

Curriculum Vitae

Personal information

First name(s) / Surname(s) **Nebojša Jakica**



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Occupational field **Adjunct Professor**

Education

Dates **From January 2012 to November 2015 (3 years 10 months)**

Title of qualification awarded **Ph.D.**

Principal subjects/occupational skills covered **Doctoral Program: Technology and Design for Environment and Building
Thesis title: "PERFORMANCE-BASED ARCHITECTURAL DESIGN, SIMULATION AND OPTIMISATION OF COMPLEX BUILDING INTEGRATED PHOTOVOLTAICS"**

Supervisor: Prof. Alessandra Zanelli

Keywords: High-Performance Façade Design, Performance-Based Building Design, Multi-Criteria Optimisation, Knowledge-Based Expert System, Computational design, User-Interactive Simulation, Visualisation, Active and Passive Solar Strategies, BIPV (Building-Integrated Photovoltaic), DSSC (Dye-Sensitized Solar Cell), Daylighting, , High-Performing Facades, Zero Energy Buildings, Cost-optimal design,

Abstract:

PhD research aims to address issues and limits appearing in traditional segmented design and simulation processes of architects, designers, building physicist and engineers, by developing **new methodology for integrated design** able to account for many criteria present in a design process of **high-performance facades**. Particularly, focus has been set on concept of BIPV, considering different scales from PV cell to building and connecting design, simulation and optimisation into one integrated **Performance-Based Design (PBD)** approach.

This process is built on a set of computational strategies represented through **parametric design modelling** that provides flexible and powerful framework to include sub-processes of geometry creation, optical simulations and optimization techniques. Specifically, thesis contribution to the knowledge reflects on developing custom **simplified simulation model using knowledge-based expert system methodology and tool for early stage design and user-interactive optimisation** of component placement on a façade layout. Methodology is based on the pre-calculation of performances such as optical and electricity yield of the PV cell and BIPV module using **ray-tracing simulation**, in order to cut-off long daylighting simulation time during design process and provide flawless PBD. Moreover, expert system is introduced to offer **guidance to the design** by comparing values in the knowledge database and proposing improvements, without recalculation with every design change. This approach envisages **integration and balancing passive and active solar strategies** for achieving better overall building performance and offer novel approach to design **Zero Energy Buildings (ZEB)**. Process is demonstrated and validated on the case study model of innovative BIPV façade with **Dye-Sensitized Solar Cells (DSSC)**.

Name and type of organisation providing education and training **Politecnico di Milano**
Department of Architecture, Built Environment and Construction Engineering
Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Level in national or international classification Level 8 according to The International Standard Classification of Education (ISCED 2011)

Dates **From November 2010 to January 2012 (1 year 3 months)**

Title of qualification awarded **Specializing Master 2nd level**

Principal subjects/occupational skills covered **Study programme: Architecture, Structure and Technology**
Postgraduate course – Master of advanced studies

Final grade: 110 (On a scale 66-110 which 66 is the lowest passing grade.)

Total number of ECTS credits: 60

Principal subjects: Buildings and Structures, Architecture and Sustainability, Architectural Constructions

Master Thesis Title: "Parametric Framework for Performance-Based Structural Design Optimisation of the Sports Arena"

Supervisor: Prof. Paola Ronca, Arch. Chiara Domenici

Main research fields: Parametric Modelling, Performance-Based Building Design, Structural Optimisation

The thesis is focused on structural optimization by utilizing parametric framework in performance-based design method, where performances become the guiding factor in the design process. These concepts were applied and shown in Lamezia Terme Sport Arena.

Name and type of organisation providing education and training **Politecnico di Milano**
Scuola Master Fratelli Pesenti
(Facolta' Di Architettura Civile + Ingegneria Civile, Ambientale E Territoriale + Ingegneria Dei Sistemi)
Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Level in national or international classification Level 7 according to The International Standard Classification of Education (ISCED 2011)

Dates **From October 2003 to February 2009 (5 years 4 months)**

Title of qualification awarded **Master in Architecture**

Principal subjects/occupational skills covered **Study programme: Architecture and Urban Planning**
Integrated Undergraduate Academic and Graduate Academic – Master level studies

Average grade: 9.17 (On a scale 6-10 which 6 is the lowest passing grade.)

Total number of ECTS credits: 305

Principal subjects: Architectural and Urban Design, Interior Design, Landscape Design, Architectural Constructions, Architectural/Urban Heritage – Conservation and Protection, Ecology of the Built Environment

Master Thesis Title: "Centre for Innovation in Novi Sad – Parametric Design Study"

Supervisor: Prof. Predrag Šidanin

Co-Supervisor: Dr. Bojan Tepavčević

Main research fields: Intelligent architecture, Parametric design, Building Information Modelling, Building technology and ecology, Energy efficiency

The thesis is focused on designing energy efficient and intelligent buildings by using parametric design software in order to obtain a high level of flexibility in the design process. Different kinds of parameters, connected in an algorithm, allow designing intelligent parametric facade modules and simulation of building behaviour and reactions to environment in real time. These concepts were applied and shown on the Centre for Innovation in Novi Sad.

Scientific board had evaluated the Master thesis with a grading of 10 (On a scale 6-10 which 6 is the lowest passing grade.) for both thesis and public presentation.

Name and type of organisation providing education and training **University of Novi Sad, Faculty of Technical Sciences, Department of Architecture and Urbanism**
Trg Dositeja Obradovića 6, 21000 Novi Sad, Serbia

Teaching experience

Dates	February 2019 to June 2019 (4 months)
Occupation or position held	Guest Professor
Main activities and responsibilities	Diploma Engineer Course - 2 nd semester - Passive Solar Design and Daylighting (Diane Bastien, Assistant Professor) Teaching students Daylighting Principles, Basic Daylighting Simulation, Climate Based Daylighting Modelling, Daylight Metrics, Shading and Shade Benefit
Name and address of employer	University of Southern Denmark (SDU) Department of Technology and Innovation, SDU Civil and Architectural Engineering Unit Campusvej 55, 5230, Odense M, Denmark
Type of business or sector	Education
Dates	October 2018 to June 2019 (9 months)
Occupation or position held	Adjunct Professor
Main activities and responsibilities	053014 – CONSTRUCTION OF ARCHITECTURAL WORKS – 1 st and 2 nd semester - Corso di Laurea Magistrale DM 270/04 in Architettura – progettazione Architettonica, sede di Milano Leonardo (Scuola di Architettura Urbanistica Ingegneria delle Costruzioni) - Corso di Laurea Magistrale DM 270/04 in Architettura e Disegno Urbano – Architecture and Urban Design, sede di Milano Leonardo (Scuola di Architettura Urbanistica Ingegneria delle Costruzioni) Teaching students sustainable architectural and construction technologies, energy-efficient buildings, structural systems in concrete, wood, steel, prefabricated and in-situ construction techniques, construction details.
Name and address of employer	Politecnico di Milano Department of Architecture, Built Environment and Construction Engineering Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Type of business or sector	Education
Dates	From March 2018 to June 2018, (4 months)
Occupation or position held	Teaching Assistant, Lecturer
Main activities and responsibilities	Master Course ICAR/12 (Prof. Alessandra Zanelli): - TECHNOLOGICAL AND ENVIRONMENTAL DESIGN all'interno del corso: 051571 - DESIGN AND CONSTRUCTION STUDIO - N. Rif. 419 Teaching students parametric design and sustainability concepts of lightweight systems for sport stadiums (complex envelopes, large spans, Solar / Energy Analysis, Detailed Design + Construction Design) through lectures and lab work, preparing materials and assisting professors with lectures, grading practice exams and assisting in grading final exams
Name and address of employer	Politecnico di Milano Department of Architecture, Built Environment and Construction Engineering Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Type of business or sector	Education
Dates	January 2018 (1 month)
Occupation or position held	Lecturer
Main activities and responsibilities	PhD Course / Workshop ICAR/12 (Prof. Alessandra Zanelli): - Textile Architecture, Lightweight construction: Sheltering design workshop Teaching students advanced sustainability strategies (optical and thermal design, thermal comfort strategies, PV integration and energy generation potential) for lightweight systems (tents and shelters) through lectures and lab work, preparing materials and assisting professors with lectures, grading practice exams and assisting in grading final exams
Name and address of employer	Politecnico di Milano Department of Architecture, Built Environment and Construction Engineering Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Type of business or sector	Education

Dates	From March 2016 to June 2016, From March 2017 to June 2017 (2 x 4 months)
Occupation or position held	Teaching Assistant, Lecturer
Main activities and responsibilities	Master Course ICAR/12 (Prof. Alessandra Zanelli): - Design of Ultralightweight Building Systems Teaching students parametric design and sustainability concepts of ultralightweight systems (facades, canopies, roofs, deployable structures, kinetic systems) through lectures and lab work, preparing materials and assisting professors with lectures, grading practice exams and assisting in grading final exams
Name and address of employer	Politecnico di Milano Department of Architecture, Built Environment and Construction Engineering Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Type of business or sector	Education

Dates	From October 2015 to June 2016 (9 months)
Occupation or position held	Teaching Assistant Lecturer
Main activities and responsibilities	Master Course ICAR/12 (Prof. Carol Monticelli): - Architectural Design Studio 1 Teaching students architectural design principles and technology through lab work, preparing materials and assisting professors with lectures, grading practice exams and assisting in grading final exams
Name and address of employer	Politecnico di Milano Department of Architecture, Built Environment and Construction Engineering Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Type of business or sector	Education

Dates	From October 2008 to June 2009 (9 months)
Occupation or position held	Teaching Assistant (full-time)
Main activities and responsibilities	Bachelor courses (Prof. Predrag Šidanin): - Descriptive Geometry, - Techniques and Presentations of Architectural and Urban Projects, - Representations of Architectural and Urban Projects, Master course (Prof. Predrag Šidanin): - Geometry and Visualisation of Free forms in Architecture Teaching students to develop and improve their skills in 3D modelling (ArchiCAD, Autocad, 3Ds max, Sketchup) and visualization (Vray) in form of lectures and lab work, preparing materials and assisting professors with lectures, grading practice exams and assisting in grading final exams
Name and address of employer	University of Novi Sad, Faculty of Technical Sciences, Department of Architecture and Urbanism Trg Dositeja Obradovića 6, 21000 Novi Sad, Serbia
Type of business or sector	Education

Research experience

Dates	From January 2017 – December 2017 (1 year)
Occupation or position held	Post-doc Research Fellow (full-time)

Principal subjects/occupational skills covered Research on emerging technologies in Solar Design, High-Performance Facades, Renewables and Zero Energy Buildings
 Development of Innovative, Integrated and Performance-Based Design Methodologies & Tools on various scales and complexity
 Implementation of Active and Passive Solar Design Strategies & Multi-Criteria Optimisations for Zero Energy Buildings
 Optical and Thermal Simulation, Material & Components Characterization, Daylighting, Physically-based Visualisation
 Scientific writing and publishing (papers in journals and conferences, books, book chapters)
 Defining and strategizing research objectives, activities, partners competences and facilities
 Writing grant applications, preparing and managing documentation
 Representing Politecnico di Milano in research networks and community including Associations, Actions, Conferences, Workshops
 Leader of Action 5 on BIPV design and simulation of International Energy Agency - PVPS Task 15 on BIPV

Research supervisor: Prof. Alessandra Zanelli

Name and type of organisation providing education and training **Politecnico di Milano**, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Type of business or sector University Research

Dates **From September 2014 to December 2014 (3months)**

Occupation or position held **Visiting researcher (full-time)**

Principal subjects/occupational skills covered BIPV testing and certification procedures particularly IEC 61215 standard "Crystalline silicium terrestrial photovoltaic (PV) Modules - Design qualification and type approval" and IEC 61646 "Thin-film terrestrial photovoltaic (PV) Modules - Design qualification and type approval"

Research supervisor: Dr. Francesco Frontini

Name and type of organisation providing education and training **University of Applied Sciences and Arts of Southern Switzerland (SUPSI)**
Department for Environment Construction and Design (DACD)
Institute for Applied Sustainability to the Built Environment (ISAAC)
 Campus Trevano, CH-6952 Canobbio, Switzerland

Type of business or sector Applied research, training and professional advice on BIPV systems, BIPV testing and certification

Dates **From November 2013 to October 2014 (1 year)**

Occupation or position held **Research Fellow (full-time)**

Main activities and responsibilities Research fellow on the project "**TIFAIN – Photovoltaic Building Integrated Glass Tiles for innovative architectural application**" financed by MIUR (Italian Ministry of Education, University and Research) and Regione Lombardia

Research deals with performance-based design and optimisation of the BIPV façade system and component using parametric and programming framework for flexible simulation-informed design process.

Managing activities for patent application (Documentation, Illustrations, Feasibility studies with producers, Performance assessments)

Performing and managing design, simulation and outdoor/laboratory testing activities with team members, clients and partners

Research supervisor: Prof. Alessandra Zanelli

Name and address of employer **Politecnico di Milano**, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Type of business or sector University Research

Work experience

Dates **From September 2018 onwards**

Occupation or position held **Assistant Professor in Façade Design and Engineering**

Main activities and responsibilities Research & Education in Façade Design and Engineering
 Organisation of Nordic Façade Master Programme
 Façade Testing and Certification
 Consulting and Services

Name and address of employer **University of Southern Denmark (SDU)**
 Department of Technology and Innovation, SDU Civil and Architectural Engineering Unit
 Campusvej 55, 5230, Odense M, Denmark

Type of business or sector Education

Dates From January 2018 to August 2018

Occupation or position held Environmental design specialist

Main activities and responsibilities Creating sustainable solutions to improve performance of facades, buildings and urban districts
Developing innovative sustainability design strategies, workflows & custom tools
Preparation of conceptual, schematic, design development sustainability analyses
Education and support of multidisciplinary design teams on sustainable design
Identifying & learning from successful practices, projects and cases
Fostering integrated approach to combine design and simulation in a single workflow
Automated performance assessment of Daylighting, Building Energy, Natural Ventilation, Pedestrian Wind Comfort, Indoor and Outdoor Thermal Comfort

Name and address of employer Architectural office "HENN GmbH", Alexanderstrasse 7, Berlin, Germany

Type of business or sector Architectural services

Dates From January 2012 to January 2018

Occupation or position held Computational Designer, BIM and Sustainability Specialist

Main activities and responsibilities Creating high-aesthetic innovative design visions, concepts & solutions for facades and buildings
Proposing design visions, Leading & Collaborating on multiple winning international competitions
Leading and participating in design reviews
Positioning and matching client values, project requirements & design vision
Implementation and transfer of digital design process know-how into project values
Identify project & business opportunities in relation to implementation of innovative design processes & technologies
Managing & coordinating activities to meet client, team, partners and project values, expectations & deliverables
Communicating ideas within project team, partners, clients, producers & contractors to help resolve project issues & coordination
Presenting design vision, progress reviews and project deliverables to clients and client representatives
Writing meeting reports and minutes & track project progress
Streamlining design process from early design studies to the detail design ensuring design idea is consistent and properly executed
Consultancy & responsibility in synchronisation, implementation & facilitation on Advanced Integrated Digital Design Strategies
BIM implementation in design process from conceptual design to Integrated Project Delivery (IDP)
Developing innovative digital design workflows & tools and facilitating their implementation
Supervising & Preparation of conceptual, schematic, design development documents including drawings, visualisation and illustrations
Collaboration & participation in international architectural venues, initiatives, actions, scientific and professional associations
Education and support of multidisciplinary design teams on digital design & presentation
Organising & mentors team members and their expectations to meet Design, Modelling and Project deliverables & deadlines
Identifying & learning from successful practices, projects and cases

Name and address of employer Architectural office "Vittorio Grassi Architect and Partners", Via Cenisio 73, 20154 Milan, Italy
Politecnico di Milano, TEXTILESHUB, Piazza Leonardo da Vinci 32, 20133 Milan, Italy
Industria e Innovazione, Via Durini 18, 20122 Milan, Italy

Type of business or sector University research, Applied research, Consultancy

Dates From May 2011 to July 2013

Occupation or position held Architect

Main activities and responsibilities Creating high-aesthetic innovative design visions, concepts & solutions for facades and buildings
Positioning and matching client values, project requirements & design vision
Implementation and transfer of digital design process know-how into project values
Communicating ideas within project team, partners, clients, producers & contractors to help resolve project issues & coordination
Streamlining design process from early design studies to the detail design ensuring design idea is consistent and properly executed
Consultancy & responsibility in synchronisation, implementation & facilitation on Advanced Integrated Digital Design Strategies
BIM implementation in design process from conceptual design to Integrated Project Delivery (IDP)
Developing innovative digital design workflows & tools and facilitating their implementation
Preparation of conceptual, schematic, design development documents including drawings, visualisation and illustrations
Education and support of multidisciplinary design teams on digital design & presentation
Identifying & learning from successful practices, projects and cases

Name and address of employer **Architectural office "Vittorio Grassi Architect and Partners", Via Cenisio 73, 20154 Milan, Italy**

Type of business or sector Architectural services

Dates **From 2010 to 2012**

Occupation or position held **3D modelling and visualization expert**

Main activities and responsibilities Working on **three projects (MONATUR, EXPO MONATUR and EDICT)** from Calls for Proposal HUSRB/0901, HUSRB/1002 and HUSRB/1203, Priority 2- Economy, Education and Culture, Action 2.1.2. Development of thematic routes of cultural heritage that were approved for implementation from Joint Monitoring and Steering Committee of the **Hungary-Serbia IPA** (Instrument for Pre-accession Assistance) Cross-border Cooperation Programme, which is implemented within the **2007-2013 European Union financial framework**.

Job tasks include 3D design and visualization of the medieval monasteries in Araca and Rakovac in Vojvodina. Process involves 3D reconstruction of existing structures as well as proposed ones using photogrammetry methods followed by creation of photorealistic virtual 3D model and visualizations in order to present findings from archaeological excavations and get an impression of its appearance before ruin.

Name and address of employer **Museum of Vojvodina, Dunavska 35-37, Novi Sad 21000, Serbia**

Type of business or sector Architectural services

Dates **From June 2009 to November 2010**

Occupation or position held **Junior Architect**

Main activities and responsibilities BIM management, Creation and maintenance of the BIM (ArchiCAD) template files according to the office standards
Automating routines (Quantity take-offs, layouts, drawings) in BIM to support design and improve productivity
Managing digital file transfer and exchange with project partners
Assist staff in BIM project setup and design, Providing ArchiCAD internal beginner and advanced training to staff
Identifying trends and business opportunities relating to BIM
BIM implementation in schematic and design development phases of Theatre, Residential, Commercial and Mix-use projects

Name and address of employer **Architectural office "Novi Dom", Jevrejska 13, 21000 Novi Sad, Serbia**

Type of business or sector Architectural services

Dates **From October 2003 to October 2008**

Occupation or position held **Architectural Assistant**

Main activities and responsibilities Involved in project planning and drawing, research and implementations of BIM software in projects

Name and address of employer **Architectural office "Novi Dom", Jevrejska 13, 21000 Novi Sad, Serbia**

Type of business or sector Architectural services

Personal skills and competences

Mother tongue(s) **Serbian**

Other language(s)

	Listening		Reading		Writing		Speaking		Overall score	
English*	6.5		6.5		6.0		6.0		6.5	
English**	C1	Proficient user	C1	Proficient user	C1	Proficient user	C1	Proficient user	C1	Proficient user
Italian**	A2	Basic user	A2	Basic user	A2	Basic user	A2	Basic user	A2	Basic user

(*) IELTS International English Language Testing System (Scale 1-9, where 1 is the lowest and 9 is the maximum grade, date of the test 11.9.2010. taken at the British Council, Belgrade)

(**) Common European Framework of Reference for Languages

- Social skills and competences
- Ability to adapt and collaborate within a team;
 - Flexible attitude and ability to work harmoniously in an international environment with people of different nationalities and cultural backgrounds
 - Able to build good relationships at all levels
- Organisational skills and competences
- Leader of International Energy Agency - PVPS Task 15 on BIPV Action 5 on BIPV design and simulation
 - Council on Tall Buildings and Urban Habitat (CTBUH) Scandinavia - Member of Future Leaders Committee
 - Member of Organizing Committee for the Tensinet Symposium 2019 in Milan, Italy.
 - Member of Organizing Committee for the International Conference on Descriptive Geometry 2006 in Novi Sad, Serbia.
 - Project and team leader for the Shenzhen Bay Super City International Competition, Shenzhen, China. 2014
 - Coordinator of several international student team projects and competition entries
 - Ability to manage and prioritize tasks and time efficiently and rationally
 - Consistently committed to progress in work and learning
 - Analytical and systemic thinking
 - Dedicated to overcome issues and find out-of-the-box solutions
- Technical skills and competences
- Experience in digital rapid prototyping, 3D printing, CNC fabrication
- Computer skills and competences
- Proficient user of following applications:
- Operating system: **Windows, Mac OS X**
 - Word Processing, spreadsheet and presentation: **Microsoft Office**
 - 2D and 3D CAD design: **Autodesk AutoCAD, Sketchup**
 - Building Information Modelling: **Graphisoft ArchiCAD, Autodesk Revit**
 - Nurbs and polygon modelling: **Rhinoceros 3D, T-Splines, Evolutetools, Autodesk 3Ds max**
 - Generative-parametric modelling: **Grasshopper**
 - Optimisation: **Galapagos, Goat, Octopus**
 - Sustainable design (whole building energy and daylighting analysis): **RADIANCE classic, EnergyPlus, OpenStudio, DIVA for Rhino, Honeybee, Ladybug, ARCHSIM**
 - Graphical and web design: **Adobe Suite**
 - Rendering: **Vray, Corona, Octane, Ocean**
 - Programming: **Python**
- Artistic skills and competences
- Architectural photography, Architectural visualisation, Graphic design, Branding, Virtual Reality
- Other skills and competences
- Certificate in First Aid

Additional information

Conferences

(presentations, panel sessions, posters)

Glass Performance Days 2019 "All Eyes on Smarter Glass" June 26-28, 2019, Tampere, Finland, 20 minute oral presentation: Physically Accurate Visual Representation of Advanced Glass Facades, ISBN:978-952-5836-08-0, Hameen Kirjapaino, Tampere, pp. 248-254

(Invited) The University of Wollongong in Dubai with Politecnico di Milano School of Management - Joint Alumni Event and Panel session: Future of innovation and design, 15 November 2017, Dubai, UAE, 20 minute oral presentation: Performance Driven Aesthetics: TIFAIN Photovoltaic facade

- IASS Annual Symposium 2017** "Interfaces: architecture . engineering . science" September 25 - 28th, 2017, Hamburg, Germany, 20 minute oral presentation: Innovative Cable Net Curved-Glass Photovoltaic Façade
- 7th Energy Rating and Module Performance Modeling Workshop**, 30-31 March 2017, Lugano, Switzerland, Poster and 10 minute oral presentation: *Knowledge-Base Design Approach For a Curved Glass Complex Bipv Façade*
- 31st European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC 2015)**, 14-18 September 2015, Hamburg, Germany; Poster presentation: *Experimental Validation of Optical Simulation for Complex Building Integrated Photovoltaic System*. In session: 6AV.5 Integrating Photovoltaics in our living environment: new solutions from optimization to application / PV Applications, Poster No. 6AV.5.19; Poster and 20 minute oral presentation: *Performance Based Design of BIPV Façade For The Project TIFAIN*. In Parallel event: Photovoltaics Forms Landscapes; 20 minute oral presentation: *BIPV projects mapping and tools – what are the necessary elements in a BIPV database to fulfil market demands?* In Parallel event: Reaching out for opportunities in BIPV – market, policies and BIPV development drivers
- 6th IBPC – Building Physics for a Sustainable Built Environment**, 14-17 June 2015, Politecnico di Torino, Turin, Italy; 20 minute oral presentation: *Knowledge Based Expert System Optimisation of the Complex Glass BIPV System Panel Layout on the Cable Net Structural Skin*
- ENERGY FORUM, Conference on Advanced Building Skins**, Chapter: Performance Simulation of the Building Envelope, 28-29 October 2014, Bressanone/Brixen, Italy; 20 minute oral presentation: *Dynamic Visualization of Optical and Energy Yield Co-Simulation of New Generation BIPV Envelope in Early Design Phase Using Custom Ray Tracing Algorithm in Python*
- TENSINET Symposium**, 8-10 May 2013, Istanbul, Turkey; 20 minute oral presentation: *Parametric Design and Optimisation of the ETFE Envelope of the Sports Stadium in Lamezia Terme*
- Junior Scientist Conference**, 7-9 April 2010, Vienna, Austria; Poster presentation: *Centre for Innovation in Novi Sad - Parametric Design Study*. In session: Master thesis
- UK - Ireland Planning Research Conference 2010**, 7-9 April 2010, Chelmsford, Essex, UK; 20 minute oral presentation: *Parametric Modeling: An Approach to Energy Efficient Building Envelopes and their Interaction with Urban Environment*
- MoNGeometry 2006**, 2006, Novi Sad, Serbia; 15 minute oral presentation: *Geometry of Rectilinear Surfaces, Their Visualization and Application in Creating Architectural forms*

Peer-reviewed publications (journal papers, conference proceedings, books)

- Jakica N., Kragh M., Besse G. (2019) - Physically Accurate Visual Representation of Advanced Glass Facades, In: **Proceedings of the Glass Performance Days 2019** "All Eyes on Smarter Glass" June 26-28, 2019, Tampere, Finland, pp. 248-254, ISBN:978-952-5836-08-0, Glass Performance Days, Finland
- Markoska E., Lazarova-Molnar S., Jakica N., Kragh M. (2019) - Assessment of Building Intelligence Requirements for Real Time Performance Testing in Smart Buildings, In: **Proceedings of the IEEE SpliTech2019 - 4th International Conference on Smart and Sustainable Technologies**, Jun 18- 21, 2019, Split, Croatia
- Jakica N., Zanelli A. (2019) - Extreme Soft Skins: Multi-layered ETFE for Challenging Environments, In: **Proceedings of the TensiNet Symposium 2019** "Softening the Habitats" 3-5 June 2019, Milan, Italy, pp. 570-579, ISBN 978-88-916-3245-6, Maggioli SpA, Italy
- Jakica N., Zanelli A. (2019) - Extreme Soft Skins: Multi-layered ETFE for Challenging Environments, In: **Architectural Engineering and Design Management Journal**, DOI: 10.30448/ats2019.3245.51 (in-press)
- Jakica N. et. al. (co-editor and co-author) (2019) - **BIPV Design and Performance Modelling: Tools and Methods**, IEA PVPS Task 15, Subtask E, Report IEA-PVPS T15-06: 2019 (in-press)
- Jakica N. (co-author) (2018) - **COLOURED BIPV - Market, research and development**, IEA PVPS Task 15, Subtask E, Report IEA-PVPS T15-03: 2018 (in-press)
- Jakica N., Zanelli, A. (2017) - Innovative Cable Net Curved-Glass Photovoltaic Façade, In: Annette Bögle, Manfred Grohmann (eds.) **Proceedings of Proceedings of the IASS Annual Symposium 2017** "Interfaces: architecture . engineering . science" September 25 - 28th, 2017, Hamburg, Germany
- Jakica N. (2017) - State-of-the-Art Review of Solar Design Tools and Methods for Assessing Daylighting and Solar Potential for Building-Integrated Photovoltaics (Sonia Alves Cardoso Diniz A.Eds.), In: **Renewable and Sustainable Energy Reviews Journal**, Elsevier, ISSN 1364-0321, DOI 10.1016/j.rser.2017.05.080
- Lovati, M. Avesani, S., Maturi, L., Jakica, N., Moser D. (2016) - Evaluating a BiPV sun shading system with various software and methods, In: **Proceedings of the 11th Conference on Advanced Building Skins**, (pp.41-52). 10-11 October 2016, Bern, Switzerland, Publisher: Advanced Building Skins GmbH, Wilen, Switzerland. ISBN: 978-3-98120539-8
- Jakica N. (2016) - Performance-Based Architectural Design, Simulation And Optimisation Of Complex Building Integrated Photovoltaics In: P.Biscari Ed. - **PhD Yearbook | 2016**, PhD School of Politecnico di Milano, Milan, ISBN: 978 88 6493 0336
- Jakica, N., Zanelli, A., Frontini F. (2015) - Experimental Validation of Optical Simulation for Complex Building Integrated Photovoltaic System. In: **Proceedings of the 31st European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC 2015)**, (pp. 2890-2895),

Hamburg, Germany

- Jakica, N., Zanelli, A. (2015) - Knowledge Based Expert System Optimisation of the Complex Glass BIPV System Panel Layout on the Cable Net Structural Skin. In: **Energy Procedia 78**, Proceedings of the 6th IBPC International Conference on Building Physics for a Sustainable Built Environment, Turin, Italy, pp. 2226–2231. doi:10.1016/j.egypro.2015.11.339.
- Jakica, N., Zanelli, A. (2014) - Dynamic Visualization of Optical and Energy Yield Co-Simulation of New Generation BIPV Envelope in Early Design Phase Using Custom Ray Tracing Algorithm in Python. In: **Proceedings of the 9th Conference on Advanced Building Skins**, (pp.1031-1038). 28 - 29 October 2014, Bressanone, Italy, Publisher: Economic Forum, Munich, Germany. ISBN 978-3-98120537-4
- Jakica, N. (2013). Parametric Design and Optimisation of the ETFE Envelope of the Sports Stadium in Lamezia Terme. In: H. Bogner-Balz, M. Mollaert and E. Pusat (Ed.) **Proceedings of the TENSINET Symposium 2013 [RE]THINKING Lightweight Structures**, Chapter: ETFE (pp. 417-424). Mimar Sinan Fine Arts University, Istanbul, Turkey. ISBN 9789072325068
- Jakica, N. (2010). Parametric Modelling: An Approach to Energy Efficient Building Envelopes and their Interaction with Urban Environment. In: **Proceedings Abstracts of the UK - Ireland Planning Research Conference 2010 - Diversity and Convergence: Planning in a World of Change, Track: Climate Change, Sustainability and Ecology**. Anglia Ruskin University, Chelmsford, Essex. Liverpool University Press, Routledge, Taylor & Francis Group
- Jakica, N. (2010). New trends in China architecture (In Serbian). (S. Crkvenjakov, Ed.) In: *DaNS - Journal of Association of Novi Sad Architects* (69) (pp. 12-15). ISSN 0351-9775
- Jakica, N. (2010). Centre for Innovation in Novi Sad - Parametric Design Study. In: H. K. Kirner (Ed.), **Proceedings of the Junior Scientist Conference 2010**, Chapter: Energy and Environment (pp. 349-350). Vienna: Vienna University of Technology. ISBN 978-3-200-01797-9
- Jakica, N. (2009). Centre for Innovation in Novi Sad - Parametric Design Study (In Serbian). In: I. Ćosić (Ed.), **Proceedings of the Faculty of Technical Sciences Novi Sad**, Scientific field: Architecture, XXIV (1/2009), pp. 148-151. ISSN 0350-428X
- Jakica, N., Acmaz, M., & Pazane, T. (2007). Stressfree District. In: T. Ilmavirta (Ed.), **LOCAL IDENTITY AND GLOBALISATION - Final Report of the YTK/IFHP Urban Planning and Design Summer School 2007** (pp. 100-103). Helsinki: Helsinki University of Technology, Centre for Urban and Regional Studies. ISBN 978-951-22-9078-9 / ISSN 1455-7754
- Jakica, N. (2006). Geometry of Rectilinear Surfaces, Their Visualization and Application in Creating Architectural forms (In Serbian). In: R. Obradovic (Ed.), **Proceedings of the 23rd Conference on Descriptive Geometry, MoNGeometry 2006** (pp. 16-24). Novi Sad: Faculty of Technical Sciences, Novi Sad. ISBN 86-7892-007-6

Other publications

(architectural projects in books, exhibition catalogues, visualizations)

- Jakica, N. (2017). TIFAIN Diamond Facade In: Brendan McGetrick (Director & Curator): **Exhibition catalogue of the Global Grad Show**, (p. 205) Dubai, UAE, 13-18 November 2017.
- Jakica, N. (2017). TIFAIN Diamond Facade In: **Dubai Design Week 2017 Guide**, (p. 343) Dubai, UAE, 13-18 November 2017.
- 3D visualizations of the Archaeological sites in Novi Becej, Araca in: J. Stanojev (Ed.), **Araca - Exhibition catalogue of the permanent exhibition of Hungary-Serbia IPA (Instrument for Pre-accession Assistance) Cross-border Cooperation Programme MONATUR** (pp. 17, 25, 34, 38, 41). January 2013, Novi Becej: Promoter: Muzej Vojvodine, Novi Sad. ISBN 978-86-87723-33-7
- 3D visualizations of the Archaeological sites in Rakovac-Dumbo in: J. Stanojev (Ed.), **Dumbo - Exhibition catalogue of the permanent exhibition of Hungary-Serbia IPA (Instrument for Pre-accession Assistance) Cross-border Cooperation Programme MONATUR** (pp. 10, 22, 24, 39, 43). January 2013, Novi Becej: Promoter: Muzej Vojvodine, Novi Sad. ISBN 978-86-87723-31-3
- 3D visualizations of the Archaeological sites in Novi Becej - Araca and Rakovac - Dumbo in: Stanojev, J., 2012. **MONATUR, Medieval monasteries as a part of the collective cultural heritage tourism, and as potentially important part of sustainable development**. Muzej Vojvodine, Novi Sad. (pp. 16-18, 94-96, 98-99, 131-135, 137-138) ISBN 978/86-87723-18-4
- Jakica, N. (2012). Parametric Framework for Performance – Based Structural Design Optimisation of the Sports Arena. In: P. Horvat, M. Lapajne (Eds.), **Abstracts Of The Projects Awarded - The 11th International Trimo research award 2012 for the best Diploma papers, Specialist dissertation, Master's dissertations, and Doctoral theses** (p. 37). Trimo, d. d., Trebnje, Slovenia
- Jakica, N. (2010). New trends in China architecture (In Serbian). (S. Crkvenjakov, Ed.) In: *DaNS - Journal of Association of Novi Sad Architects* (69) (pp. 12-15). ISSN 0351-9775
- Jakica, N. (2010). Centre for Innovation in Novi Sad - Parametric Design Study. In: P. Horvat, M. Lapajne, & M. Gabrijel (Eds.), **Abstracts Of The Projects Awarded - The 9th International Trimo research award 2010 for the best Diploma papers, Specialist dissertation, Master's dissertations, and Doctoral theses** (p. 39). Trimo, d. d., Trebnje, Slovenia
- Jakica, N. et al. (2008). Project for International competition for conceptual solutions for remodelation and revitalization of Kastel Fortress (In Serbian). In: **Exhibition catalogue of the Salon of Architecture 2008, Novi Sad**. Novi Sad: Association of Novi Sad Architects, Department of Architecture and Urbanism.
- Jakica, N. (2008). In: D. Reba, R. Dinulovic, & I. Maras (Eds.), **Research study of development and reconstruction of Irig central zone** (In Serbian) (pp. 35-38). Novi Sad: Faculty of Technical Sciences, Department of Architecture and Urbanism. ISBN 978-86-7892-070-7

Jakica, N. et al. (2007). In: V. Kunic (Ed.), **Exhibition catalogue of the International competition for conceptual solutions for remodeling and revitalization of Kastel Fortress** (In Serbian) (p. 12). Museum of Contemporary Art of Republika Srpska, Banja Luka, Republika Srpska: Department for Urban Planning, Banja Luka.

Jakica, N. (2006). Urban Fragment Project in Novi Sad (In Serbian). In M. Rutar (Ed.), **Exhibition catalogue of the 15th Salon of Urbanism** (p. 10.09.). Novi Sad: Association of Urbanists of Serbia, Belgrade. ISBN 86-84275-13-6

Patents

Patent for community design application

Patent number: 002824847, Patent filling date: 15 October 2015

Patent for industrial invention: Application method for building-integrated photovoltaic modules

Patent number: 102015000061983, Patent filling date: 15 October 2015

Expert Meetings and Workshops

IEA PVPS Task 15 - Enabling Framework for BIPV Acceleration: 20-22 November, Copenhagen, Denmark; 5-9 February, Tokyo, Japan; 14-17 March 2017, Madrid, Spain; 09 November 2016, Marrakesh, Morocco; 14 September 2015, Hamburg, Germany; 22-24 June 2015, Heerlen, The Netherlands, 23 September 2014, Amsterdam, Netherlands

European Façade Network (EFN): 26 November 2018, Lucerne, Switzerland; 20 May 2019, Bolzano, Italy

Summer schools, Short Courses and Workshops

Facades + Performances, Date: 12 April 2013, Location: NY, USA, Organized by: Jon Sargent, SOM

The Theme: **ENVIRONMENTAL PERFORMANCE IN PARAMETRIC ENVELOPE DESIGN (Grasshopper + DIVA)**

Learning: Computational connections between parametric facade models and environmental performance using Grasshopper and the DIVA-for-Rhino plug-in, through validated simulation engines to assess day lighting, energy use, and occupant comfort. Process of asking relevant performance questions, setting up geometric and/or material parameters for exploration, running simple optimizations, and drawing actionable conclusions from multivariate fitness landscapes.

Rhino Python online, Date: 10-12, 15 December 2012, Location: online, Organized by: Giulio Piacentino, Ilaria Giardallo

The Theme: **Scripting, automating and making the most of the new programming language for Rhinoceros 5.0**

Learning: learn how to handle basic Python codes, run macros to automate commands, perform calculations and successfully develop codes for geometry in Rhino 5 for Windows and for Mac, learn how to write own functions, manage different data structures and extend Grasshopper experience by combining it with iterative and recursive Python codes.

Advances in Architectural Geometry 2012, Date: 29-30 September 2012, Location: Paris, France, Organized by: Robert Aish (Autodesk), Patrick Tierney (Autodesk), Al Fisher (Buro Happold), Sam Joyce (University of Bath)

The Theme: **Geometric and Topological modelling for architecture, building engineering and digital fabrication using DesignScript**

The Topic: Geometry modelling combined with associative modelling and imperative scripting, and with engineering analysis and optimization. Learning: How to develop appropriate design strategies by harnessing a mix of advanced geometric modelling and engineering analysis tools.

The 13th YTK/IFHP Urban Planning and Design Summer School 2007, Date: 6-18 August 2007, Location: Helsinki, Turku & Jyväskylä, Finland, Organized by: Centre for Urban and Regional Studies (YTK), Helsinki University of Technology (TKK) with International Federation of Housing and Planning (IFHP).

The Theme: **Local Identity And Globalisation, Urban Culture – Global Edge**

The total amount of work was approximately 150 hours, and the Summer School entitled the participants six (6) ECTS credits. My contribution had been evaluated and I received a grading of 5 (On a scale 1-5 which 1 is the lowest passing grade.)

The 6th Architectural Student Congress Ex YU together with Workshop Architecture In Transition, Zagreb & Rijeka, Croatia, 27 April – 1 May 2007

The 5th Architectural Student Congress Ex YU together with Workshop Urban Recycling, Belgrade, Serbia, 26-30 April 2006

Exhibitions

2017 - Project TIFAIN Diamond Facade on the **Global Grad Show, part of Dubai Design Week**, Dubai, UAE, 13-18 November 2017.

2014 - Project on the **Exhibition of selected projects on Shenzhen Bay Super City International Competition**. Shenzhen City Hall, Shenzhen, China, October

2013 - Winning project on the **Exhibition of the ten finalist projects of the International Competition Maspes-Vigorelli Velodrome**, Urban Centre of Milan, Galleria Vittorio Emanuele 11/12, Milan, Italy, 30 May - 14 June.

2013 - 3D visualizations of the Archaeological sites in Novi Becej, Araca on the **Permanent exhibition of Hungary-Serbia IPA (Instrument for Pre-accession Assistance) Cross-border Cooperation Programme MONATUR**, Culture Centre, Novi Becej, Serbia, January to February

- 2013 - 3D visualizations of the Archaeological sites in Rakovac-Dumbo on the **Permanent exhibition of Hungary-Serbia IPA (Instrument for Pre-accession Assistance) Cross-border Cooperation Programme MONATUR**, Elementary School "Jovan Grcic Milenko, Beocin, Serbia, January to February
- 2009 - Master thesis-project "Centre for Innovation in Novi Sad - Parametric Design Study" on **Days of Novi Sad Architects Exhibition, Category: The best student works**, Pozorište Mladih, Novi Sad, Serbia, 1-7 July
- 2009 - Tourist Agency and Auto Salon Projects for Interior Architecture and Design - Faculty Course on **The 18th International Exhibition of Furniture, Design and Interior Decoration "Ambijenta"**, Novi Sad Fair, Master Centre, Novi Sad, Serbia, 13-18 March
- 2008 - Project on **Research study of Development and Reconstruction of Irig Central Zone Exhibition**, Irig Cultural Centre, Serbia, October
- 2008 - Tourist Agency and Auto Salon Projects for Interior Architecture and Design - Faculty Course on **The Presentation Exhibition of The Faculty Of Technical Sciences Novi Sad, Department of Architecture and Urbanism**, The Sapienza University of Rome, Italy, September
- 2008 - Project on **The International competition for conceptual solutions for remodeling and revitalization of Kastel Fortress Exhibition**, The Museum of Contemporary Art of Republika Srpska, Banja Luka, BiH, 13-20 March
- 2008 - Project for The International competition for conceptual solutions for remodeling and revitalization of Kastel Fortress in Banja Luka on **Salon of Architecture Exhibition**, The Museum of Contemporary Art Vojvodina, Novi Sad, Serbia, 16-25 May
- 2008 - Project for The International competition for conceptual solutions for remodeling and revitalization of Kastel Fortress in Banja Luka on **Selected works of The 4th Author's Competition of the "Novosti" company for the Best Architectural Work Exhibition, Category: Student Projects**, Jugoslovensko Dramsko Pozorište, Belgrade, Serbia, 26-31 March
- 2007 – **Fortress Bac, within the manifestation European heritage days**, with support from Vekovi Baca Fund, in cooperation with FTN, Novi Sad, co-author with Jermina Stanojević, Bac, Serbia, 22 September
- 2007 – 3rd prize project on **the Exhibition of the winning proposals of The National Competition for the Knauf Stand on The International Building Trade Fair (UFI) Southeast Europe Belgrade Building Expo 2007 (SEBE) Exhibition**, Department of Architecture and Urbanism, Novi Sad, Serbia, July
- 2006 - Urban Fragment Project in Novi Sad on **The 15th Salon of Urbanism Exhibition**, SPENS, Novi Sad, Serbia, 8-15 November

Research proposals writing

- COST Action** – Leading and writing FACADICT project proposal; Not selected for funding
- 2019 Tensinet conference** – Contribution to the writing, presenting proposal; Successful
- Marie-Curie proposals for ITN** - Contribution to writing Projects ADD-PV, DENZ 2 and ARISE. Not selected for funding

Grants and scholarships

- Research Grant for the project "TIFAIN – Photovoltaic Building Integrated Glass Tiles for innovative architectural application"**, Funding body: MIUR (Italian Ministry of Education, University and Research) and Regione Lombardia, Duration: November 2013 - October 2014
- Scholarship for Serbian citizens studying in Italy**, Funding body: **Government of the Republic of Italy, Ministry of Foreign Affairs**, Duration: 2013/2014
- Scholarship for studying abroad**, Funding body: Government of the Republic of Serbia, Ministry of Youth and Sport, Fund for young talents – Dositeja, Duration: 2011/2012 and 2012/2013
- Visiting scholarship** for the 13th YTK/IFHP Urban Planning and Design Summer School 2007 in Finland, Funding body: University of Novi Sad, Duration: August 2007
- Visiting scholarship** for the 13th YTK/IFHP Urban Planning and Design Summer School 2007 in Finland, Funding body: Vojvodina Provincial Secretariat for Culture, Duration: August 2007
- Visiting scholarship** for the 13th YTK/IFHP Urban Planning and Design Summer School 2007 in Finland, Funding body: Vojvodina Provincial Secretariat for Architecture, Urban Planning and Civil Engineering, Duration: August 2007
- Scholarship for exceptional results achieved in studying**, Funding body: Government of the Republic of Serbia, Ministry of Education, Duration: 2004-2009

Awards

- 2016 - Nomination for the **MIT Technology Review – Innovators Under 35, Italian edition Award**.
- 2015 - **3rd place-the National Competition for the "Musealization of the Violin stable" in Aquileia, Italy**. Group leader: Lithos restauri. My responsibilities include design, 3d modelling and visualisation

- 2014 - **1st place**- the International Design Competition for the design of the Cultural Centre and the Park dedicated to the Yakut heroic epos Olonkho in Olonkholand, Yakutsk, Russia. Architect: Vittorio Grassi Architetto & Partners. My responsibilities include conceptual design, 3d modelling of the building mass and façade including preparation of the files for CNC model making
- 2014 - **Selected project** - Shenzhen Bay Super City International Competition, Shenzhen, China. Architects: Myself (head of the Group), Stojanovic Bogdan, Slavko Milanovic and Zhengyu Fan. My responsibilities include organisational activities, conceptual design, 3d modelling of the building masses and freeform complex facade for the skyscrapers and cultural centres, sustainable analyses, graphic design (partly)
- 2014 - **1st place** -the International Design Competition for the Masterplan of the former industrial area ZIM Site Usines Maslennikov in Samara, Russia. Announced on 20th January 2014; Architect: Vittorio Grassi Architetto & Partners. My responsibilities include conceptual design, 3d modelling of the building mass and the Freeform complex facade for the skyscraper and shopping mall
- 2013 - **1st place** -the International Design Competition for the requalification of the Velodrome Maspes-Vigorelli, Municipality of Milan; Group Leader: Vittorio Grassi, Architect (Vittorio Grassi Architetto & Partners); Group members: John Barrow - Architect (POPULOUS LIMITED), Knut Goppert - Engineer (SCHLAICH BERGERMANN UND PARTNER-SBP GMBH), Marija Golubovic – Engineer, Giuseppe Gaspare Amaro – Engineer, Giorgio Veronelli – Architect. My responsibilities include 3d modelling and design of the parametric responsive façade
- 2013 - **1st place**- Tekla BIM Award Italia 2013 for the project Sports Hall in Lamezia Terme, Italy. Architect: Vittorio Grassi Architetto & Partners, Structural engineering: AI Engineering Srl. My responsibilities include 3d parametric modelling of the tiers and ETFE envelope freeform space-frame panelling optimisation and structural design layout - 3d output for structural engineers
- 2012 - **1st place** -the International Design Competition of the Military City of Cecchignola in Rome, organized by Italian Ministry of Defence, January 2012. Architect: Vittorio Grassi Architetto & Partners. My responsibilities include 3d modelling and visualization of elevations and public spaces
- 2012 - **The 11th International Trimo research award** for the best Master dissertations
- 2010 - **The 9th International Trimo research award** 2010 for the best Master dissertations
- 2009 - **Faculty Of Technical Sciences diploma for the best student** – Promotion of Architecture and Urban Planning study programme
- 2007 - **3rd place** - The National Competition for the Knauf Stand on The International Building Trade Fair (UFI) Southeast Europe Belgrade Building Expo (SEBE) –Co-author with Jermina Stanojevic
- 2007 - **Mention and honorary award** - the International competition for conceptual solutions for remodelation and revitalization of Kastel Fortress, Banja Luka, BiH, 2007
- 2006 - **University of Novi Sad special award**- for the research paper “Geometry of Rectilinear Surfaces, Their Visualisation and Application in Creating Architectural forms”

Memberships

- EFN - European Facades Network
- IEA - PVPS Task 15 – BIPV – Leader of the Action 5 Design and Performance in Subtask E Reserch & Development
- CTBUH Scandinavia – Future Leaders Committee
- IBPSA Italia – International Building Performance Simulation Association, Italian Regional Affiliate
- TENSINET – The Association for Tensioned Membrane Construction
- IASS – International Association for Shell and Spatial Structure

Date and Place:
20.07.2019.
Milan, Italy

Signature:

