



# Alexander Bornik

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## Curriculum Vitae

### Education

- 2001–2007 **Dr. techn. (PhD) Computer Science**, *Graz University of Technology*.  
with distinction
- 1996–2001 **Dipl. Ing. (MSc) Telematik**, *Graz University of Technology*.  
focus on computer graphics and software engineering  
with distinction
- 1988–1996 **Matura**, *Alpen Adria Gymnasium Völkermarkt*.  
with distinction

### PhD Thesis

- Title Virtual Liver Surgery Planning: Virtual Reality based Tools for Radiological Tasks  
Advisors Prof. Dieter Schmalstieg & Prof. Nassir Navab (TU Munich)

### Masters Thesis

- Title Textures from Architectural Image Sequences  
Advisor Prof. Franz Leberl

### Employment

#### Vocational

- 2020–Present **Researcher - Visualisation**, LUDWIG BOLTZMANN INSTITUTE - ARCHAEOLOGICAL PROSPECTION AND VIRTUAL ARCHAEOLOGY IMAGING, Graz.  
Research towards innovative visualisation techniques for the analysis of multimodal archaeological prospection data including but not limited to ground penetrating radar (GPR), magnetics, and 3D laser scans, with the goals increase data understanding to close the gaps between data evidence and archaeological expert interpretations in virtual archaeology.

2014–2019 **Key Researcher - Visualization**, LUDWIG BOLTZMANN INSTITUTE - CLINICAL-FORENSIC IMAGING, Graz.

Development of software tools for forensic case analysis and in-court presentation based on different sources of digital information ranging from digital photographs over surface models to volumetric images from CT, MR, etc.

2009–2013 **Post-Doc**, GRAZ UNIVERSITY OF TECHNOLOGY.

Work on software tools for in the forensic context - see above.

2007–2009 **Post-Doc**, GRAZ UNIVERSITY OF TECHNOLOGY.

Ubiquitous tracking in mixed-reality environments: Development of a library for sensor fusion in the context of the *Presenccia* EU project.

2001–2007 **Research Assistant**, *Graz University of Technology*.

Development of software tools for virtual liver surgery planning, involving research in the area of volume visualization, interactive segmentation refinement, deformable surface models, 3D user interfaces and interaction techniques. Funding was provided by the FWF under grants P14897 and P17066.

### Miscellaneous

1994–2006 **Linux System Administration**.

For various small to mid sized companies.

1994–2001 **Software Development**.

Various software development projects.

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## Awards

2003 1st Eurographics Medical Prize

2017 EuroVis 2017 Best Short Paper Award

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## Programming Languages & Libraries

Advanced C++, more than ten years of experience

OpenGL, more than ten years of experience

CUDA, more than five years of experience

GLSL, more than five years of experience

Intermediate Python, SQL, SML/NJ, Javascript

Basic Java

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## Languages

German native

English fluently, written and spoken

French basic

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## Reviewing Activities

### Scientific Journals

IEEE Computer Graphics Forum

Medical Physics

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International Journal of Human-Computer Studies  
Computer Methods and Programs in Biomedicine  
Forensic Science International

### Conferences

International Symposium on Mixed and Augmented Reality  
EuroVis

## Thesis Supervision

- 2016 Christof Sirk - Dynamic Label Placement in Volumetric Scenes, MSc.
- 2013 Marlene Vukmanic - Transfer Functions and Transfer Function Generation Techniques for Direct Volume Rendering: A Survey, Bakk.
- 2012 Qiang Chen - Interactive CSG Rendering of Polyhedral Bounded Objects, MSc.
- 2011 Wolfgang Knecht - Clustered Deep Shadow Maps for Integrated Polyhedral and Volume Rendering, MSc.

## Interests

- Sports: cycling, skiing, running, windsurfing
- HiFi: High-End & DIY
- Permaculture

## Grants

- 2015 - 2018 **CSISmartScan3D**, *Austrian research promotion agency FFG*, approx. 300.000,-, PI and project lead.  
Research towards an affordable integrated solution for 3D crime scene documentation.

## Publications

### Peer-Reviewed

- [1] Wolfgang Neubauer, Alexander Bornik, Mario Wallner, and Geert Verhoeven. "Novel volume visualisation of GPR data inspired by medical applications". In: *Proceedings of the 13th International Conference on Archaeological Prospection*. Sligo, Ireland, Sept. 2019.
- [2] Alexander Bornik, Martin Urschler, Dieter Schmalstieg, Horst Bischof, Astrid Krauskopf, Thorsten Schwark, Eva Scheurer, and Kathrin Yen. "Integrated computer-aided forensic case analysis, presentation, and documentation based on multimodal 3D data". In: *Forensic Science International* 287 (2018), pp. 12 –24. ISSN: 0379-0738. DOI: <https://doi.org/10.1016/j.forsciint.2018.03.031>. URL: <http://www.sciencedirect.com/science/article/pii/S0379073818301282>.
- [3] Alexander Bornik, Mario Wallner, Alois Hinterleitner, Geert J. Verhoeven, and Wolfgang Neubauer. "Integrated Volume Visualisation of Archaeological Ground Penetrating Radar Data". In: *GCH 2018 - Eurographics Workshop on Graphics and Cultural Heritage, Vienna, Austria, November 12-15, 2018*. Ed. by Robert Sablatnig and Michael Wimmer. Eurographics

Association, 2018, pp. 231–234. DOI: 10.2312/gch.20181368. URL: <https://doi.org/10.2312/gch.20181368>.

- [6] Christof Sirk, Denis Kalkofen, Dieter Schmalstieg, and Alexander Bornik. “Dynamic Label Placement for Forensic Case Visualization”. In: *19th Eurographics Conference on Visualization, EuroVis 2017 - Short Papers, Barcelona, Spain, June 12-16, 2017*. Ed. by Barbora Kozlíková, Tobias Schreck, and Thomas Wischgoll. Eurographics Association, 2017, pp. 139–143. DOI: 10.2312/eurovisshort.20171147. URL: <https://doi.org/10.2312/eurovisshort.20171147>.
- [12] Martin Urschler, Johannes Höller, Alexander Bornik, Tobias Paul, Michael Giretzlehner, Horst Bischof, Kathrin Yen, and Eva Scheurer. “Intuitive presentation of clinical forensic data using anonymous and person-specific 3D reference manikins”. In: *Forensic Science International* 241 (2014), pp. 155–166. ISSN: 18726283. DOI: 10.1016/j.forsciint.2014.05.017.
- [14] Martin Urschler, Alexander Bornik, and Michael Donoser. “Memory Efficient 3D Integral Volumes”. In: *2013 IEEE International Conference on Computer Vision Workshops, ICCV Workshops 2013, Sydney, Australia, December 1-8, 2013*. IEEE Computer Society, 2013, pp. 722–729. DOI: 10.1109/ICCVW.2013.99. URL: <https://doi.org/10.1109/ICCVW.2013.99>.
- [17] Alexander Bornik, Wolfgang Knecht, Markus Hadwiger, and Dieter Schmalstieg. “Clustered Deep Shadow Maps for Integrated Polyhedral and Volume Rendering”. In: ed. by George Bebis, Richard Boyle, Bahram Parvin, Darko Koracin, Charless C. Fowlkes, Sen Wang, Min-Hyung Choi, Stephan Mantler, Jürgen P. Schulze, Daniel Acevedo, Klaus Mueller, and Michael E. Papka. Vol. 7431. Lecture Notes in Computer Science. Springer, 2012, pp. 314–325. ISBN: 978-3-642-33178-7. DOI: 10.1007/978-3-642-33179-4. URL: <https://doi.org/10.1007/978-3-642-33179-4>.
- [18] Martin Urschler, Alexander Bornik, Eva Scheurer, Kathrin Yen, Horst Bischof, and Dieter Schmalstieg. “Forensic-Case Analysis: From 3D Imaging to Interactive Visualization”. In: *IEEE Computer Graphics and Applications* 32.4 (2012), pp. 79–87.
- [22] Dieter Schmalstieg, Alexander Bornik, Gernot R. Müller-Putz, and Gert Pfurtscheller. “Gaze-directed ubiquitous interaction using a Brain-Computer Interface”. In: ed. by Hideo Saito, Jean-Marc Seigneur, Guillaume Moreau, and Pranav Mistry. ACM, 2010, p. 4. ISBN: 978-1-60558-825-4.
- [24] Tobias Heimann, Bram van Ginneken, Martin Styner, Yulia Arzhaeva, Volker Aurich, Christian Bauer, Andreas Beck, Christoph Becker, Reinhard Beichel, György Bekes, Fernando Bello, Gerd Karl Binnig, Horst Bischof, Alexander Bornik, Peter Cashman, Ying Chi, Andrés Cordova, Benoit M. Dawant, Márta Fidrich, Jacob D. Furst, Daisuke Furukawa, Lars Grenacher, Joachim Hornegger, Dagmar Kainmüller, Richard Kitney, Hidefumi Kobatake, Hans Lamecker, Thomas Lange, Jeongjin Lee, Brian Lennon, Rui Li, Senhu Li, Hans-Peter Meinzer, Gábor Németh, Daniela Stan Raicu, Anne-Mareike Rau, Eva M. van Rikxoort, Mikaël Rousson, László Ruskó, Kinda Anna Saddi, Günter Schmidt, Dieter Seghers, Akinobu Shimizu, Pieter Slagmolen, Erich Sorantin, Grzegorz Soza, Ruchaneewan Susomboon, Jonathan M. Waite, Andreas Wimmer, and Ivo Wolf. “Comparison and Evaluation of Methods for Liver Segmentation From CT Datasets”. In: *IEEE Trans. Med. Imaging* 28.8 (2009), pp. 1251–1265.

- [25] Bernhard Kainz, Markus Grabner, Alexander Bornik, Stefan Hauswiesner, Judith Muehl, and Dieter Schmalstieg. "Ray casting of multiple volumetric datasets with polyhedral boundaries on manycore GPUs". In: *ACM Trans. Graph.* 28.5 (2009).
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- [27] Judith Mühl, Bernhard Kainz, Alexander Bornik, Markus Grabner, Stefan Hauswiesner, and Dieter Schmalstieg. "The Future of Volume Graphics in Medical Virtual Reality". English. In: *IFMBE Proceedings.* ., 2009, pp. 1349–1352.
- [29] Martin Urschler, E. Scheurer, Alexander Bornik, Thomas Pock, and Horst Bischof. "Interactive 3D segmentation as an example for medical visual computing". English. In: *VGI - Österreichische Zeitschrift für Vermessung und Geoinformation* 97.3 (2009), pp. 311–318. ISSN: 1605-1653.
- [30] Reinhard Beichel, Christian Bauer, Alexander Bornik, Erich Sorantin, and Horst Bischof. "Liver Segmentation in CT data: A Segmentation Refinement Approach". In: *MICCAI 2007 Workshop: 3D Segmentation in the Clinic: a grand challenge.* Lecture Notes on Computer Science. Springer, 2007.
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- [57] Alexander Bornik and Andrej Ferko. "Texture Minification using Quad-trees and Fipmaps". In: *23rd Annual Conference of the European Association for Computer Graphics, Eurographics 2002 - Short Presentations, Saarbrücken, Germany, September 2-6, 2002*. Ed. by Isabel Navazo and Philipp Slusallek. Eurographics Association, 2002. DOI: 10.2312/egs.20021013. URL: <https://doi.org/10.2312/egs.20021013>.
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### Others

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- [5] Johannes Höller, Fabian Schenk, Martin Urschler, Friedrich Fraundorfer, and Alexander Bornik. "CSISmartScan3D - Cost-efficient Integrated 3D Crime Scene Documentation". English. In: 10th International Symposium on Advances in Legal Medicine (ISALM) ; Conference date: 11-09-2017 Through 15-09-2017. Sept. 2017.
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