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RESEARCH INTERESTS	My research involves 3D structure inference and sensing from mobile and wearable devices in a multi-sensor environment, and incorporation of higher-level priors. Another aspect of my work relates to efficient numerical methods for optimization and statistical inference of spatially regularized models, and their use for computer vision problems such as 3D structure and motion understanding, scene interpretation, and medical image analysis.	
APPOINTMENTS	2013 - Postdoctoral researcher, Computer Science and AI Lab, MIT, w/ Prof. Daniela Rus and Sr. Research Scientist John W. Fisher III. Participated in numerous research projects, including 10 peer-reviewed publications in 3D understanding and lifelong processing of visual data.	
EDUCATION	2009 - 2013 Ph.D., Dept. of Comp. Science, Technion, advisor: Prof. Ron Kimmel, "On Natural Parametrizations of Motion and Structure Manifolds", GPA 98.3. 2005 - 2008 M.Sc. cum laude, Dept. of Comp. Science, Technion, advisor: Prof. Ron Kimmel, "Topologically Constrained Isometric Embedding". GPA 95.4. 2000 - 2004 B.Sc. summa cum laude, Dept. of Comp. Science, Technion. Incl. projects in biomedical image analysis and 3D reconstruction. GPA 92.9.	
WORK EXPERIENCE	2010-2011 Algorithm developer, Invision biometrics. Worked on a 3D scanner prototype. Researched and implemented parts of the software interface, 3D acquisition and processing. Company sold to Intel for its 3D scanning technology. 2008-2009 Algorithms developer RAFAEL Advanced Defense Systems. Formulated and implemented computer vision algorithms for products/systems (most of the work is classified). I was given an internal award for a knowledge transfer course for a foreign client's algorithmic team. 2007-2013 Medicvision Imaging Solutions, technical consultant and an algorithm developer in medical imaging in GPU-based systems. Formulated algorithmic solutions from radiologists' feedbacks, guided team members, and implemented some of the algorithms. Accompanied the startup from pre-seed to product sales, incl. multiple patents. 2003-2008 IBM Haifa Research Labs. Researched and implemented image processing, registration, and segmentation for document processing products. Incl. a paper publication in IEEE ICDAR 2007, and a patent. 1997-2000 Regular / mandatory army service, armored corps. Tank commander and instructor. Honorable release as staff sergeant. Released from reserve duty as first sergeant.	
AWARDS	2015 Won with my team 1st place in the MIT IAP autonomous RACECAR competition. 2013, Intel PhD award. 2011, 2012, Faculty excellence scholarships. 2011, Jacobs-Qualcomm scholarship recipient. 2011, 2012, Guided undergrad projects that won two Amdocs projects competitions. 2001-2004 Multiple president's honors during my undergraduate studies.	
SKILLS	Programming Languages - C/C++, Matlab, Python, Java. Frameworks - CUDA, OpenCV, PCL, ROS, OpenGL, Tensorflow, Eclipse.	

ACADEMIC  
ACTIVITIES

Journals reviewer - JMIV, IEEE-TIP, IEEE-TPAMI, IJCV, IEEE-TSP, SIIMS, T-RA.  
 Confereneces reviewer - ECCV, CVPR, ICRA, ACCV, AISTATS, SSVM, and Dagstuhl seminars.  
 Grant reviewer - Binational Science Foundation / NSF.  
 Associate Editor - ICRA 2016.  
 Session chair on CVPR 2016. Session chair on metric geometry, IEEE/Israeli conference 2012.  
 Program committee member and session chair, Scale-Space and Variational Methods 2013.

TEACHING  
EXPERIENCE

2009- Co-advised M.Sc. and Ph.D. students at the Technion and at MIT. Helped formulate research problems and solutions, implemented some of the code  
 2007-2013 TA in charge – Numerical Analysis of Images. Syllabus included mathematical topics and practical applications in image and surface processing. Wrote significant portions of the slide deck (still being used today), wrote and checked the homework, taught 20 students from both graduate school and industry partners. Devised and guided individual research projects, some of which were published as peer-reviewed papers.  
 2006-2013 Advisor, undergraduate research projects, the Geometric Image Processing lab. Devised projects in 3D understanding and computer vision, guided students to build systems.  
 2009 Build and taught a technical course for developers from a foreign client, RAFAEL. Course was awarded a departmental award, which is available and non-classified.  
 1998 Instructed army trainees. Commanded a class of 30 trainees, wrote teaching material, taught lectures, practical work, and exam drills.

PUBLIC  
RECOGNITION /  
MEDIA

2016 Mentored in the MIT Duckietown autonomous vehicles course, presented in the open house. Developed and guided students on the implementation of algorithms in a Python ROS module for computer vision on a raspberry-Pi board.  
 2014-2015 Appeared twice on MIT News with autonomous car project team and paper on mixtures of Manhattan frames.  
 2015 Gave demos to middle-school students on 3D reconstruction at MIT, including principles and applications.  
 2013 Created and presented demonstrations in EU Science Night at the Technion.

# Publications List

Guy Rosman

## Journal Articles

- [1] G. Rosman, J. W. Fisher III, and D. Rus. “Information-Driven Adaptive Structured-Light Scanners”. In: *IEEE Trans. on Computational Imaging* (2016). in preparation.
- [2] G. Rosman, M. V. Volkov, D. Feldman, J. W. Fisher III, and D. Rus. “Coresets for k-Segmentation of Streaming Data”. In: *J. Machine Learning Research* (2016). submitted.
- [3] J. Straub, O. Freifeld, G. Rosman, J. Leonard, and J. W. Fisher III. “The Manhattan Frame Model - Manhattan World Inference in the Space of Surface Normals”. In: *IEEE Trans. Pattern Anal. Mach. Intell.* (2016). accepted.
- [4] A. Dubrovina-Karni, G. Rosman, and R. Kimmel. “Multi-Region Active Contours with a Single Level Set Function”. In: *IEEE Trans. Pattern Anal. Mach. Intell.* 37.8 (2015), pp. 1585–1601.
- [5] G. Rosman, X.-C. Tai, R. Kimmel, and A. M. Bruckstein. “Augmented-Lagrangian regularization of matrix-valued maps”. In: *Methods and Applications of Analysis* 21.1 (2014). special issue, pp. 121–138.
- [6] G. Rosman, A. Dubrovina, and R. Kimmel. “Patch-Collaborative Spectral Point-Cloud Denoising”. In: *Computer Graphics Forum* (2013). ISSN: 1467-8659. DOI: 10.1111/cgf.12139.
- [7] G. Rosman, L. Dascal, X.-C. Tai, and R. Kimmel. “On Semi-implicit Splitting Schemes for the Beltrami Color Image Filtering.” In: *Journal of Mathematics in Imaging and Vision* 40.2 (2011), pp. 199–213.
- [8] G. Rosman, M. M. Bronstein, A. M. Bronstein, and R. Kimmel. “Nonlinear Dimensionality Reduction by Topologically Constrained Isometric Embedding”. In: *International Journal of Computer Vision* 89.1 (2010), pp. 56–68.
- [9] G. Rosman, L. Dascal, R. Kimmel, and A. Sidi. “Efficient Beltrami Image Filtering via Vector Extrapolation Methods”. In: *SIAM J. on Imaging Sciences* 3 (2008), pp. 858–878.

## Peer-reviewed Conference Articles

- [1] C. Baykal, G. Rosman, S. Claici, and D. Rus. “Persistent Surveillance of Events with Unknown, Time-varying Statistics”. In: *ICRA*. accepted. 2017.
- [2] G. Rosman, J. W. Fisher III, and D. Rus. “Probabilistic Model for Collaborative User Interaction Summarization”. In: *CVPR*. submitted. 2017.
- [3] G. Rosman, C. Choi, M. Dogar, J. W. Fisher III, and D. Rus. “Task-specific Sensor Planning for Robotic Assembly Tasks”. In: *RSS*. in preparation. 2017.
- [4] M. Volkov, D. A. Hashimoto, G. Rosman, O. R. Meireles, and D. Rus. “Machine Learning and Coresets for Automated Real-Time Video Segmentation of Laparoscopic and Robot-Assisted Surgery”. In: *ICRA*. accepted. 2017.
- [5] C. Baykal, G. Rosman, K. Kotowick, M. Donahue, and D. Rus. “Persistent Surveillance of Events with Unknown Rate Statistics”. In: *WAFR*. 2016.
- [6] R. Or-El, R. Hershkovitz, A. Wetzler, G. Rosman, A. M. Bruckstein, and R. Kimmel. “Real-Time Depth Refinement for Specular Objects”. In: *CVPR*. 2016.
- [7] G. Rosman, J. W. Fisher III, and D. Rus. “Information-Driven Adaptive Structured-Light Scanners”. In: *CVPR*. 2016.

- [8] M. Volkov, D. A. Hashimoto, G. Rosman, O. R. Meireles, and D. Rus. “Machine Learning and Coresets for Automated, Real-Time Video Segmentation of Laparoscopic Surgery”. In: *SAGES*. Boston, Massachusetts, 2016.
- [9] R. Or-El, G. Rosman, A. Wetzler, R. Kimmel, and A. M. Bruckstein. “RGBD-fusion: Real-time high precision depth recovery”. In: *CVPR*. 2015, pp. 5407–5416.
- [10] M. V. Volkov, G. Rosman, D. Feldman, J. W. Fisher III, and D. Rus. “Coresets for visual summarization with applications to loop closure”. In: *ICRA*. 2015, pp. 3638–3645.
- [11] R. Cabezas, O. Freifeld, G. Rosman, and J. W. Fisher III. “Aerial Reconstructions via Probabilistic Data Fusion”. In: *CVPR*. 2014, pp. 4010–4017.
- [12] G. Rosman, M. V. Volkov, D. Feldman, J. W. Fisher III, and D. Rus. “Coresets for k-Segmentation of Streaming Data”. In: *NIPS*. 2014, pp. 559–567.
- [13] J. Straub, G. Rosman, O. Freifeld, J. J. Leonard, and J. W. Fisher. “A mixture of manhattan frames: Beyond the manhattan world”. In: *2014 IEEE Conference on Computer Vision and Pattern Recognition*. IEEE. 2014, pp. 3770–3777.
- [14] A. Dubrovina, G. Rosman, and R. Kimmel. “Active Contours for Multi-region Image Segmentation with a Single Level Set Function”. In: *Scale Space and Variational Methods in Computer Vision*. 2013, pp. 416–427.
- [15] R. Mecca, G. Rosman, R. Kimmel, and A. M. Bruckstein. “Perspective Photometric Stereo with Shadows”. In: *Scale Space and Variational Methods in Computer Vision*. 2013, pp. 258–269.
- [16] G. Rosman, A. Dubrovina, and R. Kimmel. “Sparse Modeling of Shape from Structured Light”. In: *3DIMPVT*. 2012, pp. 456–463. ISBN: 978-0-7695-4873-9. DOI: 10.1109/3DIMPVT.2012.20. URL: <http://dx.doi.org/10.1109/3DIMPVT.2012.20>.
- [17] G. Rosman, A. M. Bronstein, M. M. Bronstein, and R. Kimmel. “Articulated Motion Segmentation of Point Clouds by Group-Valued Regularization”. In: *Eurographics Workshop on 3D Object Retrieval*. 2012, pp. 77–84.
- [18] G. Rosman, Y. Wang, X.-C. Tai, R. Kimmel, and A. M. Bruckstein. “Fast Regularization of Matrix-Valued Images.” In: *European Conf. Computer Vision*. Vol. 7574. Lecture Notes on Computer Science. Springer, 2012, pp. 173–186. ISBN: 978-3-642-33711-6.
- [19] G. Rosman, A. M. Bronstein, M. M. Bronstein, X.-C. Tai, and R. Kimmel. “Group-Valued Regularization for Analysis of Articulated Motion”. In: *ECCV NORDIA Workshop*. 2012, pp. 52–62.
- [20] S. Shemtov, G. Rosman, G. Adiv, R. Kimmel, and A. M. Bruckstein. “On Globally Optimal Local Modeling: From Moving Least Squares to Over-parametrization”. In: *Innovations for Shape Analysis*. Ed. by M. Breuß, A. Bruckstein, and P. Maragos. Mathematics and Visualization. Springer, 2012, pp. 379–405.
- [21] A. Wetzler, G. Rosman, and R. Kimmel. “Patch-space Beltrami denoising of 3D point clouds”. In: *IEEE Israeli chapter*. 2012.
- [22] G. Rosman, M. M. Bronstein, A. M. Bronstein, A. Wolf, and R. Kimmel. “Group-valued regularization framework for motion segmentation of dynamic non-rigid shapes”. In: *Scale Space and Variational Methods in Computer Vision*. Vol. 6667. Lecture Notes on Computer Science. 2011, pp. 725–736.
- [23] G. Rosman, S. Shemtov, D. Bitton, T. Nir, G. Adiv, R. Kimmel, A. Feuer, and A. M. Bruckstein. “Over-parameterized Optical Flow using a Stereoscopic Constraint”. In: *Scale Space and Variational Methods in Computer Vision*. Vol. 6667. Lecture Notes on Computer Science. 2011, pp. 761–772.
- [24] G. Rosman, X.-C. Tai, L. Dascal, and R. Kimmel. “Polyakov Action for Efficient Color Image Processing”. In: *ECCV workshop on color and reflectance in comp. vision*. 2010.
- [25] G. Rosman, X.-C. Tai, L. Dascal, and R. Kimmel. “Polyakov Action for Efficient Color Image Processing”. In: *ICNAAM*. Vol. 1281. AIP. 2010, pp. 1018–1021.
- [26] Y. S. Devir, G. Rosman, A. M. Bronstein, M. M. Bronstein, and R. Kimmel. “On reconstruction of non-rigid shapes with intrinsic regularization”. In: *NORDIA workshop*. 2009, pp. 272–279.

- [27] L. Dascal, G. Rosman, and R. Kimmel. “Efficient Beltrami Filtering of Color Images Via Vector Extrapolation”. In: *Scale Space and Variational Methods in Computer Vision*. Ed. by F. Sgallari, A. Murli, and N. Paragios. Vol. 4485. Lecture Notes on Computer Science. Ischia, Italy: Springer Verlag, 2007, pp. 92–103.
- [28] G. Rosman, A. Tzadok, and D. Tal. “A new physically motivated warping model for form drop-out”. In: *International Conference on Document Analysis and Recognition*. Vol. 2. IEEE. 2007, pp. 774–778.

## Patents

- [1] J. Straub, G. Rosman, O. Freifeld, J. J. Leonard, and J. W. Fisher III. *System And Method For Extracting Dominant Orientations From A Scene*. US Patent 20,150,286,893. 2015.
- [2] G. Rosman, A. Bronstein, M. Bronstein, and R. Kimmel. *Acceleration of multidimensional scaling by vector extrapolation techniques*. US Patent 8,645,440. 2014.
- [3] E. Bar-Aviv, Z. Devir, E. Dahan, T. Kenig, and G. Rosman. *Denoising medical images*. US Patent 8,605,970. 2013.
- [4] G. Rosman, D. Tal, and A. Tzadok. *Method of correcting digital image distortion caused by a sheet-fed scanner*. US Patent 8,195,003. 2012.
- [5] E. Bar-Aviv, E. Dahan, Z. Devir, T. Kenig, and G. Rosman. *Non-linear resolution reduction for medical imagery*. US Patent App. 13/807,015. 2011.

## Technical Reports, Misc

- [1] R. Or-El, R. Hershkovitz, A. Wetzler, G. Rosman, A. M. Bruckstein, and R. Kimmel. *Real-Time Depth Refinement for Specular Objects*. ArXiv report 1511.08886. 2015.
- [2] G. Rosman, A. Dubrovina, and R. Kimmel. *Patch-Collaborative Spectral Surface Denoising*. Technical Report CIS-2012-03. 2012.
- [3] G. Rosman, A. Dubrovina, and R. Kimmel. *Sparse Modeling of Shape from Structured Light*. Technical Report CIS-2012-05. 2012.
- [4] G. Rosman, Y. Wang, X.-C. Tai, R. Kimmel, and A. M. Bruckstein. *Fast Regularization of Matrix-Valued Images*. Tech. rep. CAM11-87. UCLA, 2011.
- [5] G. Rosman, Y. Wang, X.-C. Tai, R. Kimmel, and A. M. Bruckstein. *Fast Regularization of Matrix-Valued Images*. Tech. rep. CIS2011-03. Technion, 2011.
- [6] G. Rosman, X.-C. Tai, R. Kimmel, and L. Dascal. *Polyakov action minimization for efficient color image processing*. Technical Report CIS-2010-04. Technion, 2010.
- [7] D. Bitton, G. Rosman, T. Nir, A. M. Bruckstein, A. Feuer, and R. Kimmel. *Over-parameterized Optical Flow using a Stereoscopic Constraint*. Technical Report. CIS2009-18. Technion, 2009.
- [8] G. Rosman, A. M. Bronstein, M. M. Bronstein, and R. Kimmel. *Nonlinear Dimensionality Reduction by Topologically Constrained Isometric Embedding*. Technical Report CIS-2009-05. Technion, 2009.
- [9] G. Rosman, A. M. Bronstein, M. M. Bronstein, A. Sidi, and R. Kimmel. *Fast Multidimensional Scaling using Vector Extrapolation*. Technical Report CIS-2008-01. Technion, Israel Institute of Technology, Feb. 2008.