

Curriculum Vitae

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DI. Dr. techn. Clemens Arth



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Personal Data

Born	November 22, 1979, Fuerstenfeld, Austria
Citizenship	Austria
Marital status	Married, one child
Driver License	A,B,C,E

Education

05/2014	TUG Seminar "Businessplanning"
02/2014	TUG Seminar "Leadership"
01/2014	TUG Seminar "Time Management"
09/2013	Civil Engineering Course and Application Exam
02/2012	TUG Seminar "Financial Management of Funded Research Projects"
12/2012	TUG Seminar "Patents"

11/2012	TUG Seminar "Research Funding by Local Agencies"
02/2008	Promotion (Dr. techn.)
2005 - 03/2008	Graz University of Technology , Engineering Sciences (Doctoral study), Institute for Computer Graphics and Vision , Thesis title: <i>Visual Surveillance on DSP-Based Embedded Platforms</i> , Thesis supervisor: Prof. Dr. Horst Bischof.
2003 - 09/2004	Graz University of Technology , Telematics (Master study), Institute for Computer Graphics and Vision , Thesis title: <i>Vehicle Classification using the ADA-Boost algorithm</i> , Thesis supervisor: Prof. Dr. Horst Bischof, with distinction.
1998 - 2003	Graz University of Technology , Telematics (Bachelor study).
1989 - 1997	BG/BRG Fuerstenfeld (high school).
1985 - 1989	Volksschule (primary school).

Employment

11/2015 - current	CEO of AR4 GmbH, Graz
06/2014 - 10/2015	Deputy Director of the Christian Doppler Laboratory for Handheld Augmented Reality (in cooperation with QUALCOMM Inc.)
10/2008 - 05/2014	Senior Researcher in the Christian Doppler Laboratory for Handheld Augmented Reality (in cooperation with QUALCOMM Inc.)
04/2008 - 10/2008	Institute for Computer Graphics and Vision at Graz University of Technology as research assistant in the field of Augmented Reality (in cooperation with IMAGINATION GmbH)
07/2007 - 03/2008	engineering as freelancer by ZYDACRON GmbH
01/2005 - 03/2008	Institute for Computer Graphics and Vision at Graz University of Technology (computer science, PhD thesis)
10/2004 - 12/2004	engineering as freelancer by FREQUENTIS GmbH
1999 - 2003	engineering as freelancer by Messphysik GmbH. Altenmarkt/Fuerstenfeld, Material Testings
10/1997 - 09/1998	military service (officer-in-training)

Military Career

11/2011	military driver license (B and C)
11/2007	promotion to "Oberleutnant" (equiv. lieutenant first class)
04/2004	promotion to "Leutnant" (equiv. lieutenant)

07/2002 - 02/2004	participation in several seminars, courses and exercises
10/1998	promotion to "Wachtmeister" (equiv. sergeant)
10/1997 - 09/1998	officer-in-training (Leibnitz), ammunition and fuels supply (HVS Wien)

Languages

German	native
English	fluently

Talks, Presentations and Workshops at International Conferences

2015	International Symposium on Mixed and Augmented Reality (ISMAR), Fukuoka, Japan
2012	International Conference on Pattern Recognition (ICPR), Tsukuba, Japan Asian Conference on Computer Vision (ACCV), Daejeon, Korea
2011	International Symposium on Mixed and Augmented Reality (ISMAR), Basel, Schweiz
2010	International Symposium on Mixed and Augmented Reality (ISMAR), Seoul, Korea
2009	International Symposium on Mixed and Augmented Reality (ISMAR), Orlando, USA
2007	IEEE International Conference on Distributed Smart Cameras (ICDSC), Vienna, Austria
2006	2nd Workshop on Embedded Computer Vision , IEEE International Conference on Computer Vision and Pattern Recognition (CVPR), New York, USA

Awards

Best-Paper-Award	IEEE Int. Symposium on Mixed and Augmented Reality, 2015, Fukuoka, Japan
Best-Paper-Award	3. Workshop on Embedded Computer Vision , IEEE International Conference on Computer Vision and Pattern Recognition, Minneapolis, USA, 2007

Best-Paper-Award	12. Computer Vision Winter Workshop (CVWW07), Feb. 2007
BMVIT 2006	Best Diploma Thesis and PhD Thesis Awards

Prior Venue Organization and Reviewing Work (excerpt only)

Organizer	Global-Scale Localization in Outdoor Environments for AR, Fukuoka, Japan, September 29, 2015
Organizer	Taking AR to the next level - CDL Workshop on Tracking Technology for AR, Graz, Austria, September 15-17, 2014
Organizer	Workshop on AR Supermodels, ISMAR 2011, Seoul, Korea
Reviewer	IEEE Virtual Reality Conference (since 2013)
Reviewer	Transactions on Visualization and Computer Graphics (since 2012)
Reviewer	Int. Conference on Advances in Computer Entertainment Technology (ACE) (since 2011)
Reviewer	International Symposium on Mixed and Augmented Reality (ISMAR) (since 2009)
Reviewer	Symposium on Virtual Reality Software and Technology (VRST) (since 2012)
Reviewer	IEEE Pervasive Computing (since 2011)
Reviewer	Journal on Virtual Reality (VR) (since 2012)
Reviewer	Springer Real-Time Image Processing Journal (since 2013)
Reviewer	Elsevier Pattern Recognition Journal (since 2013)
Reviewer	Int. Conference on Pattern Recognition (ICPR) (since 2012)
Reviewer	Intelligent Solutions in Embedded Systems (WISES) (since 2012)
Reviewer	Computers and Graphics (since 2012)
Reviewer	Springer International Journal of Machine Learning and Cybernetics (since 2011)
Reviewer	Transactions of Intelligent Transport Systems (since 2008)

Patent Applications

US Patent 8,965,057	Scene Structure based self-pose estimation Clemens Arth, Gerhard Reitmayr, Dieter Schmalstieg, QUALCOMM Inc., San Diego, USA
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US Patent App. 14/139,856	Wide-area Localization from SLAM Maps Dieter Schmalstieg, Clemens Arth, Jonathan Ventura, Christian Pirchheim, Gerhard Reitmayr, QUALCOMM Inc., San Diego, USA
US Patent App. 13/417,976	Real-Time Self-Localization from Panoramic Images Clemens Arth, Manfred Klopschitz, Gerhard Reitmayr, Dieter Schmalstieg, QUALCOMM Inc., San Diego, USA
US Patent App. 13/719,012	Sensor-Aided Wide-Area Localization on Mobile Devices Clemens Arth, Alessandro Mulloni, Gerhard Reitmayr, Dieter Schmalstieg, QUALCOMM Inc., San Diego, USA
US Patent App. 61/815,594	A Method for real-time wiping and replacement of objects Georg Reinisch, Clemens Arth, QUALCOMM Inc., San Diego, USA

Publications

- [1] A.D. Hartl, C. Arth, J. Grubert, and D. Schmalstieg. Efficient verification of holograms using mobile augmented reality. *Visualization and Computer Graphics, IEEE Transactions on*, PP(99):1–1, 2015.
- [2] Clemens Arth, Christian Pirchheim, Jonathan Ventura, Dieter Schmalstieg, and Vincent Lepetit. Instant outdoor localization and SLAM initialization from 2.5d maps. *IEEE Trans. Vis. Comput. Graph.*, 21(11):1309–1318, 2015.
- [3] Jonathan Ventura, Clemens Arth, and Vincent Lepetit. An Efficient Minimal Solution for Multi-Camera Motion. In *IEEE Int. Conference on Computer Vision (ICCV)*, page to appear, 2015.
- [4] Christian Poglitsch, Clemens Arth, Dieter Schmalstieg, and Jonathan Ventura. A Particle Filter Approach to Outdoor Localization using Image-based Rendering. In *Int. Symposium on Mixed and Augmented Reality (ISMAR)*, pages 132–135, 2015.
- [5] Philipp Fleck, Clemens Arth, Christian Pirchheim, and Dieter Schmalstieg. Tracking and Mapping with a Swarm of Heterogeneous Clients. In *Int. Symposium on Mixed and Augmented Reality (ISMAR)*, pages 136–139, 2015.
- [6] Clemens Arth, Raphael Grasset, Lukas Gruber, Tobias Langlotz, Alessandro Mulloni, and Daniel Wagner. The History of Mobile AR. Technical Report 2015-001, Institute for Computer Graphics and Vision (ICG), Graz University of Technology, April 2015, [arXiv:1505.01319 \[cs.HC\]](https://arxiv.org/abs/1505.01319).

- [7] Clemens Arth, Christian Pirchheim, Jonathan Ventura, and Vincent Lepetit. Global 6DOF Pose Estimation from Untextured 2D City Models, February 2015, [arXiv:1503.02675 \[cs.CV\]](#).
- [8] Andreas Hartl, Alexander Isop, Clemens Arth, and Dieter Schmalstieg. Towards mobile recognition and verification of holograms using orthogonal sampling. In *International Workshop on Visual Recognition and Retrieval for Mixed and Augmented Reality (VRRMAR), held in conjunction with ISMAR*, page to appear, 2015.
- [9] Andreas Hartl, Clemens Arth, and Dieter Schmalstieg. Real-time detection and recognition of machine-readable zones with mobile devices. In *International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP)*, 2015.
- [10] Andreas Hartl, Jens Grubert, Christian Reinbacher, Clemens Arth, and Dieter Schmalstieg. Mobile user interfaces for efficient verification of holograms. In *IEEE Virtual Reality Conference (VR)*, 2015.
- [11] Andreas Hartl, Clemens Arth, and Dieter Schmalstieg. AR-based Hologram Detection on Security Documents using a Mobile Phone. In *International Symposium on Visual Computing*, 2014.
- [12] Jonathan Ventura, Clemens Arth, and Vincent Lepetit. Approximated relative pose solvers for efficient camera motion estimation. In *Workshop on Computer Vision in Vehicle Technology, held in conjunction with ECCV*, 2014.
- [13] Jonathan Ventura, Clemens Arth, Gerhard Reitmayr, and Dieter Schmalstieg. A minimal solution to the generalized pose-and-scale problem. In *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2014.
- [14] Jonathan Ventura, Clemens Arth, Gerhard Reitmayr, and Dieter Schmalstieg. Global localization from monocular slam on a mobile phone. In *IEEE Virtual Reality Conference (VR)*, 2014.
- [15] Georg Reinisch and Clemens Arth. Panoramic mapping on mobile phone gpus. In *Proceedings of CESC G 2013: The 17th Central European Seminar on Computer Graphics (non-peer-reviewed)*, 2013.
- [16] Georg Reinisch, Clemens Arth, and Dieter Schmalstieg. Panoramic mapping on a mobile phone gpu. In *Int. Symposium on Mixed and Augmented Reality (ISMAR)*, 2013.
- [17] Clemens Arth, Jonathan Ventura, and Dieter Schmalstieg. Geospatial management and utilization of large-scale urban visual reconstructions. In *The 4th International Conference on Computing for Geospatial Research & Application (COM.Geo 2013)*, 2013.

- [18] Clemens Arth, Alessandro Mulloni, and Dieter Schmalstieg. Exploiting Sensors on Mobile Phones to Improve Wide-Area Localization. In *Int. Conference on Pattern Recognition (ICPR)*, 2012.
- [19] Clemens Arth, Gerhard Reitmayr, and Dieter Schmalstieg. Full 6DOF Pose Estimation from Geo-Located Images. In *Asian Conference on Computer Vision (ACCV)*, 2012.
- [20] Andreas Hartl, Clemens Arth, and Dieter Schmalstieg. Instant Medical Pill Recognition on Mobile Phones. In *IASTED Int. Conference on Computer Vision*, pages 188–195, 2011.
- [21] Andreas Hartl, Lukas Gruber, Clemens Arth, Stefan Hauswiesner, and Dieter Schmalstieg. Rapid Reconstruction of Small Objects on Mobile Phones. In *Proceedings of the 7rd Workshop on Embedded Computer Vision , IEEE International Conference on Computer Vision and Pattern Recognition*, pages 20–27, 2011.
- [22] Qi Pan, Clemens Arth, Edward Rosten, Gerhard Reitmayr, and Tom Drummond. Rapid Scene Reconstruction on Mobile Phones from Panoramic Images. In *Int. Symposium on Mixed and Augmented Reality (ISMAR)*, pages 55–64, Washington, DC, USA, 2011. IEEE Computer Society.
- [23] Clemens Arth and Dieter Schmalstieg. Challenges of Large-Scale Augmented Reality on Smartphones. In *Workshop on Enabling Large-Scale Outdoor Mixed Reality and Augmented Reality, held in conjunction with ISMAR*, 2011.
- [24] Clemens Arth, Manfred Klopschitz, Gerhard Reitmayr, and Dieter Schmalstieg. Real-Time Self-Localization from Panoramic Images on Mobile Devices. In *Int. Symposium on Mixed and Augmented Reality (ISMAR)*, pages 37–46, 2011.
- [25] Andreas Hartl, Clemens Arth, and Dieter Schmalstieg. Instant Segmentation and Feature Extraction for Recognition of Simple Objects on Mobile Phones. In *Proceedings of the IEEE International Workshop on Mobile Vision (IWMV) , IEEE International Conference on Computer Vision and Pattern Recognition*, 2010.
- [26] Clemens Arth, Daniel Wagner, Manfred Klopschitz, Arnold Irschara, and Dieter Schmalstieg. Wide Area Localization on Mobile Phones. In *Int. Symposium on Mixed and Augmented Reality (ISMAR)*, pages 73–82, 2009.
- [27] Clemens Arth, Christian Leistner, and Horst Bischof. *Embedded Computer Vision*, chapter 4 (Using Robust Local Features on DSP-based Embedded Systems), pages (79–100). Springer, 2008.
- [28] Clemens Arth and Horst Bischof. Real-Time Object Recognition using Local Features on a DSP-based Embedded System. *Journal of Real-Time Image Processing (RTIP)*, 2:233–253, 2008.

- [29] Clemens Arth. *Visual Surveillance on DSP-Based Embedded Platforms*. PhD thesis, Institute for Computer Graphics and Vision, Graz Technical University, Austria, March 2008.
- [30] Michael Donoser, Clemens Arth, and Horst Bischof. Detecting, Tracking and Recognizing License Plates. In *Asian Conference on Computer Vision (ACCV)*, volume II, pages 447–456, November 2007.
- [31] Clemens Arth, Christian Leistner, and Horst Bischof. Object Reacquisition and Tracking in Large-Scale Smart Camera Networks. In *Proceedings of the IEEE International Conference on Distributed Smart Cameras*, September 2007.
- [32] Clemens Arth, Christian Leistner, and Horst Bischof. Robust Local Features and their Application in Self-Calibration and Object Recognition on Embedded Systems. In *Proceedings of the 3rd Workshop on Embedded Computer Vision , IEEE International Conference on Computer Vision and Pattern Recognition - BEST PAPER AWARD*, June 2007.
- [33] Clemens Arth, Florian Limberger, and Horst Bischof. Real-Time License Plate Recognition on an Embedded DSP-Platform. In *Proceedings of the 3rd Workshop on Embedded Computer Vision , IEEE International Conference on Computer Vision and Pattern Recognition*, June 2007.
- [34] Martin Winter, Sandra Ober, Clemens Arth, and Horst Bischof. Vocabulary Tree Hypotheses and Co-Occurrences. In *Proceedings of the 12th Computer Vision Winter Workshop (CVWW'07) - BEST PAPER AWARD*, February 2007.
- [35] Clemens Arth, Christian Leistner, and Horst Bischof. TRICam - An Embedded Platform For Remote Traffic Surveillance. In *Proceedings of the 2nd Workshop on Embedded Computer Vision , IEEE International Conference on Computer Vision and Pattern Recognition*, June 2006.
- [36] Morgane Rouxel, Clemens Arth, and Andreas Kroepfl. Real-Time Detection on the TRICam, an Intelligent Camera DSP-based for Efficient Video Surveillance of Remote Locations. In *presented at EDERS (European DSP Education and Research Symposium)*, Texas Instruments, April 2006.
- [37] Clemens Arth. Vehicle Classification using the ADA-Boost Algorithm. Master's thesis, Graz University of Technology, 2004.