reproducibility assessments using state-of-the-art explainability techniques, and interdisciplinary communication.
- **Developing and leading educational initiatives**, including international summer schools and specialized AI courses. Several of these programs became recurring events under her leadership due to their outstanding reception.
- **Supervising Ph.D. candidates and Master's students,** offering mentorship, scientific direction, and hands-on support. She has also led teams in research competitions and international AI challenges.
- **Regularly presenting her work** at national and international conferences, both as an invited keynote speaker and through peer-reviewed contributions.

Dr. Ghaffari Laleh brings to her work a combination of best scientific rigor, creativity, and impactful leadership. Her analytical skills, capacity for independent judgment, and resilience under pressure are truly exemplary. She is highly organized, operates with strategic foresight, and consistently delivers exceptional results across all tasks and responsibilities.

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Her strong commitment, initiative, and problem-solving abilities are matched by her talent for collaboration and communication. Whether in academic discourse, interdisciplinary teamwork, or high-profile presentations, she is consistently confident, well-spoken, and impactful. Her work has significantly advanced the visibility and reputation of our group.

Particularly impressive is her voluntary assumption of full responsibility for our educational programs over multiple years. Despite the demands of her scientific workload, she has continuously delivered outstanding results in planning, organizing, and executing complex events. Her visionary thinking, attention to detail, and people skills have ensured the success of every initiative she led.

Equally commendable is her role as a mentor. She empowers students and junior researchers with clarity, empathy, and motivation, creating a collaborative atmosphere that fosters innovation and learning.

Her conduct toward supervisors, colleagues, and external partners is exemplary at all times. She is held in the highest regard for both her professional excellence and her positive, respectful demeanor. Her ability to work constructively in interdisciplinary settings makes her an invaluable contributor and a trusted collaborator.

We are, without exception, extremely satisfied with Dr. Ghaffari Laleh's performance and contributions. We thank her sincerely for her remarkable achievements to date and look forward with great enthusiasm to our continued collaboration.

Yours sincerely,

Jakob Nikolas Kather

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Heidelberg am 16.04.2025

Reference

To whom it may concerne,

Dr. rer. nat. Narmin Ghaffari Laleh (13.06.1993, Tabriz), has been a postdoctoral researcher at the Heidelberg University Hospital since April 1, 2024. In her current role, Dr. Ghaffari Laleh leads a flagship collaboration with the global biopharmaceutical and biotechnology company GlaxoSmithKline GmbH & Co. KG (GSK). This high-impact, GSK-funded initiative aims to advance AI-driven precision medicine-an area that lies at the crossroads of cutting-edge academic research and real-world industrial application. Dr. Ghaffari Laleh was entrusted with this responsibility due to her exceptional scientific background and proven expertise in the field.

GSK is a global biopharmaceutical company headquartered in the United Kingdom, focused on researching, developing, and manufacturing innovative medicines and vaccines. With operations in over 100 countries and a diverse pipeline of drugs, GSK continues to play a key role in advancing global health.

Dr. Ghaffari Laleh's key responsibilities during this employment have included:

1. **Developing Scalable AI and Computational Models** for spatial profiling of tumor microenvironments using proprietary standard histopathological images. These models contribute directly to the development of diagnostic and predictive tools that are essential for modern, data-driven drug development and clinical decision-making pipelines.

Prof. Dr. med. Dirk Jäger
Direktor
Medizinische Onkologie im NCT

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(DKFZ)

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2. **Refining Machine Learning and Statistical Frameworks** to integrate histological image data with molecular signatures. These models improve patient stratification and biomarker discovery—key capabilities in targeted therapy and personalized treatment programs.

3. **Leading Explainable AI (XAI) Initiatives**, including the integration of transparency techniques into complex AI models. In her work she works together with the AI/ML team of GSK on model interpretability, which is crucial in industrial adoption of AI technologies in the healthcare industry.

4. **Leading a Neuropathology Project:** In addition to her work with GSK, Dr. Ghaffari Laleh has also led a project within the Neuropathology Department at Heidelberg University Hospital. This project focuses on guiding tissue sampling for molecular diagnosis—an approach that enhances the accuracy of sampling in heterogeneous tumors by identifying representative high-grade regions.

What truly distinguishes Dr. Ghaffari Laleh is her rare ability to bridge innovation and implementation. She combines deep scientific knowledge with a practical understanding of timelines, deliverables, and stakeholder engagement—skills that are vital for leading high-stakes, industry-aligned projects.

Throughout the collaboration, she has taken an active leadership role across all project stages—from conceptual development and technical execution to communication and reporting. She has also participated in GSK's internal knowledge-sharing programs, which has further strengthened her familiarity with industrial data platforms, compliance protocols, and production-grade software development.

In collaborative settings, Dr. Ghaffari Laleh consistently demonstrates:

- **Clear, impactful communication** with both technical and non-technical stakeholders, ensuring alignment and shared understanding across disciplines.

- **Proactive problem-solving**, especially under constraints or ambiguity—an essential trait in product-driven innovation.

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- **High ethical standards and responsibility**, particularly in handling patient-derived data with confidentiality and regulatory compliance.

Her ability to translate complex scientific insights into real-world applications has been highlighted repeatedly in feedback from our GSK counterparts. She is viewed as a strategic asset—someone who not only understands advanced computational biology and AI but also knows how to drive these innovations into industry-relevant deliverables.

Dr. Ghaffari Laleh has earned the full trust and respect of our academic and industry partners through her outstanding competence, integrity, and collaborative spirit. We are confident that she will thrive in any industrial setting that values innovation, interdisciplinary collaboration, and scientific rigor to enable business objectives.

With kind regards

Prof. Dr. med. Dirk Jäger
Medical Director Medical Oncology

ZEISS

Letter of Reference

Ms Narmin Ghaffari Laleh born on 13 June 1993 was employed in our enterprise from 1 August 2018 to 31 July 2019 in the department Software development as working student.

Carl Zeiss Meditec AG, which is listed on MDAX & TecDax of the German stock exchange, is one of the world's leading medical technology companies. The Company supplies innovative technologies and application-oriented solutions designed to help doctors improve the quality of life of their patients. It provides complete packages of solutions for the diagnosis and treatment of eye diseases, including implants and consumable materials. The Company creates innovative visualization solutions in the field of microsurgery. The Group's head office is located in Jena, Germany.

In the field of software development, her task was to develop a tool for automatic calculation of intraocular lenses (IOL) based on the ZEISS IOL calculation kernel. With this tool the user can easily utilize all common and state-of-the-art IOL calculation formulas, e.g. the Barrett Universal II formula to precisely select a customized IOL for an eye to achieve the best objective refraction.

In the field of algorithm development, Ms. Narmin Ghaffari Laleh compared two OCT B-scan segmentation algorithms for biometry measurements. Among these biometry measurements are the axial length of an eye as well as the eye lens thickness and anterior chamber depth. She evaluated the repeatability and accuracy of the biometry results with respect to their clinical relevance in IOL calculation.

Ms Ghaffari Laleh has wide-ranging, excellent professional knowledge, which she used extremely successfully in practice at all times. Ms. Narmin Ghaffari Laleh had a very goodunderstanding of the anatomy of the eye, corresponding biometry measurement andIOL calculation. After only a short time, she was able to successfully utilizethe acquired knowledge for her tasks. She also had very good programming skillsin MATLAB and C#, which in combination provided the perfect basis to accomplishher tasks.Ms. Narmin Ghaffari Laleh proved that shewas always been able to make and realize very thoughtful suggestions regardingher work. She was always able to work under pressure, always acted calmly and extremelywell-considered. She worked very purposefully, independently and extremelyresponsible.Her exceptional social skills and abilityto work in a team require special mention. They allowed us to successfullyconduct problem- and target-oriented discussions of her evaluated results. With regular and always very successful further training, she continuously expanded her outstanding professional knowledge.

Her creative thinking and her extraordinarily rapid power of comprehension enabled her to find the best solutions at all times, even for difficult problems. Ms Ghaffari Laleh always worked in a highly proactive manner and completely identified with her tasks and our company at all times. She always displayed an impressive level of dedication and motivation. Ms Ghaffari Laleh was highly open to new experiences at all times; she was always willing to learn new things. In situations with extreme stress, she always displayed exemplary resilience.

She always completed her tasks completely autonomously, with much diligence and

according to a well thought-out plan. She always worked serenely, thoughtfully, target-oriented and extremely precisely. She continuously impressed us particularly in terms of quality and quantity. Ms Ghaffari Laleh worked always extremely reliable and with high precision.

Ms Ghaffari Laleh impressed us particularly with the very good quality of her work results at all times. All abovementioned tasks were successfully implemented by Mrs. Narmin Ghaffari Laleh to our fullest satisfaction. We thank her for her excellent work and cooperation. because of her work success and personal commitment we offer her a position as master student.

In summary, we were perfectly satisfied with her performance at all times.

With her always engaging and extremely helpful manner, Ms Ghaffari Laleh was particularly appreciated by her superiors and colleagues. Her behaviour was exemplary at all times.

We would like to thank Ms Ghaffari Laleh for her always very good services and wish her for the future further success, both professionally and personally and all the best. However - because of her extraordinary work success and personal commitment we offered her a position as master student.

Jena, 31 July 2019

Carl Zeiss Meditec AG
Göschwitzer Straße 51-52
07745 Jena

i.V.

Jörg Meißner
Senior Manager Entwicklung

i.V.

Sonja Wege
Personalreferentin

ZEISS

Letter of Reference

Title:	Ms.	Duration of contract:	1 August 2019 - 31 July 2020
Last name:	Ghaffari Laleh	Company:	Carl Zeiss Meditec AG
First name:	Narmin	Division / Department:	SUR Program Biometry
Date of birth:	13 June 1993	Type of employment:	Master thesis
Place of birth:	Tabriz, Iran	Specialist area:	Medical Photonics

Job description

By means of optical coherence tomography (OCT), the ZEISS IOLMaster 700 captures sectional images of the human eye, known as B-scans. For intraocular lens (IOL) calculation, length measurements of the eye, for example the axial length, anterior chamber depth and lens thickness, are required. For this and other applications, an automatic and robust segmentation of the B-scan is necessary. During her master thesis with the title "Lens Segmentation of OCT B-scans of the human eye using Machine (Deep) Learning" Ms. Ghaffari Laleh was entrusted with the following tasks:

• Development of a machine learning based algorithm for automatic and accurate detection of the anterior and posterior lens surfaces, the main challenge is the large variability of the data due to physiological differences, pathologies and varying signal characteristics
• Literature review and method selection
• Robust detection of the lens surfaces
• Consideration of various perturbations
• Data acquisition and preparation
• Systematic experimental evaluation and comparison with existing measurement techniques with respect to repeatability, accuracy and the clinical relevance in IOL calculation
• Close collaboration with machine learning experts from the Zeiss Central Research and Technology team and application experts from the Zeiss Meditec team, however, it must be said that the objective, implementation and the great results were based on her own initiative, which we were pleased to support
• Independently and autonomously worked her way into new areas of expertise and creatively developed her own solution approaches
To our great regret, due to the current COVID-19 pandemic, we were forced to stop our plans to offer her a professional or academic perspective in our team. We thank her for her excellent work and cooperation.

Assessment

1

Job-related skills		very pronounced	pronounced	present	is barely perceptible	assessment not possible*
Analytical and conceptual skills	Develops meaningful, practical solutions and puts job-related knowledge to good use	X				
Quality of work	Completes tasks to the required standard	X				
Speed of execution	Delivers usable results in an appropriate time frame	X				
Effectiveness, efficiency	Carries out tasks very well and avoids unnecessary process steps	X				

*Skills could not be assessed for this task

Assessment

2 **Methodological skills**

		very pronounced	pronounced	present	is barely perceptible	assessment not possible*
Flexibility	Adapts to new/changed tasks without difficulty	X				
Goal orientation	Sets realistic goals in his/her work and pursues them accordingly	X				
Customer orientation	Treats customers in an appropriate manner and offers them support where necessary					X

3 **Social skills**

		very pronounced	pronounced	present	is barely perceptible	assessment not possible*
Interpersonal skills	Establishes and fosters contact with others on own initiative	X				
Team skills	Integrates well into working environment without difficulty and is accepted by colleagues, managers and customers	X				
Communication skills	Can present arguments effectively and speaks coherently and clearly	X				
Collaboration/intercultural skills	Works with others in a targeted, topic-focused manner and can adapt to different people/approaches	X				
Conflict skills	Addresses problems openly, is receptive to others' opinions and has the courage to enter into constructive debate with others	X				
Ability to accept criticism; assertiveness	Can handle positive and negative feedback and questions and is prepared to change own behavior	X				

4 **Personal skills**

		very pronounced	pronounced	present	is barely perceptible	assessment not possible*
Motivation	Shows commitment, interest and enthusiasm	X				
Willingness to learn	Accepts and makes use of opportunities to learn	X				
Reliability	Performs tasks in a responsible, careful and trustworthy manner	X				
Ability to cope with stress	Can cope with difficult work conditions and/or can handle stress	X				
Personal image	Acts in a convincing and appropriate manner	X				

*Skills could not be assessed for this task.

Ms. Narmin Ghaffari Laleh will leave the company after the completion of her master thesis. We would like to thank her very much for her work and we wish her all the best in her professional and personal life.

Carl Zeiss AG

i. V.

Marion Fischer

i. V.

Olga Beck

Oberkochen, 31 July 2020

Urkunde | RWTH AACHEN
Certificate | UNIVERSITY

English Transcript

The Faculty of Mathematics, Computer Science and Natural Sciences of RWTH Aachen University

on behalf of the Rectorate headed by
Universitätsprofessor
Dr. rer. nat. Dr. h. c. mult. Ulrich Rüdiger

and on behalf of the Dean's Office headed by
Universitätsprofessor
Dr. rer. nat. Carsten Honerkamp

herewith confers on

Narmin Ghaffari Laleh
born on June 13, 1993 in Tabriz, Iran

the academic degree

DOKTORIN DER NATURWISSENSCHAFTEN
(Dr. rer. nat.)

after all the conditions in the regulations governing doctoral studies were satisfied under the supervision and assessment of

Universitätsprofessor
Dr.-Ing. Volkmar Schulz

Professor
Dr. med. Jakob Nikolas Kather

Professorin als Juniorprofessorin
Dr. rer. nat. Anna Matuszyńska

and a thesis was submitted with the title

"Predicting Tumor Properties from Diagnostic Pathology Whole Slide Images Using Weakly-Supervised Deep Learning Methods"

and academic competence in the oral examination on March 20, 2024 was proven. The overall grade of

SUMMA CUM LAUDE

was awarded.

Aachen, April 9, 2024

Universitätsprofessor
Dr. rer. nat. Dr. h. c. mult.
Ulrich Rüdiger
The Rector

Universitätsprofessor
Dr. rer. nat. Carsten Honerkamp
The Dean

Fakultät für
Mathematik, Informatik
und Naturwissenschaften

RWTHAACHEN
UNIVERSITY

RWTH Fakultät für Mathematik, Informatik und Naturwissenschaften D-52056 Aachen

Frau Dr.
Narmin Ghaffari Laleh, M. Sc.
Welkenrather Straße 67
52074 Aachen

Der Dekan
Univ.-Prof. Dr. rer. nat.
Carsten Honerkamp

Promotionssekretariat
Sachbearbeiter: NOW

Templergraben 59
52062 Aachen

Telefon: +49 241 80-94501
Fax: +49 241 80-92124

promotionen@fb1.rwth-aachen.de

Sehr geehrte Frau Dr. Laleh,

nachdem Sie bei der Fakultät für
Mathematik, Informatik und
Naturwissenschaften Ihr
Promotionsverfahren erfolgreich
abgeschlossen haben, übersende ich
Ihnen anliegend mit den besten
Wünschen Ihre Dr.-Urkunde.

Gleichzeitig füge ich zu Ihrer
Information Unterlagen über die
Freunde und Förderer der RWTH
Aachen e.V. (proRWTH) bei. Ich würde
es sehr begrüßen, wenn Sie sich zu
einer Mitgliedschaft entschließen
könnten.

Mit freundlichen Grüßen

Dear Mrs. Laleh,

I would like to congratulate you on
successfully completing your doctoral
degree at the Faculty of Mathematics,
Computer Science and Natural
Sciences. Please find enclosed, with my
best wishes, the doctoral degree
certificate.

I attached information on proRWTH, the
Association of Friends and Supporters
of RWTH Aachen University. Please
consider joining this network. I hereby
invite you to do so.

Sincerely

Univ.-Prof. Dr. rer. nat. Carsten Honerkamp
Dekan - Dean

FRIEDRICH SCHILLER UNIVERSITY JENA
FACULTY OF MEDICINE
FACULTY OF CHEMISTRY AND EARTH SCIENCES
FACULTY OF PHYSICS AND ASTRONOMY

GRADE CERTIFICATE
OF THE MASTER EXAMINATIONS

Narmin Ghaffari Laleh
born on 13 June 1993 in Tabriz (Iran)

has successfully passed the Master examinations (120 ECTS) in the study programme
»Medical Photonics«

with the final overall grade **very good** (1.5 according to the German grading system).

FRIEDRICH-SCHILLER-
UNIVERSITÄT
JENA

Results of the Individual Module Examinations

Compulsory Modules	Grade	ECTS
A1.1 - Mathematical Methods	1.0	4
A1.2 - Optical Engineering	1.7	4
A1.3 - Physical Chemistry	3.3	8
F1.1 - Image Processing I	1.7	4
F1.2 - Biomedical Imaging I	2.7	4
A2.1 - Physical Optics	1.7	4
A2.2 - Light Matter Interaction	1.3	4
F2.1 - Image Processing II	1.0	4
F2.2 - Biomedical Statistics	1.3	4
P1 - Practical Course	2.9	12
P2 - Research Labwork	1.3	18

Required Elective Modules

	Grade	ECTS
S2.2 – Biomedical Imaging II	3.3	4
S2.7 - Image Understanding	1.3	4
S3.3 - Electron Microscopy	2.3	4
S3.9 - Chemometrics	2.7	4
S3.11 – Mass Spectrometry Imaging	1.0	4

Master thesis

For the Master thesis (30 ECTS) on the subject

» Lens Segmentation of OCT B-scan of the Human Eye using Machine (Deep) Learning «

the **grade 1.1** (according to the German grading system) was given.

Jena, 11 September 2020

Prof.·Dr. C. Biskup
Chairperson of the
Examination Committee

FRIEDRICH SCHILLER UNIVERSITY JENA
FACULTY OF MEDICINE
FACULTY OF CHEMISTRY AND EARTH SCIENCES
FACULTY OF PHYSICS AND ASTRONOMY

DEGREE CERTIFICATE

The Friedrich Schiller University Jena, represented by its
Faculty of Medicine, by its Faculty of Chemistry and Earth
Sciences and by its Faculty of Physics and Astronomy,
herewith awards

Narmin Ghaffari Laleh
born on 13 June 1993 in Tabriz (Iran)
with the academic degree

MASTER OF SCIENCE (M.Sc.)

after successfully completing the Master examinations (120 ECTS)
in the study programme »Medical Photonics«
on 11 September 2020.

Jena, 11 September 2020

Prof. Dr. C. Spielmann
*Dean of the Faculty of Physics
and Astronomy*

Prof. Dr. H.-D.Arndt
*Dean of the Faculty of Chemistry
and Earth Sciences*

Prof. Dr. O. Guntinas-Lichius
Dean of Studies of the Medical Faculty

Prof. Dr. C. Biskup
*Chairperson of the
Examination Committee*

FRIEDRICH-SCHILLER-UNIVERSITÄT JENA

Machine Learning with Python (*Issued by Coursera, Authorized by IBM, 2020*)

- The badge earner has demonstrated a good understanding and application of machine learning (ML) including when to use different ML techniques such as regression, classification, clustering.

- The individual has acquired the skills to use different machine learning libraries in Python, mainly Scikit-learn and Scipy, to generate and apply different types of ML algorithms such as decision trees, logistic regression, k-means, KNN, DBSCCAN, SVM and hierarchical clustering.

Python for Data Science and AI (*Issued by Coursera, Authorized by IBM, 2020*)

- This badge earner has the core skills in Python such as critical data structures, programming fundamentals and experience with core libraries for data science.

- They can apply this knowledge to work with data and develop applications for data science.

- The individual also has sufficient Python knowledge to work with Python libraries.

Data Analysis with Python (*Issued by Coursera, Authorized by IBM, 2020*)

- This badge earner has the core skills in Data Analysis using Python.

- They can readily clean, visualize and summarize data using Pandas.

- Using Scikit-learn, the earner can develop Data Pipelines, construct Machine learning models for Regression and evaluate these models.

Data Visualization with Python (*Issued by Coursera, Authorized by IBM, 2020*)

- This badge earner has a good understanding of what data visualization is, uses of data visualization, and best practices when creating plots and visuals.

- The individual has the skills to use different Python Libraries, mainly Matplotlib and Seaborn to generate different types of visualization tools such as line plots, scatter plots, bubble plots, area plots, histograms, and bar charts.

Databases and SQL for Data Science (*Issued by Coursera, Authorized by IBM, 2020*)

- This badge earner understands relational database concepts, can construct and execute SQL queries, and has demonstrated hands-on experience accessing data from databases using Python-based Data Science tools like Jupyter notebooks.

Leistungsnachweis
Certificate

Hiermit bestätigen wir, dass
We hereby certify that

Narmin Ghaffari Laleh

Matrikelnummer
Student ID   **429972**

den Kurs/das Programm
successfully completed the course/program

RWTH Deutschkurs C1.1
RWTH German Course C1.1.

im Umfang von **4 Semesterwochenstunden** im **Sommersemester 2021** im Bereich Deutsch als Fremdsprache am Sprachenzentrum der RWTH Aachen University erfolgreich abgeschlossen hat.
*offered by the German Language Department of the RWTH Aachen University Language Center during the **Summer Semester 2021**. The course comprised **4 contact hours per week**.*

Niveau *Level*		Note *Grade*		ECTS *Credits*	
	C1		**2,0** *2.0*		**Empfohlen 4 ECTS oder laut Studienordnung** *Recommended 4 ECTS or curriculum-dependent*

Der Nachweis wurde durch kursinterne Leistungskontrollen erworben.
The grade is based on course tests and exercises.

Dozent/-in *(Instructor)*: Wiebke Schweer-Kampa, M.A.

Aachen, den 30. Juli 2021

IELTS™

Test Report Form

ACADEMIC

NOTE Admission to undergraduate and post graduate courses should be based on the ACADEMIC Reading and Writing Modules.
GENERAL TRAINING Reading and Writing Modules are **not** designed to test the full range of language skills required for academic purposes.
It is recommended that the candidate's language ability as indicated in this Test Report Form be re-assessed **after two years** from the date of the test.

Centre Number	IR120	Date	03/DEC/2016	Candidate Number	010100

Candidate Details

Family Name	GHAFFARI LALEH
First Name	NARMIN
Candidate ID	L27927984

Date of Birth	13/06/1993	Sex (M/F)	F	Scheme Code	Private Candidate

Country or Region of Origin	
Country of Nationality	IRAN, ISLAMIC REPUBLIC OF
First Language	FARSI

Test Results

Listening	9.0	Reading	8.0	Writing	6.5	Speaking	7.0	Overall Band Score	7.5	CEFR Level	C1

Administrator Comments

Centre stamp — IRSAFAM INSTITUTE · JFI · IR120 · IELTS TEST CENTRE

Validation stamp — VALIDATION STAMP · IELTS · CAMBRIDGE ENGLISH LANGUAGE ASSESSMENT

Administrator's Signature

Kazem Mousavi Pour

Date	18/12/2016	Test Report Form Number	16IR010100GHAN120A

BRITISH COUNCIL · idp IELTS AUSTRALIA · CAMBRIDGE ENGLISH Language Assessment Part of the University of Cambridge

The validity of this IELTS Test Report Form can be verified online by recognising organisations at http://ielts.ucles.org.uk

ATTESTATION DE PARTICIPATION

Par la présente, nous certifions que

Narmin GHAFFARI LALEH

A participé au Congrès de l'AFEF 2022 qui s'est déroulé
du 05 octobre au 07 octobre 2022 à Dijon.

Fait à Dijon, le 7 octobre 2022

Leia Gutierrez

Colloquium
SAS au capital de 2 347 000 €
1-5 quai George V - 76600 LE HAVRE
420 728 372 RCS Le Havre
www.colloquium-group.com

Déclaration d'activité en tant que prestataire de formation enregistrée sous le numéro
11753818775.
Cet enregistrement ne vaut pas agrément de l'état.