RESUME –Professor Yizhar Or

Full name:	Yizhar Or
Date and place of birth:	03.04.1974, Israel
Marital status:	Married + 3
Web site:	http://yizhar.net.technion.ac.il/
ORCID:	https://orcid.org/0000-0002-9091-9357
Contact:	Office: +972-48295493, Email: izi@technion.ac.il

ACADEMIC DEGREES

2001-2007: Ph. D. in Mechanical Engineering (direct doctoral track), Technion, Israel

1997-2001: B. Sc. Summa cum Laude in Mechanical Engineering, Technion, Israel

1997-2001: B. Sc. Summa cum Laude in Education in Computer Science, Technion, Israel

ACADEMIC APPOINTMENTS

Years 2020+2021; Nov. 2024 – Oct. 2025:

Vice Dean for Teaching Affairs, Faculty of Mechanical Engineering, Technion, Israel

2025-present: Professor, Faculty of Mechanical Engineering, Technion, Israel

2018-present: Associate Professor, Faculty of Mechanical Engineering, Technion, Israel

2010-2017: Assistant Professor, Faculty of Mechanical Engineering, Technion, Israel

(this rank was named "Senior Lecturer" at the Technion until 2012)

2009-2010: Lecturer, Faculty of Mechanical Engineering, Technion, Israel

2007-2009: Postdoctoral Scholar, Dept. of Control and Dynamical Systems, California Institute of Technology (Caltech), California, USA

2007: Short-term postdoctoral scholar, Faculty of Mechanical Engineering and Russell Berrie Nanotechnology Institute (RBNI), Technion, Israel

RESEARCH INTERESTS

Dynamics of under-actuated robots. Dynamics and control of biologically-inspired undulatory robotic locomotion, particularly legged locomotion and swimmers. Dynamics of low-Reynolds-number swimming in biological and bio-medical systems. Soft robotics. Non-smooth dynamics of mechanical systems with intermittent frictional contacts. Hybrid dynamical systems, Nonlinear dynamics and control, Geometric mechanics, Robotics

TEACHING EXPERIENCE (* - given also in English at Technion's International Program)

Instructor: (2009-present, Technion)

036087* "Hybrid dynamics in mechanical systems" (joint undergraduate + graduate + *international).

036026* Kinematic, dynamics and control of robots (joint undergraduate + graduate + *international)

034032* Linear systems (undergraduate)

034010 Dynamics (undergraduate)

035010 Kinematics of mechanisms (undergraduate)

Teaching assistant: (2001-2007, Technion)

034032 Linear systems (undergraduate)

034040 Introduction to control (undergraduate)

034011 Theory of vibrations (undergraduate)

035188 Control Theory (undergraduate)

036026 Kinematics, dynamics and control of robots (joint undergraduate + graduate)

INSTITUTIONAL ACTIVITIES

2026 – present Member, committee for appointment and promotion of research staff, TRDF

2024 - 2025 ME Faculty delegate at Technion's Senate

2024 Leading establishment of a new inter-departmental BSc minor program in Robotics

2022-2023 – participating in Technion's "campus leaders" program (תכנית מובילים בקמפוס מחזור ב')

DEPARTMENTAL ACTIVITIES

2025 – present: Head of Technion's Center for Robotics and Manufacturing System's

2025 – present: Member, Faculty's undergraduate studies committee

2020+2021 + Nov. 2024 – Oct. 2025:

Vice Dean for Teaching Affairs, Faculty of Mechanical Engineering

Led the process of a major revision in the Technion's BSc curriculum of Mechanical Engineering.

2009-2015, 2020-2025: Member of Faculty's graduate studies committee

2009 – present: Head of the Laboratory of Bio-Dynamics and Mechanics of Locomotion

2009 – 2017: Head of "Reamim" program for excellent undergraduate students

PUBLIC PROFESSIONAL ACTIVITIES

Israel Science Foundation (ISF) - member of mechanics committee

Program committee chair and member of steering committee, 3rd Israeli Conference on Robotics, 10-11 November, 2010, Herzliya, Israel.

Conference Editorial Board, IEEE International Conf. Robotics and Automation (ICRA), 2015,2016
International Program Committee Member, IFAC Conf. on Nonlinear Control Systems, 2016 [OC7].

Program committee member, Israeli Conference on Robotics, March 28 2023, Herzliya, Israel.

2024 – present: Advisory board member, Israeli Robotics Association

Reviewer:

Scientific Journals: Advanced Science, Nature Physics, Science Robotics, Phys. Rev. Letters, Phys. Rev E, Proc. Roy. Soc. A, Journal of Fluid Mechanics, Small (Wiley), Soft Robotics, IEEE Transaction on Robotics, IEEE Transaction on Automatic Control, IEEE Transaction on Automation Science & Engineering, Automatica, ASME J. Applied Mechanics Reviews, PLOS One, Journal of Nonlinear Science, International Journal of Nonlinear Mechanics, SIAM Journal on Applied Dynamical Systems, Nonlinear Dynamics, Physica D, European Physical Journal E, Bioinspiration and Biomimetics, Mechanisms and Machine Theory, Journal of Sound and Vibration, European Journal of Mechanics - B/Fluids, Discrete and Continuous Dynamical System – B, Mechanics Research Communications, Mathematical Problems in Engineering.

Research grant proposals: Israel Science Foundation, Israel Ministry of Science and Technology, Pazy Foundation.

Conference Proceedings: IEEE Conference on Decision and Control (CDC), IEEE Conference on Robotics and Automation (ICRA), IEEE/ASME American Control Conference (ACC), IFAC Symposium on Nonlinear Control Systems (NOLCOS), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

IEEE Control Systems society + Robotics and Automation Society
American Physical Society (APS), Division of Fluid Dynamics (DFD)

AWARDS AND HONORS

1997-2001	Certificate of excellence in B.Sc. studies, President of the Technion (for all 8 semesters of undergraduate studies) Two B.Sc. Degrees Summa Cum Laude, Average grade 94.4
2002	Outstanding achievements scholarship - Graduate School, Technion
2001 - 2005	Technion Award for Excellence in Teaching, awarded six times
2004	Ne'eman scholarship for excellent Ph.D beginners, Technion.

2005 Lev-Zion scholarship for excellent Ph.D students from peripheral areas, Planning and Budgeting Committee, Israeli Council for Higher Education (VATAT)

2007 Pnueli Prize for excellent Ph.D. thesis, Faculty of Mech. Eng. Technion

2007-2008 Fulbright Postdoctoral Fellowship

2007-2009 Bikura Postdoctoral Scholarship (ISF) for two academic years

2009 Guan Zhao-Zhi Best Paper Award, IEEE International conference on Decision and Control (CDC) 2009, (paper C11)

2010 David Posnack Memorial Academic Lectureship

2011 Award of excellence in teaching, (034010 Dynamics, spring term 2011)

2013 Award of excellence in teaching, (034032 Linear Systems, spring 2013)

2014 Moshe Yanai Prize for excellence in teaching, Technion

2015 Uzi and Michal Halevy Fund for Innovative Applied Engineering, Research Grant no. 2020992, joint with Amir Gat

2017 Technion's remarkable excellence in teaching, spring term 2017.

2020 Technion's remarkable excellence in teaching, spring term 2020.

2021 Technion's remarkable excellence in teaching, spring term 2021.

2024 Technion's remarkable excellence in teaching, spring term 2024.

2025 Technion's remarkable excellence in teaching, spring term 2025.

GRADUATE STUDENTS

Ph.D. students - graduated: (J - journal paper, C- conference paper, P - conference presentation)

1. Emiliya Gutman, Currently at Rafael, “Analysis of the Dynamics of Miniature Swimmers”, graduated January 2016. [J12, J15, J17, J18, J20]. Currently at RAFAEL Inc.

2. Oren Wiezel, “Optimal control of simplified microswimmer models”, Graduated Jan. 2020. [J21,C17, J30,J34]. Currently at Fortellix Inc.

3. Benny Gamus (co-supervisor Amir Gat), “Dynamic walking locomotion of soft robots with embedded fluidic networks”. [J26,J35,J37,J38]. Graduated June 2020. Currently at Focal Medical Technology.

4. Lior Salem (co-supervisor Amir Gat), “Soft legged robot actuated by embedded fluidic network”, started 3/2015, direct PhD track at Technion Autonomous Systems Program [J26,J35,J36,J37,J42]. Graduated 2021. Currently postdoctoral scholar, co-supervised with Amir Gat.

5. Eran Ben-Haim (Brakim program*, direct PhD track, co-supervisor Amir Gat), "Leveraging bi-stability for minimalistic control of fluid-based soft actuators: theoretical and experimental investigation", graduated 2024. [J26, J36,J43,J48,J51, J53,P77]

Ph.D. students - ongoing:

6. Zvi Chapnik, "Extending geometric mechanics beyond kinematic isotropic systems", co-supervisor Shai Revzen, U. Michigan [J59,P80,P82,P84]. Expected graduation 2027.

7. Noam Berkovich-Lahav, "Using optimal control to improve the performance of multi-link micro-swimmer models with different actuation modes" [P78], direct PhD track, expected graduation 2028.

8. Ruigang Chen, GTIIT student, co-supervised with GTIIT Assoc. Prof. Mingyi Liu, transferred to direct PhD track "Improve the Energy Efficiency of Robot Manipulator by Energy Harvesting and Passive Dynamics", expected graduation 2028. [J52,P83]

M.Sc. students - graduated:

1. Benny Gamus, "Analysis of dynamic bipedal robot walking with contact transitions", Graduated 2013. [J16, C15]

2. Adi Cohen, "Dynamics and control of a robotic walking exoskeleton for disabled persons", Graduated 2014. Currently at KAMAG, Israel. [J27]

3. Asaf Gross, "Analysis of Dynamic Jumping Motion of a Robotic Leg", graduated 2014 [P27].

4. Lior Lasker, "Motion planning of parallel manipulator with joint clearances", graduated 2015 [P18].

5. Motti Moravia (Brakim program*), "Influence of foot slippage on the dynamics and performance of simple legged locomotion models", graduated 2015 [J19].

6. Ofir Chakon (Brakim program*), "Dynamics and control of the Twistcar toy vehicle", graduated October 2015 [P22, J24].

7. Paz Aranyi (Brakim program* ,co-supervisor with J. Dayan), "Optimization of a hybrid robot's weight lifting ability", graduated 2017 [P30]

8. Evgenia Virozub (co-supervisor Alon Wolf), "Dynamics and gait optimization of a multi-link swimming robot using "perfect fluid" model", graduated 2017. [J30, P33]

9. Yuval Harduf (Brakim program*), "Analysis of stability transitions in a superparamagnetic microswimmer" graduated 2017. [J28,J32,J39,P35,P37,P43]

10. Roee Keren, "Analysis of dynamics and actuation and preliminary design of an exoskeleton - a device for assistance in legged motion and load carrying", graduated 2018. [J25,J29]

11. Dan Kellner, "Lyapunov Stability of a Planar Rigid Body Supported by Two Frictional Contacts", graduated 2018.

12. Tal Yona, "Investigation of singular configurations in the dynamics of the kinematic snake robot model", graduated 2018. [J31]

13. Oriel Halvani, "Nonholonomic dynamics of the Twistcar vehicle: asymptotic analysis and hybrid dynamics of frictional skidding", Graduated 2019 [J41].

14. Amit Ross (co-supervisor Amir Degani), "Hybrid robot manipulator obstacle-aided locomotion: modeling, path planning and simulation", graduated June 2021.

*Brakim program – a pre-military program for excellent students who complete both BSc and MSc degrees in 4.5 years.

15. Michael Pukshansky (co-supervisor Amir Gat), “Experimental study of actuation and locomotion in minimally controlled fluid-driven soft robotics”, graduated 2021 in Autonomous Systems Program. [J44].

16. Gilad Ben-Zvi, “Dynamics and stability of Purcell’s micro swimmer model with flexible joints and/or controlled torque at the joints”, graduated 2022 [P75, J49].

17. Elon Tovi, “Dynamics of a planar multi-link swimmer with passive elastic joint(s) using "Perfect Fluid" model”, graduated 2022. [J50,P66]

18. Zvi Chapnik, “Spatial dynamics of flexible nano-swimmers under a rotating magnetic field”, graduated 2022. [J39,P65,J57]

19. Yamit Geron, “Dynamics and minimalistic control of a flexible structure containing bi-stable elements”, (co-supervised with Sefi Givli), graduated 2022. [J53,P67, P77]

20. Leonid Rizayev, “Locomotion dynamics of an underactuated three-link robotic vehicle”, graduated 2023. [P70,P72,J55]

21. Ari Dantus, “Dynamics of an underactuated wheeled robotic vehicle: experimental and theoretical analysis”, (co-supervisor Alon Wolf), graduated 2025 [P81,J58,P85].

22. Zitao Yu, “Nonholonomic Dynamics of several variants of the Twistcar vehicle model - with dissipation, skidding ,and passive steering joint”, graduated 2025. [P71,P73,P79,J58,J54,P85]

23. Chen Reichsboucher, Autonomous Systems and Robotics Program, “Analysis of theoretical models for multilegged robots as dynamic control systems with coupled phase oscillators” (co-advisor Shai Revzen, U. Michigan), graduated 2025.

24. Rom Levy, (Brakim program*), “Investigating generalized models of the dynamics of the Twistcar vehicle”, expected graduation 2026 [P81,J58,J54,P85].

M.Sc. students - ongoing:

25. Avi Marcovici, “Investigating kinematic and dynamic locomotion of snake robot, incorporating intermittent frictional contacts and ground friction”, (co-advisor A. Wolf) in Technion’s Autonomous Systems Program (TASP), expected graduation 2026.

26. Tongchen Lin, GTIIT student, co-supervised with GTIIT Assoc. Prof. Mingyi Liu, “Improving the Energy Efficiency of Bipedal Walking by Energy Recycling”, expected graduation 2026. [J56]

27. Itamar Mordel, “Experimental investigation of a planar robotic swimmer with a passive elastic joint” (co-advisor A. Wolf), expected graduation 2026.

28. Maor Kimmel, “Analysis of Painlevé paradox for a legged robot with two frictional contacts”, expected graduation 2028.

Supervised researchers and research scholars:

Alumni:

Dr. Benny Gamus, post-doctoral scholar 2020-2021 (co-PI Amir Gat), “Analysis of fluid-actuated soft robots for locomotion”. Benny is currently at Focal Medical Technology.

Dr. Oren Wiezel, post-doctoral scholar 2020-2021, “Dynamics and control of multi-link micro-robotic swimmers” [J47]. Oren is currently at Fortellix.

Dr. Jithu Paul post-doctoral scholar 2022-2023 (co-PI Oleg Gendelman), “Analysis of the nonlinear dynamics of robotic locomotion systems” [J46,P68]

Dr. Itzhak Fouxon, external research scientist 2020-2022, Technion Research Associate 2022-2024 (co-PI Alex Leshansky), “Fluid mechanics of spherical squirmers in quasi-steady Stokes flow” [J33,J45].

2024 – 2025 Dr. Alexander Kuznetsov, Immigrating Research Associate, “Animal-inspired energy efficient mechanism for legged walking”.

Ongoing:

2020-present Dr. Lior Salem, post-doctoral scholar, (co-PI Amir Gat) “Fluid-actuated soft robotics”.

2023 - present Dr. Anna Zigelman, research scientist (co-PIs Amir Gat and Yuli Starosvetsky) – “bifurcations in dynamic locomotion systems” [J49,J50,J54,J60,P85].

2024 – present Dr. Eran Ben-Haim, visiting research scientist (co-PI Amir Gat) - “Physical neural networks”

INTERNATIONAL RESEARCH COLLABORATORS (recent 10 years)

Brad Nelson, ETH Zurich, on magnetic nano-swimmers [J17,J32,J39]

Li Zhang, Chinese U. Hong Kong, on magnetic nano-swimmers [J28]

Ross Hatton, Oregon State U., on geometric and optimal control of robot locomotion [J47].

Peter Varkonyi, Budapest University, dynamics and stability of frictional contact systems [J22,J40].

Aaron Ames, California Inst. of Technology, hybrid dynamics of legged robots, [C18,C19]

Shai Revzen, U. Michigan, multi-legged locomotion with friction and slippage, co-PI in Kahn grant, co-supervisor of one MSc and one PhD student [J59,P80,P84].

Mingyi Liu, GTIIT, energy-efficient robots with spring-clutch semi-passive mechanisms, co-supervisor of one MSc and one PhD student. [J52,J56]

Antonio DeSimone, SISSA, Italy. Energy efficiency of micro-swimmers [J34].

Laetitia Giraldi, INRIA Sophia Antipolis Méditerranée. Energy efficiency of micro-swimmers [J34].

François Alouges, Ecole Normale Supérieure Paris-Saclay. Energy efficiency of micro-swimmers [J34].

RESEARCH GRANTS

Grants from external competitive research funds:

2014-2018 Israel Science Foundation – 235,392$, “Investigation of robotic microswimmers’ propulsion, dynamics and control”.

2017-2019 Ministry of Science and Technology (MOST): 1.1 Millions NIS for 3 years, "Dynamic Legged Locomotion of a Soft Robot Actuated by flow in an Embedded Channel Network", joint with Amir Gat.

2019-2022 Ministry of Science and Technology (MOST): 1.5 Million NIS for 3 years, "Dynamics and control of amphibious snake-like robots", joint with Alon Wolf.

2019-2023 Israel Science Foundation – 1,038,000 NIS, “Hybrid dynamics of robotic systems with intermittent frictional contacts – analysis and applications”.

2021-2023 Ministry of Science and Technology (MOST): 400,000 NIS for 3 years, "Dynamics, control and optimization of robotic micro-swimmers".

2020 Israel Science Foundation, 70,000 NIS grant for International Workshop on Microswimmers and Soft Robotics, was held at Technion on February 3-5, 2020. Co-organizers Alex Leshansky and Amir Gat. Booklet

2023-2027 Israel Science Foundation – 1,040,000 NIS, “Nonlinear dynamics, mechanics and control of semi-actuated undulatory robot locomotion”.
ISF equipment for mid-career researchers - 600,000 NIS, “soft robotics laboratory”.

2025 Israel Science Foundation – 70,000 NIS, research workshop “Applications of artificial Intelligence and Machine Learning in Robotics” co-PIs Noa Agmon, David Zarrouk, Avishai Sintov, to be held at Technion during 2026.

Additional research grants:

2010 Bikura research grant for a new faculty (ISF) - 29,000$

2011 Technion Autonomous Systems Program (TASP) – 20,000$, “Control of bipedal robotic locomotion”, with M. Zacksenhouse and P.O. Gutman. [J15, C14, C15]

2012 Technion Autonomous Systems Program (TASP) – 30,000$, “Control of bipedal robotic locomotion”, with M. Zacksenhouse & P.O. Gutman. [J15, C14, C15]

2015-2017 Ministry of Defense (MAFAT) – 700,000ILS, “Soft-robots based on embedded fluidic networks”, joint with Amir Gat (700,000 to each PI for 3 years).

2015 Uzi and Michal Halevy Fund for Innovative Applied Engineering Research – 20,000$, “Soft-robots based on embedded fluidic networks”, joint with Amir Gat.

2016 Ministry of Defense (MAFAT) – 200,000ILS, “Feasibility investigation of a wearable passive device for energy saving in outdoor walking with heavy loads”.

2018 Innovation Authority & Ministry of Defense (MAFAT), “Meimad-Magneton” program, 350,000NIS academy side, " Development of flexible robot for motion in narrow unstructured cavities", joint with Amir Gat.

2020-2022 Dan & Betty Kahn Foundation: "Dynamics and control of legged robots on rough surfaces”, co-PI in {Technion, U. Michigan, Weizmann Institute} collaboration on autonomous robotics in agriculture. (Technion’s part 2.5M$ for 3 years).

2021 Crown-Vanguard Fund for research equipment, 100,000$, “Accurate 3D printing of elastic structures with embedded cavities for soft robotics applications”, joint with Amir Gat.

2021-2024 Ministry of Defense (MAFAT) – 450,000ILS, “Soft-robots for search-and-rescue in collapsed structures at disastrous areas”, joint with Amir Gat.

2022-2025 Technion's Center for Security Science and Technology – 3×100,000ILS, "Investigation and development of a multi-stable robot for search & rescue and tunnels exploration", joint with Amir Gat.

2022 Technion's Autonomous Systems Program – 12,000$, "Investigation and development of a multi-stable robot for search & rescue and tunnels exploration", joint with Amir Gat.

2024-2027 Technion's Autonomous Systems Program – 100,000$ x 3 years, Flagship Project - "Autonomous multi-stable robot for search and exploration", joint with Amir Gat, Oren Salzman, and Amir Degani.

2025-2026 Ministry of Defense (MAFAT) – 600,000ILS, "A demonstrator of elongated flexible structure with manual operation for search-and-rescue in collapsed structures at disastrous areas", joint with Amir Gat.

PUBLICATIONS

Supervised students are underlined. Publications are also available online **here**.

Refereed papers in professional journals my name in bold

Published papers

J1. **Y. Or** and E. Rimon, "Computation and Graphical Characterization of Robust Multiple-Contact Postures in Two-Dimensional Gravitational Environments", *Int. J. of Robotics Research*, 25(11): 1071-1086, 2006.

J2. E. Rimon, R. Mason, J. W. Burdick and **Y. Or**, "A General Stance Stability Test Based on Stratified Morse Theory with Application to Quasi-Static Locomotion Planning", *IEEE Trans. on Robotics*, 24(3):626-641, 2008.

J3. **Y. Or** and R. M. Murray, "Dynamics and Stability of a Class of Low Reynolds Number Swimmers Near a Wall", *Physical Review E*, 79(4):045302R, 2009. (4 pages)

J4. **Y. Or** and E. Rimon, "Analytic Characterization of a Class of 3-Contact Frictional Equilibrium Postures in Three-dimensional Gravitational Environments*", Int. J. of Robotics Research*, 29(1): 3-22, 2010.

J5. D. G. Crowdy and **Y. Or**, "Two-dimensional point singularity model of a low Reynolds number swimmer near a wall", *Physical Review E,* 81(3):036313, 2010

J6. **Y. Or**, "Dynamics and stability of Purcell's three-link microswimmer near a wall", *Physical Review E*, 82(6):065302(R), 2010.

J7. **Y. Or** and A. R. Teel, "Zeno Stability of the Set-Valued Bouncing Ball", *IEEE Trans. on Automatic Control,* 56(2):447-452, 2011.

J8. **Y. Or** and A. D. Ames, "Stability and Completion of Zeno Equilibria in Lagrangian Hybrid Systems*", IEEE Trans. on Automatic Control* 56(6):1322-1336, 2011.

J9. **Y. Or**, S. Zhang and R. M. Murray, "Dynamics and stability of low-Reynolds-number swimming near a wall", *SIAM J. Applied Dynamical Systems*, 10(3):1013-1041, 2011.

J10. **Y. Or** and E. Rimon, "Investigation of Painlevé's Paradox and Dynamic Jamming During Mechanism Sliding Motion", *Nonlinear Dynamics*, 67:1647–1668, 2012**.**

J11.**Y. Or**, “Asymmetry and stability of shape kinematics in microswimmers’ motion”, *Physical Review Letters*, 108:258101, 2012. Marked as “Editor’s Suggestion”.

J12. E. Passov (Gutman) and **Y. Or**, “Dynamics of Purcell's three-link microswimmer with a passive elastic tail”, *European Physical Journal E* 35(8):78, 2012. (invited paper at special issue on active matter)

J13. **Y. Or**, “Painlevé's paradox and dynamic jamming in simple models of passive dynamic walking”, *Regular and Chaotic Dynamics*, 19(1):64-80, 2014. (Springer, invited paper at a special issue: 150th anniversary of anniversary Paul Painlevé's birthday)

J14. D. Alkaher, A. Moshaiov and **Y. Or**, “Guidance laws based on optimal feedback linearization pseudo-control with time-to-go estimation”, *AIAA Journal of Guidance, Control, and Dynamics*, 37(4): 1298-1305, 2014.

J15. E. Gutman and **Y. Or**, “Simple model of a planar undulating magnetic microswimmer”, *Physical Review E* 90(1):013012, 2014.

J16. B. Gamus and **Y. Or**, “Dynamic Bipedal Walking under Stick-Slip Transitions”, *SIAM J. Applied Dynamical Systems* 14(2):609-642, 2015.

J17. B. Jang, E. Gutman, N. Stucki, B. Seitz, P. García-Wendel, T. Newton, J. Pokki, O. Ergeneman, S. Pané, **Y. Or**, and B. J. Nelson, “Undulatory locomotion of magnetic multi-link nanoswimmers”, *ACS Nano Letters* 15(7):4829-4833, 2015

J18. E. Gutman and **Y. Or**, “Symmetries and gaits for Purcell’s three-link microswimmer model”, *IEEE Trans. Robotics* 32(1):53-69, 2015.

J19. M. Moravia and **Y. Or**, “Analysis of foot slippage effects on an actuated spring-mass model of dynamic legged locomotion”, *International Journal of Advanced Robotic Systems* 13:69, 2016.

J20. E. Gutman and Y. Or, “Optimizing an undulating magnetic microswimmer for cargo towing”, *Physical Review E* 93(6):063105, 2016.

J21. O. Wiezel and **Y. Or**, “Optimization and small-amplitude analysis of Purcell's three-link microswimmer model", *Proc. Roy. Soc. A*, 472: 20160425, 2016.

J22. P. L. Varkonyi and **Y. Or**, “Lyapunov stability of a rigid body with two frictional contacts”, *Nonlinear Dynamics* (Springer), 88(1),363-393, 2017. DOI: 10.1007/s11071-016-3247-6

J23. **Y. Or** and E. Rimon, “Characterization of frictional multi-legged equilibrium postures on uneven terrains”, *International Journal of Robotics Research*, 36(1):105-128, 2017.

J24. O. Chakon & **Y. Or**, “Analysis of underactuated dynamic locomotion systems using perturbation expansion - the twistcar toy example”, *J. Nonlinear Science,* 27(4):1215-1234, 2017.

J25. R. Keren and **Y. Or**, "Energy performance analysis of a backpack suspension system with a timed clutch for human load carriage", *Mechanism and Machine Theory (Elsevier)* 120:250-264, 2018.

J26. B. Gamus, E. Ben-Haim, L. Salem, A. D. Gat and **Y. Or**, "Interaction between Inertia, Viscosity and Elasticity in Soft Robotic Actuator with Fluidic Network", *IEEE Transactions on Robotics*, 34(1):81-90, 2018.

J27. A. Cohen and **Y. Or**, “Modelling the Dynamics and Control of Rehabilitative Exoskeleton with Robotic Crutches", International Journal of Advanced Robotic Systems, 15(2), 1729881418761137, 2018.

J28. Y. Harduf, D. Jin, **Y. Or**, and L. Zhang, "Nonlinear parametric excitation effect induces stability transitions in swimming direction of flexible superparamagnetic microswimmers", *Soft Robotics,* 5(4):389-398, 2018.

J29. R. Keren and **Y. Or**, "Theoretical Analysis of a passive wearable spring-clutch mechanism for reducing metabolic energy cost during human walking". *ASME J. Mechanisms Robotics*; 10(6):061004-061004-9, 2018.

J30. E. Virozub, O. Wiezel, A. Wolf and **Y. Or**, "Multi-link swimmers: experiments and theoretical investigation using 'perfect fluid' Model". *Robotica*, 37(8): 1289-1301, 2019.

J31. T. Yona and **Y. Or**, "The wheeled three-link snake model: Singularities in nonholonomic constraints and stick-slip hybrid dynamics induced by Coulomb friction." *Nonlinear Dynamics* 95:2307-2324, 2019. DOI: 10.1007/s11071-018-4693-0

J32. B. Jang, A. Hong, C. Alcantara, G. Chatzipripiridis, X. Martí, E. Pellicer, J. Sort, Y. Harduf, **Y. Or**, B. J. Nelson and S. Pané, "Programmable Locomotion Mechanisms of Hard-Magnetic Nanowires Near a Surface Boundary". *ACS Applied Materials & Interfaces* 11 (3):3214–3223, 2019.

J33. I. Fouxon and **Y. Or**, "Inertial self-propulsion of spherical microswimmers by rotation-translation coupling". *Physical Review Fluids* 4(2), 023101, 2019. *arXiv preprint arXiv:1710.10677*.

J34. O. Wiezel, L. Giraldi, A. DeSimone, **Y. Or** and F. Alouges, "Energy-optimal small-amplitude strokes for multi-link microswimmers: Purcell's loops and Taylor's waves reconciled". *New Journal of Physics,* 21:043050, 2019. *arXiv preprint arXiv:1801.04687*.

J35. L. Salem, B. Gamus, **Y. Or** and A. D. Gat, "Leveraging viscous-peeling in fluid-driven soft-actuators and reconfigurable microchannel networks". *Soft Robotics*, 7(1):76-84, 2020.

J36. E. Ben-Haim, L. Salem, **Y. Or** & A. D. Gat, "Single-input control of multiple fluid-driven elastic actuators via interaction between bi-stability and viscosity", *Soft Robotics* 7(2):259-265, 2020. *arXiv preprint arXiv:1903.04280*

J37. B. Gamus, L. Salem, A. D. Gat and **Y. Or**, "Understanding Legged Crawling for Soft-Robotics", *IEEE Robotics and Automation Letters* 5(2):1397-1404, 2020. *arXiv preprint arXiv:1911.05227*

J38. B. Gamus, A. D. Gat and **Y. Or**, "Dynamic Inchworm Crawling: Performance Analysis and Optimization of a Three-link Robot", *IEEE Robotics and Automation Letters*, 6(1), 111-118, 2020. *arXiv preprint arXiv:2006.01990*.

J39. J. Wu, B. Jang, Y. Harduf, Z. Chapnik, X. Chen, J. Puigmartí-Luis, O. Ergeneman, B. J. Nelson, **Y. Or** and S. Pané, "Helical Klinotactic Locomotion of Two-Link Nanoswimmers with Dual-Function Drug-Loaded Soft Polysaccharide Hinges", *Advanced Science* 8(8), 2004458, 2021, DOI: 10.1002/advs.202004458.

J40. **Y. Or** and P. L. Varkonyi, "Experimental Verification of Stability Theory for a Planar Rigid Body with Two Unilateral Frictional Contacts", *IEEE Transactions on Robotics*. 37(5): 1634-1648, 2021. DOI: 10.1109/TRO.2021.3064871. *arXiv preprint, LINK to movie.*

J41. O. Halvani and **Y. Or**, "Nonholonomic dynamics of the Twistcar vehicle: asymptotic analysis and hybrid dynamics of frictional skidding", *Nonlinear Dynamics*, 107:3443-3459, 2022. DOI 10.1007/s11071-021-07151-2.

J42. L. Salem, A. D. Gat and **Y. Or**, "Fluid-driven traveling waves in soft robots", *Soft Robotics* 9:6, 1134-1143, 2022 (online), DOI: 10.1089/soro.2021.0116. *arXiv:2108.07579* .

J43. E. Ben-Haim, D. Ilssar, **Y. Or** and A. D. Gat, "Viscous flow-fields in hyperelastic chambers", *Journal of Fluid Mechanics*, 937:A18, 2022. DOI:10.1017/jfm.2022.96. *arXiv:2105.10290* .

J44. D. Ilssar, M. Pukshansky, **Y. Or** and A. D. Gat, "Dynamics of reconfigurable straw-like elements", *Physical Review Applied* 18:034041, 2022. DOI: 10.1103/PhysRevApplied.18.034041. **Marked as "Editor's Suggestion"**, arXiv preprint 2202.12657 .

J45. I. Fouxon, A. Leshansky, B. Rubinstein, and **Y. Or**, "Lamb-type solution and properties of unsteady Stokes equations", *Physical Review Fluids*, *7*(9), 094103, 2022. arXiv preprint: arXiv:2110.00387 .

J46. J. Paul*, **Y. Or** and O. V. Gendelman, "Nonlinear dynamics and bifurcations of a planar undulating magnetic microswimmer". *Physical Review E* 107:054211, 2023. arXiv preprint arXiv:2209.15299.

J47. O. Wiezel, S. Ramasamy, N. Justus, **Y. Or** and R. L. Hatton, "Geometric analysis of gaits and optimal control for three-link kinematic swimmers". *Automatica* 158 (2023) 111223. arXiv preprint arXiv:2109.06511.

J48. E. Ben-Haim, G. Shmuel, **Y. Or** and A. D. Gat, "Non-spherical deformations of hyperelastic membranes", *Int. J. Solids and Structures*, 282 (2023) 112448. Preprint at Elsevier SSRN.

J49. G. Ben Zvi, A. Zigelman and **Y. Or**, "Dynamics of Purcell's swimmer with active-elastic joints", *Physical Review E* 110:014207, 2024. arXiv preprint arXiv.2309.09655.

J50. E. Tovi, A. Zigelman and **Y. Or**, "Dynamics, stability and bifurcations of a planar three-link swimmer with passive visco-elastic joint using "ideal fluid" model", *Int. J. Nonlinear Mechanics* 167:104859, 2024. Online preprint

J51. E. Ben-Haim, S. Givli, **Y. Or** and Amir Gat, "Multistable physical neural networks", *Advanced Intelligent* Systems, 2400694, 2025. arXiv preprint arXiv:2406.00082

J52. R. Chen, **Y. Or** and M. Liu, "Improving the Energy Efficiency by Using Quasi-Passive-Dynamics-based Elastic Actuator", *IEEE Robotics and Automation Letters*, 10(4):3996-4003, 2025.

J53. Y. Geron, E. Ben-Haim, A. D. Gat,**Y. Or** and S. Givli, "Dynamic single-input control of multi-state multi-transition soft robotic actuator", *Advanced Intelligent Systems*, 2500077, 2025. arXiv preprint arxiv:2407.05961

J54. A. Zigelman, Z. Yu, R. Levy and **Y. Or**, "Dynamics and multi-stability of a rotor-actuated Twistcar robot with passive steering joint", accepted to Nonlinear Dynamics, DOI:10.1007/s11071-025-12092-1. arXiv preprint arxiv:2507.04846

J55. L. Rizyaev and **Y. Or**, "Locomotion Dynamics of an Underactuated Three-Link Robotic Vehicle", Accepted to *IEEE Transactions on Robotics*, 2026. DOI:10.1109/TRO.2026.3661720, arXiv preprint arxiv:2407.21540

Submitted papers:

J56. T. Lin, C. Zhang, **Y. Or** and M. Liu, "Improving the Energy Efficiency of Bipedal Walking by Energy Recycling", submitted.

J57. Z. Chapnik and **Y. Or**, "Spatial dynamics of flexible nano-swimmers under a rotating magnetic field", submitted. arXiv preprint arxiv:2506.07174

J58. R. Levy, A. Dantus, Z. Yu, and **Y. Or**, "Analysis and experiments of the dissipative Twistcar: direction reversal and asymptotic approximations", submitted. arXiv preprint arxiv:2506.19112

J59. Z. Chapnik, **Y. Or**, and S. Revzen, "Sample Efficient Learning of Body-Environment Interaction of an Under-Actuated System", submitted. arXiv preprint arxiv:2601.13777

J60. A. Zigelman, G. Israel, **Y. Or**, and Y. Starosvetsky, "Passive Vibration-Driven Locomotion", submitted, 2026. arXiv preprint arxiv:2602.16277

Refereed papers in Conference proceedings

Published papers (graduate students – underlined, presenter – marked by '*')

C1. **Y. Or*** and E. Rimon, "Robust Multiple-Contact Postures in a Two- Dimensional Gravitational Field", *Proc. 2004 IEEE Int. Conf. on Robotics and Automation*, pp. 4783-4788, New Orleans, LA, April 26 - May 1, 2004

C2. **Y. Or** and E. Rimon*, "Computation and Graphical Characterization of Robust Multiple-Contact Postures in 2D Gravitational Environments", *Proc. 2005 IEEE Int. Conf. on Robotics and Automation*, pp. 247-252, Barcelona, Spain, April 18-22, 2005

C3. **Y. Or*** and E. Rimon, "Computing 3-Legged Equilibrium Stances in Three- Dimensional Gravitational Environments", *Proc. 2006 IEEE Int. Conf. on Robotics and Automation*, pp. 1984-1989, Orlando, FL, May 15-19, 2006

C4. **Y. Or*** and E. Rimon, "Geometric Characterization and Experimental Validation of Frictional 3-Contact Equilibrium Stances in Three Dimensions", *Proc. 2007 IEEE Int. Conf. on Robotics and Automation*, pp. 193-198, Rome, Italy, April 10-14, 2007

C5. D. Meltz, **Y. Or*** and E. Rimon, "Experimental Verification and Graphical Characterization of Dynamic Jamming in Frictional Rigid-Body Mechanics", *Proc. 2007 IEEE Int. Conf. on Robotics and Automation*, pp. 580-585, Rome, Italy, April 10-14, 2007

C6. **Y. Or*** and E. Rimon, "On the Hybrid Dynamics of Planar Mechanisms Supported by Frictional Contacts. I: Necessary Conditions for Stability", *Proc. 2008 IEEE Int. Conf. on Robotics and Automation*, pp. 1213-1218, Pasadena, CA, May 19-23, 2008

C7. **Y. Or*** and E. Rimon, "On the Hybrid Dynamics of Planar Mechanisms Supported by Frictional Contacts. II: Stability of Two-Contact Rigid Body Postures", *Proc. 2008 IEEE Int. Conf. on Robotics and Automation*, pp. 1219-1224, Pasadena, CA, May 19-23, 2008

C8. **Y. Or*** and A. D. Ames, "Stability of Zeno Equilibria in Lagrangian Hybrid Systems", *Proc. 2008 IEEE Conf. on Decision and Control (CDC)*, pp. 2770-2775, Cancun, Mexico, December 9-11, 2008

C9. **Y. Or** and A. D. Ames*, "Existence of Periodic Orbits with Zeno Behavior in Completed Lagrangian Hybrid Systems", in *Proc. Hybrid Systems: Computation and Control, Lecture Notes on Computer Science*, Springer-Verlag, 2009, pp. 291-305, San Francisco, CA, April 13-15, 2009.

C10. **Y. Or*** and A. D. Ames, "Formal and Practical Completion of Lagrangian Hybrid Systems", in *Proc. 2009 American Control Conference (ACC*), pp. 3624-3631, St. Louis, MO, June 10-12, 2009.

C11. **Y. Or**, J. Vankerschaver*, S. D. Kelly, R. M. Murray and J. E. Marsden, "Geometric Control of Particle Manipulation in a Two-Dimensional Fluid", in *Proc. 2009 IEEE Conf. on Decision and Control (CDC)*, pp. 19-26, Shanghai, China, December 16 – 18, 2009. **Winner of Guan Zhao-Zhi Best Paper Award**

C12. S. Zhang*, **Y. Or** and R. M. Murray, "Experimental demonstration of the dynamics and stability of a low Reynolds number swimmer near a plane wall", in *Proc. 2010 American Control Conference (ACC)* pp. 4205-4210, Baltimore, MD, June 30 - July 2, 2010

C13. **Y. Or*** and A. R. Teel, "Using the Set-Valued Bouncing Ball for Bounding Zeno Solutions of Lagrangian Hybrid Systems", *2010 IFAC Symposium on Nonlinear Control Systems (NOLCOS)* pp. 801-806, Bologna, Italy, September, 01-03, 2010

C14. J. Spitz*, **Y. Or** and M. Zacksenhouse, "Towards a Biologically Inspired Open Loop Controller for Dynamic Biped Locomotion", *Proceedings of the 2011 IEEE conference on Robotics and Biomimetics (ROBIO)*, pp. 503-508, Phucket, Thailand, December 7-11, 2011

C.15 B. Gamus and **Y. Or**, "Analysis of dynamic bipedal robot locomotion with stick-slip transitions", *Proc. 2013 IEEE Int. Conf. on Robotics and Automation*, pp. 3333-3340, Karlsruhe, Germany, May 6-10, 2013

C16. H. Ziso*, **Y. Or** and M. Shoham. "Numerical model of magnetic bead chain for minimal radius of curvature passage based on linear programming", *Proc. 14th World Congress in Mechanism and Machine Science*, pp. 606-611, Taipei, Taiwan, 25-30 October, 2015.

C17. O. Wiezel* and **Y. Or**, "Using optimal control to obtain maximum displacement gait for Purcell's three-link swimmer", *Proc. 2016 IEEE Conf. on Decision and Control (CDC)*, pp. 4463-4468. Las Vegas, USA, 12-15 December 2016.

C18. W. Ma, **Y. Or** and A. D. Ames, "Dynamic Walking on Slippery Surfaces: Demonstrating Stable Bipedal Gaits with Planned Ground Slippage". *Proc. 2019 IEEE Int. Conf. on Robotics and Automation* pp. 3705-3711, May 20-24, 2019, Montreal, Canada. *Arxiv preprint*

C19. E. Ambrose, N. Csomay-Shanklin, **Y. Or** and A. D. Ames, "Design and Comparative Analysis of 1D Hopping Robots", *Proc. 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Nov. 4 – 8, 2019 Macao, China.

Patents:

Elbaz, S., Salem, L., Gamus, B., Or, Y., Gat, A.D., & Peretz, O. (2022), "Morphing aircraft skin with embedded viscous peeling network", U.S. Patent Application No. 17/422,539.

CONFERENCES

Invited talks at international workshops (funded travel):

I1. Invited lecture in the International Workshop on Geometric and Topological Methods in Control and Robotics, October 4-6, 2010, Madrid, Spain - "Geometric mechanics, control and stabilization of low-Reynolds-number swimming near boundaries", (1 out of 10 invited speakers).

I2. Invited lecture in the workshop on impact with friction and the Painlevé paradox, Bristol University, UK, 21-22 Nov. 2011 - "Dynamic jamming and Painlevé's paradox". Organizer: Prof. Alan Champneys

I3. Invited lecture series, "nonholonomic dynamics and undulatory locomotion of articulated robotic vehicles", to be given at 2025 CISM course on The Dynamics of Rolling and Balancing in Micromobility, to be held at the International Center for Mechanical Sciences (CISM) at Udine, Italy in October 2025.

Invited talks at local workshops and at invited sessions in local conferences:

I3. **Y. Or**, "Exact geometric characterization of equilibrium postures on a frictional terrain in three dimensions", CRI Workshop on Geometry and Topology in Robotics, Haifa University, Israel, January 10, 2010

I4. **Y. Or** and A. R. Teel, "The set-valued bouncing ball and its application to Lagrangian hybrid systems", special session on switched and hybrid systems (organizer: Prof. Michael Margaliot, Tel-Aviv University), IEEE 26th Convention of Electrical and Electronics Engineers in Israel, Eilat, Israel, Nov. 17-20, 2010

I5. **Y. Or,** "Symmetries and stability in the dynamics of robotic microswimmers", CRI Workshop on Topological Robotics, Haifa University, Israel, December 25, 2012.

I6. **Y. Or,** "Dynamics and control of (bio-)robotic locomotion: Nonlinear, nonholonomic and hybrid mechanical systems", 2nd Sweden-Israel Control Conference, Technion, November 9-11, 2014.

I7. **Y. Or**, "Dynamics and control of robotic locomotion", Symposium on Control Theory and Power Engineering (organizers: Prof. Michael Margaliot, and Prof. George Weiss), ICSEE 2016 Conference of IEEE Israel, Eilat, Nov. 16-18, 2016

Conference presentations (supervised students – underlined, presenter – marked by '*')

P1. **Y. Or**, "Towards Motion Planning and Control of Walking Multi-Legged Robots Under Gravity", Workshop of Graduate Students in Control (GSC 2005), Ben Gurion University, Beer Sheva, Israel, January 3, 2005

P2. **Y. Or*** and E. Rimon, "Computation and Graphical Characterization of Robust Multiple-Contact Postures in 2D Gravitational Environments", The 30th Israeli Conference on Mechanical Engineering, Tel-Aviv, Israel, May 29-30, 2005

P3. **Y. Or*** and E. Rimon, "Computing 3-Legged Equilibrium Stances in Three-Dimensional Gravitational Environments", The 1st Israeli Conference on Robotics (ICR 2006), Tel-Aviv University, Israel, June 29, 2006

P4. **Y. Or***, D. Meltz and E. Rimon, "Dynamic jamming - experimental demonstration of inconsistency in frictional rigid-body dynamics", ICRA 2008 Workshop on Contact Models for Manipulation and Locomotion, Pasadena, CA, May 19, 2008

P5. E. Rimon* and **Y. Or**, "Geometric Characterization and Experimental Validation of Frictional 3-Contact Equilibrium Stances in Three Dimensions", ICRA 2008 Workshop on Algorithmic Automation, Pasadena, CA, May 20, 2008

P6. D. Meltz*, **Y. Or** and E. Rimon, "Experimental Verification and Graphical Characterization of Dynamic Jamming in Frictional Rigid-Body Mechanics", 2nd Israeli Conference on Robotics (ICR 2008), Herzlia, Israel, November 19-20, 2008

P7. **Y. Or*** and R. M. Murray, "Dynamics and stability of low Reynolds number swimming near a plane wall", 61st Annual Meeting of the APS Division of Fluid Dynamics (DFD), San Antonio, Texas, November 23–25, 2008

P8. **Y. Or*** and R. M. Murray, "Dynamics and stability of low Reynolds number swimming near a wall" (poster), IMA Workshop: "Natural Locomotion in Fluids and on Surfaces: Swimming, Flying, and Sliding", University of Minnesota, June 1-5, 2010

P9. **Y. Or*** and E. Rimon, "Investigation of Painlevé's paradox and dynamic jamming during mechanism sliding motion", 7th European Nonlinear Dynamics Conference (ENOC 2011), July 24-29, 2011, Rome, Italy.

P10. **Y. Or***, "Dynamics and stability of Purcell's three-link microswimmer near a wall", 7th European Nonlinear Dynamics Conference (ENOC 2011), July 24-29, 2011, Rome, Italy.

P11. B. Gamus* and **Y. Or**, "Analysis of a Bipedal Walking Robot with Hybrid Dynamics", 32nd Israeli Conf. on Mechanical Engineering, Tel Aviv, Israel, October 17-18, 2012.

P12. E. Gutman* and **Y. Or**, "Dynamics of Purcell's Three-Link Microswimmer with a Passive Elastic Tail", 32nd Israeli Conf. on Mechanical Eng., Tel Aviv, Oct. 17-18, 2012.

P13. **Y. Or***, "Asymmetry and stability of shape kinematics in microswimmers' motion", 65th Annual Meeting of APS Division of Fluid Dynamics, San Diego, CA, USA, November 18-20, 2012.

P14. E. Gutman and **Y. Or***, "Dynamics of Purcell's three-link microswimmer with a passive elastic tail", 65th Meeting of APS Division of Fluid Dynamics, San Diego, CA, November 18-20, 2012.

P15. **Y. Or***, "Asymmetry and stability of shape kinematics in microswimmers' motion", 5th International Symposium on Bifurcations and Instabilities in Fluid Dynamics (BIFD 2013), Haifa, Israel, July 8-11, 2013.

P16. E. Gutman and **Y. Or***, "Dynamics of Purcell's three-link microswimmer with a passive elastic tail", 5th International Symposium on Bifurcations and Instabilities in Fluid Dynamics (BIFD 2013), Haifa, Israel, July 8-11, 2013.

P17. E. Gutman* and **Y. Or**, "Analysis of the dynamics and motion control of miniature swimmers", 4th Israeli Conference on Robotics (ICR 2013), Tel Aviv, Israel, November 19-20, 2013.

P18. L. Lasker* and **Y. Or***, "Path planning of planar parallel manipulator with joint clearances", 4th Israeli Conference on Robotics (ICR 2013), Tel Aviv, Israel, November 19-20, 2013.

P19. B. Gamus and **Y. Or***, "Analysis of dynamic bipedal robot walking with stick-slip transitions", Dynamic Walking 2014, June 10-13, 2014, ETH University, Zurich, Switzerland.

P20. B. Gamus and **Y. Or***, "Analysis of dynamic bipedal robot walking with stick-slip transitions", 8th European Nonlinear Dynamics Conference (ENOC 2014), July 6-11, 2014, Vienna, Austria.

P21. E. Gutman* and **Y. Or**, "Simple model of a planar undulating magnetic microswimmer", 8th European Nonlinear Dynamics Conference (ENOC 2014), July 6-11, 2014, Vienna, Austria.

P22. O. Chakon* and **Y. Or**, "Theoretical and Experimental Investigation of the Twistcar Vehicle's Dynamics", 33rd Israeli Conf. on Mechanical Eng., Tel Aviv, March 2-3, 2015.

P23. A. Cohen* and **Y. Or**, "Dynamics and control of rehabilitative exoskeleton with robotic crutches", 33rd Israeli Conf. on Mechanical Eng., Tel Aviv, March 2-3, 2015.

P24. E. Gutman* and **Y. Or**, "Simple model of a planar undulating magnetic microswimmer", 33rd Israeli Conf. on Mechanical Eng., Tel Aviv, March 2-3, 2015.

P25. E. Gutman and **Y. Or***, "Optimizing an undulating magnetic microswimmer for cargo towing**",** 68th Annual Meeting of APS Division of Fluid Dynamics (DFD), Boston MA, Nov. 22–24, 2015.

P26. I. Perel*, H. Bunis* and **Y. Or**, "Control of a truck and trailer system in reverse", 33rd Israeli Conf. on Mechanical Eng., Tel Aviv, March 2-3, 2015.

P27. A. Gross* and **Y. Or**, "Analysis of Dynamic Jumping Motion of a Robotic Leg", 33rd Israeli Conf. on Mechanical Eng., Tel Aviv, March 2-3, 2015.

P28. **Y. Or***, "Analysis of foot slippage in simple theoretical models of dynamic legged locomotion in sagittal plane", CRM conference on open problems in nonsmooth dynamics, February 1-5, 2016, Barcelona, Spain.

P29. O. Wiezel* and **Y. Or**, "Optimization and small-amplitude analysis of Purcell's three-link microswimmer model", 5th Israeli Conf. on Robotics (ICR 2016), Herzlia, Israel, April 13-14, 2016

P30. P. Aranyi*, **Y. Or** and J. Dayan, "Optimization of a hybrid robot's weight lifting ability", 5th Israeli Conf. on Robotics (ICR 2016), Herzlia, Israel, April 13-14, 2016

P31. M. Goltsman, A. Levi-Yamamori and **Y. Or***, "Stabilization and path tracking control of a vehicle with trailers in reverse", 5th Israeli Conf. on Robotics (ICR 2016), Herzlia, Israel, April 13-14, 2016

P32. O. Wiezel* and **Y. Or**, "Optimal control, optimization and asymptotic analysis of Purcell's microswimmer model", Israeli Conf. of Mechanical Engineering, Technion Haifa, Nov 22-23, 2016.

P33. E. Virozub* and **Y. Or**, "Dynamics and gait optimization of a swimming snake robot using 'perfect fluid' model", Israeli Conf. of Mechanical Engineering, Technion Haifa, Nov 22-23, 2016.

P34. R. Keren* and **Y. Or**, "Analysis of energy performance of a suspension system with a timed clutch mechanism for human load carriage", Israeli Conf. of Mechanical Engineering, Technion Haifa, Nov 22-23, 2016.

P35. Y. Harduf* and **Y. Or**, "Dynamics and stability analysis of a microswimmer with a superparamagnetic head under a planar oscillating magnetic field", Israeli Conf. of Mechanical Engineering, Technion Haifa, Nov 22-23, 2016.

P36. **Y. Or*** and P. L. Varkonyi "Lyapunov stability of a rigid body with two frictional contacts", Israeli Conf. of Mechanical Engineering, Technion Haifa, Nov 22-23, 2016.

P37. Y. Harduf* and **Y. Or**, "Stability transitions and directional flipping in a microswimmer with superparamagnetic links"**,** 69th Annual Meeting of APS Division of Fluid Dynamics (DFD), Portland OR, Nov. 20–22, 2016.

P38. O. Wiezel* and **Y. Or**, "Optimal control, optimization and asymptotic analysis of Purcell's microswimmer model"**,** 69th Annual Meeting of APS Division of Fluid Dynamics (DFD), Portland OR, Nov. 20–22, 2016.

P39. Y. Harduf* and **Y. Or**, "Analysis of stability transitions in a microswimmer with superparamagnetic head", Annual Conference of the Israeli Association of Theoretical and Applied Mechanics (ISTAM), February 22, 2017, Tel Aviv. (ISTAM Best student lecture distinction).

P40. P. Varkonyi* and **Y. Or**, "Lyapunov stability of a planar rigid body with two frictional point contacts", 9th European Nonlinear Dynamics Conference (ENOC 2017), June 25-30, 2017, Budapest, Hungary.

P41. **Y. Or*** and O. Chakon, "Analysis of underactuated dynamic locomotion systems using perturbation expansion - the twistcar toy example", European Nonlinear Dynamics Conference (ENOC 2017), June 25-30, 2017, Budapest, Hungary.

P42. **Y. Or*** and R. Keren, "Analysis of passive wearable spring-clutch device for energy saving during walking", 9th European Nonlinear Dynamics Conference (ENOC 2017), June 25-30, 2017, Budapest, Hungary.

P43. Y. Harduf and **Y. Or***, "Analysis of stability transitions in a microswimmer with superparamagnetic head", 9th European Nonlinear Dynamics Conference (ENOC 2017), June 25-30, 2017, Budapest, Hungary.

P44. D. Jin*, Y. Harduf, **Y. Or** and L. Zhang, "Stability transitions in swimming direction of flexible superparamagnetic microswimmers under oscillating magnetic field", poster presentation at International Conference of Micro/Nanomachines (ICMNM), Wuhan, China, August 25-28, 2017.

P45. **Y. Or**, "Soft Robotics: shape-changing legged locomotion", presented at Workshop on Security and Defense Research, Nov 21, 2017, at the Technion.

P46. B. Gamus*, L. Salem, E. Ben-Haim, A. D. Gat and **Y. Or**, "Interaction between inertia, viscosity, and elasticity in soft robotic actuator with fluidic network". 70th Annual Meeting of APS Division of Fluid Dynamics (DFD), November 19-21, 2017, Denver, Colorado, USA.

P47. B. Gamus*, L. Salem, E. Ben-Haim, A. D. Gat and **Y. Or**, "Interaction between inertia, viscosity, and elasticity in soft robotic actuator with fluidic network". Workshop talk, IEEE Int. Conf. on Soft Robotics (RoboSoft 2018), April 25-27, 2018, Livorno, Italy.

P48. B. Gamus*, L. Salem, A. D. Gat and **Y. Or**, "Analysis of Soft Robotic Actuators and Bipedal Crawling", Poster presentation, IEEE Int. Conf. on Soft Robotics (RoboSoft 2018), April 25-27, 2018, Livorno, Italy.

P49. L. Salem*, B. Gamus, **Y. Or** and A. D. Gat, "Viscous-Peeling as a Method to Fabricate and Actuate Microchannel Networks and Soft-Robots". Poster presentation, IEEE Int. Conf. on Soft Robotics (RoboSoft 2018), April 25-27, 2018, Livorno, Italy.

P50. Y. Harduf and **Y. Or***, Nonlinear parametric excitation effect induces stability transitions in swimming direction of flexible superparamagnetic microswimmers". Workshop talk, IEEE Int. Conf. on Soft Robotics (RoboSoft 2018), April 25-27, 2018, Livorno, Italy.

P51. B. Gamus*, L. Salem, E. Ben-Haim, A. D. Gat and **Y. Or**, "Interaction between inertia, viscosity, and elasticity in soft robotic actuator with fluidic network". Poster presentation, IEEE Conf. on Robotics and Automation (ICRA 2018), May 21-16, 2018, Brisbane, Australia.

P52. B. Gamus*, L. Salem, A. D. Gat and **Y. Or**, "Understanding Legged Crawling for Soft-Robotics", Workshop talk, IEEE/RSJ International Conf. on Intelligent Robots and Systems (IROS 2018), October 1-5, 2018, Madrid, Spain.

P53. O. Wiezel*, L. Giraldi, A. DeSimone, **Y. Or** and F. Alouges, "Energy-optimal small-amplitude strokes for multi-link microswimmers", the 35th Israeli Conference on Mechanical Engineering, Oct. 9-10, 2018, Ben-Gurion University, Israel.

P54. E. Ben-Haim, L. Salem*, **Y. Or** and A. D. Gat, "Control of multiple elastic actuators by a single input via interaction between viscosity and bi-stability", the 35th Israeli Conference on Mechanical Engineering, Oct. 9-10, 2018, Ben-Gurion University, Israel.

P55. L. Salem*, B. Gamus, **Y. Or** and A. D. Gat "Viscous-Peeling as a Method to Fabricate and Actuate Microchannel Networks and Soft-Actuators", the 35th Israeli Conference on Mechanical Engineering, Oct. 9-10, 2018, Ben-Gurion University, Israel.

P56. T. Yona and **Y. Or***, "Theoretical analysis of wheeled three-link snake robot: singularities of nonholonomic constraints and stick-slip hybrid dynamics", the 35th Israeli Conference on Mechanical Engineering, Oct. 9-10, 2018, Ben-Gurion University, Israel.

P57. L. Salem, B. Gamus*, **Y. Or**, and A. D. Gat, "Leveraging viscous peeling in soft actuators and reconfigurable microchannel networks", Poster presentation, IEEE Int. Conf. on Soft Robotics (RoboSoft 2019), April 14-18, 2019, Seoul, Korea.

P58. B. Gamus*, L. Salem, A. D. Gat and **Y. Or**, "Hybrid Quasistatics for Multi-Contact Soft-Robotic Legged Locomotion". Poster presentation, IEEE Int. Conf. on Soft Robotics (RoboSoft 2019), April 14-18, 2019, Seoul, Korea.

P59. E. Ben-Haim, L. Salem, **Y. Or** and A. D. Gat*, "Single-Input Control of Multiple Fluid-Driven Elastic Actuators Via Interaction Between Bi-Stability and Viscosity". Poster presentation, IEEE Int. Conf. on Soft Robotics (RoboSoft 2019), April 14-18, 2019, Seoul, Korea.

P60. L. Salem*, B. Gamus, **Y. Or**, and A. D. Gat, "Leveraging viscous peeling in soft actuators and reconfigurable microchannel networks", Fluid and Elasticity Conference, June 24-26, 2019, Malaga, Spain.

P61. B. Gamus*, L. Salem, **Y. Or** and A. D. Gat, "Modeling and Analyzing Multi-Contact Soft-Robotic Passive Frictional Crawling", The 6th Israeli conference on Robotics, July 8-10 2019, Herzliya, Israel.

P62. O. Wiezel* and **Y. Or**, "Geometric vs. variational optimal control of gaits for 3-link swimmers", the 6th Israeli conference on Robotics, July 8-10 2019, Herzliya, Israel.

P63. O. Halvani* and **Y. Or**, "Nonholonomic dynamics of the Twistcar vehicle: Asymptotic analysis and hybrid dynamics of frictional skidding", the 6th Israeli conference on Robotics, July 8-10 2019, Herzliya, Israel.

P64. **Y. Or*** and P. L. Varkonyi, "Experimental Verification of Stability Theory for a Planar Rigid Body with Two Unilateral Frictional Contacts", 10th European Nonlinear Dynamics Conference (ENOC 2022), July 17-22, 2022, Lyon, France.

P65. Z. Chapnik* and **Y. Or**, "Stability transitions of flexible nano-swimmer under rotating magnetic field", 10th European Nonlinear Dynamics Conference (ENOC 2022), July 17-22, 2022, Lyon, France.

P66. E. Tovi* and **Y. Or**, "Dynamics and stability of a planar three-link swimmer with passive visco-elastic joint in Ideal fluid", 10th European Nonlinear Dynamics Conference (ENOC 2022), July 17-22, 2022, Lyon, France.

P67. Y. Geron*, S. Givli and **Y. Or** (poster), "Dynamics and minimalistic control of a flexible structure containing bi-stable elements", 10th European Nonlinear Dynamics Conference (ENOC 2022), July 17-22, 2022, Lyon, France.

P68. J. Paul*, **Y. Or** and O. V. Gendelman (poster), "Bifurcations and stability transitions in nonlinear dynamics of a planar undulating magnetic microswimmer", 10th European Nonlinear Dynamics Conference (ENOC 2022), July 17-22, 2022, Lyon, France.

P69. Z. Chapnik* and **Y. Or**, "Stability transitions of flexible nano-swimmer under rotating magnetic field", Israeli Robotics Conference, March 28, 2023, Herzliya, Israel.

P70. L. Rizyaev* and **Y. Or**, "Locomotion dynamics of an underactuated wheeled three-link robot", Israeli Robotics Conference, March 28, 2023, Herzliya, Israel.

P71. Z. Yu* and **Y. Or**, "Nonholonomic dynamics of steer-free rotor-actuated Twistcar", Israeli Robotics Conference, March 28, 2023, Herzliya, Israel.

P72. L. Rizyaev* and **Y. Or**, "Locomotion dynamics of an underactuated wheeled three-link robot" (online), 3rd International Nonlinear Dynamics Conf. (NODYCON 2023), June 18-22, Rome, Italy.

P73. Z. Yu* and **Y. Or**, "Nonholonomic dynamics of steer-free rotor-actuated Twistcar", 3rd International Nonlinear Dynamics Conference (NODYCON 2023), June 18-22, Rome, Italy.

P74. J. Paul*, **Y. Or** and O. V. Gendelman, "Nonlinear dynamics and bifurcations of a planar undulating magnetic microswimmer" (online), 3rd International Nonlinear Dynamics Conference (NODYCON 2023), June 18-22, Rome, Italy.

P75. G. Ben Zvi and **Y. Or***, "Dynamics of Purcell's three-link microswimmer model with actuated-elastic joints" (online), 3rd International Nonlinear Dynamics Conference (NODYCON 2023), June 18-22, Rome, Italy.

P76. **Y. Or***, "Nonlinear dynamics, bifurcations and stability transitions in motion of periodically-actuated micro-swimmers" (online), 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023), August 20-25, Tokyo, Japan.

P77. E. Ben-Haim, Y. Geron, A. D. Gat**, Y. Or*** and S. Givli, "Dynamic single-input control of multi-state multi-transition soft robotic actuator", 11th European Nonlinear Dynamics Conference (ENOC 2024), July 22-26, 2024, Delft, Netherlands.

P78. N. Berkovich-Lahav*, O. Wiezel and **Y. Or**, "Optimal control of a swimming robot based on Purcell's microswimmer model", 11th European Nonlinear Dynamics Conference (ENOC 2024), July 22-22, 2024, Delft, Netherlands.

P79. Z. Yu* and **Y. Or**, "Nonholonomic dynamics of the dissipative Twistcar vehicle - theoretical analysis and experiments", 11th European Nonlinear Dynamics Conference (ENOC 2024), July 22-22, 2024, Delft, Netherlands.

P80. Z. Chapnik*, S. Revzen and **Y. Or**, "Extending geometric mechanics beyond kinematic isotropic systems" (Poster), 12th Annual D. Dan and Betty Kahn Scientific Symposium: Frontiers in Biomedical Research, June 28-July 1, 2024, Traverse City, Michigan, USA.

P81. R. Levy, A. Dantus and **Y. Or**, "Analysis and experiments of the dissipative Twistcar - direction reversal and asymptotic approximations", 4th International Nonlinear Dynamics Conference (NODYCON 2025), June 22-25, 2025, Hoboken, New Jersey, USA.

P82. Z. Chapnik*, S. Revzen and **Y. Or**, "Modeling Underactuated Swimmers in Granular Fluid Using Geometric Mechanics" (Poster), IEEE International Conf. Robotics and Automation (ICRA), May 20-23, 2025, Atlanta, Georgia, USA.

P83. R. Chen, **Y. Or** and M. Liu, "Improving the Energy Efficiency by Using Quasi-Passive-Dynamics-based Elastic Actuator", *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, October 19-25, 2025, Hangzhou, China. (Presenting paper [J52]).

P84. Z. Chapnik*, S. Revzen and **Y. Or**, "Sample efficient learning of body-environment interaction of an under-actuated system", accepted to Mechanism and Machine Theory Symposium MMT 2026, June 21-123, 2026, Porto, Portugal.

P85. R. Levy, A. Zigelman, A. Dantus, Z. Yu and **Y. Or***, "Experiments and analysis of Twistcar-type robots", accepted to Mechanism and Machine Theory Symposium MMT 2026, June 21-123, 2026, Porto, Portugal.

Participation in organizing conferences

OC1. Program committee chair and member of steering committee, 3rd Israeli Conference on Robotics, 10-11 November, 2010, Herzliya, Israel.

OC2. Organizer, Belfer Symposium on "Dynamics of micro-swimmers", held at the Technion in Jan 12th, 2015. Keynote speakers: Eric Lauga, UC San Diego; Bradley Nelson, ETH Zurich. Booklet

OC3. Co-Organizer, IAAC Workshop on Motion Control Methods in Robotics, 23 November, 2015, Herzlia, Israel. (Co-organized with Amir Degani). Program (Hebrew), Booklet.

OC4. Conference Editorial Board, IEEE International Conf. Robotics and Automation (ICRA), 2015,2016

OC5. International Program Committee Member, IFAC Conf. on Nonlinear Control Systems, 2016

OC6. Co-organizer, ISF-supported international research workshop on "Micro-swimmers and Soft Robotics", Technion, February 3-5, 2020. (with Alex Leshansky & Amir Gat), Program & Booklet

OC7. Program committee member, Israeli Conference on Robotics, March 28 2023, Herzliya, Israel.

Seminar talks

S1. Y. Or, "Computing Stable Equilibrium Stances of a Legged Robot in Frictional Environments", Center of Foundations of Robotics Seminar, Robotics Inst., Carnegie Mellon University, Pittsburgh, PA, May 22, 2006

S2. Y. Or, "Frictional Dynamics, Hybrid Dynamics, and Stability of Planar Two-Contact Stances under Gravity", special GRASP seminar, GRASP Laboratory of Robotics Research and Education, University of Pennsylvania, Philadelphia, PA, June 11, 2007

S3. Y. Or, "Frictional Dynamics, Hybrid Dynamics, and Stability of Planar Two-Contact Stances under Gravity", CDS seminar, Dept. of Control and Dynamical Systems, California Inst. of Technology, Pasadena, CA, June 13, 2007

S4. Y. Or, "Dynamics, geometry and stability of low Reynolds number swimming near a Plane Wall", lecture in CDS 280a – Advanced Topics in Geometric Mechanics and Dynamical Systems (Instructor: Jerrold Marsden), Dept. of Control and Dynamical Systems, Caltech, Pasadena, CA, October 30, 2008

S5. Y. Or, "Dynamics and control of bio-locomotion: low Reynolds number swimming near a wall", Applied Math seminar, Dept. of Applied Mathematics and Computer Science, Weizmann Institute of Science, Rehovot, Israel. January 20, 2009

S6. Y. Or, "Dynamics and stability of swimming near a wall in low Reynolds number", Dept. of Mechanical and Aerospace Engineering, University of California, San Diego, CA, April 24, 2009

S7. Y. Or, "Dynamics and stability of swimming near a wall in low Reynolds number", Dept. of Aerospace and Mechanical Engineering, Univ. of Southern California, Pasadena, CA, June 1, 2009

S8. Y. Or, "Reversing symmetry and stability in low-Reynolds-number swimming", Dept. of Applied Mathematics and Mathematical Physics (AMMP), Imperial College, London UK, Nov. 24, 2011.

S9. Y. Or, "Dynamics and control of locomotion – from micro-swimming to walking", Dept. of Mechanical Engineering, Technion, Israel, June 26, 2013.

S10. Y. Or, "The nonlinear dynamics and mechanics of robotic locomotion", Dept. of Mechanical Engineering, Technion, Israel, November 7, 2017.

S11. Y. Or, "Nonlinear dynamics and control of articulated robot locomotion", Control Systems Theory Seminar, Technion, Israel, February 28, 2022.

S12. Y. Or, “Nonlinear dynamics and control of articulated robot locomotion”, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, September 13, 2022.

S13. Y. Or, “Nonlinear dynamics and mechanics of undulatory (bio-) robotic locomotion”, Mechanical Engineering Seminar, Tel Aviv University, May 22, 2023.

S14. Y. Or, “Nonlinear dynamics and mechanics of under-actuated robot motion”, Mechanical Engineering Seminar, Technion, May 27, 2024.

S15. Y. Or, “Nonlinear mechanics, dynamics and control of under-actuated robot motion”, Control seminar, University of Michigan, Ann Arbor, September 12, 2025.