

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
- 8/2002 – 1/2005 **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

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 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*, in review
- 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*, accepted, in production
- 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

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

GRANTS

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., <i>Latitudo Borealis, Taubman College of Architecture Research Through Making Grant</i> ,current,(\$20.000), ORSP
5/2016 – 8/2016	Junghans, L. (2016/5-2016/8), Model Predictive Control in the Built Environment, <i>Rackham Spring/Summer Research Grant</i> , accomplished, (\$8.000), ORSP
8/2015 – 8/2016	Junghans, L., Sustainable Building Design optimization algorithm for early architectural design steps, <i>Baumschlagwer Eberle Architects</i> , Austria, accomplished, (\$52.000), ORSP
8/2013 – 8/2014	Junghans, L., Global Building Optimization using the Climate Surface Calculation Method, <i>Office of the Vice President of Research OVPR</i> , 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, <i>Office of the Vice President of Research OVPR</i> , University of Michigan, Seed funding opportunity, accomplished, (\$20.000), ORSP
5/2011 – 8/2011	Junghans, L., Building simulation on High Performance Project, <i>Rackham Spring/Summer Research Grant</i> , accomplished, (\$6.000), ORSP
1/2011 – 12/2011	Junghans, L., Zero Net Emission Office Building in the Cold Climate of Austria, <i>Baumschlagwer Eberle Architects Austria</i> , accomplished, (\$20.000), ORSP

GRANTS (Collaboration)

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

2021	Arch 505	Sustainability and Affordability
2011 – 2020	Arch 505	High Performance Building Design
2014 – 2016	Arch 505	Building Optimization
2013 – 2016	Arch 505	Air and Wind in Architecture
2010 – 2014	Arch 315	Sustainable Systems I
2011 – 2017	Arch 425	Sustainable Systems II
2018 – 2021	Arch 425	Sustainable Systems (3G)
2016	Arch 825	Area Seminar in Building Technology
2012	Arch 562	Comprehensive Studio/Technology
2011	A509	Hydro Lab

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