

Curriculum Vitae

Dr. Abraham Weiss, Senior Lecturer

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SUMMARY

Currently department head and a senior lecturer in the department of mechanical engineering at Ort Braude academic college of engineering in Karmiel, Israel. Ph.D. in aerospace engineering from Carleton University in Ottawa, Canada, with research in the field of mobile robotics and motion platforms. Versatility, multidisciplinary abilities and leadership skills are demonstrated in positions held as a material engineer, system engineer and software engineer, as well as project management, and up to senior management positions in the Hi-Tech industry (VP of Engineering). These skills are dominant in my research, which deals with multidisciplinary projects with a high level of applicability. Wide teaching portfolio including courses in kinematics, dynamics, vibration, control, finite elements, flight mechanics, orbital mechanics, robotics and more.

EDUCATION

Academic Education:

Ph.D - Aerospace Engineering, 2010

Department of Mechanical and Aerospace Engineering
Carleton University, Ottawa, Ontario, Canada

Topic: "Generalized Mathematical Modeling of a Novel Singularity-free Class of Six Degrees of Freedom Motion Platform"

M.Sc. - Aerospace Engineering, 2004

Department of Aerospace Engineering, Dynamics & Control Track
University of Alabama, Tuscaloosa, Alabama, USA

Topic: "Aeroelastic Modeling for the Trim Analysis of a Missile in Steady, Supersonic Flight"

B.Sc. - Aerospace Engineering, 1990

The Technion - Israel Institute of Technology, Haifa, Israel

B.A. - Natural Sciences, 1996 (Physics & Chemistry)

The Open University, Tel-Aviv, Israel

Courses in Economics and Psychology, 1992

Bar Ilan University outreach, Tel-Aviv, Israel

Non-Academic Education:

Certificate - Software Engineering for Embedded Systems, 1995 (one-year program).

IBM, Tel-Aviv, Israel

Highschool – Biotechnology track (In Bar Ilan University)

ACADEMIC EMPLOYMENT

May 2018-Current - **ORT Braude Academic College, Karmiel, Israel**
Head of Department of Mechanical Engineering

Oct 2009-Current - **ORT Braude Academic College, Karmiel, Israel**
Senior Lecturer - Department of Mechanical Engineering (Appointed Senior Lecturer 12/14).

Sept 2004-Sept 2009 - **Carleton University, Ottawa, ON**
Teaching and Research Assistant - Department of Mechanical and Aerospace Engineering

ACADEMIC ACTIVITIES

Professional and Research Experience:

ORT Braude Academic College, Karmiel, Israel Oct 2009-Current

ORT Braude Academic College is an engineering college granting B.Sc. and M.Sc degrees in engineering and applied mathematics, approved by the Israeli committee of higher education. The department of Mechanical Engineering currently has about 650 students.

Lecturer, Senior Lecturer - Department of Mechanical Engineering

- Co-Founder of The Smart Robotic Systems Center

The Smart Robotic Systems Center is a center for research and development of smart dynamical systems, offering creative and novel solutions to problems in the fields of mobile robotics, medical rehabilitation robotics, simulators and robotic manipulators. The center acts as a knowledge base and develops capabilities in the fields of mechatronics and robotics starting from the idea phase up to prototype development.

- Supervision and overseeing of capstone projects and internships:

1. October 2009 – July 2010 – Harun Harun, "An experimental platform for optimization of a six degrees of freedom motion platform" – final project supervision
2. March 2010 – July 2010 – Alex Freivert – "Kinematics of a dual robot system" – student excellence program project supervision
3. March 2010 – January 2011 – Roe Mizrahi – "Kinematics and Dynamics of a dual robot system" – final project supervision
4. October 2010 – July 2011 – Itai Malka – "Hopper – Development of a long range UAV with hovering capabilities" – final project and internship supervision
5. October 2011 – July 2012 – Yaniv Armon – "Motion of a cylinder in an electromagnetic field" - excellence program project supervision
6. October 2011 – July 2012 – Avigdor Engel – "Development and implementation of an experimental program for a spindle under development " – in Colibri Spindles - project and internship overseeing
7. October 2011 – July 2012 – Eitan Yaakovi – "Design of a mobile computer " – in Omdan Integrated Systems - project and internship overseeing
8. October 2011 – July 2012 – Yaakov Chutenuk – "Tire dismantling system " - project and internship overseeing
9. October 2012 – July 2013 – Adham Salih – "Cognitive robotic system" - final project and internship supervision
10. October 2012 – July 2013 – Maor Peretz – "Motion control of a cylinder in an electromagnetic field " - final project supervision
11. October 2013 – July 2014 – Constantine Safonov – "Design of Generation 2 dual robot " - project and internship overseeing
12. March 2014 – March 2015 – Yuri Sibirtsev – "Dynamics Mimicking" - final project supervision

13. March 2015 – September 2015 – Alex Fuerlender – "Optimization and Control of the Dynamics Mimicking Platform" - final project and internship supervision
14. October 2016 – July 2017 – Asaf Karmon – " Optimization and Control of the Dynamics Mimicking Platform" - final project and internship supervision
15. October 2016 – July 2017 – Niv Maoz – " Wall Climbing Robot" - final project and internship supervision
16. October 2017 – July 2018 – Nimrod Nabi – "Characterizing the performance of an autonomous miniature jumping robot" – final project and internship supervision
17. March 2018 – March 2019 – Elad Harel – "Dynamics Mimicking System – Mechatronics and Control" – final project supervision
18. October 2018 – July 2019 – Gil-ad Freiman – "Adaptive Acoustic Chamber" – final project supervision
19. March 2019 – March 2020 – Daniel Pariente – "Mobile chair" – final project supervision
20. October 2019 – July 2020 – Tamir Rosenberg – "Adaptive Acoustic Chamber – Mechatronics and Control" – final project supervision
21. March 2020 – Current – Sapir Tranos – "Modelling, simulation and control of a dual inverted pendulum mobile robot with non-rigid contacts" – final project supervision

- Post-Doctorate Supervision – Huang Ming, 2018. – "Control of a dual inverted pendulum robot".
- Reviewer for "Robotica", "Assistive Technology" and "Bioinspiration & Biomimetics".
- Research Areas: Kinematics, dynamics, optimization and control of mobile and motion platforms with emphasis on the design optimization perspective, mobility enablement and workspace expansion, cognitive mechanics, and dynamics of rigid bodies in magnetic fields.

Carleton University, Ottawa, ON

Sept 2015-Aug 2016

Visiting Professor - Department of Mechanical and Aerospace Engineering

- Research focus on the Atlas spherical motion platform and omnidirectional wheel actuation.

Carleton University, Ottawa, ON

Sept 2004-Sept 2009

PhD Candidate and Teaching Assistant - Department of Mechanical and Aerospace Engineering

- Engaged in research on dissertation topic: "Mathematical Modeling and Optimization of a Novel Singularity-free Six Degrees of Freedom Motion Platform Design"
- Research Areas: Kinematics, Dynamics, Vibration, Contact Mechanics, Mathematical Modelling.

Simulis LLC, Los Angeles, California, USA

2000-2004

Simulis developed sophisticated technical training and skills assessment products that use simulation of real-world experiences to prove and enhance workforce competency for the aviation, energy and health-care markets. Simulis' applications supported technical reasoning, equipment operations, maintenance and sales.

Vice President, Engineering:

- Assumed full responsibility for the technical direction of the company.
- Built engineering teams: recruited, trained and mentored. Developed a training path for recruited engineers to meet the high demands of knowledge and skills in both mechanical/bio-medical/electrical engineering and in software engineering. Achieved a high rate of employee retention.
- Provided support for executive management and sales in the form of technical evaluations, assistance in qualifying and pricing business opportunities, and validation of technical proposals
- Supervised and oversaw project development and delivery.

- Led all research activities and projects to establish the company's unique technological advantage and offerings in the market.
- Served as the top authority in technical matters, both engineering and software development.
- Led development of complex simulations of operational and embedded systems and devices.
- Effectively researched, budgeted and developed new capabilities and integration with new technologies; made build/buy decisions.

e-SIM Ltd., Misgav, Israel / Pasadena, California, USA

1997-2000

e-SIM was a provider of a suite of simulation-based software tools and services, intended for rapid time-to-market design and development electronic products HMI.

Director, Embedded Systems Development (1999 – 2000):

- Oversaw all embedded systems activities in the Americas including development projects, marketing support, pre-sales activities, customer training, third party relationships and business development.
- Built the Americas software engineering teams from the ground up.
- Conducted embedded system projects for the development of cellular phones, satellite phones, electrical appliances, and vehicle entertainment centers, for our north-America customers such as Motorola, Hughes, Ford, GE, etc.

Project Manager (1998 – 1999):

- Managed and led embedded systems development projects for customers.
- Performed Code Generation training for in-house and customers' engineers.

Senior Software Engineer (1997-1998):

- Participated in the specification and development of a C code generation tool from code-free simulation environment. Generated code was platform and operating-system independent, and was integrated to numerous embedded environments, such as Intel processors, Hitachi Processors, ARM chipsets, to name a few.
- Performed research for the purpose of optimizing the generated code and the development process by means of pilot projects with customers.
- Led and implemented the first successful code generation project for the company.

Ubique (AOL), Israel

1996-1997

Ubique was a start-up that developed innovative interactive online environments, called Virtual Places. Sold to AOL in 1995, and then in 1998 to IBM, the technology became the basis for SameTime by Lotus (now IBM).

Software Engineer (1996-1997):

- Developed and programmed services for Internet chat and conferencing software.

Indigo, Israel

1995-1996

Indigo N.V was a market leader in digital color printing systems for commercial and industrial printing. Headquartered in The Netherlands, R&D and manufacturing operations are in Israel (now part of HP).

Software Lead (1996):

- Promoted to Software Lead for the development of a newer model of the digital printing machine

Software Engineer (1995-1996):

- Served as the first engineer in the software development group that was based on computer science majors and programmers for the purpose of developing Real-time software (Control Unit) to operate and control the company's digital printing machines.
- Served as the liaison of R&D in the technology research department to support and take part in research projects such as temperature control, blanket cleaning station, and more.

Israel Air Force (IAF), Israel**1990-1995****Systems Engineering Officer, Captain in IAF, Aeronautical Maintenance Unit (depot) (1993-1995):**

- Led mechanical and opto-mechanical maintenance, upgrades and development projects.
- Directed ISO 9000 assimilation in the unit.

Materials & Process Engineering Officer, Lieutenant in IAF, Aeronautical Maintenance Unit (depot) (1990-1993):

- Designed and performed polymers and composites engineering research and maintenance projects
- Developed courses on process engineering and trained new technicians.

Military rank at release: Captain**Research Collaboration:****Carleton University – Department of Mechanical and Aerospace Engineering****Professor M.J.D. Hayes, Professor R.G. Langlois**

Follow-up research on my PhD thesis topic.

Tel Aviv University - Department of Mechanical Engineering, Department of Zoology**Professor Amir Ayali, Dr. Gabor Kosa**

Miniature locust-inspired jumping robot.

University of Basel – Department of Biomedical Engineering**Dr. Gabor Kosa**

Miniature locust-inspired jumping and gliding robot.

ORT Braude College of engineering – Department of Mechanical Engineering**Dr. Gideon Avigad, Dr. Uri Ben Hanan, Dr. Shaul Salomon, Dr. Ayelet Goldstein**

Mechanical Cognitization, Dynamics Mimicking, Stair climbing robots, Pair of cooperating Segway type robots, Motion of a cylinder and a sphere in an electromagnetic field, Skating robot, Inverse ground effect on a downward thrusting propeller.

Haifa University – Department of Marine Technology**Dr. Roe Diamant**

Automatic Adaptive Calibration of Acoustic Chamber.

Teaching Experience:

Lecturer, Senior Lecturer at ORT Braude College of Engineering (2009-Current)

- Courses taught: Kinematics and Theory of Mechanisms, Dynamics, Vibration Theory, Finite Elements, Signals and Systems, Introduction to Control, Introduction to Control Systems, Selected Topics in Advanced Israeli Industries, Aerial Robotics, Introduction to Flight Mechanics, Principles of Space Flight, Advanced Manufacturing Technologies, Mechanical Design Project, Engineering Design.
- Courses developed: Vibration Theory, Finite Elements, Selected topics in advanced Israeli Industries, Aerial robotics, Introduction to flight mechanics, Mobile Robots, Principles of Space Flight.

Teaching assistant at Carleton University, Department of Mechanical and Aerospace Engineering (2004–2009)

- Teaching Assistant for undergraduate engineering courses: Engineering Dynamics, Dynamics of Machinery, Robotics Lab, Fluid Mechanics, Engineering Graphic Design.

Teacher at Yitzhak Rabin High School, Ottawa, Canada (2007-2009)

- Hebrew

Teacher at Ottawa Modern Jewish School, Ottawa, Canada (2005-2008)

- Jewish History (Grades 5,6,7)

Course materials development and training, Simulis, Los Angeles, USA (2000-2004):

- Developed and taught a course on Simulation Development – target audience were simulation developers.

Course materials development and training, e-SIM, Misgav, Israel and Pasadena, USA (1997-2000):

- Developed and taught a course on Code Generation – target audience were embedded system engineers

Course materials development and training, Israel Air Force, Israel (1991-1997):

- Wrote a book and taught the course Composite Materials – target audience were field technicians and engineers.
- Taught additional courses:
 - Corrosion and corrosion control
 - Electroplating and Coating
 - Hydrocarbons and polymers – from fuels to adhesives

ACADEMIC and PROFESSIONAL AWARDS and GRANTS:

2019 - Outstanding faculty member award for the year 2018, with prize money of 14% salary increase for a year.

2018 - Outstanding faculty member award for the year 2017, with prize money of 15% salary increase for a year.

2018 – Haifa University – Ort Braude Cooperative Grant, "An Automatic Adaptive-Calibration Acoustic Chamber for the Production of Underwater Acoustic Instrumentation". With Dr. Roei Diamant. Amount of 40,000 ILS.

2016 - Outstanding faculty member award for the year 2015, with prize money of 10% salary increase for a year.

2015 – Outstanding faculty member award for the year 2014, with prize money of 7.5% salary increase for a year.

2015 – Led a team of students in the course "Aerial robotics" to win 2nd place in a national aerial robotics competition, with prize money of 10,000 ILS.

2014 – Outstanding faculty member award for the year 2013, with prize money of 5% salary increase for a year.

2014 – Led a team of students in the course "Aerial robotics" to win 2nd place in a national aerial robotics competition, with prize money of 15,000 ILS.

2014 – Best Paper award – "Mechanical Cognitization", COGNITIVE 2014, The sixth international conference on advanced cognitive technologies and applications, Venice, Italy, May 2014.

2007-2009: National Science and Engineering Research Council of Canada. A nationwide competitive scholarship to amount of \$42,000.

2007-2008: Ontario Graduate Scholarship. Province wide competitive scholarship to the amount of \$15,000

2006-2007: Ontario Graduate Scholarship. Province wide competitive scholarship to the amount of \$15,000

2004-2006: Ontario Tuition Award. Province wide competitive award to the amount of \$15,000

1994: Honor of Excellence, awarded by the Dean of the Open University, Israel

1990: Honor of Excellence, awarded by the Faculty of Aerospace Engineering, the Technion, Israel

ACADEMIC and ADMINISTRATIVE ACTIVITIES

Academic Activities:

Current:

- **Dynamic Mimicking** – Research and development of a robot capable of transporting a wheelchair over obstacles utilizing the chair's own user interface to drive the robot. Patented.
- **Miniature Autonomous Jumping Robot** – Research and development of a prototype of a tiny robot (~25g) that can jump over 3.5m height, glide and control its direction.
- **Miniature clamping system** – Research and development of a clamping system for manufacturing of small parts utilizing force control.

- **Skating Robot** - Researching the energy efficient locomotion method of skating by analyzing skating motion of humans and developing a skating mechanism mimicking the human skating motion.
- **Inverse Ground Effect on a Downward Thrusting Propeller** – While developing a wall climbing robot utilizing downward thrust propellers for increasing traction, a decrease in thrust was discovered when propellers get close to the ground. Whereas ground effect usually increases lift, in this case we observe the opposite phenomenon, which was not investigated yet. First experimental work shows that increasing the distance of the propellers from the ground increases the thrust.
- **Automatic Adaptive-Calibration of Acoustic Chamber** – An acoustic chamber needs to isolate sounds produced inside the chamber and reduce sound reflections. The material used to cover the chamber effects these reflection properties. However, different material shapes provide better reflection reduction for different sound frequencies. Thus, for different frequencies, different chambers are used. We are examining a method to actively change the shape of the material based on the sound frequency produced in the chamber.
- **Cognitive Mechanics** – Research in new direction of cognitive robotics that is focusing on the mechanical aspects of cognition. Current and previous research in the field of cognitive robotics concentrates on the "brain" of the robot, that is, computing and data structures to support cognition in robots. This work focuses on the mechanical aspects of cognition utilizing a climbing robot. A patent was submitted in the US, and is now in provisional status.
- **Mobile Hybrid Kinematic Chain** – One of the major issues in urban robotics is combining the ability to move fast in open areas with the ability to climb over obstacles such as stairs and move inside space-limited structures. The requirements seem to contradict – climbing stairs generally requires large robots, while motion in limited-space structures requires small agile robots. The idea is to use two small and agile robots that can maneuver easily in limited-space structures and connect them together using a serial manipulator to obtain the size required to climb stairs.
- **Cooperation of Inverted Pendulum Robots** – Inverted pendulum robots are highly maneuverable, however, they are very limited when encountering obstacles. We are examining the possibility to get two (or more) such robots to join together so that they can traverse obstacles. The project deals with the design issues of the robots, communication between the robots to find one another and the mechanism and algorithm of autonomous connection.
- **Active Spherical Joint** – While passive spherical joints exist for a long time, active ones do not. The idea to develop an active spherical joint is based on work done in my Ph.D. thesis that presents a motion platform that allows an unlimited angular workspace. This would be an adaptation from the larger motion platform to the smaller realm of a spherical joint.
- **Modelling and Optimization of the Atlas Platform Design** – The Atlas platform is a motion platform that allows a singularity-free unlimited angular motion about any axis. The underlying theoretical work was performed in my Ph.D. thesis. The next natural step is improving the model to reflect the actual design of the platform leading to obtaining optimal performance from the standpoint of payload, dynamics, structure, and control.

Previous:

- **Ph.D.** - Generalized Mathematical Modeling of a Novel Singularity-free Class of Six Degrees of Freedom Motion Platform. This work was laying the mathematical foundations of the suggested motion platform known as the "Atlas". The work included kinematics, dynamics, and vibration analysis of the suggested platform in a generalized and unified form.
- **M.Sc.** - Aeroelastic Modeling for the Trim Analysis of a Missile in Steady, Supersonic Flight. This work entailed the aeroelastic analysis and proof of feasibility of a concept for maneuvering a wingless missile through air using aeroelastic properties of the missile's body as controls instead of the traditional aerodynamic surfaces.

Administrative Activities:

- **May 2018 – Current** – Member of the Academic Council of ORT Braude College.
- **October 2017 – September 2018** - Member of the College Academic Committee.
- **October 2015 – Current** - Member of the departmental MSc Program Committee of the Department of Mechanical Engineering in ORT Braude College of Engineering.

- **October 2013 – May 2018** - Member of the departmental Academic Committee of the Department of Mechanical Engineering in ORT Braude College of Engineering.
- **October 2012 – October 2015** - Member of College Library Committee in ORT Braude College of Engineering.
- **October 2011 – October 2015** - Second year student advisor in the Department of Mechanical Engineering, ORT Braude College of Engineering.
- **October 2010 – October 2015** - Seminars coordinator in the Department of Mechanical Engineering, ORT Braude College of Engineering.
- **October 2009 – October 2012** - Member of College Computerizing Committee in ORT Braude College of Engineering.

SEMINAR and CONFERENCE LECTURES

Seminar Presentations:

1. "Generalized Mathematical Modeling of a Novel Singularity-free Class of Six Degrees of Freedom Motion Platform", Seminar series of the Department of Mechanical and Aerospace Engineering, Carleton University, Ottawa, Canada, Oct. 2010.
2. "Mobile Hybrid Kinematic Chain", Braude Research Conference, Kfar Bloom, Israel, 2011.
3. "Novel Solutions for Robotic Climbing", Department of Mechanical Engineering, Western Ontario University, London, Canada, Feb. 2013
4. "New directions in Robotics Research", Department of Mechanical Engineering, Cornell University, Ithaca, NY, USA, Feb. 2013.
5. "Novel Solutions for Robotic Climbing", Seminar series of the Department of Mechanical and Aerospace Engineering, Carleton University, Ottawa, Canada, Feb. 2013.
6. "Towards Active Spherical Joint", Braude Research Conference, Hagoshrim, Israel, 2013.
7. "Dynamics Mimicking", ORT Braude Research Conference, Hagoshrim, Israel, 2013.
8. Zaytsev V., Weiss A., Ben Hanan U., Ayali A., Kosa G., "A Biomimetic Jumping Robot", ORT Braude Research Conference, Hagoshrim, Israel, 2013.
9. "The Atlas Platform", ORT Braude Research Conference, Naharia, Israel, 2014.
10. "Mechanical Cognitization", ORT Braude Research Conference, Naharia, Israel, 2014.
11. "Mobile Robotics Research Projects", Vineland Research and Innovation Centre, Vineland Station, ON, Canada, Nov 2015.
12. "Wheelchair users' Perceptions on a Novel Device Enabling Them to Traverse Rough Terrain on Their Own Wheelchair", ORT Braude Research Conference, Kfar Bloom, Israel, 2019.

Conference Presentations:

1. A. Weiss, R.G. Langlois, and M.J.D. Hayes. "Kinematics of the Atlas Platform with Redundant Contact Points". 2008 CSME Symposium on Machines, Mechanisms and Mechatronics, on CD, Ottawa, Canada, June 2008.
2. M.J.D. Hayes, R.G. Langlois, and A. Weiss. "Atlas Motion Platform Generalized Kinematic Model". Proceedings of the Second International Workshop on Fundamental Issues

and Future Research Directions for Parallel Mechanisms and Manipulators, September 21-22, 2008, Montpellier, France.

3. A. Weiss, G. Avigad, U. Ben Hanan, " Mobile Hybrid Kinematic Chain - Utilizing two small robots for climbing stairs", ICME 2012, on CD, Tel Aviv, Israel, October 2012.
4. A. Weiss, G. Avigad, "Optimal design of a pair of cooperating robots by kinetic analysis of stair climbing states", ECCOMAS Multibody Dynamics, on CD, Zagreb, Croatia, July 2013.
5. A. Weiss, G. Avigad, U. Ben Hanan, "Enhancing Wheelchair Maneuverability by Dynamics Mimicking", Israeli Conference on Robotics, on CD, Tel Aviv, Israel, November 2013.
6. G. Avigad, A. Weiss, "Mechanical Cognitization", COGNITIVE 2014, May 25-29, Venice, Italy. – won **best paper award**.
7. A. Weiss, R.G. Langlois, and M.J.D. Hayes. "The Atlas Spherical Motion Platform", Israeli Conference of Mechanical Engineering, ICME 2015, on Disc, Tel Aviv, March 2015.
8. A. Weiss, G. Avigad, U. Ben Hanan "Dynamics mimicking of wheelchair as a mobility enhancing platform", ECCOMAS Multibody Dynamics, Barcelona, Spain, July 2015.
9. A. Weiss, U. Ben Hanan, "Cooperation of two two-wheeled inverted pendulum robots". The 4th International conference on Multibody System Dynamics, Montreal, QC, Canada, May 2016.
10. A. Weiss, U. Ben Hanan, "Two-wheeled AGV cooperating to climb stairs". The 34th Israeli conference on Mechanical Engineering, Faculty of Mechanical Engineering, Technion I.I.T, Haifa, 21-22 November 2016.
11. A. Weiss, U. Ben-Hanan, G. Avigad, "Design of a Dynamic Mimicking System for Enhancing Wheelchair Traversability", The 34th Israeli Conference of Mechanical Engineering, Faculty of Mechanical Engineering, Technion I.I.T, Haifa, 21-22 November 2016.
12. A. Weiss, U. Ben Hanan, "Performance of a Quasi-Holonomic Mobile Robotic Carrier in the Dynamics Mimicking Platform", ECCOMAS Multibody Dynamics, Prague, Czech Republic, July 2017.
13. V. Zaitsev, U. Ben Hanan, A. Weiss, "Miniature Jumping Robot with Consecutive Jumping Ability". The 5th International conference on Multibody System Dynamics, Lisbon, Portugal, June 2018.

LIST OF PUBLICATIONS

Ph. D. Thesis:

1. Generalized Mathematical Modeling of a Novel Singularity-free Class of Six Degrees of Freedom Motion Platform.

Refereed Papers:

1. A. Weiss, R.G. Langlois, and M.J.D. Hayes. "The Effects of Dual-Row Omnidirectional Wheels on the Kinematics of the Atlas Spherical Motion Platform". Journal of Mechanism and Machine Theory, v 44, n 2: pages 349–358 February 2009.
2. M.J.D. Hayes, R.G. Langlois, and A. Weiss. "Atlas Motion Platform Generalized Kinematic Model". Meccanica, n46, v1, pages 17-25, January 2011.
3. A. Weiss, R.G. Langlois, and M.J.D. Hayes. "Unified Treatment of the Kinematic Interface Between a Sphere and Actuating Omnidirectional Wheels". ASME Journal of Mechanisms and Robotics, v3, n4, pp 041001:1-9, November 2011.

4. G. Avigad, A. Weiss, "Enhancing Robustness through Mechanical Cognitization". International Journal on Advances in Intelligent Systems, v7, n3&4, 2014, pp652-661, December 2014.
5. G. Avigad, W. Li, A. Weiss, (2015), "Mechanical Cognitization: a kinematic proof of concept", Adaptive Behavior 23 (3) 155 – 170. DOI: 10.1177/1059712315584380.
6. A. Weiss, R. G. Langlois and M. J. D. Hayes "Dynamics and vibration analysis of the interface between a non-rigid sphere and omnidirectional wheel actuators". Robotica, v33, issue 09, pp 1850-1868, November 2015, doi:10.1017/S0263574714001088
7. Zaytsev V., Gvirsman O., Ben-Hanan U., Weiss A., Ayali A., Kosa G., "A Locust-Inspired Miniature Jumping Robot", Bioinspiration & Biomimetics, v10, n6, pp066012, 2015.
8. Beck. A, Zaytsev V., Ben-Hanan U., Kosa G., Ayali A., Weiss A., "Jump Stabilization and Landing Control by Wing-Spreading of a Locust-Inspired Jumper", 2017 *Bioinspir. Biomim.* 12 066006, October, 2017, DOI: [10.1088/1748-3190/aa8ceb](https://doi.org/10.1088/1748-3190/aa8ceb).
9. A. Weiss, E. Fadida, U. Ben Hanan. "Optimizing step climbing by two connected wheeled inverted pendulum robots", Procedia Manufacturing, v21, pp236-242, 2018.
10. U. Ben Hanan A. Weiss, V. Zaitsev. "Jumping efficiency of small creatures and its applicability in robotics", Procedia Manufacturing, v21, pp243-250, 2018.
11. A. Weiss, U. Ben Hanan, "Landing recovery and orientation control of a locust-inspired miniature jumping robot" – Engineering Research Express, DOI: <https://doi.org/10.1088/2631-8695/ab68a5>
12. R. Diamant, I. Shahar, T. Rosenberg, A. Weiss, "Origami-inspired adaptive acoustic tank for optimal reflection mitigation" – accepted for publication in IEEE Sensors, 7/2020.

Conference Proceedings (refereed):

13. A. Weiss, R.G. Langlois, and M.J.D. Hayes. "Kinematics of the Atlas Platform with Redundant Contact Points". 2008 CSME Symposium on Machines, Mechanisms and Mechatronics, on CD, Ottawa, Canada, June 2008.
14. M.J.D. Hayes, R.G. Langlois, and A. Weiss. "Atlas Motion Platform Generalized Kinematic Model". Proceedings of the Second International Workshop on Fundamental Issues and Future Research Directions for Parallel Mechanisms and Manipulators, September 21-22, 2008, Montpellier, France.
15. A. Weiss, G.Avigad, U. Ben Hanan, " Mobile Hybrid Kinematic Chain - Utilizing two small robots for climbing stairs", ICME 2012, on CD, Tel Aviv, Israel, October 2012.
16. A. Weiss, G. Avigad, "Optimal design of a pair of cooperating robots by kinetic analysis of stair climbing states", ECCOMAS Multibody Dynamics, on CD, Zagreb, Croatia, July 2013.
17. A. Weiss, G. Avigad, U. Ben Hanan, "Enhancing Wheelchair Maneuverability by Dynamics Mimicking", Israeli Conference on Robotics, on CD, Tel Aviv, Israel, November 2013.
18. Zaytsev V., Weiss A., Ben Hanan U., Ayali A., Kosa G., "A Biomimetic Jumping Robot", Israeli Conference on Robotics, on CD, Tel Aviv, Israel, November 2013.
19. G. Avigad, A. Weiss, "Mechanical Cognitization", COGNITIVE 2014, May 25-29, Venice, Italy. – won **best paper award**.

20. A. Weiss, G. Avigad, U. Ben Hanan, "Enhancing Wheelchair Mobility Through Dynamics Mimicking", Proceedings of the 3rd International Conference on Mechanical engineering and Mechatronics Prague, Czech Republic, August 14-15, 2014.
21. A. Weiss, R.G. Langlois, and M.J.D. Hayes. "The Atlas Spherical Motion Platform", Israeli Conference of Mechanical Engineering, ICME 2015, on Disc, Tel Aviv, March 2015.
22. V. Zaitsev, O. Gvirtzman, U. Ben Hanan, A. Weiss, A. Ayali, G. Kosa. "Locust-Inspired Miniature Jumping Robot", 2015 IROS – IEEE/RSJ International Conference on Intelligent Robots and Systems, Hamburg, Germany, Sept 28 – Oct 02, 2015.
23. A. Weiss, E. Fadida, U. Ben Hanan. "Optimizing step climbing by two connected wheeled inverted pendulum robots", 15th Global Conference on Sustainable Manufacturing, Sep 2017.
24. U. Ben Hanan A. Weiss, V. Zaitsev,. "Jumping efficiency of small creatures and its applicability in robotics", 15th Global Conference on Sustainable Manufacturing, Sep. 2017.

Patents:

1. G. Avigad, Weiss A., "Method and System for Developing Cognitive Responses in a Robotic Apparatus Through Mechanical Cognition", Provisional, EFS ID 14431891, Dec. 2012. PCT.
2. G. Avigad, Weiss A., "A Wheelchair Transportation System", US 8,960,352, Feb, 2015.
3. Ben Hanan U., Weiss A. Zaytsev V., "Jumping Robot", Provisional, 62/555,091, Sep. 2017.
4. R. Diamant, A. Weiss, "Adaptive acoustic chamber and method for acoustic calibration", Provisional, US 62/740,403, Oct. 2018. PCT.
5. Ben Hanan U., Weiss A. Zaytsev V., "Jumping Robot", Provisional, 62/889,587, Aug. 2019.

Professional and Research Reports:

Sample Research Projects in Industry (Unpublished due to proprietary reasons)

1. **Utilizing free-play simulations for asynchronous training and assessment:**
 RapidPLUS is a code-free state-machine based program for designing HMI of embedded systems. It uses a graphic interface in the Windows environment to simulate the functionality of embedded systems. While free-play simulation is a useful tool to learn how to operate a system, it does not allow for structured learning and assessment. This project focused on utilizing simulation of complex systems (aircrafts, including all sub-systems; medical equipment; oil and gas industry equipment; manufacturing equipment), for asynchronous training and assessment of clinical, operational and maintenance skills. For this purpose a clinical and technical Reasoning System and a Scenario Generation System were constructed.
 The new systems, combining technical aspects of devices and interfaces with scenarios developed to assess reasoning skills, were among the first of their kind. As the project lead, my role was to research and define the project objectives, design solutions, and lead their implementation. These systems were adapted and implemented for customers such as Rockwell-Collins, US Airways, Alaska Airlines, Northwest Airlines, FlightSafety, Halliburton, Schlumberger, Weatherford, Abbot, Kaiser Permanente, and more.
2. **Research and development of a system for automatic generation of operational code from simulation input:**
 RapidPLUS is a code-free state-machine based program for designing HMI of embedded systems. It used a graphic interface to simulate the functionality of embedded systems in the Windows environment. The research project focused on converting the code-free simulation into efficient functional code that would run on any embedded platform, thus accomplishing two major goals:

First, eliminating the coding phase, a significant and time consuming phase in development of HMI for embedded systems; and second, to enable testing and subsequent changes to the code-free simulation environment that in turn reflect in the generated code.

This project required research and experiments performed on multiple and various embedded environments (such as processors, real-time operating systems, etc.). The project was successful and eventually became a product. My role was initially as a senior software engineer, working on the research and experimental part of the project. Once a prototype of the product was developed I became project manager on the first successful commercial project, authored the detailed report on the research aspect of the project, and took a major role in the optimization process that followed. Customers I have worked with included Kokusai Communication Systems, Hughes Network Systems, Qualcomm, General Electric, Motorola, Samsung, NEC, and more.

3. **Simulation design methodology for optimum code generation:**

After working on the code generation project above, I performed research on the effects of the code-free simulation design and implementation on the efficiency of the resulting functional code from the standpoints of code size, memory usage and real-time performance. The results were converted into a methodology guide on writing simulations that would yield efficient code on the embedded platform. I was the leader of this project. The methodology guide was distributed with the product as a manual, so it bears no author credit.

4. **Research of automatic cleaning methods for a charged printing blanket for a digital printing machine:**

Indigo NV developed digital printing machines that relied on charging a printing blanket, and exposing it to ink that is oppositely charged, such that it would stay only at the desired points, to be later deposited on paper from the blanket, eliminating the need for specifically manufactured "hard-coded" template used in traditional printing machines. This blanket, though, after a while started accumulating "ghost" images and needed to be replaced, which was both expensive and required stopping the machine for the change. The purpose of the project was to develop a solution that would increase the life expectancy of the blanket by "cleaning" the ghost images, and by so doing also improve the image quality. The research combined multiple disciplines, such as physics, chemistry, mechanical engineering and software engineering. I was the software engineer for the project, utilizing my interdisciplinary background in mechanical and aerospace and natural sciences, to achieve a solution that was both valid and applicable.

Sample Research Projects in Military

5. **A compact back strapped long-range optical system:**

The purpose of this project was to utilize advances in electro-optics to reduce a vehicle mounted long-range optical system to one that may be back strapped. I was the lead engineer and mechanical designer of this project.

6. **Non-destructive methods for identifying heat and fire damage on various metals and polymers:**

Since most materials on an airplane are heat treated to deliver the required properties, overheating may alter these properties, resulting in possible effect to flight safety and performance. The ability to assess whether damage has taken place and its extent is therefore crucial. However, few non-destructive methods for assessment have been developed, and even fewer options exist for field conditions.

We have performed intensive research in this field that led to the development of methods for determining heat and fire damage in field conditions. Several methods, involving both simple visual inspection and utilizing equipment, were developed for assessing damage in aluminum, titanium, steel, and some composites. Research was both experimental and theoretical. The project was an ongoing endeavor, and I was lead on some of the specific categories.

7. **Research and development of methods for fixing damage in composite materials and composite structures:**

During my service as a Materials and Process engineer, I have developed many methods for fixing problems with composite materials and structures on aircrafts. These were classified and combined into an engineering manual distributed to the field and all engineering units as the manual for composites fixing on aircrafts.

8. **An electromagnetically inert mobile tower:**
The development of a 10 m high mobile tower for mounting an antenna was a project that combined both structural analysis, and a manufacturing challenge. I was the lead engineer on the project.
9. **Research on F-16 tail radome recurring failure:**
The F-16 Tail Radome (Antenna Cover) had recurring cases of falling off during flight. The covers were sent multiple times to the air force labs for analysis, however all suggested solutions were not working. The unit therefore undertook to conduct own research on the topic. This research was based on failure analysis, experimental and theoretical work, and led to conclusions and results that were accepted both by the air-force and the American manufacturer. I was the lead researcher on the project.

Other Publications:

1. A. Weiss, K. O'Reilly, "Interface design is a central task", EE Times, April 4, 2000.

LANGUAGES

English - Mother Tongue Level
Hebrew - Mother Tongue Level