

Dana Cobzaş

Biomedical Engineering
University of Alberta
Edmonton, AB T6G 2V2

(office) +780 492 2564
cobzas@ualberta.ca
<https://webdocs.cs.ualberta.ca/~dana>

Education

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|-----|------------------------|----------------------------------|------|
| PhD | Vision and Robotics | University of Alberta, Canada | 2004 |
| MSc | Software Engineering | Babes-Bolyai University, Romania | 1998 |
| BSc | Math and Comp. Science | Babes-Bolyai University, Romania | 1997 |

Research interests

Medical imaging : Working on applications of PDEs and variational methods in medical image segmentation and registration.
Working on subcortical brain segmentation and shape analysis in Multiple Sclerosis and Parkinson disease.
Brought contributions in automatic and semi-automatic brain tumor segmentation and growth prediction from MRI and Diffusion Tensor Images.
Lead project on muscle and fat segmentation from CT images with applications to body mass composition in cancer patients.

Vision : Interested in different aspects of 3D modeling from images.
Investigated variational methods for 3D shape modeling from images and video.
Brought contributions in the fields of multi-view geometry, reflectance models, light models, appearance models.
Developed a novel 3D tracking algorithm in the area of dynamic vision.

Graphics : Researched the capture and use of 3D models from images.

Robotics : Developed new methods for mapping in mobile robotics and predictive display.

Awards

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| IEEE BME Northern Chapter Award (project) | University of Alberta, Canada | 2009 |
| Best Vision Paper Award | IEEE Int. Conf. on Robotics and Autom. | 2005 |
| Best Paper Award | IEEE Vision Interface Conference | 2003 |
| Pacific Inst. of Mathematics (PIMS) PDF | Math. and C.S., Univ. of Alberta | 2006-2008 |
| NSERC PDF | INRIA, Grenoble, France | 2004-2006 |
| Dissertation Scholarship | University of Alberta, Canada | 2003 |
| Ph. D. Research Scholarship | University of Alberta, Canada | 2000-2001 |
| FS Chia PhD Scholarship | University of Alberta, Canada | 1998-2002 |
| Scholarship for graduate studies | Babes-Bolyai University, Romania | 1997-1998 |
| Honor Scholarship for undergraduate studies | Babes-Bolyai University, Romania | 1993-1997 |

Funding

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| NSERC Discovery (individual) | \$19,000 | 2011-2016 |
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Work Experience¹

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| Visiting Researcher <i>Co-instructor for medical image analysis seminar.</i> | Technical University Munich (TUM) | 2013-2014 |
| Research Associate <i>Working on developing MRI image segmentation and shape analysis methods for subcortical brain structures in Multiple Sclerosis and Parkinson disease patients. Supervised one summer student and one graduate student.</i> | Biomedical Eng., U. of Alberta | 2010- |
| Adjunct Assistant Professor Researcher <i>Contributions in two collaborative projects one on brain tumor segmentation and prediction and the other on liver segmentation. Supervising two graduate students. Designed an automatic muscle fat segmentation software for CT images. Supervised a research assistant that implemented the system.</i> | Comp. Science, U. of Alberta Cross Cancer Institute | 2009- 2008-2009 |
| PIMS Postdoctoral Fellow <i>Designed and implemented variational segmentation methods for brain tumor segmentation. Supervised one graduate student in the same project. Supervised a graduate student working in computer vision (wavelet-based light reconstruction from images).</i> | Math. and Comp. Sc., U. of Alberta | 2006-2008 |
| Visiting Researcher <i>Worked on developing view dependent texture from images for a 3D laser-based model acquisition system.</i> | German Space Institute (DLR) | Fall 2006 |
| NSERC Postdoctoral Fellow <i>Designed and implemented a variational method for 3D shape and appearance reconstruction from images.</i> | INRIA Rhone-Alpes, France | 2004-2006 |
| Teaching Assistant | University of Alberta | 1998-2002 |
| Research Assistant (Robotics and Vision) | University of Alberta | 1999-2003 |
| Research Assistant (Industrial project, Syncrude) | University of Alberta | 2002 |

Teaching and Mentoring**Teaching training**

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| University Teaching Program (UTS) <i>20 formal lectures on pedagogy combined with supervised in-class practicum in regular UofA courses.</i> | University of Alberta | 1998-2003 |
| Course in pedagogy <i>Course on theoretical pedagogy combined with practical teaching of lectures for high school students.</i> | Babes-Bolyai Univ., Romania | 1996 |

Teaching activities

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| Co-instructor (taught 1/2 semester) CMPUT613: Math. Methods in Imaging and Vision <i>Designed and delivered lectures and one exam.</i> | University of Alberta | 2008,2009,2011 |
| Co-instructor (8 lectures on 3D Modeling from Images) CMPUT615: 3-Dimensional Computer Vision <i>Designed and delivered lectures and one exam.</i> | | 2006 |
| Teaching assistant for 7 semesters CMPUT306: Image Processing, CMPUT414: Multimedia | University of Alberta | 1998-2002 |

¹I was on maternity leave April 2009 - April 2010 and March 2012 - March 2013

Student co-supervisor at University of Alberta

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| KartEEK Popuri | PhD student <i>FEM-based medical images segmentation and registration methods</i> | 2008-2013 |
| Neil Birkbeck | Outstanding PhD Thesis Award <i>Vision-based modeling of dynamic appearance and deformation of human actors</i> | 2006-2011 |
| Matt Gallivan | summer undergrad <i>Ventricle shape analysis in PD</i> | 2011 |
| Parisa Mosayebi | Outstanding MSc Thesis Award <i>Tumour growth prediction from DW-MRI</i> | 2007-2010 |
| Howard Chung | summer undergrad <i>Muscle/fat segmentation in CT images</i> | 2008 |
| Cameron Upright | MSc student <i>Recovering light using a wavelet basis</i> | 2005-2009 |
| KartEEK Popuri | MSc student <i>Variational brain tumour segmentation</i> | 2005-2009 |
| Adviser for undergraduate students | Syncrude lab. | 2002-2003 |

Invited Talks

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| Technical University München | Random walks for deformable image registration | 12/2013 |
| FIELDS conference, Toronto | Random walks for deformable image registration | 06/2011 |
| CMS meeting, Edmonton | A geodesic distance predicts tumor invasion margin | 05/2011 |
| SFU, Vancouver | A semi-automatic segmentation tool | 08/2008 |
| ETH Zürich, Switzerland | Variational brain tumor segmentation | 05/2007 |
| Technical University München | Variational brain tumor segmentation | 01/2007 |
| CNR-ISTI Pisa, Italy | 3D Tracking and modeling | 05/2007 |
| Malmö University, Sweden | An automatic 3D image-based capture system | 06/2006 |
| Lund University, Sweden | 3D SSD tracking | 06/2006 |
| Babes-Bolyai Univ., Romania | Variational methods for surface modeling | 05/2006 |
| INRIA Rhone-Alpes, France | Image based modeling with dynamic textures | 02/2004 |
| IEEE Virtual Reality 2003 Tut. | An introduction to multi-view geometries | 03/2003 |

Professional Activities**Workshop organizer**

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| BIRS Workshop Math. Methods in Computer Vision (5 days) | 10/2006 |
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Conf. program committee

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| Canadian Conf. on Computer and Robot Vision (CRV) | 2007- |
| IEEE/RSJ Intelligent Robots and Systems (IROS) | 2005-2006 |
| 3-D Digital Imaging and Modeling (3DIM) | 2007 |

Journal reviewing

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| IEEE Trans. on Medical Imaging (TMI) |
| IEEE Trans. on Biomedical Engineering (TBME) |
| IEEE Trans. on Pattern Analysis and Machine Intelligence (PAMI) |
| Computer Vision and Image Understanding (CVIU) |
| Image and Vision Computing (IVC) |

D. Cobzaş

IEEE Trans. on Image Processing

IEEE Trans. on Robotics (T-RO)

Conference reviewing

Medical Image Computing and Computer Assisted Intervention (MICCAI)

IEEE International Symposium on Biomedical Imaging (ISBI)

IEEE Conference on Computer Vision and Pattern Recognition (CVPR)

Canadian Conf. on Computer and Robot Vision (CRV)

IEEE Int. Conf. on Robotics and Automation (ICRA)

IEEE/RSJ Intelligent Robots and Systems (IROS)

Graphics Interface (GI)

3-D Digital Imaging and Modeling (3DIM)

Other

Organizer of reading group on “Medical image processing” 2007-2014

Organizer of reading group on “Variational methods” 2006

Organizer for research demos ECCV04, ICML04, CRV 04, AAAI 02

Student volunteer organizer for IEEE CIRA 01.

Student volunteer for 3DIM 04, AAAI 02

Vice-president of CS Graduate Student Association (CSGSA) 2001

*an organization representing the graduate students in department
and university councils as well as serving practical student needs.*

Languages

Romanian (native), English (fluent), French (basic)

Summary of Contributions and Impact

- Authored or co-authored over 40 full length papers in major computer vision and graphics conferences ICCV(2011), CVPR (2009), ECCV (2006,2002), Eurographics (2002), IEEE VR (2003), major medical imaging venues Medical Image Analysis (2011), MICCAI (2013,2011,2009), MMBIA (2010,2007) and major robotics conferences ICRA (2005,2003,2002), IROS (2001).
- Three paper prizes: the ICRA 2005 best vision paper award among 1700 submissions worldwide and the Vision Interface 2003 best student paper award among 64 submissions. The MICCAI 2009 work received the IEEE BME Northern Chapter Award.
- One of my PhD students Neil Birkbeck and one of my master students MSc students, Parisa Mosayebi received the Outstanding Thesis Award.
- I was the only scientist from University of Alberta invited to give a talk at the FIELDS-Mitacs Conference on Mathematics of Medical Imaging 2011. I have given 6 invited talks at major European and American universities (ETH Zurich, Technical University Munchen, Malmo University, Lund University, CNR-ISTI Pisa, SFU).
- I was part of the organizing committee for the BIRS Workshop on Mathematical Methods in Computer Vision (2006)

Publications (Trainee co-authors bolded)

Publication rationale: For timely publication of results we focus on conferences which in our field are fully reviewed and allow article sizes on par with journals, e.g. 8 (ICCV/CVPR/MICCAI/MMBIA) to 15 (ECCV) proceedings pages. The top computer vision conferences (ICCV, ECCV, CVPR and MICCAI for medical imaging) are highly competitive with low acceptance rates below 30% and have CiteSeer impact factor rankings in the top 5% and 7%, respectively, of all computer science journals and conferences.

Current submissions

- [1] Cobzas, D., Sun, H., Walsh, A.J., Lebel, R.M., Blevins, G. and Wilman A.H. “Value of voxel-based analysis of subcortical grey matter using transverse relaxation and quantitative susceptibility mapping with application to multiple sclerosis”, *Journal of Magnetic Resonance Imaging*, submission, 13 pages
- [2] **Popuri, K.**, Cobzas, D., Jägersand M., “Random walker based discrete deformable registration”, *IEEE Transactions on Medical Imaging*, submission, 10 pages
- [3] **Popuri, K.**, Cobzas, D., Esfandiari, N., Baracos, V., Jägersand M., “FEM-based Automatic Segmentation of Muscle and Fat Tissues from CT Images”, *IEEE Transactions of Biomedical Engineering* , submission, 8 pages
- [4] **Chung, H.**, Cobzas, D., Lieffers, J., Birdsell, L. and Baracos, V. “Human body composition in relation to outcomes of malignant disease: Automated segmentation of muscle and adipose tissue on computed tomography images ”, *Clinical Cancer Research* submission, 20 pages

Refereed journals

- [5] Rudyanto, Rina D. et al. “Comparing algorithms for automated vessel segmentation in computed tomography scans of the lung: The VESSEL12 study”, *Medical Image Analysis*, July 2014
- [6] **Mosayebi, P.**, Cobzas, D., Murtha, A., and Jagersand, M. “Tumor Invasion Margin on the Riemannian Space of Brain Fibers” , *Medical Image Analysis*, 2011

- [7] **Popuri, K.**, Cobzas, D., Jägersand, M. and, Murtha, A. “3D variational brain tumor segmentation using Dirichlet priors on a clustered feature set”, *International Journal of Computer Assisted Radiology and Surgery*, August 2011
- [8] Cobzas, D., Jägersand, M. and P. Sturm “3D SSD Tracking with Estimated 3D Planes”, *Journal of Image and Vision Computing*, 27:69-79, 2009
- [9] Cobzas, D., Jägersand, M. and Zhang, H. “A Panoramic Model for Remote Robot Environment Mapping and Predictive Display”, *International Journal of Robotics and Automation* , 20(1):25-34, 2005
- [10] Cobzas, D., Yerex, K. and Jagersand, M., “Dynamic Textures for Image-Based Rendering of Fine-Scale 3D Structure and Animation of Non-Rigid Motion”, *International Journal of the Eurographics Association*, 21(3):493-502,2002

Journal equivalent conferences - full archival papers 6-15 pages

- [11] **Popuri K.**, Cobzas D. and Jagersand M. “A variational formulation for discrete registration” *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2013*
- [12] Cobzas, D. and Sen, A. “Random Walks For Deformable Image Registration”, *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2011*, pp 557-565
- [13] **Birkbeck, N.**, Jagersand, M. and Cobzas D. “Basis constrained 3D scene flow on a dynamic proxy”, *International Conference on Computer Vision (ICCV) 2011*, 8 pages
- [14] Cobzas D., **Mosayebi P.**, Murtha A. and Jagersand M. “Tumor invasion margin on the Riemannian space of brain fibers” *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) 2009*, 8 pages, **Received IEEE BME Northern Chapter Award**
- [15] Cobzas, D. and Schmidt, M. “A Conditional Active Region Model for Image Segmentation”, *IEEE Computer Vision and Pattern Recognition (CVPR) 2009*, 7 pages
- [16] Birkbeck, N., Cobzas, D., Sturm, P., Jägersand, M. “Variational Shape and Reflectance Estimation under Changing Light and Viewpoints”, *European Conference on Computer Vision (ECCV) 2006*. Also in *LNCS*, Springer 3951: 536-549
- [17] Cobzas, D. and Jägersand, M., “Tracking and Rendering using Dynamic Textures and Geometric Structure from Motion”, In *Proc. of European Conference on Computer Vision (ECCV) 2002*. Also in *LNCS*, Springer 2352:415-432

Book chapters

- [18] Cobzas,D., **Upright, C.**, Jagersand, M. “Wavelet-Based Inverse Light and Reflectance from Images”, chapter in *Image and Geometry Processing for 3D Cinematography* , Ronfard, R. and Taubin, T. editors, Springer-Verlag 2010
- [19] Jagersand, M., **Birkbeck, N.** and Cobzas, D. “View-Dependent Texturing using Linear Basis”, chapter in *Image and Geometry Processing for 3D Cinematography* , Ronfard, R. and Taubin, T. editors, Springer-Verlag 2010

Refereed conferences - full archival papers 6-15 pages

- [19] Kiros R., **Popuri K.**, Cobzas D. and Jagersand M. “Stacked Multiscale Feature Learning for Domain Independent Medical Image Segmentation”, *Machine Learning in Medical Imaging (MLMI) at MICCAI 2014*, 8 pages
- [20] **Popuri K.**, Cobzas D. and Jagersand M. “A Fem Deformable Mesh for Active Region Segmentation”, *IEEE International Symposium on Biomedical Imaging (ISBI) 2013*, 4 pages
- [21] **Popuri K.**, Cobzas D., Jagersand M., Esfandiari N. and Baracos V. “Fem-Based Automatic Segmentation of Muscle and Fat Tissues from Thoracic Ct Images”, *IEEE International Symposium on Biomedical Imaging (ISBI) 2013*, 4 pages
- [22] **Mosayebi P.**, Cobzas D., Jagersand M. and Murtha A. “Stability effects of finite difference methods on a mathematical tumor growth model”, *Mathematical Methods in Biomedical Image Analysis (MMBIA) 2010*, in conjunction with CVPR, 8 pages
- [23] **Popuri, K.**, Cobzas D. and Jagersand, M. “Fast FEM-based non-rigid registration”, *Canadian Conference on Computer and Robot Vision (CRV) 2010*, 8 pages
- [24] **Birkbeck, N.**, Cobzas D. and Jagersand, M. “Monocular depth and scene flow under constant velocity”, *International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT) 2010*, 8 pages
- [25] Lovi, D., **Birkbeck, N.**, Jagersand, M. and Cobzas D. “Incremental Free-Space Carving for Real-Time 3D Reconstruction”, *International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT) 2010*, 8 pages
- [26] **Birkbeck, N.**, Cobzas D., Jagersand, M., Murtha A. and Kesztyues, T. “An Interactive Graph Cut Method for Brain Tumor Segmentation”, *IEEE Workshop on Applications of Computer Vision (WACV) 2009*, pp 531-539
- [27] **Birkbeck, N.**, Jagersand, M., Cobzas, D. “Tracking human joint motion for turntable-based static model reconstruction”, *International Conference on 3-D Digital Imaging and Modeling (3DIM) 2009*, 8 pages
- [28] **Chung, H.**, Cobzas, D., Lieffers, J., Birdsell, L. and Baracos, V. “Automated segmentation of muscle and adipose tissue on CT images for human body composition analysis”, *SPIE Medical Imaging 2009*, 8 pages
- [29] **Popuri, K.**, Cobzas, D., Jagersand, M., Shah, S.L., Murtha, A. “Variational brain tumor segmentation on a clustered feature set”, *SPIE Medical Imaging 2009*, 8 pages
- [30] Rachmielowski, A., **Birkbeck, N.**, Jagersand, M., Cobzas, D., “Realtime visualization of monocular data for 3D reconstruction” , *Canadian Conference on Computer and Robot Vision (CRV) 2008*, pp 196-202
- [31] Jagersand, M., **Birkbeck, N.**, Cobzas, D. “A Three-tier Hierarchical Model for Capturing and Rendering of 3D Geometry and Appearance from 2D Images”, *Fourth International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT) 2008* , pp 269-276
- [32] **Upright, C.**, Cobzas, D., Jagersand, M. “Smooth and non-smooth wavelet basis for capturing and representing light”, *Fourth International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT) 2008*, pp 276 - 284
- [33] Cobzas, D., **Birkbeck, N.**, Schmidt, M., Jagersand, M and Murtha, A. “ 3D Variational Brain Tumor Segmentation using a High Dimensional Feature Set”, *Mathematical Methods in Biomedical Image Analysis (MMBIA 2007)*, in conjunction with ICCV, CDROM 8 pages
- [34] **Upright, C.**, Cobzas, D., Jagersand, M. “Wavelet-based Light Reconstruction from a Single Image”, *Canadian Conference on Computer and Robot Vision (CRV) 2007*, 8 pages

- [35] **Birkbeck, N.**, Cobzas, D., Jägersand, M. “Object centered stereo: displacement map estimation using texture and shading”, *Third International Symposium on 3D Data Processing, Visualization and Transmission (3DPVT) 2006*, CDROM 8pages
- [36] Rachmielowski, A., Cobzas, D. and Jägersand, M. “Robust SSD tracking with incremental 3D structure estimation”, *3rd Canadian Conference on Computer and Robot Vision (CRV) 2006*, pp. 12-20
- [37] Cobzas, D. and Sturm, P., “3D SSD Tracking with Estimated 3D Planes”, *2nd Canadian Conference on Computer and Robot Vision (CRV) 2005*, pp129-134
- [38] Cobzas, D. and Jägersand M., “Tracking and Predictive Display for a Remote Operated Robot using Uncalibrated Video”, *IEEE International Conference on Robotics and Automation (ICRA) 2005*, pp1859-1864, **Received IEEE ICRA best vision paper award among 1700 submissions worldwide**
- [39] Cobzas, D. and Jägersand M., “3D SSD Tracking from Uncalibrated Video”, *Workshop on Spatial Coherence for Visual Motion Analysis (SCVMA) 2004*, in conjunction with *ECCV 2004*, Also in *LNCS*, Springer 3667:25-37
- [40] Cobzas, D. and Jägersand M., “A comparison of Viewing Geometries for Augmented Reality”, *Scandinavian Conference on Image Analysis (SCIA) 2003*. Also in *LNCS*, Springer 2749:501-508
- [41] Cobzas, D., Jägersand, M. and Zhang, H., “A Panoramic Model for Robot Predictive Display”, *Vision Interface 2003*, pp111-118, **Received best student paper award among 64 submissions**
- [42] Cobzas, D., Zhang, H. and Jägersand, M., “Image-Based Localization with Depth-Enhanced Image Map”, *IEEE Conference on Robotics and Automation (ICRA) 2003*, pp1570-1575
- [43] Yerex, K., Cobzas, D. and Jägersand, M., “ Predictive Display Models for Tele-Manipulation from Uncalibrated Camera-capture of Scene Geometry and Appearance”, *IEEE Conference on Robotics and Automation (ICRA) 2003*, pp2812-2817
- [44] Cobzas, D. and Jägersand, M., “An Introduction to Multi-view Geometries and Structure-from-Motion”, chapter in *Recent Methods for Image-based Modeling and Rendering*, Tutorial 1 at *IEEE Virtual Reality 2003*, pp19-35
- [45] Cobzas, D., Zhang, H. and Jägersand, M., “ A Comparative Analysis of Geometric and Image-Based 3D-2D Registration Algorithms”, In *Proc. IEEE Conference on Robotics and Automation (ICRA) 2002*, pp2506-2511
- [46] Cobzas, D. and Zhang, H., “Cylindrical Panoramic Image-Based Model for Robot Localization”, In *Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2001*, pp1924-1930
- [47] Cobzas, D. and Zhang, H., “Mobile Robot Localization using Planar Patches and a Stereo Panoramic Model”, In *Proc. of Vision Interface (VI) 2001*, pp94-99
- [48] Cobzas, D. and Zhang, H., “Planar Patch Extraction with Noisy Depth Data”, In *Proc. of Third International Conference on 3-D Digital Imaging and Modeling (3DIM) 2001*, pp240-245
- [49] Cobzas, D. and Zhang, H., “2D Robot Localization with Image-Based Panoramic Models Using Vertical Line Features”, In *Proc. of Vision Interface (VI) 2000*, pp211-216

Refereed conferences - abstracts, presentations and posters

- [50] Birkbeck,N. , Cobzas, D., Jagersand, M., Rachmielowski, A. and Yerex, K. “Quick and Easy Capture of 3D Object Models from 2D Images”, In *European Conference on Computer Vision (ECCV) 2006*, 1 page, demo

- [51] Birkbeck,N., Rachmielowski, A., Cobzas, D. and Jagersand, M., “An Image-based Capture System”, In *Graphics Interface (GI) 2006*, 2 pages (poster session)
- [52] Martin Jagersand, Dana Cobzas, Keith Yerex, “Modulating View-dependent Textures”, short presentation *Eurographics 2004*, pp69-72
- [53] Cobzas, D., Yerex, K. and Jagersand, M., “Editing Real World Scenes: Augmented Reality with Image-Based Rendering”, *IEEE Virtual Reality 2003*, 2 pages
- [54] Cobzas, D. and Jagersand, M., “A comparison of Non-Euclidean Image-Based Rendering”, In *Graphics Interface (GI) 2001*, 2 pages (poster session)

Non-refereed publications

- [55] Yerex, K., Cobzas, D. and Jagersand, M., “Image-based Rendering using Hardware Accelerated Dynamic Textures”, In *Proc. of Western Computing Graphics Symposium 2002*, pp113-119
- [56] Cobzas, D. and Zhang, H., “Using Image-Based Panoramic Models for 2D Robot Localization”, In *Proc. of Western Computing Graphics Symposium 2000*, pp1-7

Theses

- [57] Cobzas, D. “Image-Based Models with Applications in Mobile Robotics”, PhD thesis, University of Alberta, 2004
- [58] Cobzas, D. , “Component Design : theory and practice”, MSc thesis, Babes-Bolyai University, Romania, 1998