LARS JUNGHANS, PhD
CURRICULUM VITAE

Lars Junghans (PhD)

E-mail: Junghans@umich.edu

EDUCATION

1/2006 – 11/2006	**University of California Berkeley, USA** Post-doctoral studies
9/2002 – 12/2005	**ETH Zürich, Switzerland** **Doctor of Science** Thesis: "Optimal Facade Technologies in Tropical and Subtropical Climates" Advisors: Prof. K. Daniels, Prof. D. Eberle and Prof. R. Hastings
1995-2001	**Technical University Braunschweig, Germany** **Diploma in Architecture**

ACADEMIC APPOINTMENTS

Sept. 2010 – current	**University of Michigan** **Taubman College of Architecture** Field: Building Physics, Sustainable Building Design, Mechanical Building Systems
Sept.2008 – Aug 2010	**University of Liechtenstein** Lecturer

PROFESSIONAL EXPERIENCE

12/2006 – 8/2010	**TeamGMI, Engineering office, Vaduz, Liechtenstein** Project manager for building simulation and energy system development **Baumschlager & Eberle Architects** - Consulting on energy efficient architecture and energy concepts - Software development
8/2001 – 8/2002	**AEU Architecture, Energy and Environment Ltd., Wallisellen, Switzerland (Principal: Prof. Robert Hastings, dipl. Arch.)** - Research on low energy housing for the IEA (International Energy Agency)
1997 – 2001	Research during architecture study in Germany
1992 – 1995	Apprenticeship as a carpenter

REGISTRATION and PROFESSIONAL SOCIETIES

2010 – current	ASHRAE Association of Heating Refrigeration and Air Conditioning of America

AWARDS

2020	2019-20 Technology, Architecture + Design Best Article Award,"Experiments Toward Hyper-Local Reverse Heat Flow Assemblies", published in TAD Volume 2, Issue 2, Collaborators: Geoffrey Thun, Dustin Brugmann, Daniel Tish, Kathy Velikov
2015	Building 22/26 awarded with Energy Globe price of Vorarlberg 2015
	Gold Metal for Building 22/26 at German Design Award 2015
	Building 22/26 on the shortlist for nomination for Mies van der Rohe – Award 2015

BOOK CHAPTERS

2024	DeokOh Woo, Lars Junghans ,"Introduction and Literature Review of the Application of Hydronic-Based Radiant Cooling Systems in Sustainable Buildings „ Chapter in „Natural Energy, Lighting, and Ventilation in Sustainable Buildings" Springer Press p225-244, DOI:10.1007/978-3-031-41148-9_10
2021	Lars Junghans, Jen Maigret (2021), "Building Standards", University of Michigan Presidents Commission on Carbon Neutrality (PCCN), http://sustainability.umich.edu/media/files/pccn/BuildingStandardsAnalysis_FinalReport_2020.pdf
2020	Lars Junghans (2019) Feasibility of the "22/26" building under varying construction, occupancy and climate condition, LowTech in Buildings, Issue 21, Bundesamt fuer Bauwesen (Department of Building Construction and Urban Planning, Germany), p54-65
	Lars Junghans (2019) Discussion of the "22/26" technology – Insights and recommendations of the new building automation strategy, LowTech in Buildings, Issue 21, Bundesamt fuer Bauwesen (Department of Building Construction and Urban Planning, Germany), p66-73
2015	BE Baumschlager Eberle 22/26, Book Chapter, Birkhauser Publisher, ISBN 978-3-0356-0387-3, Editor: F. Aicher, 5/2015
2014	Junghans L., " Generic Optimization Algorithm for Building Energy demand Optimization", Book Chapter in: "Post-Parametric Automation in Design and Construction", Editor Thomas Spiegelhalter and Alfredo Andia, to be published in Archtech House, Inc. Norwood USA, London UK.
2007	Junghans L., "Shading and Glazing", chapter in *Plusminus 20°/40°Latitude, Sustainable Building Design in Tropical and Subtropical Regions,* Editor K. Daniels, Published by Axel Menges, Stuttgart DE

2005	Junghans L., Hastings, R., "Daylighting", chapter in *Sustainable Solar Housing*, Edited by Robert Hastings and Maria Wall, Published by Earthscan, London UK on behalf of the International Energy Agency IEA
	Junghans L.,Hastings, R., "Daylighting in High Performance Residential Buildings", *International Daylighting* issue 5 Sept.2002, Australia
	Junghans L., "Thermal Chimneys", chapter in "Innovative designs for Warm Climates" from IEA SHC Task 28, Edited by R. Hyde and R. Hastings. Published by Earthscan, London UK on behalf of the International Energy Agency IEA

PEER REVIEWED JOURNAL ARTICLES

2023	R.Shan, L.Junghans (2023), "Multi-Objective Optimization for High-Performance Building Façade Design: A Systematic Literature Review", Sustainability 2023, 15(21), 15596
2023	Hyeonsoo Kim, Lars Junghans (2023)," Economic feasibility of achieving net-zero energy building (NZEB) by utilizing PV-integrated ground source heat pump: A case in the United States residential sector", Journal of Cleaner Production 416 (2023) 137822
2022	Hyeonsoo Kim, Lars Junghans (2022),"Integrative economic framework incorporating the Emission Trading Scheme (ETS) for U.S. residential energy systems", Energy Conversion and Management: X, Volume 14, 2/2022, 100197
2022	Kyungyong Park, Deok-Oh Woo, Seung-Bok Leigh, Lars Junghans (2020), „Impact of hybrid ventilation strategies in energy savings of buildings: in regard to warm and humid climate regions", Energies 2022, 15, 1960. https://doi.org/10.3390/en15061960
2022	Joosang Lee, Deok-Oh Woo, Jihoon Jang, Lars Junghans, Seung-Bok Leigh (2022), "Collection and Utilization of Indoor Environmental Quality Information Using Affordable Image Sensing Technology", Energies 2022, 15, 921. https://doi.org/10.3390/en15030921
2021	Lars Junghans, DeokOh Woo (2021),"Introduction of a Plug and Play Model Predictive Control to predict room temperatures", Journal of Building Engineering 43 (2021) 102578
2020	DeokOh Woo, Lars Junghans (2020),"Framework for model predictive control (MPC)-based surface condensation prevention for thermos-active building systems (TABS)", Energy and Buildings, Volume 215, 15 109898
2018	Junghans L., Tish D, Bruggman D, Thun G ,Velikov K,"Climate Measures: Experiments Toward Hyper-local Reverse Heat Flow Assemblies" ,Technology | Architecture + Design (TAD) : Vol.2 No.2 11/2018
2017	Junghans L., Widerin P., "Thermal comfort and indoor air quality of the "Concept 22/26", a new high performance building standard", Energy and Buildings 149 (2017) 114-122
	Shan R.,Junghans L.,"Adaptive radiation optimization for building façade design", Building Simulation Journal, (accepted paper, in press)

2016	Junghans L., Bae N., “Influence of the uncertainties of occupant behavior on computer-based optimization process”, Energy and Buildings 116: 478-497
2015	Junghans L.,Darde N., “Hybrid Single Objective Genetic Algorithm coupled with the Simulated Annealing Optimization Method for Building Optimization”, *Energy and Buildings*, 86 651-662
	Velikov K., Thun G ,O Malley M.,Junghans L., “Computational and Physical Modeling for Multi-Cellular Pneumatic Envelope Assemblies”, International Journal of Architectural Computing 13 (2):143-168
2014	Junghans L., “Economic and ecologic of Heat Pump Systems in Buildings with different Insulation Levels”, *Renewable Energy*, 76 699-705
	Junghans L., “Economic Applicability Evaluation of Heat Pump Pump Systems in Buildings with different Insulation Levels”, ASHRAE Transactions Vol. 120, Issue 2
2013	Junghans L., “Sequential Equi-Marginal Optimization Method for ranking strategies for Thermal Building Renovation”, *Energy and Buildings*, 65 10-18

ACADEMIC AND PROFESSIONAL CONFERENCE PAPERS

2016	Walter Hugentobler, Willem Bruijn, Peter Widerin, Lars Junghans,(2016),“ Do healthy buildings need technology?”, Proceedings of the Indoor Air Conference 2016, Gent, Belgium, peer reviewed
2015	Junghans L., “Concept 2226, Simulation Methods”, Proceedings of the Building Simulation Conference IBPSA 2015, Hyderabad, India**,** peer reviewed
	Junghans L., “Hybrid Optimization for Complex Façade Systems”, Proceedings of the Building Simulation Conference IBPSA 2015, Hyderabad, India, peer reviewed
	Shan R., Junghans L., “Evolutionary Adaptive Radiation Principles used for Building Façade Optimization”, Proceedings of the Building Simulation Conference IBPSA 2015, Hyderabad, India**,** peer reviewed
	Junghans L., “Concept 2226, a High-Performance Office Building without Mechanical Heating, Cooling and Ventilation Devices”, Proceedings of the International Solar Energy Society Conference ISES 2015, Daegu, South Korea**,** peer reviewed
	Junghans L., Sustainability and resiliency of the 22/26 Building in Lustenau. What can we learn for the future? BAUZ Conference on Sustainable Buildings Proceedings 2/2015**,** peer reviewed
	Slee B, Hyde R, Blair J, Junghans L, “The NSW Demountable classroom: A review of existing research and proposed methodology for future research”, Procedia of the 2014 Asia-Pacific Solar Research Conference, Singapore**,** peer reviewed

2014	Junghans L., “Improved fast calculating building optimization processes using the genetic algorithm”, *Energy Procedia* 2014 5**,** peer reviewed
2013	Junghans L., “Fast Calculating Multi-Parameter Building Optimization for Early Design Stages using the Climate Surface Calculation Method”, Proceedings of CISBAT conference, Lausanne 2013, Switzerland, peer reviewed
2005	Junghans L., “Shading and Cooling Energy Demand in Office Buildings in Hot Climates”, *Conference Proceedings: Neuntes Symposium Innovative Lichttechnik in Gebäuden,* Publisher OTTI Energiekolleg, Regensburg, DE, ISBN 3-934681 24-7, peer reviewed

ACADEMIC AND PROFESSIONAL LECTURES OR PRESENTATIONS

2/2024	„The 22/26 Building“. Invited presentation and studio review at the Architecture Department at the Rheinisch Waestfaehlische Technische Hochschule Aachen RWTH, Aachen, Germany
1/2024	„The 22/26 Building“. Invited presentation at the Architecture Department at the University of British Columbia UBC, Vancouver, Canada
6/2023	„The 22/26 Building and it’s influence to the built environment“. Invited presentation at the Architecture Department at the ETH Zurich Zurich, Switzerland
1/2023	„The 22/26 Building“. Invited presentation at the Architecture Department at the University of British Columbia UBC, Vancouver, Canada
6/2022	„The 22/26 Building and it’s influence to the built environment“. Invited presentation at the Architecture Department at the ETH Zurich Zurich, Switzerland
9/2021	„The 22/26 Building and it’s influence to the built environment“. Invited presentation as a Keynote Speaker at the International Building Simulation Conference. Bruges, Belgium, https://bs2021.org
5/2019	„Measurement results of the Concept 22-26 “. Invited presentation at the Technical University of Berlin and the German Federal Department of Housing, Berlin , Germany
10/2018	„The Concept 22-26 for the humid climate of south Korea“. Invited presentation at the Korean Society of Architects, Busan, South Korea
9/2018	„The Concept 22-26 for the humid climate of south Korea“. Invited presentation at Yonsei University, Seoul, South Korea
3/2016	“Concept 22-26” Cornell University, Department of Architecture, Invited presentation
12/2015	“Concept 2226, a new High Performance Office Building without Mechanical Heating, Cooling and Ventilation Devices”, Building Simulation Conference IBPSA 2015, Hyderabad, India, Presentation of research paper

12/2015	“Hybrid Optimization for Complex Façade Systems”, Building Simulation Conference IBPSA 2015, Hyderabad, India, Presentation of research paper
11/2015	“Concept 2226, a new High Performance Office Building without Mechanical Heating, Cooling and Ventilation Devices”, International Solar Energy Society Conference ISES 2015, Daegu, South Korea
5/2015	“Concept 2226, a new High Performance Office Building without Mechanical Heating, Cooling and Ventilation Devices”, University of California Berkeley, USA
4/2015	“Concept 2226, a new High Performance Office Building without Mechanical Heating, Cooling and Ventilation Devices”, University of New South Wales, Australia
4/2015	“Concept 2226, a new High Performance Office Building without Mechanical Heating, Cooling and Ventilation Devices”, Sydney Technical University, Australia
2/2015	„BAUZ 2015 – Vienna Congress on Sustainable Buildings“ , Invited Key Speaker, Vienna, Austria
7/2014	“Economic and ecologic feasibility of heat pump systems in asian countries”, ISES Conference Asia, Tokyo, Japan
7/2014	“Concept 2226”, ISES Conference Asia, Tokyo, Japan
4/2014	“Economic feasibility of heat pump systems”, presentation at the ASHRAE Annual Conference 2014, Seattle, USA
4/2014	“Concept 2226, a zero net energy building without active heating, cooling and ventilation system”, presentation at the ASHRAE High Performance Building Conference 2014, San Francisco, USA
9/2013	“Improved fast calculating building optimization using the Climate Surface process” presentation ISES Conference, Cancun, Mexico
9/2013	“Improved fast calculating building optimization using the Climate Surface process” presentation CISBAT Conference Switzerland, International Conference about Sustainable Architecture, Lausanne, Switzerland
6/2010	“A novel computer simulation program for architects to calculate the energy performance of buildings”,ETH Zurich (Swiss federal Institute of Technology in Zurich, Switzerland), Zurich, Switzerland
2010	“Sustainable Architecture Aspects of Baumschlager Eberle Architects” The Royal Danish Institute of Art, Copenhagen Department of Architecture, Copenhagen, Denmark
4/2006	“Simulation Software to advice architects in the design process” Center for Environmental Design Research, UC Berkely, Berkeley, USA
1/2004	“Daylighting and Shading in Offices in Hot Climates” OTTI Congress: ”Innovative Daylight in Architecture”, Bad Staffelstein (Germany)
9/2004	“Modern Versus Vernacular Shading Devices in India” University of Ahmedabad, Ahmedabad, India

EXHIBITED WORK

2015	Bern/ Switzerland Constructive Alps. Sustainable architecture in the alps Building 22/26 http://www.constructivealps.net/ausstellung/
2014	Berlin / Germany AEDES am Pfaffenberg Building 22/26 Aedes-arc.de

PUBLICATIONS WRITTEN BY OTHERS ABOUT MY WORK

2014	M. Pepchinski, 2226 Building Lead by Example: Baumschlager Eberle designs an elegant, efficient home for its own firm, Architectural Record, Vol. 202 Issue 7, p72, 1p
2014	J.Schoof ,House Without Heating: Office Building in Austria, DETAIL, 4/2014
2013	F. Aicher,Buerohaus "2226", Bauwelt 44.2013
2013	B. Mauerle, Burogebaude in Lustenau (A),Ruckbesinnung auf das Elementare, db deutsche bauzeitung 12|2013

GRANTS

3/2024-8/2025	Seed Funding on "2226 Midwest". The research is aimed to bring the successful 2226 technology to the USA. Funding source: Pressing Matters, Taubman College of Architecture and Urban Planning, University of Michigan.
3/2024-5/2025	Seed Funding on "2226 Midwest". The research is aimed to bring the successful 2226 technology to the USA. Funding source: Office of the Vice President of Research OVPR, University of Michigan.
1/2023- 12/2023	Grant on "Linking Design Research for Passive Cooling Strategies in Self-Built Homes with Low-Income Communities to Improve Health Outcomes from Extreme Heat" Funding by the University of Michigan CGHE Seed Grant And the Taubman College Pressing Matters Research Incentive PI: Ana Paula Pimentel Walker, Urban Planning CoPI specialized on building modelling and technical aspects.
8/2021- 8/2022	Funding by the University of Michigan ArtsEngine Initiative ($3000)
5/2016 – 3/2017	Junghans, L. & Thun G.,Latitudo Borealis, *Taubman College of Architecture Research Through Making Grant*,current,($20.000), ORSP
5/2016 – 8/2016	Junghans, L. (2016/5-2016/8), Model Predictive Control in the Built Environment, *Rackham Spring/Summer Research Grant*, accomplished, ($8.000), ORSP

8/2015 – 8/2016	Junghans, L., Sustainable Building Design optimization algorithm for early architectural design steps, *Baumschlagwer Eberle Architects,* Austria, accomplished, ($52.000), ORSP
8/2013 – 8/2014	Junghans, L., Global Building Optimization using the Climate Surface Calculation Method, *Office of the Vice Presitent of Research OVPR*, University of Michigan, Seed funding opportunity, accomplished, ($16.000), ORSP
8/2012 – 8/2013	Junghans, L., Retrofitting of mechanical ventilation systems in North American homes using decentralized sensor and innovative controlled diffuser technology, *Office of the Vice Presitent of Research OVPR*, University of Michigan, Seed funding opportunity, accomplished, ($20.000), ORSP
5/2011 – 8/2011	Junghans, L., Building simulation on High Performance Project, *Rackham Spring/Summer Research Grant*, accomplished, ($6.000), ORSP
1/2011 – 12/2011	Junghans, L., Zero Net Emission Office Building in the Cold Climate of Austria, *Baumschlagwer Eberle Architects Austria*, accomplished, ($20.000), ORSP

GRANTS (Collaboration)

9/2018 – 8/2021	Sirota A, Loejoy W,Junghans L., Oakland Avenue Urban Farm*, Water Stewardship Gardens, Erb Family Foundation,* Role: Co-PI, ($215000)
5/2012 – 3/2014	Lynch, J. & Thun, G., Integrated Responsive Building Envelopes,*University of Michigan OVPR, Rackham Graduate School, Taubman College, College of Engineering, Special Projects Grant (Jointly Funded)*, Role: Co-PI, ($534950)
1/2012 – 8/2013/8	Velikov, K., The Pillow Case: Light Sensitive ETFE Prototyping, *University of Michigan OVPR, Small Project Grant/Taubman* College Research Fund , Role: Co-PI, ($14941), ORSP
5/2011 – 8/2011	Lynch, J. & Thun, G., The Cirrus Project,*University of Michigan WIMS ERC Strategic Seed Funding*, Role: Co-PI, ($25000)

PRACTICAL/CREATIVE WORK

2020 **Building Standards of the University of Michigan**

The research is focused on the estimation how much Green House Gas emission can be reduced by improving buildings on the UM Campus. An extensive evaluation of the CO2 emission of all buildings of the UM campus has been done. Buildings have been classified in occupancy type and quality of building envelope. The current CO2 emission have

been estimated by using this data. The main part of the research was focused on strategies how to reduce the CO2 emission in an economic feasible way. Optimization algorithms have been combined with thermal dynamic simulation tools to find optimal strategies for each building type. Results are showing that there is a huge opportunity to reduce the CO2 emission at building operation when geothermal heat pump systems or groundwater well heat pump systems are used for room heating and cooling. The general recommendation is to reduce the amount of non-renewable energy sources like gas.
The authors of the research work hope that the results will lead to additional research work on sustainable and affordable solutions in the building sector.
The research is a collaboration with Prof. Jen Meigret of the Taubman College of Architecture.

2013 **Concept 22/26, realized high performanc building project.**

Dr. Junghans was the leading engineer on the office building project Concept 22/26 in Austria. The introduced building concept goes beyond the conventional high performance building discussion by introducing an office building without any active systems for heating, cooling and ventilation. In an intensive collaboration between the worldwide known architect Dietmar Eberle and Dr. Junghans, the building envelope was improved to a level of performance where no active systems are needed any longer. The innovative building automation is the heard of the building energy concept. It controls the natural ventilation openings based on the internal carbon dioxide concentration, temperature levels and the occupant demands.
The building is accomplished in the middle of July 2013. Data in extreme external temperature periods are illustrating that the room temperatures are in the comfort field at every weather condition. The award winning building achieved international recognition.

Other realized projects with major contribution:

2010 Bruckner University Innsbruck, Austria
Contribution: Project manager building energy concept and mechanical systems
Architect: Architekturburo 1, Realization: 2011, Construction value: $75MM

2009 University of Luxemburg “Maison Savoir”, Luxemburg
Contribution: Project manager building energy concept and mechanical systems
Architect: Baumschlager Eberle, Realization: 2010-11, Construction value: $145MM

2009 High performance High Rise Residential Buildings, Shanghai, China
Contribution: Project manager building energy concept and mechanical systems
Architect: Baumschlager Eberle, Realization: 2011-12, Construction value: $80MM

TEACHING

University of Michigan

Taubman College of Architecture
Classes in Building Physics, High Performance Building Design, Mechanical Building Systems, Building Optimization

Lecturer at: Hochschule Liechtenstein
Master Classes in Sustainable Architecture and Building Services Education in:
-Strategies in climate responsible architecture design
-Energy efficient building services (use of renewable resources)
-Principles for HVAC design

Teaching assistant
Doctoral studies at the ETH Zürich 2004-2006

DISSERTATION COMMITTEE

University of Michigan

2017 – 2023	PhD Dissertation Committee (chair), Hyeonsoo Kim
2015 – 2021	PhD Dissertation Committee (chair), DeokOh Woo
2012 – 2016	PhD Dissertation Committee (chair), Rudai Chan, Graduated 4/2016
2012 – 2016	PhD Dissertation Committee (chair), Nuri Bae, Graduated
2019 – 2023	PhD Dissertation Committee (member), Mengjun Hou (Civil Engineering)
2020 – 2023	PhD Dissertation Committee (member), Devki Desai (Civil Engineering)
2015 – 2018	PhD Dissertation Committee (member), Anahita Khodadadi
2015 – 2020	PhD Dissertation Committee (member), Omid Torghabehi

University of Sydney

2017 – 2018	PhD Dissertation Committee (member), Benjamin Slee
2013 – 2017	PhD Dissertation Committee (member), Margaret Liu

TAUBMAN COLLEGE of ARCHITECTURE SERVICE

2011	Architecture Admission / Scholarship Committee
2011	Faculty Search Committee (4 faculty members)
2012 – 2013	Architecture Chair Advisory Committee
2014	Architecture Admission / Scholarship Committee
2014 – 2016	Doctoral Studies in Architecture Advisory Committee, Representative of Building Technology Area
2019 – ongoing	Elected Member of the University of Michigan Faculty Senate
2020 - 2021	Promotion and LEO Committee member

PROFESSIONAL SERVICE

Since 2013	Reviewer for the scientific journal Energy and Buildings

2014	Reviewer for the ARPAe grant of the US Department of Energy (DOE). The proposal was on local climate control in buildngs.Washington, USA
2015	SimAUD2017 International Conference, Paper Reviewer
2016	ACADIA National Conference, Paper Reviewer
2016	Building Simulation Conference, Paper Reviewer