

## Curriculum Vitae

# Leo Joskowicz

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Last updated: **November 8, 2009**

## Research interests

- **Computer-aided surgery and medical image processing:** medical modeling, multi-modality registration, surgical navigation, medical robotics, with emphasis on orthopaedics and neurosurgery.
- **Computer-aided mechanical design and computational geometry:** geometric reasoning, analysis, design, and tolerancing, assembly planning and validation, the configuration space method, geometric uncertainty.

## Education

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| 1984-1988 | PhD, Courant Institute of Mathematical Science, Computer Science Department, New York University, USA. Advisor: Prof. E. Davis.      |
| 1983-1984 | MSc, Courant Institute of Mathematical Science, Computer Science Department, New York University, USA. Advisor: Prof. M.C. Harrison. |
| 1978-1983 | BSc, Computer Science Department, Technion, Israel Institute of Technology, Haifa, Israel.   |
| 1965-1978 | Diplome Baccalauréat Série E, Lycée Franco-Mexicain, Mexico City, Mexico.  |

## Honors and awards

- Kaye Innovation Award, The Hebrew University of Jerusalem, June 2007.
- Best Clinical Paper presentation, 6th Annual Meeting, Int. Society for Computer-Aided Orthopaedic Surgery, June 21-24, 2006, Montreal, Canada.
- Guastalla Faculty Fellowship, Israel, 1995.
- Excellence in Teaching, The Hebrew University of Jerusalem, 1995-96.
- Rudin Graduate Award, Humanities Council, Graduate Student Forum, New York U. 86-88.

## Employment

- 10/06 - Professor, School of Eng. and Computer Science, Hebrew University.
- 10/01 - 02/09 Director, Leibniz Center for Research in Computer Science, Hebrew University. Elected for three consecutive three-year periods.
- 10/00 - 10/06 Associate Professor, School of Eng. and Computer Science, Hebrew University.
- 10/95 - 10/00 Senior Lecturer, Institute of Computer Science, Hebrew University. Founder, Computer-Aided Surgery and Medical Image Processing Laboratory.
- September 07 Visiting Professor, Hospital for Special Surgery, Cornell U., New York, USA.
- Summer 06-09 Visiting Professor, Instituto de Matemáticas, Universidad Nacional Autónoma de México (UNAM).
- Summer 96-09 Visiting Professor, Instituto Tecnológico Autónomo de México (ITAM).
- Summer 06 Visiting Professor, School of Medicine, Universidad Panamericana, Mexico.
- Summer 97 Visiting Professor, Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas (IIMAS), Universidad Nacional Autónoma de México (UNAM).
- 9/94 - 10/95 Project Leader, Computer-Assisted Surgery group: Modeling and Registration. IBM T.J. Watson Research Center, Yorktown Heights, New York, USA.  
Lead two new efforts: (1) modeling and registration techniques for computer assisted surgery, and (2) government-funded (NIST-ATP) joint project on computer-integrated revision total hip replacement surgery.
- 4/93 - 8/94 Research Staff Member, Computer-Assisted Surgery group, IBM Research.  
Designed and implemented a novel insertability analysis technique for orthopaedic hip implants. The technique has been patented and transferred to a major medical company. Joint work with Dr. Russell H. Taylor, IBM.
- 10/88 - 3/93 Research Staff Member, Artificial Intelligence Department, IBM Research.  
Conducted basic research in Artificial Intelligence, Geometric Reasoning, Constraint Satisfaction and Intelligent CAD.
- 9/84 - 7/88 Research and Teaching Assistant, Courant Institute, New York University.

## Grants

- G1. *Efficient representation and computation of geometric uncertainty with the linear uncertainty model.* Israel Science Foundation. USD 160,000 for four years. Submitted November 2009.
- G2. *Computer-based quantitative patient-specific integrated femoral fracture fixation assessment.* Johnson and Johnson and Julius Oppenheimer Endowment Fund for Applied Research (with M. Liebergall and R. Mosheiff). USD 60,000 for one year. Started Aug 2009.
- G3. *ROBOCAST: Robot and sensor integration as guidance for enhanced computer-assisted surgery and therapy.* 7th Framework Program, European Union. STREP Proposal FP7-ICT-2007-1, Grant agreement FP7 215190. STREP Proposal FP7-ICT-2007-1, Grant agreement FP7

215190. Consortium of 8 universities and 2 companies in Italy, Germany, UK, and Israel, EU 205,000 out of EU 4,500,000, 2008-11. Started Jan 1, 2008.
- G4. *Patient-specific preoperative simulation of endovascular surgical procedures* (with Simbionix Ltd. and Dr. Sosna, Dept of Radiology, Hadassah). Ministry of Trade and Industry, MAGNETON Grant 38652, \$295,000 out of \$795,000, 2007-09. Started Sept 2007.
- G5. *Computer-aided intraoperative fracture reduction and fixation based on electromagnetic tracking* (with M. Liebergall). Innovation Grant, the Hebrew University, \$15,000, 2006-07.
- G6. *Navigated minimally invasive two-incision vs. non-navigated mini posterior approaches to total hip arthroplasty: comparative study*, (with Y. Weill, O. Lubovsky, M. Liebergall, Dept. of Orthopaedic Surgery, Hadassah). The Joint Research Fund of the Hebrew University, \$15,000, 2005-06.
- G7. *Image-guided system with a miniature robot for precise positioning and targeting in neurosurgery*, (with Mazor Surgical Technologies Ltd.). Ministry of Trade and Industry, MAGNETON Grant, \$165,000 out of \$480,000, 2004-06.
- G8. *Computer-aided image guidance and precise targeting in orthopaedic surgery*, (with M. Liebergall, Dept. of Orthopaedic Surgery, Hadassah). Robert Szold Fund, Internal Applied Research Grant, \$22,000, 2003-04.
- G9. *Fundamentals of virtual reality and medical applications* (with D. Lischinski, School of Eng. and Computer Science, Hebrew U.). Ministry of Science, \$125,000 out of \$1,500,000, 2002-05.
- G10. *Vision based active robot navigation*, (with I. Shimshoni, Technion, and R. Basri, Weizmann Institute). Ministry of Science, \$70,000 out of \$300,000, 2000-03.
- G11. *Image-guided robot for minimally invasive surgery*, (with M. Shoham, Technion). Ministry of Science, Strategic Infrastructure Grant, \$100,000 out of \$200,000, 1999-2001.
- G12. *Registration technology for real-time imaging and tracking*, (with DenX Ltd). Ministry of Industry and Trade – IZMEL Consortium on Image-Guided Therapy, \$650,000 out of \$3,000,000, 1998-2003.
- G13. *Augmented surgery*, (with Odin, Envision, and Biomedicom Ltd). Ministry of Industry and Trade – IZMEL Consortium on Image-Guided Therapy \$350,000 out of \$3,000,000, 1998-2003.
- G14. *A computer-integrated system for image-guided bone fracture surgery*, (with C. Milgrom, Hadassah). Hadassit Grant – Hadassah Medical Organization, \$56,700, 1999-2000.
- G15. *Computer-aided contact analysis and mechanical system design using configuration spaces*, (with E. Sacks, Purdue U.). Israel Academy of Sciences, Grant 98/536 \$ 120,000 out of \$130,500, 1998-2001.
- G16. *Automatic allocation of functional tolerances and quantification of robustness* (with E. Sacks, Purdue U.). Ford Univ. Research Grant, \$100,000 out of \$200,000, 1998-2000.
- G17. *Real-time three-dimensional motion tracking and measurement system*. Equipment Grant 9061/98, Israel Academy of Sciences, \$50,000, 1998.
- G18. *Computational kinematics*. Authority for Research and Development, The Hebrew University of Jerusalem, \$17,000, 1997-1998.

G19. *Medical imaging*. Silicon Graphics Biomedical Ltd, Israel, \$18,000, 1996-1997.

G20. Guastalla Faculty Fellowship, Israel, \$100,000, 1995-1998.

## Editorial Boards

1. Deputy Editor, *International Journal of Computer Assisted Radiology and Surgery*, Elsevier, since its inception in 2006.
2. Member, Editorial Board, *Medical Image Analysis*, Elsevier, since 2000.
3. Member, Editorial Board, *Advanced Engineering Informatics* (formerly *Artificial Intelligence in Engineering*, Elsevier), since 1992.
4. Member, Editorial Board, *Computer-Aided Surgery* (Robotics and Instrumentation), Wiley, Francis and Taylor, Informa 1997-2009.
5. Associate Editor, *ASME Journal of Computing and Information Science in Engineering*, ASME Press, 2005-09.
6. Member, Editorial Board, *Annals of Mathematics and Artificial Intelligence*, Kluwer Academic Publishers, since 1999.

## Recent Professional Activities

- General Secretary, *Int. Society for Computer-Aided Orthopaedic Surgery*, CAOS-International. Elected June 2007.
- Member, Executive Council, *Int. Society for Computer-Aided Surgery*, ISCAS. Elected in 2002.
- Member, Organizing Committee, *Int. Congress on Computer Assisted Radiology and Surgery*, CARS 2007-10.
- Member, Program Committee, *14-23th Int. Congress on Computer Assisted Radiology and Surgery*, CARS 2000-10.
- Member, Program Committee, *1-10th Int. Conf. on Medical Image Computing and Computer Assisted Interventions*, MICCAI 1998-2010.
- Member, Program Review Committee, *Int. Conf. on Computer-Aided Orthopaedic Surgery*, CAOS 2004-10.
- Co-chair and co-founder, *1-12th Israeli Symposium Computer-Aided Surgery, Medical Robotics, and Medical Imaging*, ISRACAS 1998-2009, Israel.
- Co-chair and co-founder, *1-10th Mexican Symposium on Computer Aided Surgery, Medical Image Processing, and Medical Robotics*, Mexico, 2000-09.
- Member, Program Committee, *8-11th CIRP Int. Seminar on Computer Aided Tolerancing*. Bi-annual conference, 2003-09.
- Co-organizer, *2009 MICCAI Workshops*: 1) 3D Segmentation Grand Challenge, and 2) Geometric Accuracy in Image-Guided Surgery, London, UK, September 2009.

- Member, Program Committee, *Int. Conf. on Advanced Robotics*, ICAR, 2007-09.
- Member, Program Committee, *Workshop on 3D Anatomical Modeling*, Switzerland, 2008-2010.
- Member, Scientific Committee, *7th National Life Science and Technology Week, Israel Life Science Industry - Biomed 2008 Conference*, Tel-Aviv, Israel, May 27-29, 2008.
- Member, Program Committee, *Geometric Modeling and Processing*, USA and China, July 2006 and 2008.
- Member, European Executive Committee, *19th and 20th Int. Congress on Computer Assisted Radiology and Surgery*, CARS 2005-06.
- Member, Program Committee, Latin American Robotics Symposium (LARS), Santiago Chile, Chile, October 2006.
- Member, Advisory Board, *1-4th Int. Conf. on Design Computing and Cognition*, Biannual, July 2004-10.
- Member, Scientific Committee, *2nd and 3rd Int. Symposium on Multibody Systems and Mechatronics*, Uberlandia, Brazil, 2005 and 2007.
- Member, Program Committee, *Mexican Int. Conference on Artificial Intelligence*, MICAI, Mexico, 2000-06.
- Member, Scientific Committee, IZMEL Consortium on Image-Guided Therapy, funded by the Israeli Ministry of Trade and Commerce, 1998-2003.

## Refereeing

- **Journals:** *IEEE Trans. on Medical Imaging*, *IEEE Trans. on Biomedical Engineering*, *IEEE Trans. Robotics and Automation*, *Artificial Intelligence*, *Research in Engineering Design*, *Computer-Aided Design*, *Engineering Applications of Artificial Intelligence*, *Artificial Intelligence in Engineering*, *Design and Manufacturing*.
- **Conferences:** numerous (at least 100) conferences in the fields of Computer-Aided Surgery, Robotics and Medical Imaging, Computer-Aided Design, and Artificial Intelligence.

**Theses (T)**

- T1. Eran Peleg, PhD, 2009 (expected, co-advisor)  
Patient-specific quantitative analysis of bone fracture fixations.
- T2. Gurion Rivkin, MD, 2009  
Evaluation of intertrochanteric femur fracture fixation using a finite element model.
- T3. Miriam Natanzon, MSc, 2009  
Nearly automatic liver vessels segmentation of CTA patient scans
- T4. Noah Broide, MSc, 2009  
A graph-based approach to carotid arteries CTA patient-specific segmentation.
- T5. Yoav Taieb, MSc, 2009  
An iterative Bayesian method for liver tumors segmentation.
- T6. Ofer Elisassaf, MSc, 2009  
Nearly automatic liver contour segmentation.
- T7. Aviv Hurvitz, MSc, 2008  
Registration of a CT-like atlas to fluoroscopic X-ray images using intensity correspondences.
- T8. Yair Yarom, MSc, 2008  
Electromagnetic tracing in a fluoroscopy-based orthopaedic surgical environment
- T9. Pavel Katz, MSc, 2006  
Liver tumor segmentation and volume computation with user-guided 3D active contours
- T10. Yaron Ostrovsky-Berman, PhD, 2005  
Shape and position uncertainty in mechanical assemblies
- T11. Ruby Shamir, MSc. 2005  
Miniature robot system for keyhole neurosurgery.
- T12. Moti Freiman, MSc. 2005  
Three-way registration for robot-assisted image-guided targeting for minimally invasive neurosurgery.
- T13. Ziv Yaniv, PhD. 2004  
Fluoroscopic X-ray image guidance for manual and robotic surgery
- T14. Yoram Weil, MD, 2004  
Percutaneous compression plate for the fixation of intertrochanteric fractures using a computerized fluoroscopic navigation system.
- T15. Dotan Knaan, MSc. 2003  
Intensity-based 2D/3D rigid registration of fluoroscopic X-ray to CT.
- T16. Harel Lyviatan, MSc. 2003, rector's list  
Gradient-based 2D/3D rigid registration of fluoroscopic X-ray to CT
- T17. Moti Melloul, MSc. 2001  
Segmentation of microcalcifications in X-ray mammograms using entropy thresholding.

- T18. Ofri Sadowsky, MSc. 2001  
Contact and image-based rigid registration in computer-assisted surgery: materials, methods, and experimental results.
- T19. Dudi Einey, BSc, Amirim program, 2004  
Diffusion Tensor Magnetic Resonance Imaging.
- T20. Ziv Yaniv, MSc. 1998  
Fluoroscopic image processing and registration for computer-aided orthopaedic surgery.
- T21. Yoav Lasovsky, MSc. 1998  
Approximate motion planning in planar geometrically complex situations
- T22. Lana Tockus, MSc. 1997  
A system for computer-aided fluoroscopic image-guided bone fracture surgery

## External theses committees

1. *Jonathan Shers*, PhD, Inst. Polytechnique de Grenoble, France (Prof. J. Troccaz), 2009.
2. *Arnaldo Mayer*, PhD, Tel-Aviv Univ, Fac. of Engineering (Prof. H. Greenspan), 2009.
3. *Shirli Gordon*, PhD, Tel-Aviv Univ, Fac. of Engineering (Prof. H. Greenspan), 2009.
4. *Alex Miropolsky*, PhD, Technion, Fac. Computer Science (Prof. A. Fischer), 2009.
5. *Mauricio Pohl*, PhD, Univ. Autonoma Mexico, Dept Electrical Eng, Mexico City, (Prof. V. Medina), 2008.
6. *Iddo Haniel*, PhD, Technion, Fac. Computer Science (Prof. G. Elber), 2007.
7. *Yotam Livny*, PhD, Ben-Gurion Univ, Dept. Computer Science (Prof. J. El-Sanah), 2007.
8. *Frederic Germain*, PhD, Univ. de Savoie, Chambéry, France, (Prof. M. Giordano), 2007.
9. *Daniel Glozmann*, PhD, Technion – Fac. Mechanical Engineering (Prof. M. Shoham), 2007.
10. *Sebastien Aranda*, PhD, Univ. de la Mediterranée, Aix-En-Provence, France, (Prof. J.M. Sprauel), 2006.
11. *Amir Ziv-Av*, PhD, Tel-Aviv Univ, Fac. of Engineering (Prof. Y. Reich), 2006.
12. *Octavian Soldea*, PhD, Technion, Fac. Computer Science (Profs. G. Elber and E. Rivlin), 2006.
13. *Sagi Schein*, PhD, Technion, Fac. Computer Science (Prof. G. Elber), 2006.
14. *Yanina Rubenchick*, PhD, Ben-Gurion Univ, Dept. of Mechanical Engineering (Prof. V. Portman), Israel, 2006.
15. *Gil Schwarzband*. MSc, Tel-Aviv Univ, Fac. of Engineering (Prof. N. Kiriaty), 2006.
16. *Pierre Jannin*, HDR, Habilitation á Diriger les Recherches, Faculté de Médecine, Rennes, France, 2005.

17. *Michal Berris*, PhD, Technion, Fac. of Mechanical Engineering (Prof. M. Shoham), 2004.
18. *Jerome Tonetti*, PhD, Laboratoire TIMC/IMAG - Université Joseph Fourier, Faculté de Médecine, Grenoble, France, (Prof. J. Troccaz), 2003.
19. *Tal Pechter*, PhD, Tel-Aviv Univ. Fac. Engineering (Prof. Y. Reich), 2003.
20. *Nir Tal*, MSc, Tel-Aviv University, Faculty of Exact Sciences (Prof. N.. Dyn), 2003.
21. *Amit Feldheim*, PhD, Tel-Aviv Univ, Fac. of Exact Sciences (Prof. D. Levin), 2002.
22. *Zur Izhakian*, PhD, Tel-Aviv Univ, Fac of Exact Sciences (Prof. A. Inselberg), 2002.
23. *Cedric Lelu*, PhD, Institut de Technologie, U. de Franche-Comptée, Besancon, France, (Dr. M. Dahan), 2002.
24. *Kathrin Burckhardt*, PhD, Swiss Federal Institute of Technology, Zurich, Switzerland, (Prof. G. Szekely), 2001.
25. *Fabian Schwarzer*, PhD, Technical University of München, Germany, (Prof. A. Schweikard), 2000.
26. *Michel Abadie*, PhD, Univiversité de Montpellier, France, 1998.
27. *Uri Benshetrit*, PhD, Faculty of Mechanical Engineering (Prof. M. Shoham), Technion, 1996.
28. *Bernard Yannou*, PhD, Ecole Centrale de Paris, France, 1994.

## Publications

### Book

1. *The configuration space method for kinematic design of mechanisms*. E. Sacks and **L. Joskowicz**. Monograph, The MIT Press, ISBN 978-0-262-01389-5, to appear, February 2010.

### Book chapters (B)

- B1. Principles of computer-aided surgery in trauma surgery, Y. Weill, **L. Joskowicz**, R. Mosheiff, M. Liebergall, *Navigation and minimally invasive surgery in orthopaedic surgery*, Stiehl, Konermann, et al, Springer Verlag, pp 484-494, 2006.
- B2. Computer-aided orthopaedic surgery in skeletal trauma, M. Liebergall, **L. Joskowicz**, R. Mosheiff, *Rockwood and Green's Fractures in Adults, 6th Edition*, R. Bucholz and J. Heckman editors, Lippincott Williams and Wilkins, pp 739–770, 2006. Revised 7th Edition to appear in 2009.
- B3. Computer-assisted image-guided intramedullary nailing surgery of femoral fractures (in French), **L. Joskowicz** and E. Hazan, *Monographie des Conférences d'Enseignement de la SOFTCOT*, P. Merloz Editor, Elsevier, Vol. 80: pp. 156-167, 2003.
- B4. Computer-integrated surgery and medical robotics, R.H. Taylor and **L. Joskowicz**, *Standard Handbook of Biomedical Engineering and Design*, 1st Edition, M. Kutz, Editor, McGraw-Hill Professional, pp. 29.1-29.35, ISBN: 0071356371, 2002. Revised 2nd Edition to appear, 2009.
- B5. Kinematic synthesis, M. McCarthy and **L. Joskowicz**, in *Formal Engineering Design Synthesis*, E.K. Antonsson and J. Cagan editors, Cambridge University Press, pp. 321-362, 2001.

### Refereed journal papers (J)

- J1. A novel field-of-view augmentation wand for C-arm CT-like fluoroscopy-based intraoperative navigation. E. Peleg, M. Liebergall, **L. Joskowicz**, Y. Weil, R. Mosheiff. *Journal of Orthopaedic Trauma*, to appear, 2010.
- J2. Surface-based facial scan registration in neuronavigation procedures: a clinical study, R. Shamir, M. Frieman, **L. Joskowicz**, S. Spektor, Y. Shoshan. *Journal of Neurosurgery*, to appear, 2010.
- J3. Efficient representation and computation of geometric uncertainty: the linear parametric model. Y. Myers and **L. Joskowicz**. *Precision Engineering*, Elsevier, Vol 34:2–6, 2010.
- J4. Localization and registration accuracy in image-guided neurosurgery: a clinical study. R. Shamir, **L. Joskowicz**, S. Spektor, Y. Shoshan. *Int. Journal of Computer Assisted Radiology and Surgery*, Vol 4(1):45–52, 2009.
- J5. Navigated total knee replacement – a comprehensive clinical state of the art study, I. Ilsar, **Leo Joskowicz**, L. Kandel, M. Liebergall. *British J. of Bone and Joint Surgery Suppl III*, 90-B:514–19, 2008.
- J6. Registration of a CT-like atlas to fluoroscopic X-ray images using intensity correspondences, A. Hurvitz and **L. Joskowicz**, *Int. Journal of Computer Assisted Radiology and Surgery*, Vol 3(6):493-504, 2008.

- J7. An iterative Bayesian approach for nearly automatic liver segmentation: algorithm and validation, M. Freiman, Y. Taieb, O. Eliassaf, **L. Joskowicz**, Y. Azraq, and J. Sosna. *Int. Journal of Computer Assisted Radiology and Surgery*, Vol 3(5): 439-446, 2008.
- J8. A CT-based high-order finite element analysis of the human proximal femur compared to in-vitro experiments, Z. Yosibash, R. Padan, **L. Joskowicz**, C. Milgrom, *J. of Biomechanical Engineering, Transactions of the ASME*, Vol 129: 297-309, 2007.
- J9. Advances in image-guided targeting for keyhole neurosurgery: a survey paper, **L. Joskowicz**, *Touch Briefings Reports, Future Directions in Surgery 2006 - Vol II*, 2007.
- J10. Robotic assisted spinal surgery: from concept to clinical practice. M. Shoham, I.H. Lieberman, E.C. Benzel, E. Zehavi, B. Zilberstein, M. Roffman, A. Bruskin, A. Fridlander, **L. Joskowicz**, S. Brink-Danan, N. Knoller, *Computer-Aided Surgery*, Vol 12(2):105-115, 2007.
- J11. Fracture table-mounted vs. bone-mounted dynamic reference frame tracking accuracy using computer-assisted orthopaedic surgery: a comparative study I. Ilisar, Y. Weill, R. Mosheiff, **L. Joskowicz**, A. Peyser, M. Liebergall. *Computer-Aided Surgery*, Vol 12(2):125-130, 2007.
- J12. Image-guided system with miniature robot for precise positioning and targeting in keyhole neurosurgery, **L. Joskowicz**, M. Freiman, R. Shamir, M. Shoham, E. Zehavi, Y. Shoshan *Computer-Aided Surgery*, Vol 11(4):181-193, 2006.
- J13. Relative position computation for assembly planning with toleranced parts, Y. Ostrovsky-Berman, **L. Joskowicz**, *Int. Journal of Robotics Research*, Vol 25(2):147-170, 2006.
- J14. Precise robot-assisted guide positioning for distal locking of intramedullary nails, Z. Yaniv and **L. Joskowicz**, *IEEE Trans. on Medical Imaging*, Vol 24(5):624-635, 2005.
- J15. Tolerance envelopes of planar mechanical parts with parametric tolerances, Yaron Ostrovsky-Berman and **L. Joskowicz**, *Computer-Aided Design*, Special issue on Geometric Modeling and Processing, S.-M. Hu and H. Pottmann eds., Vol. 37(5):531-544, 2005.
- J16. Long bone panoramas from fluoroscopic X-ray images, Z. Yaniv and **L. Joskowicz**, *IEEE Trans. on Medical Imaging*, Vol. 23(1):23-35, 2004,
- J17. Computer-assisted image-guided intramedullary nailing of femoral shaft fractures, E. Hazan and **L. Joskowicz**, *Techniques in Orthopaedics*, Special Issue on Computer-Aided Orthopaedic Surgery, E. Hazan editor, Lippincott, Williams and Wilkens, USA, Vol. 18(2):191-201, 2003.
- J18. Bone-mounted miniature robot for surgical procedures: concept and clinical applications, M. Shoham, M. Burman, E. Zehavi, **L. Joskowicz**, E. Batkilin, and Y. Kunicher, *IEEE Trans. on Robotics and Automation*, Special issue on Medical Robotics, R.H. Taylor guest editor, Vol 19(5):893-901, 2003.
- J19. Gradient-based 2D/3D rigid registration of fluoroscopic X-ray to CT, H. Livyatan, Z. Yaniv, **L. Joskowicz**, *IEEE Trans. on Medical Imaging*, Special issue on Medical Image Registration, M. Fitzpatrick and J. Pluim editors, Vol 22(11):1395-1406, 2003.
- J20. Kinematic analysis of spatial fixed-axes higher pairs using configuration spaces, K-J. Kim, E.Sacks, **L. Joskowicz**, *Computer-Aided Design*, Vol. 35(3):279-291, 2003.

- J21. Computer-based periaxial rotation measurement for aligning fractured femur fragments from CT: a feasibility study, O. Ron, **L. Joskowicz**, A. Simkin, and C. Milgrom, *Computer-Aided Surgery*, Vol. 7(6):332-341, 2002.
- J22. Comparative in-vitro study of contact and image-based rigid registration for computer-aided surgery, O. Sadowsky, Z. Yaniv, and **L. Joskowicz**, *Computer-Aided Surgery* Vol. 7(4):223-236, 2002.
- J23. Computers in imaging and guided surgery, **L. Joskowicz** and R.H. Taylor, *Computing in Science and Engineering*, Vol. 3(5):65-72, September/October 2001.
- J24. Efficient linear unboundedness testing: algorithm and applications to assembly planning, F. Schwartzter, **L. Joskowicz** A. Schweikard. *Int. Journal of Robotics Research*, Vol 19(9):817-834, Sept 2000.
- J25. Visualizing three-dimensional configuration spaces for mechanical design, E. Sacks, C. Pisula, **L. Joskowicz**, *IEEE Computer Graphics and Applications*, pp. 50-54, Sept. 1999.
- J26. Understanding mechanical motion: from images to behaviors, T. Dar, **L. Joskowicz**, E. Rivlin, *Artificial Intelligence*, Vol 112:147-179, 1999.
- J27. Computer-aided mechanical assembly design using configuration spaces, **L. Joskowicz** and E. Sacks, *Computing in Science and Engineering*, pp. 14-21, Nov/Dec. 1999.
- J28. Motion planning in crowded planar environments, **L. Joskowicz** and Y. Lasovsky, *Robotica*, Vol. 17(1):365-371, 1999.
- J29. FRACAS: A system for computer-aided image-guided long bone fracture surgery, **L. Joskowicz**, C. Milgrom, A. Simkin, L. Tockus, Z. Yaniv, *Computer-Aided Surgery*, Vol. 3(6):271-288, May 1999.
- J30. Solving difference constraints incrementally, G. Ramalingam, J. Song, **L. Joskowicz**, and R.E. Miller, *Algorithmica* , Vol 23(3):261-275, 1999.
- J31. Computer integrated revision total hip replacement surgery R.H. Taylor, **L. Joskowicz**, B. Williamson *et al*, *Medical Image Analysis*, Oxford Univ. Press, Vol. 1(2):1-19, 1999.
- J32. Mesh simplification with smooth surface reconstruction, O. Volpin, A. Sheffer, M. Bercovier, **L. Joskowicz**, *Computer-Aided Design*, Vol. 30(11):875-882, 1998.
- J33. Parametric tolerance analysis of part contacts in general planar assemblies, E. Sacks and **L. Joskowicz**, *Computer-Aided Design*, Vol. 30(9):707-714, 1998.
- J34. Dynamical simulation of planar assemblies with changing contacts using configuration spaces, E. Sacks and **L. Joskowicz**, *Journal of Mechanical Design*, Vol. 120:181-189, 1998.
- J35. Parametric kinematic tolerance analysis of planar mechanisms, E. Sacks and **L. Joskowicz**, *Computer-Aided Design*, Vol. 29(5):333-342, 1997.
- J36. Kinematic tolerance analysis, **L. Joskowicz**, E. Sacks and V. Srinivasan, *Computer-Aided Design*, Vol. 29(2):147-157, 1997.
- J37. An overview of computer-assisted surgery research at IBM, R.H. Taylor, J. Funda, **L. Joskowicz**, A. Kalvin, S. Gomory , A. Gueziec, and L. Brown, *IBM Journal of Research and Development*, Vol. 40(2):163-184, March 1996.

- J38. Efficient compositional modeling for generating causal explanations, P. Nayak and **L. Joskowicz**, *Artificial Intelligence*, Vol. 83(2):193-227, 1996.
- J39. Interference-free insertion of a solid body into a cavity: an algorithm and a medical application, **L. Joskowicz** and R.H. Taylor, *International Journal of Robotics Research*, Vol. 15(3):211-229, June 1996.
- J40. A representation language for mechanical behavior, **L. Joskowicz** and D. Neville, *Artificial Intelligence in Engineering*, Vol. 10:109-116, 1996.
- J41. Computational kinematic analysis of higher pairs with multiple contacts, E. Sacks and **L. Joskowicz**, *ASME Journal of Mechanical Design*, Vol. 117:269-277, June 1995.
- J42. Medical robotics at IBM Research, R.H. Taylor, J. Funda, **L. Joskowicz**, A. Kalvin, S. Gomory, A. Gueziec, *Service Robot: An International Journal*, Vol. 1(1):9-13, 1995.
- J43. Automated modeling and kinematic simulation of mechanisms, E. Sacks and **L. Joskowicz**, *Computer-Aided Design*, Vol. 25(2):107-118, 1993.
- J44. Design from physical principles, **L. Joskowicz**, B. Williams, J. Cagan, *Artificial Intelligence Magazine*, Vol. 14 (1), Spring 1993.
- J45. A reply to prolegomena to any future qualitative physics, **L. Joskowicz**, *Computational Intelligence*, Blackwell Publishers, Vol. 1(8):266-270, 1992.
- J46. Artificial intelligence meets simulation, **L. Joskowicz**, *IEEE Expert*, Vol. 6(1):73-74, 1991.
- J47. Practical tools for reasoning about linear constraints T. Huynh, **L. Joskowicz**, C. Lassez, and J.L. Lassez, *Fundamenta Informaticae*, Special issue on Logic and Artificial Intelligence, Vol. 15(4):357-379, 1991.
- J48. Computational Kinematics, **L. Joskowicz** and E. Sacks, *Artificial Intelligence*, Vol. 51(1-3):381-416, 1991.
- J49. Mechanism comparison and classification for design, **L. Joskowicz**, *Research in Engineering Design*, Vol. 1(2):149-166, 1990.
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### Refereed conference papers

- C1. Trajectory planning method for reduced patient risk in image-guided neurosurgery: concept and preliminary results. R. Shamir, **L. Joskowicz**, L. Antiga, R. Foroni, Y. Shoshan. To appear, *Proc. SPIE Symposium on Medical Imaging 2010*, Feb 13-18, San Diego, USA.
- C2. Multi-class SVM model for fMRI-based classification and grading of liver fibrosis. M. Freiman, Y. Sela, Y. Edrei, O. Pappo, **L. Joskowicz**, R. Abramovitch. To appear, *Proc. SPIE Symposium on Medical Imaging 2010*, Feb 13-18, San Diego, USA.
- C3. Affinity-based constraint optimization for nearly-automatic vessel segmentation. O. Cooper, M. Freiman, **L. Joskowicz**, D. Lischinski. To appear, *Proc. SPIE Symposium on Medical Imaging 2010*, Feb 13-18, San Diego, USA.

- C4. Min-cut method for liver vessel segmentation from MDCT: algorithm assessment and verification. M. Freiman, L. Joskowicz, J. Sosna. *Proc. 95th Radiological Society of North America Annual Meeting*, Chicago, USA, Nov. 29-Dec. 4, 2009.
- C5. Advanced planning and intra-operative validation for robot-assisted keyhole neurosurgery in ROBOCAST. S.A. Ahmadi, T. Klein, N. Navab, R. Roth, R. R Shamir, **L. Joskowicz**, E. DeMomi, G. Ferrigno, L. Antiga, R. Foroni. *Proc. Int. Conf. on Advanced Robotics*, ICAR 2009, Munich, Germany, June 22-26, 2009.
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- C7. Point distance problems with dependent uncertainties. Y. Myers, **L. Joskowicz**, *Proc. 25th European Workshop on Computational Geometry*, Brussels, Belgium, March 16-18, 2009.
- C8. Fluoroscopy-based X-ray navigation with electromagnetic tracking for orthopaedic surgery: a practical study, Y. Yarom and **L. Joskowicz**. *Proc. 23rd Int. Conf. Computer-Assisted Radiology and Surgery*, CARS'2009, Berlin, Germany, June 2009.
- C9. Patient-specific modeling of the carotid arteries for surgical simulation. M. Freiman, M. Natanzon, N. Broide, **L. Joskowicz**, L. Weizman. E. Nammer, O Shilon. *Proc. 23rd Int. Conf. Computer-Assisted Radiology and Surgery*, CARS'2009, Berlin, Germany, June 2009.
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- C11. Optimal landmarks selection and fiducial marker placement for minimal target registration error in image-guided-neurosurgery, R. Shamir, **L. Joskowicz**, Y. Shoshan. *Proc. SPIE Symposium on Medical Imaging 2009*, Vol 1605-7422, pp 72612N 1-8, Feb 2009, Orlando, USA.
- C12. Curvlet-based sampling for high-accuracy multi-modal image registration. M. Safran, M. Freiman, **L. Joskowicz**, M. Werman. *Proc. SPIE Symposium on Medical Imaging 2009*, Vol 1605-7422, pp 72611B 1-8, Feb 2009, Orlando, USA.
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- C18. Localization and registration accuracy in image-guided neurosurgery: a clinical study. R. Shamir, **L. Joskowicz**, S. Spektor, Y. Shoshan. *22nd Int. Conf. Computer-Assisted Radiology and Surgery*, CARS'2008, Barcelona, Spain, 2008.
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- C44. Planar parts relative positioning in assemblies with tolerances, Yaron Ostrovsky-Berman and **L. Joskowicz**, in *Models for computer-aided tolerancing in Design and Manufacturing*. J.K Davidson editor, *Springer*, 2006, pp 65-75. Also in *Proc. 9th CIRP Int. Seminar on Computer Aided Tolerancing*, April 2005.
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### Submitted papers

- S1. Curvlet-based sampling for high-accuracy multi-modal image registration. M. Safran, M. Freiman, **L. Joskowicz**, M. Werman. *IEEE Transactions on Medical Imaging*, Submitted April 2009.
- S2. Target and localization accuracy in keyhole image-guided keyhole neurosurgery. R. Shamir, **L. Joskowicz**, Y. Shoshan. *J. of Neurosurgery*, Submitted, November 2009.
- S3. Vessels-Cut: a graph based approach to carotid arteries patient-specific modeling. M. Freiman, N. Broide, M. Natanzon, E. Nammer, O. Shilon, L. Weizman, **L. Joskowicz**, J. Sosna. *Medical Image Analysis*, Submitted November 2009.
- S4. Geometrical analysis of registration errors in point-based rigid-body registration using invariants. *Medical Image Analysis*, Submitted November 2009.
- S5. Automatic segmentation of optic pathway gliomas in MRI. L. Weizman, **L. Joskowicz**, L. Ben-Sira, R. Precel, D. Ben-Bashat. *2010 IEEE Int. Symp. on Biomedical Imaging*, 14-17 April, Rotherdam, The Netherlands, Submitted November 2009.
- S6. An iterative model-constrained graph-cut algorithm for abdominal aortic aneurism thrombus segmentation. M. Freiman, S. Essess, **L. Joskowicz**, J. Sosna. *2010 IEEE Int. Symp. on Biomedical Imaging*, 14-17 April, Rotherdam, The Netherlands, Submitted November 2009.
- S7. Circle problems with dependent uncertainties. Y. Myers, **L. Joskowicz**, *26th European Workshop on Computational Geometry*, March 16-18, 2010, Submitted, Dec 2010.

### Editorial Work (E)

- E1. Editorial Board Member, Special Issue on Computer-Assisted Interventions, *Medical Image Analysis*, Springer, to appear June 2010.
- E2. Co-editor, *Proc. 9th Annual Computer-Aided Orthopaedic Surgery Meeting*, B. L. Davies, **L. Joskowicz**, S. Murphy, Boston, USA, Jun 17–20, 2009.
- E3. Co-editor, *Proc. 8th Annual Computer-Aided Orthopaedic Surgery Meeting*, B. L. Davies, **L. Joskowicz**, K-S Leung, Hong Kong, China, Jun 4–7, 2008.

- E4. Guest editorial. P. Jannin, K. Cleary, **L. Joskowicz** Special Issue, Selected papers from the 2005 Computer Aided Radiology and Surgery Conference (CARS 2005), *Computer-Aided Surgery*, Volume 11(3): 107-108, 2006.
- E5. *Abstracts of the Seventh Israeli Symposium on Computer-Aided Surgery, Medical Robotics, and Medical Imaging*, **L. Joskowicz** and M. Shoham editors, *Journal of Computer-Aided Surgery*, Volume 10(6), 2006.
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- E8. *Abstracts of the Fourth Israeli Symposium on Computer-Aided Surgery, Medical Robotics, and Medical Imaging*, **L. Joskowicz** and M. Shoham editors, *Journal of Computer-Aided Surgery*, Volume 6(5), 2001, pp. 305–320.
- E9. *Abstracts of the Third Israeli Symposium on Computer-Aided Surgery, Medical Robotics, and Medical Imaging*, **L. Joskowicz** and M. Shoham editors, *Journal of Computer-Aided Surgery*, Volume 5(5), 2000.
- E10. *Abstracts of the Second Israeli Symposium on Computer-Aided Surgery, Medical Robotics, and Medical Imaging*, **L. Joskowicz** and M. Shoham editors, *Journal of Computer-Aided Surgery*, Volume 4(2), 1999, pp. 105-115.
- E11. *Proc. of the 1st–11th Israeli Symposium on Computer-Aided Surgery, Medical Robotics, and Medical Imaging*, **L. Joskowicz** and M. Shoham editors, The Hebrew University of Jerusalem and Technion, 1998-2008.
- E12. *Annals of Mathematics and Artificial Intelligence*, Special Issue on Foundations of Artificial Intelligence V, **L. Joskowicz**, S. Kraus, and D. Lehmann editors, Vol. 25, Nos 1,2, July 1999, pp 1-160.
- E13. *New directions in contact analysis and simulation*, **L. Joskowicz**, E. Sacks, V. Kumar Eds, IEEE Press, 1998.
- E14. *Annals of Mathematics and Artificial Intelligence*, Special issue, **L. Joskowicz**, F. Hoffman and J.L. Lassez, editors, J.C. Baltzer Scientific Publishing Company, Vol. 10-33, 1994.
- E15. *Design from physical principles*, B. Williams and **L. Joskowicz** editors, AAAI Fall Symposium Series, AAAI Press, ISBN 0-929280-36-9, 168 pp, 1992.

## Patents (P)

- P1. *Method for optimal landmark selection and placement for minimal error registration in image-guided neurosurgery* R. Shamir, **L. Joskowicz**, Y. Shoshan, Prelim. Patent, Dec 2007.
- P2. *Adaptive navigation technique for navigating a catheter through a body channel or cavity*, D. Averbuch, O. Weingarten, **L. Joskowicz**, I. Markov, I. Vorobeychik, PCT/US07/84595, Nov 2007.

- P3. *Image-guided robotic system for keyhole neurosurgery*, **L. Joskowicz**, M. Shoham, E. Zehavi, and Y. Shoshan, WO/2006/075331, January 2006. Filed by Mazor Surgical Technologies.
- P4. *Robot for use with orthopaedic inserts*, M. Shoham, **L. Joskowicz**, C. Milgrom, Z. Yaniv, A. Simkin, WO/2003/105659, June 2003, Filed by Mazor Surgical Technologies.
- P5. *Distal intramedullary nail targeting using a bone-mounted robot*, **L. Joskowicz**, M. Shoham, E. Zehavi, US Patent No. 60/389,207, July 2003. Filed by Mazor Surgical Technologies.
- P6. *Adjustable drilling jig for targeting locking screws for intramedullary nails locking screws*, C. Milgrom, A. Simkin, **L. Joskowicz**, WO/2003/065907, June 2003. Filed by Hadassit.
- P7. *A method for automatically obtaining spatial layout for multimedia presentations*, M. Kim, **L. Joskowicz**, J. Song, U.S. Patent No. 5,669,006, September 1997. Filed by IBM Corporation.
- P8. *Interference-free insertion of a solid body into a cavity*, **L. Joskowicz** and R.H. Taylor, U.S. Patent No. 5,343,385, European Patent No. 94110676.7, August 31, 1994, IBM Corporation.

## Recent invited talks

- Invited speaker, *ARTORG Center*, Univ. of Bern, Switzerland, Dec 4, 2009.
- Invited speaker, *Madua Lectures*, Jerusalem, Nov 15, 2009.
- Invited speaker, *Functional Neuroimaging and Intraoperative neurophysiology*, Italy-Israel binational symposium, Sourasky Medical Center, Tel-Aviv, Israel, Oct 19-20, 2009.
- Invited speaker, *Engineering week*, Inst. Tecnologico Autonomo de Mexico, Oct 9, 2009.
- Invited speaker, *Inst. Invest. en Matematicas Aplicadas y Sistemas – IIMAS*, Aug 21, 2009.
- Invited speaker, *1st Forum on Computer-Aided Surgery and Medical Image Processing*, Fac of Medicine and Fac of Engineering, Univ. Anahuac Mayab, Merida Yucatan, Mexico, Aug 31-Sep 1, 2009.
- Invited speaker, *Bioengineering Symposium* Elche, Spain, Jun 1, 2009.
- Invited speaker, *Making Sense of Sensing: 1st Peter Brojde Meeting for Innovations in Engineering and Computer Science*, Jerusalem, Dec 16, 2008.
- Faculty, *Continuing Medical Education Course for Radiology Fellows*, School of Medicine, Tel-Aviv Univ, Nov 21, 2008.
- Keynote speaker, *Int. Seminar on Information Technology and Communications at the Service of Health*, Quito, Ecuador, Oct 6-8, 2008.
- Invited speaker, *Seminar*, Division of Orthopaedic Surgery, Sunnybrook Health Sciences Centre, Toronto, Canada, Sep 19, 2008.
- Invited speaker, *Symposium Series*, Human Mobility Research Centre, Queen's Univ. and Kingston General Hosp, Kingston, Canada, Sep 17, 2008.
- Invited speaker, *2nd Innovation Symposium*, The Hebrew University Buenos Aires, Argentina, Jul 2008.
- Panel organizer and moderator, *8th Int. Symp. on Computer-Aided Orthopaedic Surgery*, Hong Kong, Jun 5-7, 2008.
- Invited speaker, *5th Annual Meeting of the Asian Society for Computer-Aided Surgery*, Honk Kong, Jun 4, 2008.
- Invited speaker, *2008 Advanced Imaging and Computer Assisted Surgery of the Knee and Hip*, Research Symposium organized by the American Academy of Orthopaedic Surgeons and the Orthopaedics Research Society, Providence, RI, USA, May 15-17, 2008.
- Invited speaker, *3rd Annual Congress of the British Society for Computer Aided Orthopaedic Surgery*, Glasgow, Feb 7-9, 2008.
- Keynote invited speaker, *Annual Meeting of the Spanish Society for Computer-Aided Orthopaedic Surgery*, CAOS Spain, Elche, Spain, Oct 10-11, 2007.
- Invited speaker, Hosp. for Special Surgery, New York, USA, Sep 5, 2007.

- Keynote invited speaker, *3rd Int. Orthopaedic Congress*, Czech Republic, Mar 29-30, 2007.
- Keynote invited speaker, *Computer Vision and Machine Learning Conference*, Weizmann Institute, Israel, Jan 15, 2007.
- Invited speaker and session co-organizer, *Int. Symp. on Computer-Aided Orthopaedic Surgery*, Montreal, Canada, Jun 23-26, 2006.
- Invited speaker, *EURON'06 Winter School on Telesurgery*, Benidorm, Spain, Mar 26-31, 2006.
- Keynote invited speaker, *Symposium on Telemedicine and Innovation for Competitiveness*, Mexico City, Mexico, January 27-28, 2006.
- Faculty, *Continuing Medical Education Course on Orthopaedic Surgery*, School of Medicine, Tel-Aviv University, Jan 8, 2006.
- Invited speaker, *4th Leipzig Forum on Computer Assisted Surgery* and Opening Ceremony, Innovation Center for Computer Assisted Surgery, Leipzig, Germany, Dec 12, 2005.
- Invited speaker and panelist, *Forum Euromed Health, Euro-mediterranean Conference*, Barcelona, Spain, Nov 14-15, 2005.
- Invited speaker *Advances in Methods and Systems for Development of Products and Processes*, German-Israel Binational Conference, Berlin, July 7-8, 2005.
- Invited speaker, Robotics Workshop at the *CARS Int. Conf. on Computer Assisted Radiology and Surgery*, Berlin, Germany, June 26, 2005.
- Keynote invited speaker, *5th National Congress on Emergency Medicine*, Veracruz, Mexico, April 27, 2005.
- Guest lecturer, *Seminar on Computer-Aided Surgery*, Graduate School of Engineering, Univ. of Verona, Italy, March 3-4, 2005.
- Opening address and presentation, *Permanent Forum on Computer-Aided Surgery*, Hadassah University Hospital, Ein-Karem, Jerusalem, January 30, 2005.
- Keynote address, *Surgetica 2005*, Computer Assisted Medical and Surgical Interventions Surgery, Chambery, France, January 19-21, 2005.

## Professional affiliations

- Member, International Society for Computer-Aided Orthopaedic Surgery (CAOS-International)
- Member, International Society for Computer-Assisted Surgery (ISCAS)
- Senior Member, Institute of Electrical and Electronic Engineers (IEEE)
- Member, American Society of Mechanical Engineers (ASME)
- Member, Sociedad Mexicana para la Ciencia de la Computacion (SMCC)