1. Record Nr. UNINA9910886074503321

Titolo	Scalable Disruptors : Design Modelling Symposium Kassel 2024 / / edited by Philipp Eversmann, Christoph Gengnagel, Julian Lienhard, Mette Ramsgaard Thomsen, Jan Wurm
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2024
ISBN	9783031682759 3031682750
Edizione	[1st ed. 2024.]
Descrizione fisica	1 online resource (593 pages)
Disciplina	745.5928
Soggetti	Engineering design Manufactures Industrial design Human-machine systems User interfaces (Computer systems) Human-computer interaction Engineering Design Machines, Tools, Processes Industrial Design Interaction Design User Interfaces and Human Computer Interaction Modelisme
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Intro -- Introduction -- Organization -- Contents -- Area A: Realising Circular Design -- A Taxonomy of Techniques and Tools for Rubble -- 1 Introduction -- 2 Background -- 3 Methods -- 3.1 Survey of Techniques -- 3.2 Case Studies -- 4 Results and Reflection -- 4.1 Case Study Evaluation -- 4.2 Considerations for Large Scale Implementation -- 5 Conclusion -- References -- Structural Concrete Rubble Arrangements -- 1 Introduction -- 1.1 Background and Goal -- 1.2 Related Work -- 2 Methods -- 2.1 Geometry Acquisition -- 2.2 Raster-Based Single-Leaf Masonry Stacking -- 2.3 Masonry Analysis --

2.4 Construction Planning for Assembly Using any Hoisting Machinery -- 2.5 Validation of Structural Performance -- 3 Results -- 4 Discussion -- 5 Conclusion -- References -- VRoxel -- 1 Introduction -- 2 Background -- 3 Methods -- 3.1 Intuitive Design -- 3.2 Digital Materials -- 3.3 Design Methodology -- 3.4 Design Context -- 3.5 H-Block Digital Material -- 4 Results and Reflection -- 5 Conclusion -- References -- Shaping Structures from Reclaimed Elements
A Computational Framework for Stock-Constrained Design of Static Equilibrium -- 1 Introduction -- 2 Research Context -- 2.1 Structural Design with Reclaimed Elements -- 2.2 Contributions -- 3 Method -- 3.1 Layout Optimization -- 3.2 Geometry Optimization -- 3.3 Assignment Optimization -- 4 Case Study -- 4.1 Design Context -- 4.2 Element Stock and New Sections -- 4.3 Design Results -- 5 Conclusion -- References -- Place the Waste: Designing with Reclaimed Concrete -- 1 Introduction -- 2 Methods -- 2.1 General Approach -- 2.2 Voussoir Stacking Algorithm -- 3 Results and Reflections -- 4 Conclusions -- References -- Bayesian Inference for Modelling Uncertainty in Non-standard Building Systems -- 1 Introduction -- 1.1 Background -- 1.2 Relevance -- 2 Probabilistic Graphical Models. 3 Challenges in Coreless Filament Winding -- 4 Case Study: Bayesian Inference in Coreless Filament Winding -- 4.1 Parameter Learning -- 4.2 Inference -- 4.3 Results -- 5 Discussion -- 5.1 Challenges -- 6 Conclusion -- References -- Integrating Naturally Grown Timber in Sandwich Timber Panels -- 1 Introduction -- 1.1 Motivation -- 1.2 Raw Material: Broad-Leaf Forest Resources for Sustainable Timber Construction -- 1.3 Structural Optimization Systems: Construction Patterns Based on Stress Direction -- 1.4 Background in Naturally Grown Timber Applications -- 2 Methodology -- 2.1 Geometrical Analysis and Parametrisation for an Inventory of Two-Dimensional Timber Elements, Phase I -- 2.2 Parametrisation of the Target Geometry, Phase II -- 2.3 Matching Algorithm and Design Approach for Load- and Stress-Aligned Panels, Phase III -- 3 Design and Fabrication of a Timber Canopy. ReGrowth Pavilion, a Case Study -- 3.1 Design and Construction Development -- 3.2 Static Analysis and Workflow Application -- 3.3 Preliminary Results Analysis -- 3.4 Augmented Reality Assisted Assembly -- 4 Conclusions and Further Discussion -- References -- Constructing with Discarded Wood -- 1 Introduction -- 1.1 Irregular Wood in Construction -- 1.2 Technology and Optimisation -- 1.3 Tingstedet -- 2 Workflow for Handling Irregular Wood Planks -- 3 Prototyping and Development -- 4 A Case for Constructing with Irregular Wood Planks -- 5 Conclusion -- References -- Computationally Integrated Embodied Carbon Performance Tools for Structural Design Stages -- 1 Introduction -- 2 Background -- 2.1 Climate Change Context -- 2.2 Existing Tools -- 2.3 Research Problem -- 2.4 Overview -- 3 The Tools and Workflows -- 3.1 Smart Massing Tool -- 3.2 ECO2 Tool -- 3.3 Case Study -- 4 Results and Reflection -- 4.1 Smart Massing Tool -- 4.2 ECO2 Tool -- 5 Conclusion -- References.
Web-Based Material Database for Circular Design -- 1 Introduction -- 1.1 Context -- 1.2 Literature Review -- 1.3 Problem Statement and Contribution -- 2 Methodology -- 2.1 Database, Data Collection and Data Engineering -- 2.2 3D Model Generation Through Computer Vision and Image Segmentation -- 2.3 Data Access in 3D Modeling Environments -- 3 Results -- 3.1 Case Study 1: Database Accessibility -- 3.2 Case Study 2: Reclaimed Brick Façade -- 3.3 Limitations and Future Work -- 4 Conclusion -- References -- Kit-of-Parts Equilateral Constant Normal Curvature (ECNC) Gridshell -- 1 Introduction -- 2 Geometrical Background and Kit-of Parts System --

2.1 Geometrical Background -- 2.2 Kit-of Part Building System -- 3 Digital Modelling -- 4 Physical Exploration and Architectural Implication -- 4.1 Deployable ECNC Model -- 4.2 Digitally Informed Physical Exploration -- 4.3 Pavilion -- 4.4 Architectural Implementation -- 4.5 Structural Analysis -- 5 Conclusion -- References -- Modular Metal Nodes for Timber Space Frames -- 1 Introduction -- 2 Background -- 2.1 Material Context -- 2.2 Construction Context -- 3 Method -- 3.1 Digital Design -- 3.2 Material Constraints -- 3.3 Node Typology -- 3.4 Node Fabrication -- 4 Results and Reflection -- 5 Conclusion -- References -- Data-Driven Reuse of Waste Wood -- 1 Introduction -- 1.1 Background -- 2 Method -- 2.1 Context and Collaborative Partners. -- 2.2 The Design Method -- 2.3 Beam Library -- 2.4 Flow-Based Case -- 2.5 Bin-Packing -- 3 Results -- 3.1 System Augmentation -- 4 Discussion and Conclusion -- References -- Area B: Scaling Digital Concepts -- Unleashing the Power of Topology Optimization in Computational Engineering Workflows -- 1 Introduction -- 2 Background -- 2.1 Purpose and Scope -- 2.2 Literature Review -- 2.3 Knowledge Gap -- 2.4 Research Objectives and Hypothesis -- 2.5 Theoretical Framework.
3 Methods -- 3.1 First Case Study - 3D Roof Structure -- 3.2 Second Case Study - 2.5D Glass Dome Structure -- 3.3 Third Case Study - A Door Handle -- 4 Results and Reflection -- 5 Conclusion -- References -- Past to Future: Revitalising Construction Systems -- 1 Introduction -- 2 Extension of Design Objectives and Methods -- 2.1 Design Parameters -- 2.2 Multimodal Optimization -- 3 Revitalizing Ceiling Systems from the Past -- 3.1 Uniaxially Load-Bearing System: Kappe+ -- 3.2 Biaxially Load-Bearing System: Kassette+ -- 4 Transformation for the Future in Construction -- 4.1 Kappe Template -- 4.2 Kappe Modular -- 4.3 Kassette Shell -- 4.4 Kassette Fold -- 5 Results: A Comparative LCA Analysis -- 6 Conclusion -- References -- Critical Collaboration: Reflecting on Power and Agency in Human-Robot-Collaboration in Architecture and Construction, for a Diverse and Democratic Practice -- 1 Introduction -- 2 Theoretical Framework: Feminist Technoscience for Human-Robot Collaboration Desing -- 2.1 Embodiment -- 2.2 Reconfiguration -- 2.3 Interrelations -- 2.4 Participation -- 2.5 Summary -- 3 Methods -- 3.1 Case Studies -- 3.2 Selection Criteria -- 4 Results -- 4.1 Prototype as Artefact [14] -- 4.2 Interactive Robotic Plastering [15] -- 4.3 Usability Evaluation of an Augmented Reality System for Collaborative Fabrication Between Multiple Humans and Industrial Robots [16] -- 5 Reflection -- 5.1 The FTS Analysis of "Prototype as Artefact" [14] -- 5.2 The FTS Analysis of "Interactive Robotic Plastering" [15] -- 5.3 The FTS Analysis of "Usability Evaluation of an Augmented Reality System for Collaborative Fabrication Between Multiple Humans and Industrial Robots" [16] -- 5.4 The FTS Framework as a Generative Tool -- 6 Conclusion -- References -- Languages of Geometry -- 1 Introduction -- 2 Method -- 2.1 Language -- 2.2 Solution Spaces -- 3 Results -- 3.1 Collection.
3.2 Genealogy -- 4 Discussion -- Appendix Language Descriptions -- References -- An Open-Source and Multi-platform Computational Design Framework for Timber Engineering -- 1 Introduction -- 2 Development of the Framework -- 2.1 Framework Architecture -- 2.2 Open Source -- 3 Implementation and Case Studies -- 3.1 Verification of Connection Nodes on Timber Gridshell -- 3.2 Design of Non-standard Doweled Connection -- 3.3 Timber Floor Vibration Assessment Based on FE Modeling -- 4 Discussion -- 5 Conclusion -- References -- ARA - Grasshopper Plugin for AI-Augmented Inverse Design -- 1 Introduction -- 1.1 Forward and Inverse Design -- 1.2

About This Work -- 2 Background -- 2.1 Generative AI for Inverse Design -- 2.2 Autoencoders -- 3 Related Work -- 3.1 Generative Design (Disambiguation) -- 3.2 Inverse Design Problems -- 3.3 Machine Learning Tools for Grasshopper -- 4 ARA -- 4.1 Overview -- 4.2 Parametric Model -- 4.3 Data -- 4.4 Autoencoder Model -- 4.5 Generative Design -- 5 Applications -- 5.1 Example: Urban Massing -- 5.2 Example: Shell Bridge -- 6 Discussion -- 6.1 Benefits and Limitations -- 6.2 Outlook and Future Work -- References -- TileGPT: Generative AI for Intuitive Design Exploration and Trade-Offs Navigation Title -- 1 Introduction -- 2 Background -- 2.1 Designing for Net-Zero -- 2.2 Wave Function Collapse -- 2.3 Quality Diversity Optimization -- 2.4 Generative Pretrained Transformers -- 3 Methods and Data -- 3.1 Tile-Based Design and Wave Function Collapse -- 3.2 Qualitative and Quantitative Performance Metrics -- 3.3 Diversity Optimization for Generating Labeled Design Space -- 3.4 GPT and WFC -- 3.5 In-Loop Control and Design Iteration -- 4 Findings -- 5 Conclusion -- References -- Systems in Communication with Their Environment -- 1 Introduction -- 2 Method/Description of the Bio-Robotic System -- 2.1 Nutrient Medium.
2.2 Robotic Extruder.

Sommario/riassunto

This book reflects and expands on current trends in the Architecture, Engineering and Construction (AEC) industries as they respond to the unfolding climate and biodiversity crisis. Shifting away from the traditional focuses, which are narrowly centered on efficiency, this book presents a variety of approaches to move the AEC community from a linear, extractive paradigm to circular and regenerative one. The book presents contributions including research papers and case studies, providing a comprehensive overview of the field as well as perspectives from related disciplines, such as computer science, biology and material science.