

## Curriculum Vitae

### PERSONAL

First Name: Nir  
 Surname: Shvalb  
 Lives in: Kibutz Bachan, Israel.  
 Date and Place of Birth: January 29th, 1972, Israel.  
 Marital status: Happily ♥ married + 3 lovely girls


### CONTACT INFORMATION

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### EDUCATION

Ph.D., 2002 to 2006,  
 Mechanical Engineering Department, Technion, Haifa, Israel.

**Doctoral Dissertation:** *Configuration Spaces For Parallel Mechanisms.* 

**Supervised by:** Professor Moshe Shoham, Technion & Professor David Blanc, Haifa University.

M.Sc., 1998 to 2001, (Cum Laude)  
 Mathematics Department, Haifa University, Haifa, Israel.

**Thesis:** *Lie Algebra Models for Rational Homotopy Types.* 

**Supervised by:** Professor David Blanc, Haifa University.

B.Sc., 1996 to 1997, (Cum Laude)  
 Mechanical Engineering Department, Technion, Haifa, Israel.

B.A., 1993 to 1996, (Cum Laude)  
 Physics Department, Technion, Haifa, Israel.

### EMPLOYMENT HISTORY

Physicist, RAFAEL, Israeli's Armament Research Institute, 1994-1997.  
 CTO at Innoging LTD 2018-

### FOUNDER OF:










<http://www.memimed.com>

























Hominis surgical system enables surgical procedures otherwise considered as unfeasible. The Humanoid shaped robotic arms mimic human dexterity and surpass human flexibility with 360° articulation and a variety of minimally-invasive access configurations.




















<http://www.InnoGing.com>

Enables radiologists and physicians to remotely analyze ultrasound scans as if the patient was right next to them. Converted data extracted from ultrasound device can be manipulated, analyzed and evaluated while a Probe and Pad system provides a user interface allows intuitive navigation.

EDUCATIONAL EXPERIENCE	<p><b>Senior Lecturer (Assistant Professor)</b>, Ariel University, Israel. 2013 to present  <i>Courses taught:</i> Introduction to Mechanical Engineering , Final Projects, Robotics Laboratory, Mechanical Systems, Automated manufacturing systems, Advanced Robotics  (Graduate level).</p> <p><b>Lecturer</b>, Ariel University, Israel. 2007 to 2013  <i>Courses taught:</i> Introduction to Robotics, Creative Design, Machine Design, Final Projects, Robotics Laboratory, Introduction to Mechanical Engineering.</p> <p><b>Lecturer</b>, Open University, Israel. 1997 to 2002  <i>Courses taught:</i> Calculus A, Calculus B, Mathematics For Social Sciences,</p> <p><b>Teaching Assistant</b>, Technion, Israel. 2003 to 2006  <i>Courses taught:</i> Plastic deformations.</p> <p><b>Teaching Assistant</b>, Haifa University, Israel. 1996 to 1999  <i>Courses taught:</i> Topology, Modern Algebra.</p> <p><b>Teaching Assistant</b>, Carmiel Collage, Israel. 2004 to 2005  <i>Courses taught:</i> Kinematics and Mechanisms.</p>
RESEARCH INTERESTS	<p>My main interest is Robotics. My research deals mainly with theoretical robotics. Using Algebraic topology I investigate the configuration spaces of parallel mechanisms and their Topological singularities. in the past few years I've also been having fun with some practical robotics. Most of my practical work takes place at the KCG laboratory which I'm head of, together with Dr. Boaz Ben Moshe. We deal with a variety of problems such as medical robotics, global path planning and climbing Robots. At the KCG laboratory we also investigate various computational problems.</p>
PROFESSIONAL ACTIVITIES	<p><b>Editorial board Member:</b> International Journal of Advanced Robotic Systems.</p> <p><b>Journal Reviewer:</b> IEEE Transaction on Robotics, Mathematical Problems in Engineering, Robotica, International journal of robotic research, Mathematical Reviews, Transactions on Mechatronics, Acta Astronautica.</p> <p><b>Conferences Reviewer:</b> IEEE Conference on Robotics and Automation (ICRA), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechanics (BioRob)</p>
PUBLISHED BOOKS	<p>B1. <i>Introduction to Robotics: revised</i>, N. Shvalb, ISBN 9789657376201, Ariel University (203 pages., Hebrew). An undergraduate textbook. </p>
JOURNAL PUBLICATIONS	<p>J1. N. Shvalb, D. Blanc and M. Shoham, "The Configuration Space of Arachnoid Mechanisms", <i>Forum Mathematicum</i>, <b>17/6</b> (2005), pp. 1033-1042.  </p> <p>J2. N. Shvalb, G. Liu, M. Shoham and J. Trinkle, "Complete Motion planning for a Class of planar Multi loop closed chain", <i>International Journal of Robotic Research</i>, <b>26/5</b> (2007). </p> <p></p>

- J3. Y. Wischnitzer, N. Shvalb, and M. Shoham, "Wire-driven Parallel Robot: Permitting Collisions Between Wires", *The International Journal of Robotics Research*, **27/9**, (2008), PP. 1007-1026.  
- J4. N. Shvalb, H. Bamberger, and M. Shoham "Kinematic and Topological Singularities in a class of Parallel Mechanisms", *Mathematical problems in engineering*, Vol 2009.  
- J5. N. Shvalb, M. Shoham and D. Blanc "The configuration space of a parallel polyhedral mechanism", *JP journal of geometry and topology*. **9/2** (2009) PP. 137-167.  
- J6. D. Blanc, N. Shvalb "Generic singular configurations of linkages", *Topology and applications* **159/3** (2012), pp. 877-890.  
- J7. B. Ben-Moshe, M. Shani and N. Shvalb, "Efficient model for indoor radio paths computation", *Simulation Modelling Practice and Theory*, **29**, (2012), pp. 163172.  
- J8. A. Taitz, O. Medina, B. Ben Moshe and N. Shvalb, "Configuration space compression for kinematically redundant robots", *International Journal of advanced robotic systems*, **10/9**, (2013).  
- J9. O. Medina, B. Ben-Moshe and N. Shvalb "A real-time motion planning algorithm for a hyper-redundant set of mechanisms", *Robotica* **31/8**, pp 1327-1335, (2013).  
- J10. M. Wagner, E. M. Berliner, N. Shvalb "Stereo-fusion acquisition and preservation: effects of peripheral fusion locks", *Journal of Molecular Neuroscience*, **51/1**, (2013).
- J11. R. Sarig, I. Hershkovitz, N. Shvalb, T. Sella-Tunis, H. May and A.D. Vardimon, "Proximal attrition facets: morphometric, demographic, and aging characteristics", *European journal of oral sciences* **122/4**, pp 271-278, (2014). 
- J12. I. Reyhav, D. Wu, N. Shvalb, and B. Ben-Moshe, "An exploration of 3D spatial training in teams with a remotely controlled robotic system" *International Journal of Learning Technologies* **9/4**, pp 338-355, (2014). 
- J13. O. Medina, A. Shapiro and N. Shvalb, "Motion Planning for a polyhedron Actuated Flexible Manifold", *Advanced Robotics*, doi:10.1080/01691864.2015.1046925, **29/18**, (2015).  
- J14. Y. Alpert, B. Ben-Moshe, N. Shvalb, E. Piura, R. Tepper, "The effect of the pressure exerted on the maternal abdominal wall by the U.S probe on fetal MCA peak systolic velocity", *European Journal of Ultrasound* **S01/36**, pp 1-7, (2015). 
- J15. O. Medina, A. Shapiro and N. Shvalb, "Kinematics for an Actuated Flexible n-Manifold" *ASME Journal of Mechanisms and Robotics*, **8/2**, (2015).  
- J16. Y. Alpert, E. Piura, N. Shvalb, B. Ben-Moshe, R. Tepper, "The effect of the pressure exerted on the maternal abdominal wall by the U.S probe on fetal MCA peak systolic velocity", *Ultrasound in Obstetrics and Gynecology*, **44/S1**, Pg. 274 (2014) 
- J17. O. Medina, A. Shapiro and N. Shvalb, "Minimal Actuation for an Actuated Flexible Manifold", **32/3**, Pg. 698-706, *IEEE/ASME Transactions on Robotics* (2015).  

- J18. N. Shvalb, Oded Medina, Raz Itzhaki Tamir and B. Ben-Moshe “Flexible-robotic reflector for aerospace applications”, *International Journal of Antennas and Propagation*, Vol. 2015, ArticleID 252371, (2015).  
- J19. Y. Nagar, A. Shechter and N. Shvalb, “Calculating the governing mechanical parameters of Sodium Borohydrid ( $NaBH_4$ ) powder”, *Materials & Design*, 108, Pg. 240-249, (2016).  
- J20. S. Hacohen, S. Shoal, and N. Shvalb, “Applying probability navigation function in dynamic uncertain environments”, 87, Pg. 237-246 *Robotics and Autonomous Systems* (2016).  
- J21. O. Medina, A. Shapiro and N. Shvalb, “Resistor-Based Shape Sensor for a Spatial Flexible Manifold”, *IEEE Sensors Journal*, 17/1, Pg. 46-50, (2016).  
- J22. J. Nathan, N. Smorgick, N. Shvalb, “Robotic assisted laparoscopic myomectomy versus traditional laparoscopic myomectomy: are they the same?”, *Current Obstetrics and Gynecology Reports*, 5/4, Pg. 341-347, Springer (2016).  
- J23. N. Shvalb, T. Grinshpon and O. Medina, “Optimal-Regularity for Serial Redundant Robots”, *Journal of Mechanisms and Robotics*, 9/3, PaperNo: JMR-16-1144, (2017).  
- J24. Dror Hermel, Oded Medina, N. Shvalb, ‘A Note On Estimating Minimal Changeover Time.’, *Cogent Engineering*, 4/1, (2017). 
- J25. D. Blanc, N. Shvalb, ”Configuration spaces of spatial linkages: taking collisions into account”, *bulletin of the korean mathematical society*, 54/5 (2017).  
- J26. S. Hacohen, S. Shoal and N. Shvalb, “Dynamic Model for Pedestrian Crossing in Congested Traffic Based on Probabilistic Navigation Function”, *Transportation Research Part C: Emerging Technologies* (2017)
- J27. N. Shvalb, S. Hacohen, ”A short note on nested sums”, *Miskolc Mathematical Notes* (2017).
- J28. S. asaly, B. Ben Moshe, N. Shvalb, ”Accurate 3D Mapping Algorithm for Flexible Antennas”, *International Journal of Antennas and Propagation*, Article ID 3748623, (2017). 
- J29. B. Ben-Moshe, N. Shvalb, H. Levi, P. Deri, K. Gozlan ”Long-Range and Energy-Efficient Optical Networking for Tiny Sensors”, *Wireless Networks* (2017).
- J30. R. Sarig, A. Pokhojaev, H. May, E. Schulz-Kornas, N. Shvalb, “Formation of Dental Interproximal Wear Mechanisms: A quantitative assessment”, *Journal of Dental Research*, SAGE Publications (2018).
- J31. S. Hacohen, S. Shoal, and N. Shvalb, “Probability Navigation Function for Stochastic Static Environments”,  *International Journal of Control, Automation* (2019)
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- J32. S. Geler, I. Avrahami, N. Shvalb, “Speed Profiles for Autonomous Vehicles supervised Traffic Flow”, Submitted to *Transportation Research Part C: Emerging Technologies* (2019).

J33. A. Masuri, O. Medina, S. Hacoen N. Shvalb , “Self Learning of Gaits for a Quadrupedal Robot”, **Submitted** to *Advanced robotic systems* (2019).

J34. M. Hochhauser, R. Dayan, M. Wagner and N. Shvalb , ”A comparison between digit forces exerted on a writing instrument and pen tip pressure applied on the writing surface during handwriting: a pilot study”, **Submitted** to *human movement science* (2018).


J35. O. Medina, R. Yozevitch, N. Shvalb , ‘Bootstrapping a Neural Network Sensory Training datasets’, **Submitted** to *IEEE Transactions on Instrumentation & Measurement* (2018).

J36. O. Medina, S. Hacoen and N. Shvalb , “Load Carrying swarm”, **Submitted** to *IEEE, transactions of Robotics* (2018).

J37. V. Landa, B. Ben-Moshe, N. Shvalb and S. Hacoen, “GoIn – An Accurate 3D Indoor Navigation Framework based on Light-Landmarks”, **Submitted** to *Navigation* (2018).

CONFERENCE  
& PROCEEDINGS



C1. G. Liu, N. Shvalb , M. Shoham and J. Trinkle, ”Exact Motion planning for Class of planar closed-chain manipulators” Robotics and Automation 2006. ICRA 2006, Proceedings 2006 IEEE Int. Conference of , 133-138.

C2. Y. Agiv, B. Ben-Moshe, P. Carmiz, M. Shani, N. Shvalb , ”Computing Radio Paths in an Urban Environment” Proceedings of IEEE Consumer Communications and Networking Conference (CCNC), 2010 

C3. A. Taitz, O. Medina, B. Ben Moshe and N. Shvalb , ”Configuration space compression for kinematically redundant robots”, ICR 2010.


C4. D. Blanc, N. Shvalb , ” A Topological Definition for Kinematic Singularities of Linkages”, ICR 2010.



C5. N. Shvalb , S. Shoval, B. Ben Moshe, I. Ruchaevski and T. Shteinberg, ”A Jellyfish-like Robot for mimicking jet propulsion”, IEEE 27<sup>th</sup> Convention of Electrical and Electronics Engineers in Israel, 2012.


C6. B. Ben Moshe, N. Shvalb , J. Baadani ; I. Nagar, ”Indoor Positioning and Navigation for micro UAV drones”, IEEE 27<sup>th</sup> Convention of Electrical and Electronics Engineers in Israel, 2012.  





C7. O. Medina, B. Ben Moshe, A. Shapiro, and N. Shvalb , ”An Actuated Flexible Manifold”, The 32<sup>nd</sup> Israeli Conference on Mechanical Engineering, 2012.

C8. I. Rechav, W. dezhi, N. Shvalb , B. Ben Moshe, “Virtual Labs: Experiencing Internet-based 3D Spatial Training”, AIS SIG-ED IAIM 2012 Conference.




C9. M. Wagner, N. Schwalb , J. Shapiro, “Stereo-fusion efficiency and oculomotor stability: Effects of central and peripheral fusion locks ”, *Perception* **41**, 2012. 







C10. B. Ben-Moshe, N. Shvalb , S. Ploit and G. Suissa, “Air Brush — a Geometric Imaging Device for the Visually Impaired”, The European Workshop on Computational Geometry 2014.  

C11. M. Manevich, E. Itskovich and N. Shvalb , “SELF-REPEATING TRAJECTORIES OF LIGHT RAYS”, Proceedings of the 16th International Conference on Geometry and Graphics 2014. 

- C12. B. Ben-Moshe, K. Gozlan, N. Shvalb, T. Raskin, "Micro Robots for Dynamic Sensor Networks" *Lecture Notes in Computer Science* **8629**, pp 187-202, (2015). 
- C13. S. Hacohen, S. Shoal, N. Shvalb, "Motion Planning in Dynamic Uncertain Environment using Probability Navigation Function", 2014 IEEE 28-th Convention of Electrical and Electronics Engineers in Israel (IEEEI 2014). 
- C14. O. Medina, A. Shapiro, N. Shvalb, "An Actuated Flexible Manifold Control", 2014 IEEE 28-th Convention of Electrical and Electronics Engineers in Israel (IEEEI 2014).
- C15. D. Blanc, N. Shvalb, "Configuration spaces of spatial linkages", IMA Conference on Mathematics of Robotics, Inst. of Math. and App., University of Oxford (2015).
- C16. Boaz Ben-Moshe, Shiry Reisberg, N. Shvalb, Roi Yozevitch, "GoIn ? An Accurate Indoor Navigation Framework for Mobile Devices", Microsoft Indoor Localization Competition - IPSN, Vienna, Austria (2016).
- C17. Y. Atzmon, N. Shvalb, A. Aviram, A. Schwartz-Ossad, Y. Gilboa-Hermoni, C. Goldschmit, B. Ben Moshe, R. Tepper, "A novel model for evaluating performance using a laparoscopic simulator using an automatic software program", *International Society for Quality in Healthcare ISQua: 33rd International Conference (2016)*.
- C18. M. Manevitch, N. Shvalb, E. Itskovich, "Self repeating trajectories of light rays inside a polyhedron", *Proceedings of the 17th International Conference on Geometry and Graphics (2016)*.
- C19. R. Morer, S. Hacohen, B. Ben Moshe, N. Shvalb, and R. Yozevitch E. Itskovich, "Improved GNSS Velocity Estimation using Sensor Fusion", *ICSEE- International Conference on the Science of Electrical Engineering (2016)*. 
- C20. M. W. Callen, N. Shvalb, A. Yahalom, "Covariance, Lagrangian Dynamics, and an argument against cosmological variance Of lightspeed", *10th International Symposium Honouring Mathematical Physicist Jean-Pierre Vigié, PortoNovo, Italy (2016)*.
- C21. S. Hacohen, S. Shoal and N. Shvalb, "Multi Agents' Multi Targets Mission Under Uncertainty Using Probability Navigation Function", *13th IEEE International Conference on Control & Automation, Ohrid, Macedonia(2017)*.
- C22. O. Medina, R. Yozevitch and N. Shvalb, "A Neural Network based Omni Light Sensor", *13th IEEE International Conference on Control & Automation, Ohrid, Macedonia(2017)*.
- C23. V. Landa, B. Ben Moshe, S. Hacohen and N. Shvalb, "?GoIn ?- An Accurate 3D Indoor Navigation Framework for Mobile Devices", *2018 International Conference on Indoor Positioning and Indoor Navigation (IPIN)*, Nantes, France 

## PATENTS







- P1. O. Salomon, N. Shvalb, and M. Shoham with collaboration of the Technion. "Vibrating Crawling Robot" (2007). US Patent, US8,294,333 B2. 
- P2. B. Ben Moshe, N. Shvalb, "Methods for identifying whether or not a satellite has a line of sight", US Patent, (2014), US8,941,537 B2. 
- P3. B. Ben Moshe and N. Shvalb, "A Device for Imparting Distance Information" (2012). US Patent, US8,610,879 B2. 

- P4. E. Gur, N. Shvalb, B. Ben-Moshe, "Pneumatic Launcher for launching a projectile at a target and a suitable gunsight", US Patent, US8,640,684 B2. 
- P5. E. Gur, N. Shvalb, B. Ben-Moshe, "Method and device useful for aiming a firearm", UK,US patent, US 13/912,772 
- P6. N. Shvalb, B. Ben Moshe, A. Vardimon and B. Shamur, "Orientation Controller, Mechanical Arm, Gripper and Components thereof" (2010). US Patent, US9,039,057 B2. 
- P7. B. Ben Moshe and N. Shvalb, "Methods and Devices for Imparting Information Such as Image Information for Visually Impaired" (2010). PCT, WO2011117794 A1. 
- P8. B. Ben Moshe, N. Shvalb, "Light fixture connectible device useful for establishing a network infrastructure", (2014). US Patent No. 14/427727 
- P9. R. Tepper, N. Shvalb and B. Ben Moshe, "Device for training users of an ultrasound imaging device", (2014). PCT, US2015/0056591 A1. 



## IN PREPARATION

1. *John Wiley & Sons publishing* Ordered Book: "Autonomous Mobile Robots and Multi-Robot Systems: Positioning, Motion Planning and Communication".
  - 5(a). Book Editing together with E. Kagan and I. Ben-Gal.
  - 5(b). S. Hacohen, N. Shvalb, "Chapter I: Motion in the global coordinates."
  - 5(c). O. Medina, E. Kagan, S. Lineykin and N. Shvalb, "Chapter II: Basic perception and on-line motion planning".
  - 5(d). S. Hacohen, N. Shvalb, "Chapter IV: Motion in potential field and navigation function."
2. S. Hacohen, S. Shoval, and N. Shvalb, "A Multi Agent - Multi Target extensions of the Navigation Function and of the Probability Navigation Function".
3. S. Hacohen, S. Shoval and N. Shvalb, "The Paradox of Pedestrian Urgency and its Effect on Probability for Accidents".
4. D. Blanc, N. Shvalb, "Actuations of linkages and their singularities".
5. D. Blanc, N. Shvalb, "Symmetric Configuration spaces of linkages".
6. Hadas Levine, Frank Rühli, N. Shvalb and Hila May, "Femor's spatial shape as a risk factor for fractures of the collum femoris".

PAST RESEARCH  
STUDENTS

- Oded Medina**, Ph.D., Flexible robotics. (2012-2015) 
- Shlomi Hacohen**, Ph.D., Robot Motion Planning in Dynamic Uncertain Environments. (2014-2017) 
- Oded Medina**, M.Sc., Real Time motion planning for hyper redundant robots. (2010-2012) 
- Moti Shani**, M.Sc., Radio path algorithm in urban environments. (2010-2012) 
- Lior kabesa**, M.Sc., Guide wire Catheterization Simulation and Actuation. (2011-2013) 
- David Asulin**, M.Sc., High Definition Video Coding for H264. (2012-2014) 



**Yakir Nagar**, M.Sc., Modeling & Development of an Hydrogen generator. (2013-2015)   
**Saed Asli**, M.Sc. Student, Accurate 3D Mapping Algorithm for Flexible Antennas. (2016-2018) 

CURRENT RESEARCH  
STUDENTS

**Shlomo Geler**, Ph.D. candidate, Traffic Flow of Autonomous Vehicles. (2016-) 

GRANTS

**Net HD Consortium**, Networking HDTV from the Open Internet, (2010-2012).  
**MAFAT, Ministry of Defense**, (2009-2012).  
**RESCUE Consortium** - Fast Deployment of Wireless networks (2010-2012).  
**MAZI, Ministry of Defense**, (2008).  
**ISRC Consortium**, Israeli Short Range Consortium, (2008-2010).  
**Pniny Chochma**,(2012-2013).  
**NSL Satellites**,(2013-2014).  
**Y. Farber Legacy, visually impaired**,(2014-2015).  
**Omek Consortium**, Israeli 3D camera Range Consortium, (2015-2016).  
**Research excellence award** Ariel University, (2015-2016).  
**NSL Satellites**,(2016-2017).  
**MAFAT, Ministry of Defense**, (2018-2020).