

KASIMIR FORTH

POSTDOCTORAL RESEARCHER,
CIRCULAR ENGINEERING FOR ARCHITECTURE, ETH ZÜRICH

bit.ly/linkedinforth



EDUCATION

Ph.D.

Since 09.2021

TECHNICAL UNIVERSITY OF MUNICH

Graduate School, TUM School of Engineering and Design, Department of Civil and Environmental Engineering
Working title: „BIM-based semantic enrichment for environmental analyses using Large Language Models“,
Reviewer: Prof. Dr.-Ing. André Borrmann, Prof. Dr. Jakob Beetz, Associate Prof. Dr.-Ing. Patricia Schneider-Marin

Research stay

04.2023-06.2023

CHALMERS UNIVERSITY OF TECHNOLOGY, GOTHENBURG, SWEDEN

Visiting Researcher at the „Sustainable Building Research Group“, Dr. Alexander Hollberg & Prof. Holger Wallbaum

Master

10.2015 – 04.2018

GPA: 1.3

TECHNICAL UNIVERSITY OF MUNICH

M.Sc. Energy-efficient and Sustainable Building
The Faculty of Civil, Geo and Environmental Engineering and the Department of Architecture
Master thesis: „BIM-integrated Life-Cycle Assessment“ (Grade 1.0),
Highest GPA (1.3) in the M.Sc. program in the previous 2 years

Erasmus+ exchange semester

10.2015 – 02.2016

POLITECHNIKA KRAKOWSKA, POLAND

Faculty of Civil Engineering and the Faculty of Architecture

Bachelor

10.2011 – 09.2014

GPA: 2.7

TECHNICAL UNIVERSITY OF MUNICH

B.Sc. Engineering Science
Munich School of Engineering
Bachelor thesis: „Skintecture - Analysis of a Bio-inspired Variable Control of Air and Heat-permeability“ (Grade: 1.3)

PROFESSIONAL EXPERIENCE

Since 10.2024

cea.ibi.ethz.ch

CHAIR OF CIRCULAR ENGINEERING FOR ARCHITECTURE, ETH ZÜRICH

Postdoctoral researcher

As part of the “SWIRCULAR”, the swiss digital circular construction ecosystem, my research is focusing on using digital technologies, such as Large Language Models or knowledge graphs, to automatically enrich BIM models for circularity assessments. SWIRCULAR is conducted by a consortium of Swiss research institutions and industry partners, aiming to reshape the Swiss construction industry through the adoption of circular practices.

01.2021 - 09.2024

cee.ed.tum.de/cms/

CHAIR OF COMPUTATIONAL MODELING AND SIMULATION, TECHNICAL UNIVERSITY OF MUNICH

Research associate

As part of the research group „Knowledge representation and reasoning“, my research is in the field of using semantic 3D models for sustainability assessments. In various research projects, I’m investigating how BIM models or pointclouds can be used to automatically calculate embodied and operational emissions and support with an variant analysis decision making in early design stages.

04.2018 - 09.2024

ed.tum.de/loc

LEONHARD OBERMEYER CENTER, TECHNICAL UNIVERSITY OF MUNICH

Managing director

The Leonhard Obermeyer Center (LOC) brings together the scientific expertise of over 60 researchers. In dialogue with our partners from industry and government institutions, we jointly define technological research priorities. Close networking with decision-makers makes the LOC a think tank for strategic developments in this field. My responsibilities include managing partner relations, organising events, giving lectures/talks, moderating sessions, overseeing administrative requirements, and developing new executive education and M.Sc. programs.

PROFESSIONAL EXPERIENCE

| | |
|---|--|
| Since 06.2018 | FREELANCING CONSULTANT IN SUSTAINABLE BUILDINGS AND BIM As a freelancing consultant and engineer, I work with different architectural offices, such as Forth Grünig Architekten or BIM Consult, on several project consulting in questions of energy design and green building certifications. More recently, I also started working for engineering consultancies, such as BIM consult, consulting use cases of BIM and Material Passports and LCA, e.g. for employer's information requirements, an transformation of BIM to BEM. |
| 06.2019 - 12.2020 ed.tum.de/ppe | PROJEKTPLATTFORM ENERGIE + INNOVATION, TECHNICAL UNIVERSITY OF MUNICH Research associate The focus of Projektplattform Energie + Innovation is the mutual exchange of know-how to solve problems in the areas of energy system transformation, digitization and process optimization as well as strengthening the competitiveness and future viability of the SMEs in Bavarian construction industry. My key responsibilities include networking between universities and construction industry in Bavaria; such as initiating research projects for applied science or coordinating the activities of Innovationsmanagement Bau GmbH related to start-ups, student projects, Center of Digital Technology and Management (CDTM). |
| 05.2018 – 05.2019 arc.ed.tum.de/ari/ | ARCHITECTURE RESEARCH INCUBATOR, TECHNICAL UNIVERSITY OF MUNICH Research associate The Architecture Research Incubator is a central facility at the Department of Architecture for coordinating interdisciplinary research and development competencies in design, engineering, urban development and IT sectors. As part of ARI, I organised several workshops (ie. Think.Make.Start #UrbanTech, Creative Business Game, and Design Thinking Workshop); wrote research proposals (ie. „Existing Buildings Retrofit and Sustainability with BIM“ and „AI for Sustainable Buildings“) and taught „BIM and Sustainability“ course. |
| 04.2015 – 04.2018 | DREES & SOMMER, ADVANCED BUILDING TECHNOLOGIES Working student and Masterand in Green Building and Energy Design During my internship, I worked on DGNB & LEED certifications for several existing and new buildings, daylight and whole building energy simulations with IES VE, Sustainable Property Guidelines, Energy checks for municipal properties, feasibility analyses with facade and energy consultants, indoor climate concepts for competitions and feasibility analyses. I was amongst the top 10% trainees and admitted to the company's internal „Durchstarter“ program. |

ADDITIONAL ACTIVITIES

| | |
|-------------------|---|
| Since 02.2024 | IEA BC Annex 91 Open BIM for Energy Efficient Buildings Participation in workshops and strategic meetings |
| Since 05.2023 | Runder Tisch GIS e.V. Member of the Advisory Boards |
| Since 06.2020 | Stadtbaustein e.G. München Chairman of the Supervisory Board (since 06.2020) of the Housing Cooperative (Member since 2018) |
| Since 09.2019 | VDI e.V. (Verein Deutscher Ingenieure) Member of standardization group VDI 2552 Blatt 11.4 „BIM - Ökobilanzierung“ (VDI Member since 09.2018) |
| 05.2019 - 10.2022 | DGNB e.V. (Deutsche Gesellschaft für Nachhaltiges Bauen) Member and DGNB consultant for building and district certification, expert for Life Cycle Assessment, part of the expert group „Digitization and Sustainability“ |
| 11.2018 - 12.2022 | buildingSMART e.V. Part of expert group „BIM und Nachhaltigkeit“ |
| Since 10.2015 | Cradle-to-Cradle e.V. Member and volunteer in the Munich Regional Group and conferences |

LANGUAGES

| | | | |
|----------|---------------|---------|-----------------|
| German | Native | French | Good (DEL F B1) |
| English | Advanced (C1) | Turkish | Basic (A2.1) |
| Croatian | Fluent | Polish | Basic (A1) |

TALKS & MODERATION

Conference moderation
Session moderation
Podcast interview
Talk
Talk
Talk
Session moderation & Talk
Conference moderation
Conference host
Conference moderation
Session moderation
Talk
Talk
Session moderation
Conference moderation
Session moderation
Discussion
Talk
Session moderation
Conference moderation

LOC Center Day 2023, Oskar-von-Miller Forum, 03.11.2023
Digital Twins for Building and Cities: BIM World Munich 2023, 28.11.2023
open BIM und Nachhaltigkeit: buildingSMART Podcast, publication 30.09.2023
Punktwolken-basierte Ökobilanzierung von Sanierungsszenarien: BIM Weeks Bayern, „The future of BIM & Sustainability, NavVis, München, 20.07.2023
BIM-based Life Cycle Assessment: BBSR Workshop with Japanese Delegation, online, 06.07.2023
Modellbasierte Ökobilanzierung: BIM Allianz Workshop AK Nachhaltigkeit, online, 26.05.2023
Digital Twins for Sustainable Cities: BIM World Munich 2022, 29.11.2022
LOC Center Day 2022, Oskar-von-Miller Forum, 11.11.2022
Forum Bauinformatik 2022: Head organiser and session moderator
LOC Center Day 2021, Oskar-von-Miller Forum, 29.11.2021
Digital Methods for sustainable buildings and cities, BIM World Munich, 26.11.2020
Von der Digitalisierung des nachhaltigen Bauens und der Nachhaltigkeit des digitalen Bauens, Building Life, 13.05.2020
Digital Methoden der Gebauten Umwelt in Forschung und Lehre, digitalBAU, Köln, 13.02.2020
Digital Twins for Buildings and Cities – BIM and GIS, BIM World Munich, 26.11.2019
LOC Center Day 2019, Oskar-von-Miller Forum, 15.11.2019
BIM-research@LOC, BIMWeeks Bayern, 08.10.2019
Nachhaltig bauen – Recyclinghäuser, Salon Festival Munich, 20.09.2019
Future Building Processes, ARI Matching Futures – Digital Fabrication, Construction & Design, Munich, 23.07.2019
Geo 4 BIM, BIM World Munich, 27.11.2018
LOC Center Day 2018, Institute for Advanced Study Garching, 08.11.2018

RESEARCH & FUNDING

05/2024 - 04/2026
11/2022 - 07/2023
09/2021 - 01/2022
07/2021 - 04/2022
11/2020 - 10/2023
05/2018 - 09/2024

GEOAI4Retrofit - KI-basiertes Fern-Analyse-Tool zur automatisierten und variantenbasierten Sanierungspotentialbewertung für Nichtwohngebäude, Teilprojekt: „Entwicklung eines Verfahrens zur automatischen Generierung eines semantisch angereicherten 3D-Gebäudemodells zur Best. von Bauteilen und Materialien“, Zentrales Innovationsprogramm Mittelstand (ZIM), Bundesministerium für Wirtschaft und Klimaschutz (BMWK)
PC2LCA - Sanierungspotenziale mithilfe intelligenter Punktwolkenverarbeitung, Stiftung Bayerisches Baugewerbe
ThermoBIM - Untersuchung zur Anbindung von Software der thermischen Gebäudesimulation an Gebäudeinformationsmodelle (BIM), Siemens Corporate Technology
Digital Twin Footprint - Erarbeitung eines ganzheitlichen Meilensteinplans mit Handlungsempfehlungen und notwendigen Forschungsbausteinen zur zielführenden Verknüpfung der Lebenszyklusanalyse (Gebäudeökobilanzierung) und BIM-Planungsprozesse mit einem Fokus auf den frühen Planungsphasen, Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR)
BIM4EarlyLCA - Entwicklung einer Methode zur ökologischen und ökonomischen Variantenuntersuchung zur Entscheidungsunterstützung in der Beschaffung mithilfe von digitalen Bauwerksmodellen in frühen Phasen, Siemens Real Estate
Leonhard Obermeyer Center - TUM Center of Digital Methods for the Built Environment, in total 1,27 mio. €, research cooperation with industry companies such as Autodesk, Nemetschek, CADFEM, Obermeyer Holding, Hexagon, Bentley Systems, and more

AWARDS

2024
2024
2023
2023
2022
2019
2018

Sustainable Industry Impact Award 2024 by TUM Institute for LifeLong Learning
Finalist DGNB Sustainability Challenge 2024 by DGNB eV. (category „Research“)
2x open BIM Awards by buildingSmart International (categories „Student Research“ & „Sustainability“)
BIM Champion 2023 by buildingSMART Deutschland (category Sustainability)
Thesis-in-3 competition: First place of the EC3 2022 three minute thesis competition
BIM Suhr Preis 2019: 2nd price for master thesis
VDI Preis 2018: Category master thesis

SCIENTIFIC PUBLICATIONS

Website: <https://www.cee.ed.tum.de/cms/team/kasimir-forth/>

ORCID: [0000-0001-5786-8757](https://orcid.org/0000-0001-5786-8757)

Google Scholar: [a7hcbzgAAAAJ](https://scholar.google.com/citations?user=a7hcbzgAAAAJ)

Scopus: [57211216901](https://orcid.org/57211216901)

Researchgate: [Kasimir_Forth](https://www.researchgate.net/profile/Kasimir-Forth)

JOURNAL PUBLICATIONS

- Journal paper | **Forth, K.**; Borrmann, A.: *Semantic enrichment for BIM-based Building Energy Performance Simulations using Semantic Textual Similarity and fine-tuning multilingual LLM*. Journal of Building Engineering, 2024
DOI: 10.1016/j.jobe.2024.110312
- Journal paper | **Forth, K.**; Hollberg, A.; Borrmann, A.: *BIM4EarlyLCA: An interactive visualization approach for early design support based on uncertain LCA results using open BIM*. Developments in the Built Environment 16, 2023, 100263; DOI: 10.1016/j.dibe.2023.100263
- Journal paper | **Forth, K.**; Abualdenien, J.; Borrmann, A.: *Calculation of embodied GHG emissions in early building design stages using BIM and NLP-based semantic model healing*, In: Energy and Buildings 284, 2023, 112837; DOI: 10.1016/j.enbuild.2023.112837
- Journal paper | Selimovic, E.; Noichl, F.; **Forth, K.**; Borrmann, A.: *Retrofitting potential of building envelopes based on semantic surface models derived from point clouds*, In: Journal of Facade Design and Engineering 10 (2), 2022; DOI: 10.47982/jfde.2022.powerskin.8

BOOK CHAPTERS

- Book chapter | Höper, J.; Theißen, S.; **Forth, K.**: *BIM basierte Gebäudeökobilanz*. In Wimmer, R.; Bartels, N. (Hsg.); : Next Generation BIM. Aus der Praxis für die Lehre. 1. Auflage. Berlin: bSD Verlag - Haus der Bundespressekonferenz / 4103 (BIM Basics). ISBN: 978-3-948742-93-5
- Book chapter | Collins, F.; Noichl, F.; Pan, Y.; Carrara, A.; Mafipour, M.S.; **Forth, K.**, Borrmann A.: *Bestandserfassung mithilfe von Computer Vision Methoden*. In *Künstlichen Intelligenz im Bauwesen*, Haghsheno, S., et al. (Hsg.), Springer Nature, 2024, DOI: 10.1007/978-3-658-42796-2_18
- Book chapter | **Forth, K.**: *Semi-automated processes from BIM to LCA*, In: Naboni E, Havinga LC, (Eds) *Regenerative design in digital practice: a handbook for the built environment*, pp 271-77. Bolzano: EURAC Research; 2019., Bolzano, Italy

REPORTS

- Report | Bahlau, S.; Schumacher, R.; Lambertz, M.; Theißen, S.; Höper, J.; Borrmann, A.; **Forth, K.**; von Both, P.; Ebertshäuser, S.; Horn, R. (2024): *Digital Twin Footprint - Erarbeitung eines ganzheitlichen Meilensteinplans mit Handlungsempfehlungen und notwendigen Forschungsbausteinen zur zielführenden Verknüpfung der Lebenszyklusanalyse (Gebäudeökobilanzierung) und BIM-Planungsprozesse mit einem Fokus auf den frühen Planungsphasen*. Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR). ISSN: 1868-0097

CONFERENCE PUBLICATIONS

- Conference Paper | **Wu, J.**; Esser, S.; **Forth, K.**; Kairlapova, A.; Gerstner, J.: *Semi-automated assessment in fundamental BIM pedagogy for large cohorts*. 35. Forum Bauinformatik 2024, Hamburg, Germany, 2024
- Conference paper | **Forth, K.**; Berggold, P.; Borrmann, A.: *Domain-specific fine-tuning of LLM for material matching of BIM elements and Material Passports*. 2024 ASCE International Conference on Computing in Civil Engineering, Pittsburgh, Pennsylvania, USA, 2024
- Conference Paper | Ogunjinmi, G. J.; **Forth, K.**; Theißen, S.; Borrmann, A.: *Estimating the Circularity of Building Elements using Building Information Modelling*. World Sustainable Built Environment Conference, IOP Conference Series: Earth and Environmental Science 2024, online, DOI: 10.1088/1755-1315/1363/1/012043
- Conference paper | **Forth, K.**; Noichl, F.; Borrmann, A.: *LCA Calculation of Retrofitting Scenarios using Geometric Model Reconstruction and Semantic Enrichment of Point Clouds and Images*. Proc. of the ASCE International Conference on Computing in Civil Engineering 2023, Corvallis, Oregon, USA, 2024; DOI: 10.1061/9780784485231.047

CONFERENCE PUBLICATIONS

- Conference paper **Forth, K.:** *Multilingual semantic enrichment of room-specific load profiles using BIM models for whole building energy simulation.* Proceedings of the 34th Forum Bauinformatik 2023, Bochum Germany, 2023, DOI: 10.13154/294-10093
- Conference paper **Forth, K.;** Hollberg, A.; Borrmann, A.: *Interactive visualization of uncertain embodied GHG emissions for design decision support in early stages using open BIM.* Proc. of the Eighth International Symposium on Life-Cycle Civil Engineering (IALCCE) 2023, Milan, Italy, 2023, DOI: 10.1201/9781003323020
- Conference paper Hofmeyer, J.; Esser, S.; **Forth, K.;** Borrmann, A.: *Towards environmental design decision-making for infrastructure planning using parametric BIM.* Proc. of the Eighth International Symposium on Life-Cycle Civil Engineering (IALCCE) 2023, Milan, Italy, 2023, DOI: 10.1201/9781003323020-2
- Conference paper **Forth, K.;** Abualdenien, J.; Borrmann, A.: *NLP-based Semantic model healing for calculating embodied carbon in early building design stages,* In: Proceedings of the 14th European Conference on Product and Process Modelling, Trondheim, Norway, 2022, DOI: 10.1201/9781003354222
- Conference paper Lammers, B.; **Forth, K.:** *IFC-based variant analysis considering multi-criterial sustainability analysis of buildings,* In: Proc. of the Forum Bau Informatik 2022, Munich, Germany, 2022, DOI: 10.14459/2022md1686600
- Conference paper **Forth, K.;** Höper, J.; Theißen, S.; Veselka, J.; Borrmann, A.: *Towards life cycle assessment of technical building services in early design phases using Building Information Modeling,* In: Proceedings of the 2022 European Conference on Computing in Construction, Rhodes, Greece, 2022, DOI: 10.35490/EC3.2022.178
- Conference paper **Forth, K.;** Schneider-Marin, P.; Theißen, S.; Höper, J.; Svane, N.; Borrmann, A.: *Connected design decision networks: multidisciplinary decision support for early building design LCA,* In: Proc. of Central Europe towards Sustainable Building 2022 conference, Prague, Czech Republic, 2022, DOI: 10.14311/APP.2022.38.0124
- Conference paper Schumacher, R.; Theißen, S.; Höper, J.; Drzymalla, J.; Lambertz, M.; Hollberg, A.; **Forth, K.;** Schneider-Marin, P.; Wimmer, R.; Bahlau, S.; Meins-Becker, A.: *Analysis of current practice and future potentials of LCA in a BIM-based design process in Germany,* In: E3S Web of Conferences 349, 10th International Conference on Life Cycle Management (LCM 2021), Stuttgart (online), Germany, 2022, DOI: 10.1051/e3sconf/202234910004
- Conference paper **Forth, K.;** Abualdenien, J.; Borrmann, A.; Fellermann, S.; Schunicht, C.: *Design optimization approach comparing multicriterial variants using BIM in early design stages,* In: Proc. of 38th International Symposium on Automation and Robotics in Construction (ISARC 2021), Dubai, UAE, 2021, DOI: 10.22260/ISARC2021/0034
- Conference paper Kolbeck, L.; **Forth, K.:** *Interoperability of BIM based Life Cycle Energy Analysis in Early Design Stages,* In: Proc. of the Forum Bau Informatik 2021, Darmstadt, Germany, 2021
- Conference paper Drewes, L.; **Forth, K.:** *BIM-integration of sustainable building certification criteria in the early design stages,* In: Proc. of 32. Forum Bauinformatik 2021, Darmstadt, Germany, 2021
- Conference paper **Forth, K.;** Braun, A.; Borrmann, A.: *BIM-integrated LCA - model analysis and implementation for practice,* In: *Sustainable Built Environment D-A-CH Conference 2019,* Graz, Austria, 2019, DOI: 10.1088/1755-1315/323/1/012100
- Conference paper Molter, P. L., Fellner, J., **Forth, K.;** Chokhachian, A.: *Adaptive Bricks: Potentials of Evaporative Cooling in Brick Building Envelopes to Enhance Urban Microclimate,* In: *Proc. of PowerSkin Conference,* Munich, Germany, 2019