

BRANIMIR KOLAREK

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RESEARCH INTERESTS

Computational imaging (V-RTI, DEM-based surface analysis) · high-performance computing for photogrammetry · AI-driven cultural-heritage documentation and restoration (deep-learning segmentation of fresco surfaces)

EDUCATION

PhD in Graphic Engineering and Graphic Product Design 2023 – present

Faculty of Graphic Arts, University of Zagreb · GPA 5.0/5.0 · Doctoral thesis (Scandinavian kappe model, three peer-reviewed papers) on digital documentation of historical graffiti incised into fresco surfaces · Doctoral tuition funded in full by the Ruder Boskovic Institute (competitive institutional grant).

Bachelor of Visual Communications Design (4-year program; final thesis defended 2011) 2001 – 2005

Arts Academy, University of Split. Pre-Bologna degree subsequently recognized as equivalent to MA under Croatia's Bologna-conversion framework.

Multimedia studies — one semester, Fall 1998

Santa Barbara City College, California, USA

PROFESSIONAL POSITIONS HELD

Research Assistant — Centre for Informatics and Computing, Ruder Boskovic Institute, Zagreb, May 2024 – present

AI and high-performance computing applied to cultural-heritage documentation; deep-learning segmentation pipelines; HPC-scale photogrammetry workflows.

Teaching Assistant — University North, Varazdin, 2022 – present

(Detailed in Teaching section below.)

Art Director — 0903.STUDIO, self-employed, Zagreb, Oct 2019 – present

Independent design studio. Visual identity systems, editorial design, and visualization for institutional clients in technical and humanities fields.

Graphic Designer / Desktop Publishing — Futura DDB Hrvatska, Zagreb Dec 2015 – Nov 2016

Full-time staff designer and DTP preparation at a leading Croatian advertising agency.

Graphic Designer / Illustrator — Bug d.o.o., Zagreb 2000 – Mar 2012

Magazine covers, editorial design, and illustration for Croatia's largest IT publication.

Visual Communications Designer — independent practice and studio collaborations, 2000 – present

Studio collaborations: Futura DDB, Sensus Design Factory, Restart. Institutional clients: University of Zagreb (Faculty of Architecture, Faculty of Civil Engineering); University of Rijeka; University North.

COURSES TAUGHT AND SERVICES TO THE HOME INSTITUTION

Teaching Assistant — University North, Department of Art 2022 – present

- **Digital Photo and Video Production I** — laboratory sessions, guest lectures on AI image tools and on the use of photogrammetry for cultural-heritage documentation.
- **Digital Photo and Video Production II** — laboratory sessions.
- Annual instructional load: approximately 70 students.

Knowledge-transfer activities

- **Rudolfovo (Novo Mesto, Slovenia)**, 3D laser scanning and HPC photogrammetry, 8 hours over two days, June 2025.
- **Multistem project** (online, with Z. Sojat), computer vision, image processing, and AI, December 2025.
- **CIR Computer Science Seminar, Ruder Boskovic Institute**, "AI Tools for Visual Creation" — 60-minute internal seminar, October 2025.

PUBLICATIONS (PAPERS, POSTERS AND ABSTRACTS)

Listed in reverse chronological order. (B. Kolarek shown in bold.)

1. Duric, V.; **Kolarek, B.**; Mijic, N.; Davidovic, D. NCC Croatia Success Story: Setting up Photogrammetry Workflow on an HPC Cluster — A Cultural Heritage Use Case. *Austrian-Slovenian HPC Meeting 2026 (ASHPC26)*, Vienna: TU Wien, 2026, p. 28.

2. **Kolarek, B.**; Davidovic, D.; Gamulin, Lj. Applying Advanced Computational Infrastructure in Creating a High-Resolution 3D Model of the Small Fountain of Onofrio. *Digital Art History — Methods, Practices, Epistemologies V: Critical Approaches to Sources in (Digital) Art History*, S. Sekelj (ed.), Zagreb: Institute of Art History, 2025, pp. 39–41.
3. **Kolarek, B.**; Davidovic, D. A Two-Phase AI Framework for Fresco Analysis and Digital Restoration. *16th International Conference on Information Technologies and Information Society*, M. Gorisek, T. Golob, T. Strempfel (eds.), Novo Mesto: Faculty of Information Studies, 2025, p. 209.
4. Gamulin, Lj.; Vukovic, L.; Knezevic Kuzman, B.; Lucic, N.; **Kolarek, B.**; Davidovic, D. 3D Photogrammetry as a Complementary Non-Invasive Method for Hidden Layer Detection in Heritage Paintings. *Multidisciplinary Research on Cultural Heritage (MRCH 2025) — Book of Abstracts*, A. Dragojevic (ed.), Zagreb: Croatian State Archives, 2025, p. 62.
5. Bojovic, V.; **Kolarek, B.**; Davidovic, D.; Sojat, Z.; Skala, K. Improving Transparency and Accessibility in the Academic Publication Process on the EBSI Network. *2025 MIPRO 48th ICT and Electronics Convention*, Z. Car, S. Babic, M. Cicin-Sain (eds.), Piscataway, NJ: IEEE, 2025, pp. 1206–1210. doi:10.1109/mipro65660.2025.11131877.
6. **Kolarek, B.**; Gamulin, Lj.; Vukovic, L.; Knezevic Kuzman, B.; Lucic, N. High-Performance Computing as an Accelerator for 3D Photogrammetry in Heritage Conservation. *Dani e-infrastrukture Srce DEI 2025 — Book of Abstracts*, S. Mihaljevic, I. Veldic (eds.), Zagreb: SRCE, 2025, p. 58.
7. **Kolarek, B.**; Davidovic, D.; Maricevic, M. Energy Efficiency in Photogrammetry: A Comparative Analysis of Dataset, Hardware, and Resolution Effects in Agisoft Metashape. *Proceedings of the 28th International Conference on Printing, Design and Graphic Communication*, K. Pap (ed.), Zagreb: University of Zagreb Faculty of Graphic Arts, 2025, pp. 28–40.
8. Skala, K.; Sojat, Z.; Maricevic, J.; Davidovic, D.; Bojovic, V.; Zubcic, T.; **Kolarek, B.**; Pazin, D.; Tomic, D.; Slapnik, T.; et al. Prospects of Digital Scientific Publishing on Blockchain: The Concept of DAP. *Open Research Europe*, 3 (2024), pp. 117–127. doi:10.12688/openreseurope.15771.2.
9. Tomic, D.; Murgic, J.; Frobe, A.; Skala, K.; Vrljicak, A.; Medved Rogina, B.; **Kolarek, B.**; Bojovic, V. Exploring Potential Therapeutic Combinations for Castration-Sensitive Prostate Cancer Using Supercomputers: A Proof-of-Concept Study. *Scientific Reports*, 14 (2024), 1, 18824, 11 pp. doi:10.1038/s41598-024-69880-9.
10. **Kolarek, B.**; Gamulin, Lj.; Davidovic, D. Cultural Heritage on HPC — Creating High Resolution 3D Models Using Photogrammetry. *2024 47th MIPRO ICT and Electronics Convention — Proceedings*, S. Babic, Z. Car, M. Cicin-Sain, D. Ciscic et al. (eds.), Piscataway, NJ: IEEE, 2024, pp. 1121–1127. doi:10.1109/mipro60963.2024.10569784.

CONFERENCE PRESENTATIONS AND WORKSHOPS

Presented by B. Kolarek unless noted; reverse chronological.

- **ITIS 2025** (Otocec, Slovenia, Nov 2025) — "Proposal for Digital Restoration of Fresco Images Using AI," 20-min talk.
- **Digital Art History V** (Zagreb, Oct 2025) — "Applying Advanced Computational Infrastructure in Creating a High-Resolution 3D Model of the Small Fountain of Onofrio," co-presented with Lj. Gamulin, 20 min.
- **M2L Summer School** (Split, Sept 2025) — poster: "Why Creating an AI Restoration for Fresco is so hard, Hard, HARD?!"
- **MRCH 2025** (Zagreb, Sept 2025) — co-author and poster contributor, "3D Photogrammetry as a Complementary Non-Invasive Method for Hidden Layer Detection in Heritage Paintings."
- **MIPRO 2025** (Opatija, June 2025) — "Improving Transparency and Accessibility in the Academic Publication Process on EBSI Network," 20-min talk.
- **Blaz Baromic Conference** (May 2025) — "Energy Efficiency in Photogrammetry: A Comparative Analysis...", 9-min talk. Also: participation in workshops "Public Speaking" (generic-skills) and "Doctoral School Research Seminar."
- **Srce DEI 2025** (Zagreb, March 2025) — 3-min flash talk and poster: "HPC as an Accelerator for 3D Photogrammetry in Heritage Conservation." Also: workshop "Data Visualization in Research Projects."
- **EBSI-NE Demystifying Seminar** (Cotrugli Business School, Zagreb, Dec 2024) — presentation on the DAP project.
- **MIPRO 2024** (June 2024) — "Cultural Heritage on HPC — Creating High Resolution 3D Models Using Photogrammetry," conference paper presentation.
- **Ruder Open Days (SCIHILL)** (April 2026) — designed and delivered five science-outreach presentations for primary-school students, 8 hours.

SELECTED EXHIBITIONS

Group exhibitions of graphic design and visual communications work, reverse chronological. Venues abbreviated; full venue names available on request.

- **Zagreb Design Week** (Zagreb) — 2024, 2023, 2022, 2021.
- **WallRide** — exhibition of Croatian street art and skateboard culture, Klet, Zagreb, with travelling editions in Split and Osijek, 2025.
- **Sistematski pregled** — ULUPUH Gallery, Zagreb, 2022.

- **ZGRAF** — Lauba, Zagreb, 2016.
- **Interakcije 2004–2012** — HDD Gallery, Zagreb, 2012.
- **Third Croatian Biennial of Illustration** — Klovcevi dvori Gallery, Zagreb, 2010.
- **Summer School of Architecture exhibition** — Motovun, 2008.
- **DVK 97-07 graphic | interactive** — ULUPUH Gallery (Zagreb), Zadar, and Bacvice (Split), 2007–2008.
- **New ULUPUH members exhibition** — ULUPUH Gallery, Zagreb, 2007.
- **Croatian Design Exhibition 04/05/06** — HDLU Zagreb; Rovinj; Split; Jakopceva Gallery, Ljubljana (Slovenia), 2006.
- **Magdalena International Festival of Creative Communications** — Maribor (Slovenia), 2003, 2004, 2005.
- **Genova 04 — Convegno delle Accademie del Mediterraneo** — Genoa, Italy, 2004.
- **Festival of Firsts** (within Zagreb Film Festival), 2003.
- **Croatian Design Exhibition 03** — Gliptoteka HAZU, Zagreb, 2003.

MEMBERSHIP AND ACTIVITIES IN PROFESSIONAL ASSOCIATIONS

President — Graphic Design and Visual Communications Section, ULUPUH (Croatian Association of Artists of Applied Arts) Oct 2024 – present.

Vice President of the Organizing Committee — ZGRAF 13, International Exhibition of Graphic Design, Zagreb 2025.

Steering Committee Member — OPEL track (Optoelectronics, Photonics, Quantum Optics & Optical Computing), MIPRO 2026.

Organizing Committee Member — Zagrebacki Salon 2026.

Professional Member — Croatian Designers Association (HDD) ongoing.

Student Member — The International Institute for Conservation of Historic and Artistic Works (IIC) ongoing.

PROFESSIONAL HONORS, FELLOWSHIPS, AND CONTINUING EDUCATION

Selected formal training programs completed in support of the doctoral research.

- **Programming in Python** (D450 and D460), SRCE, Zagreb — November and December 2024.
- **3D Tool Blender — Fundamentals** (M300), SRCE, on-site course, March 2025.
- **Introduction to Deep Learning**, November 2024.
- **Understanding the LLM Development Cycle: Building, Training, and Fine-Tuning**, June 2024.
- **From ML Engineering to AI Engineering**, June 2024.
- **Introduction to Machine Learning and Deep Learning**, July 2024.
- **Data and AI Masters**, September 2024.
- **5-Day Gen AI Intensive Course with Google**, November 2024.
- **Unlock Hugging Face: Transformers, LLMs, RAG, Fine-Tuning**, February 2025.
- **ML Pub Club #18: Foundation Models in 3D Vision**, February 2025.

COMMUNITY SERVICE AND OUTREACH

- **Science outreach for primary-school students** — designed and delivered five practical demonstrations at Ruder Open Days (SCIHILL), April 2026.
- **Science outreach for teachers of high-school students** — designed and delivered presentation in Multistem project, December 2025.
- **Participated in mentorship of summer-intern student** — consulted the parallelization and HPC deployment of photogrammetry software, July–August 2025 (Ruder Boskovic Institute).
- **Pro-bono visual identity work** for Croatian academic and cultural institutions, and also for some writers, musicians and starting businesses (*full list of names available on request*).

LANGUAGES

Croatian — native.

English — professional working proficiency.