Dr. Thomas Lang

Curriculum Vitae

Personal Information

Born	**20th April 1993**, *Schärding*
Citizenship	**Austria**
Confession	**Roman catholic**

Education

PhD

04/01/2018 – 04/14/2021	**University of Passau**, *Computer Science*, Final grade 1.0 (*summa cum laude*)
07/09/2021	Thesis defence

Study

Term 2016/17–Term 2017/18	**University of Passau**, *Master Computer Science*, Final grade 1.1 (with distinction)
Term 2013/14–Term 2016	**University of Passau**, *Bachelor Computer Science*, Final grade 1.8 (good)

School

2012	**Matura**, *Final grade* 1.2 *(with distinction)*
2007–2012	**Höhere Technische Lehranstalt Innviertel-Nord in Andorf**
2003–2007	**Hauptschule Münzkirchen**
1999–2003	**Volksschule Münzkirchen**

PhD Thesis

Title	**AI-Supported Interactive Segmentation of 3D Volumes**
Description	Development of novel and general methods for interactive segmentation of very large 3D volumetric data using geometric information.
Download	https://nbn-resolving.org/urn:nbn:de:bvb:739-opus4-9221

Masters Thesis

Title	**Improving the Efficiency of Code Generation Based on Cylindrical Algebraic Decomposition**
Description	Implementation and optimization of code generation for arbitrary loop bounds based on a cylindrical algebraic decomposition.
Download	http://www.infosun.fim.uni-passau.de/cl/arbeiten/lang-m.pdf

Bachelors Thesis

Title	**An Intel®Xeon Phi™ Backend for the ExaStencils Code Generator**
Description	Extension of the ExaStencils code generator to support the Intel®Xeon Phi™ co-processor.
Download	http://www.infosun.fim.uni-passau.de/cl/arbeiten/lang-b.pdf

Language Skills

German	Native
English	Fluent
Russian	Fundamental
French	Fundamental

Experience

Professional

09/01/2021 – **Post-Doc**, *Fraunhofer IIS, Division EZRT/CTMT, Passau*
04/01/2018 – 08/31/2021 **Researcher**, *Institute FORWISS, University of Passau*
08/01/2016 – 03/31/2018 **Student researcher**, *Institute FORWISS, University of Passau*
2015/2016 **Student researcher**, *University of Passau, several chairs*
07–08 / {2011,2013} **Summer job**, *GST Global Sports Technologies GmbH*

Additional Qualifications

- Extensive experience with programming in `C/C++`, `Python`, among others
- Extensive experience with parallel programming (`OpenMP, MPI, CUDA, OpenCL`)
- Extensive experience in image processing (development of novel methods)
- Extensive experience with machine learning techniques and their usage
- Extensive experience with MS Office and LaTeX
- Experience with version control software (`git, svn`)

Projects

Acquired projects

03/01/2023 – 02/28/2026 **KI4D4E**, *An AI-based framework for the visualization and evaluation of massive datasets of 4D tomography for end users of beamlines*, Budget: 500k/2.5M€ (FhG/Total)
09/01/2021 – 08/31/2022 **OntoSeg**, *Efficient ontology-based segmentation of large volumes*, Budget: 90k€

Project work

01/01/2022 – **QuaST**, *Quantum-enabling Services und Tools für industrielle Anwendungen*
01/01/2022 – **MQV K7**, *Quantum algorithms for application, cloud and industry*
01/01/2022 – **BayQS**, *Research with applications of Quantum Computing*
07/01/2022 – **idROX**, *Creating a toolbox for multimodal data processing*
03/01/2021 – 07/30/2021 **BM18**, *High resolution industrial tomography beamline for large objects*
04/01/2018 – 02/28/2021 **Big Picture**, *de.: Digitalisierung, Verarbeitung und Analyse kultureller und industrieller Objekte: Wertschöpfung aus großen Daten*

Awards and Certificates

11/11/2022 Dissertationspreis der Universität Passau - Dissertation price of the University of Passau
10/01/2019 iSAQB ® Certified Professional for Software Architecture - Foundation Level
05/22/2018 Professional Scrum Master I
01/26/2018 msg Price for exceptional study work

Military Service

Type Community Service
Institution Lebenshilfe Münzkirchen
Field of Work Aiding the care of care-dependent persons
Duration 08/01/2012 to 04/30/2013

Hobbies and Interests

Computer Science Interest in software development with focus on machine learning, programming languages and image processing
Physics Passion about particle physics and fundamental research
Genealogy Creation of a genealogy of my family
Origami Creation of complex origami figures
Calligraphy Calligraphic writing, mostly in Kurrent

Publications

A. M. Stock, B. Diederichs, and T. Lang, “Compression of CT Scans With Wavelets and Adaptive Thresholding.” Poster, presented at 9th Conference on Industrial Computed Tomography (iCT) 2019, 13-15 Feb, Padova, Italy (iCT 2019), 2019.

T. Lang and T. Sauer, “AI-Supported Segmentation of Industrial CT Data,” *e-Journal of Nondestructive Testing*, vol. 27, Mar. 2022.

T. Lang and T. Sauer, “Geometric Active Learning for Segmentation of Large 3D Volumes,” *arXiv*, 2022. doi:10.48550/ARXIV.2210.06885.

T. Lang and T. Sauer, “Feature-Adaptive Interactive Thresholding of Large 3D Volumes,” *arXiv*, 2022. doi:10.48550/ARXIV.2210.06961.

T. Lang and T. Sauer, “Feature-Adaptive Interactive Thresholding.” Poster, presented at 31st Rhein-Ruhr-Workshop, Bestwig, 2022.

T. Lang and T. Sauer, “AI-Supported Segmentation of Industrial CT Data.” Poster, presented at 31st Rhein-Ruhr-Workshop, Bestwig, 2022.

T. Lang, “Clustering large 3D Volumes: A sampling-based approach,” in *Proc. 59th Annu. Br. Conf. Non-Destr. Test.*, 2022.

T. Lang, T. Sauer, T. Wittenberg, S. Gerth, and N. Uhlmann, “OntoSeg - Segmentation of Large Volumetric Datasets Using Semantic Knowledge,” in *2023 IEEE 17th International Conference on Semantic Computing (ICSC)*, (Laguna Hills, CA, USA), pp. 65–72, IEEE, Feb. 2023.

T. Lang, “Achieving Quantum Supremacy in Image Processing: Is it Possible?.” Talk given at the 32nd Rhein-Ruhr-Workshop, Bestwig, 02 2023.

R. Fischer, E. Hufnagel, T. Lang, J. Claußen, S. Gerth, and T. Sauer, “A Demonstrator for Threat Detection in Volumetric CT Scans,” *e-Journal of Nondestructive Testing*, vol. 28, Mar. 2023.

T. Lang and A. M. Stock, “Interactive Denoising of 3D Volumes Using Wavelets,” *e-Journal of Nondestructive Testing*, vol. 28, Mar. 2023.

T. Lang, N. Saeidnezhad, K. Dremel, D. Weller, M. Diez, A. M. Stock, T. Sauer, F. Cianciosi, C. Jarnias, P. Tafforeau, and S. Zabler, “Multiscale Phase-Contrast Tomography at BM18,” *e-Journal of Nondestructive Testing*, vol. 28, Mar. 2023.

S. Semmler, K. Dremel, D. Suth, T. Lang, M. Basting, M. Firsching, T. Fuchs, S. Kasperl, D. Prjamkov, M. Weule, and R. Schielein, “N-Dimensional Image Encoding on Quantum Computers,” *e-Journal of Nondestructive Testing*, vol. 28, Mar. 2023.

A. M. Stock, T. Lang, and T. Sauer, “The SCR File Format,” Mar 2023.

T. O. J. Fuchs, M. Basting, K. Dremel, M. Firsching, S. Kasperl, T. Lang, D. Prjamkov, R. Schielein, S. Semmler, D. Suth, and M. Weule, “Optimization of Computed Tomography Data Acquisition by Means of Quantum Computing,” *e-Journal of Nondestructive Testing*, vol. 28, July 2023.

M. Yosifov, T. Lang, V. Florian, S. Gerth, J. D. Beenhouwer, J. Sijbers, J. Kastner, and C. Heinzl, “Degradation Detection in Rice Products via Shape Variations in XCT Simulation-Empowered AI,” Feb. 2024.

D. Prjamkov, K. Dremel, T. Lang, S. Semmler, M. Weule, M. Firsching, S. Kasperl, and T. O. J. Fuchs, “Comparison of Different Quantum Computing Devices for Optimization of Computed Tomography Data Acquisition,” *e-Journal of Nondestructive Testing*, vol. 29, Mar. 2024.

T. Lang, A. Heim, and C. Heinzl, “Big Data Analytics for the Inspection of Battery Materials,” *e-Journal of Nondestructive Testing*, vol. 29, Mar. 2024.

T. Wittenberg, T. Lang, T. Eixelberger, and R. Gruber, “Acquisition of Semantics for Machine-Learning and Deep-Learning based Applications,” in *Unlocking Artificial Intelligence: From Theory to Applications* (C. Mutschler, C. Münzenmayer, N. Uhlmann, and A. Martin, eds.), pp. 153–175, Cham: Springer Nature Switzerland, 2024.

Scientific Activities

2023 Co-conference chair of the 12th Int. Conf. on Industrial Computed Tomography (iCT 2023)
2023 Chair of Best Paper Award committee at iCT 2023
2023 Organizer of the Fraunhofer EZRT Workshop on Industrial CT at the ESRF beamline BM18
2023 Talk on large 3D image processing in the annual meeting of the German Materials Society

Münzkirchen, 3. August 2024