R E S U M E

Full name:	**Barak Fishbain**
Identity No.:	0-3198579-9
Date and place of birth:	25/1/1975, Haifa, Israel
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ACADEMIC DEGREES

Ph.D., 2009, School of Electrical Engineering, Faculty of Engineering, Tel-Aviv University, Tel-Aviv, Israel.

M.Sc., 2004, School of Electrical Engineering, Faculty of Engineering, Tel-Aviv University, Tel-Aviv, Israel.

B.Sc., 1997, Faculty of Electrical Engineering, Technion – Israel Institute of Technology, Haifa, Israel.

ACADEMIC APPOINTMENTS

Oct 2018 – Present   Associate Professor, Division of Environmental, Water and Agriculture Engineering, Faculty of Civil and Environmental Engineering, Technion – Israel Institute of Technology, Haifa, Israel.

Oct 2011 – Oct 2018,   Assistant Professor, Division of Environmental, Water and Agriculture Engineering, Faculty of Civil and Environmental Engineering, Technion – Israel Institute of Technology, Haifa, Israel.

Oct 2015 – Sep 2016,   Faculty, Team Project Chair, International Space University.

Oct 2010 – Oct 2011,   Associate Director, Integrated Media Systems Center (IMSC), Viterbi School of Engineering, University of Southern California, Los-Angeles, CA, USA.

Oct 2008 – Feb 2011,   Postdoctoral Fellow, Department of Industrial Engineering and Operations Research, University of California, Berkeley, CA, USA.

PROFESSIONAL EXPERIENCE

Oct 2005 – Oct 2008,   Research Associate, National Simulations & Electronic Warfare Laboratory, Rafael – Advanced Defense Systems, Haifa, Israel.

Sep 1997 – Oct 2005,   Research Officer, Intelligence Corps R&D Unit (Military P.O.B 02470), Israeli Defense Forces.

- Prime Minister Citation, Sep 2005
- Major General Citation (Intelligence Corps), Jan 2005
- Rank: Major

RESEARCH INTERESTS

My research focuses on **Enviromatics**, a new research field that aims at devising machine learning methods and mathematical models for better understanding built and natural complex environments. **The goal is to harness new machine learning and mathematical models with engineering principles, computing, and networked sensing data analytics for enhancing the efficiency, resiliency, and sustainability of infrastructure and natural systems**. This includes topics related to hydro-informatics, atmospheric-informatics, traffic data, structural health, smart infrastructure systems and connected transportation.

TEACHING EXPERIENCE

Technion:
- Statistics (014003, undergraduate)
  - 2015, Excellence Teaching award (highest 12%)
  - 2017, Excellence Teaching award (highest 12%)
  - 2018, A. Arenson Excellence in Teaching Award for young Faculty.
  - 2018, Excellence Teaching award (highest 12%)
  - 2019, Excellence Teaching award (highest 4%)
- Advanced Topics in Statistics (019007, graduate)
- Technion Pre-Clinical Research Authority (PCRA) (Statistics part in the introductory course, graduate)

Tel-Aviv University:
- Digital Image Processing, Applications (0510.7211 graduate)
- Introduction to Computer Networks (0512.4462 undergraduate, as teaching assistant)

Israeli Defense Force:
- Cyber and Software Engineering (Commander, Intelligence corps elite training program – חמ״ן תלפיות)

TECHNION ACTIVITIES

2019 - Present	Division of Environmental, Water and Agriculture Engineering Graduate Committee Chair
2019 – Present	Faculty of Civil and Environmental Engineering Graduate Committee
2019 – Present	Academic Board, Applied Mathematics Interdisciplinary Graduate Program
2019 – 2020	Faculty of Civil and Environmental Engineering Computation Committee
2017 – 2019,	Faculty of Civil and Environmental Engineering Academic Secretary
2015 – 2017,	Division of Environmental, Water and Agriculture Engineering Undergraduate Studies Committee
2013 – 2017,	Division of Environmental, Water and Agriculture Engineering Academic Secretary

PUBLIC PROFESSIONAL ACTIVITIES

Aug 2018 – Present,	**Associate Editor**, Journal of Water Resources Planning and Management.
Oct 2019 – Oct 2020,	**Chair**, Emerging and Innovative Technologies Committee (EITC), Environmental & Water Resources Institute (EWRI), American Society of Civil Engineers (ASCE)
Oct 2018 – Oct 2019,	**Vice Chair**, Emerging and Innovative Technologies Committee (EITC), Environmental & Water Resources Institute (EWRI), American Society of Civil Engineers (ASCE)
Oct 2017 – Oct 2018,	**Secretary**, Emerging and Innovative Technologies Committee (EITC), Environmental & Water Resources Institute (EWRI), American Society of Civil Engineers (ASCE)
Jul 2017 – Present,	**Management Committee**, COST Action CA16202, International Network to Encourage the Use of Monitoring and Forecasting Dust Products
Jul 2017 – Present,	**Executive Board**, Israel Society of Ecology and Environmental Sciences.
May 2017 – Present	**Member**, Working Group 5.11, Computers and Environment, International Federation for Information Processing
Oct 2016 – Present,	**Associate Editor**, Journal of Mathematical Problems in Engineering
Nov 2010 – Apr 2020,	**Associate Editor**, Journal of Real-time Image Processing
Nov 2010 – Apr 2020,	**Advisory Board**, Journal of Real-time Image Processing
Jan 2010 – Nov 2010,	**Guest Editor**, Journal of Real-time Image Processing
Jun 2010,	**Review Panel**, National Science Foundation (NSF)
Jun 2009,	**Review Panel**, National Science Foundation (NSF)
Reviewer:	Water Research; Science of the Total Environment; Journal of Water Resources Planning and Management; Mathematical Problems in Engineering; Urban Water; Journal of Operations Research; Annals of Operations Research; European Journal of Transport and Infrastructure Research; IEEE Trans. on Circuits and Systems for Video Technology; Optics Letters, Optical Society of America; Journal of Optical Society of America A (JOSA A); Journal of Real-time Image Processing; Journal of Computing in Civil Engineering

FELLOWSHIPS, AWARDS AND HONORS

Jun 2018,	**A. Arenson Excellence in Teaching Award for young Faculty,** A. Arenson Ltd. General Contractors, Haifa, Israel.
Jun 2018,	**iEMSs 2018 Student Scholarship Award**, *A. Nebenzal* and **Barak Fishbain**, "Long Term Forecasting of Nitrogen Dioxide in Metropolitan Areas Using the Discrete Time Markov Model", *9th International Congress on Environmental Modelling and Software*, June 24-28, Fort Collins, CO, USA.

Jun 2018,   **iEMSs 2018 Best Student Paper Award 3rd place**, *A. Nebenzal* and **Barak Fishbain**, "Long Term Forecasting of Nitrogen Dioxide in Metropolitan Areas Using the Discrete Time Markov Model", *9th International Congress on Environmental Modelling and Software*, June 24-28, Fort Collins, CO, USA.

May 2017,   **Goldberg Excellence in Research Award,** Alexander Goldberg Foundation, Technion – Israel Institute of Technology

Jun 2016,   **Best Poster Award**: *T. Yacobi*, Y. Etzion and **B. Fishbain**, "Assessing PM ambient levels from a set of still images", *2016 Annual convention of the Israel Society of Ecology and Environmental Sciences*, Tel-Aviv, Israel, June 21–23, 2016.

Jun 2016,   **Best Poster Award Runner-up**: *A. Nebenzal* and **B. Fishbain**, "Long Term Forecasting of NO2 in Metropolitan Areas Using the Discrete Time Markov Model", *2016 Annual convention of the Israel Society of Ecology and Environmental Sciences*, Tel-Aviv, Israel, June 21–23, 2016.

Feb 2015,   **Best Poster Award**: *U. Lerner*, *T. Yacobi*, *I. Levy*, S.A. Moltchanov, T. Cole-Hunter and **B. Fishbain**, "The effect of ego-motion on environmental monitoring", *EPScon conference*, Weizmann Institute, Rehovot, Israel, 2015.

Jul 2012,   **Most Distinguished Program Graduate**, US Department of Homeland Security & US National Science Foundation (NSF)

Oct 2008,   **Research Scholar Excellence Award**, Ran Naor Foundation

Dec 2007,   **Research Student Excellence Award**, Applied Materials

Nov 2007,   **Rosenberg Excellence Award**, Faculty of Engineering, Tel-Aviv University

Nov 2007,   Israel Ministry of Science and Technology **PhD Research Fellowship**

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member, Environmental and Water Research Institute (EWRI)

Associate Member, American Society of Civil Engineers (ASCE)

Member, Operations Research Society of Israel (ORSIS)

Member, International Environmental Modelling & Software Society (iEMSs)

GRADUATE STUDENTS
Completed PhD theses

06/2016   Gabriel Raviv, *Modeling of Near Misses Related to Crane Work at Construction Sites and their Safety Risk Potential*, with (primary advisor) Aviad Shapira.

01/2017   Uri Lerner, *Mathematical Data Analysis Methods for Air-Quality Wireless Distributed Environmental Sensor Networks*.

06/2017   Noa Avni, *Algorithms for development and management of regional water systems under multiple uncertainties*, with (secondary Advisor) Uri Shamir.

07/2018   Yaela N. Golumbic, *Public Participation in Air Quality Research in Haifa: Theory into Practice*, with (primary Advisor) Ayelet Baram-Tsabari.

02/2019   Asaf Nebenzal, *Mathematical methods for Generating Accurate Dense Spatio-Temporal Maps of Air Pollutants from Sparse Sensing* (PhD in Applied Math).

09/2020   Tehila Asheri, *Data Driven Algorithms for Early Water Contamination in Water Supply Systems*.

Completed MSc theses

1/2015   Ella Levi, *Online Oxidization of low concentrations of CP for enhancing bio sensors for early detection in drinking water*.

10/2015   Levi Frolich, *Spectral Methods for Analysis of Bacteria Counts in Water Wells*, with (secondary Advisor) Dalit Vizel-Ohayon (MEKOROT).

12/2015   Daphna Yogev, *Identification of water leakage using consumption patterns of domestic end users*.

12/2015   Oren Rubinstein, *Video based Identification and analysis of High-way traffic flow models*.

05/2017   Shai Moshenberg, *Imputation of missing air pollution data using spectral methods*.

09/2017   Tamar Yacobi, *Development and Utilization of New Methods for Urban Air-Pollution Monitoring*.

02/2019   Dana Drahler, Dense PM Pollution Maps resulted from near quarries' operations.

PhD theses in progress

Noam Ginio, Reconstruction of sea level state by polarimetric reflection measurements and machine learning methodology.

MSc theses in progress

Uria Luzon, Spatiotemporal data-driven models for precise irrigation.

Or Vernik, Mathematical estimation of particulate air pollution levels by multi angle imaging

Ziv Mano, Information theory approach to optimal deployment of air quality sensors in the open environment

Alon Feldman, Estimating air pollution from video sequences

Gal Perelman, Optimal Operation of Cascaded Water Supply Systems Under Uncertainties

<u>RESEARCH GRANTS</u>

2020,   Ministry of Environmental Protection, *Characterization, distribution and source apportionment of Ambient Ultrafine Particles in Haifa Bay Area*, 350,000 NIS (three yrs.), **PI** (with David Broday).

2019,   Ministry of Science & Technology, *Heterogeneous robotic team for monitoring and detection in post-disaster catastrophic events*, 1,200,000 NIS (3 yrs.), **PI** (with Amir Degani).

2019,   The Office of the Chief Scientist Foundation, Ministry of Agriculture and Rural Development, *Early pain detection in cows from physiological sensors,* 210,000 NIS (3 yrs.), **Co-PI** (with Yael Salzer, Agriculture Research Organization – Volcani Center).

2018, Technion's Science and Security Center, *Machine Learning High Dimensional Analysis of Hyperspectral Imaging for Accurate Identification of High-Priority Materials*, 75,000 NIS (1 yr.), **PI**

2018, MEKOROT, Israel National Water Company, *Algorithms for Early Contamination Detection in Water Supply Systems*, 270,000 NIS (three yrs.), **PI**

2017, Ministry of Environmental Protection, *Characterization, distribution and source apportionment of Ambient Ultrafine Particles in Haifa Bay Area*, 350,000 NIS (three yrs.), **Co-PI** (with David Broday and Yael Dubowski).

2014, MEKOROT, Israel National Water Company, *Algorithms for Early Contamination Detection in Water Supply Systems*, 140,000 NIS (four yrs.), **PI**

2013, The German Israeli Foundation for Scientific Research and Development (G.I.F), *Real-time Event Analysis Algorithms for Effective Multi-Source Environmental Monitoring*, 38,000 Euros (1 yr.), **PI**

2013, Cornel-Tech Foundation, *Adaptive Automatic Flow Control in Transportation Facilities*, 25,600 USD (1 yr.), **PI** (with Per-Olof Gutman and Eilyan Bitar, Cornel University, Ithaca, NY).

2012, Environmental Health Foundation (EHF), *Traffic Air Pollution Exposure Assessment in an Urban Environment through Wireless Distributed Environmental Sensor Network*, 50,000 USD (3 yrs.), **PI** (with Ilan Levi).

2012, European Commission, Directorate General for Research & Innovation, 7th Framework Program (FP7), *CITI Sense - Development of sensor-based Citizens' Observatory Community for improving quality of life in cities*, 260,000 Euros (four yrs.), **Co-PI** (with David Broday).

2012, Technion-Forschungszentrum Jülich-RWTH Aachen University umbrella cooperation Program, 9,000 Euros (one year), *Carbon based Sensory Textile Reinforced Concrete for Smart Structures*, **Co-PI** (with Oded Rebinovich, Yiska Goldfeld and Thomas Gries, RWTH Aachen University, Germany).

2011, Intel, *Real-time Traffic Monitoring through Traffic Videos*, 20,000 USD (1 yr.), **PI**.

PUBLICATIONS
Theses

1. **B. Fishbain**, *Data Fusion Methods for Fusing Thermal and Visual Range Video Sequences*, M.Sc. Thesis, Tel-Aviv University, 06/2004.

2. **B. Fishbain**, *Real Time Methods for Restoration, Enhancement and Analysis of Videos with Applications in Intelligent Transportation Systems*, Ph.D. Thesis, Tel-Aviv University, 06/2008.

Refereed papers in professional journals

1. I.A. Ideses, L.P. Yaroslavsky and **B. Fishbain**, "Real-Time 2D to 3D Video Conversion", *Journal of Real-Time Image Processing*, 2(1):3-9, 2007.

2. **B. Fishbain**, L.P. Yaroslavsky and I.A. Ideses "Real-time stabilization of long range observation system turbulent video", *Journal of Real- Time Image Processing*, 2(1):11-22, 2007.

3. L.P. Yaroslavsky, **B. Fishbain**, G. Shabat and I.A. Ideses, "Super-resolution in turbulent videos: making profit from damage", *Optics Letters*, 32(20):3038-3040, 2007.

4. **B. Fishbain**, L.P. Yaroslavsky and I.A. Ideses, "Spatial, Temporal, and Inter-channel Image Data Fusion for Long-Distance Terrestrial Observation Systems", *Advances in Optical Technologies*, Vol. 2008, Article ID 546808, 2008.

5. **B. Fishbain**, I.A. Ideses, G.Shabat, B.G. Salomon and L.P. Yaroslavsky, "Superresolution in color videos acquired through turbulent media", *Optics Letters*, 34(5):587-589, 2009.

6. L.P. Yaroslavsky, G. Shabat, I.A. Ideses, B.G. Salomon and **B. Fishbain**, "Non-uniform signal sampling, signal and image recovery from sparse data and the discrete sampling theorem", *Journal of Optical Society of America A.*, 26(3):566-575, 2009.

7. *J. Griswold*, **B. Fishbain**, D.R. Ragland, and S. Washington, "Visual assessment of pedestrian crashes", *Accident Analysis and Prevention*, 43(1):301-306, 2011.

8. D.S. Hochbaum and **B. Fishbain**, "Nuclear Threat Detection with Mobile Distributed Sensor Networks", *Annals of Operations Research*, 187(1):45-63, 2011.

9. **B. Fishbain**, D. Hochbaum, and Y.T. Yang. "A new approach for real-time target tracking in videos", *SPIE Newsroom*, DOI: 10.1117/2.1201301.004648, Jan 2013.

10. **B. Fishbain** and *O. Grembeck*, "A Multi-Dimensional Clustering Algorithm for Studying Fatal Road Crashes", *Journal of Transportation and Statistics*, 10(1):79-100, 2013.

11. Y.T. Yang, **B. Fishbain**, D.S. Hochbaum, E.B. Norman and E. Swanberg, "The Supervised Normalized Cut Method for Detecting, Classifying, and Identifying Special Nuclear Materials", *INFORMS Journal on Computing*, 26(1):45-58, 2014.

12. *S. Molchanov*, *I. Levy*, Y. Etzion, *U. Lerner*, D.M. Broday and **B. Fishbain**, "On the feasibility of measuring urban air-pollution by wireless distributed sensor networks", *Science of the Total Environment*, 502:537-547, 2015.

13. *U. Lerner*, *T. Yacobi*, *I. Levy*, S. Moltchanov, **B. Fishbain**, "The effect of ego-motion on Environmental Monitoring", *Science of the Total Environment*, 533:8-16, 2015.

14. *N. Avni*, **B. Fishbain** and U. Shamir, "Water consumption patterns as a basis for water demand modeling", *Water Resource Research*, 51(10):8165-8181, 2015.

15. *S. Moshenberg*, *U. Lerner* and **B. Fishbain**, "Spectral Methods for Imputation of Missing Air Quality Data", *Environmental Systems Research*, 4(26):1-13, 2015.

16. Y. Goldfeld, O. Rabinovitch, **B. Fishbain**, T. Quadflieg and T. Gries, "Sensory Carbon Fiber based Textile-Reinforced Concrete for Smart Structures", *Journal of Intelligent Material Systems and Structures*, 27(4):469-489, 2016.

17. **B. Fishbain**, D.S. Hochbaum and S. Mueller, "A competitive study of the pseudoflow algorithm for the minimum s–t cut problem in vision applications", *Journal of Real-Time Image Processing*, 11:589-609, 2016.

18. **B. Fishbain** and E. Moreno-Centeno, "Self-Calibrated Wireless Distributed Environmental Sensory Networks", *Scientific Reports*, 6:24382; doi: 10.1038/srep24382, 2016.

19. *G. Raviv*, **B. Fishbain** and A. Shapira, "Analyzing risk factors in crane- related near-miss and accident reports", *Safety Science*, 91:192-205, 2017.

20. *G. Raviv,* A. Shapira and **B. Fishbain***,* "AHP-based analysis of the risk potential of safety incidents: Case study of cranes in the construction industry", *Safety Science*, 91:298-309, 2017.

21. **B. Fishbain**, *U. Lerner*, T. Cole-Hunter, N. Castell, O. Popoola, D.M. Broday, T. Martinez Iñiguez, M. Nieuwenhuijsen, M. Jovasevic- Stojanovic, D. Topalovic, R.L. Jones, K. Galea, Y. Etzion, F. Kizel, *Y.N. Golumbic*, A .Baram-Tsabari, J.A. Robinson, D. Kocman, M. Horvat,

V. Svecova, A. Arpaci and A. Bartonova, "An Evaluation Tool Kit of Air Quality Micro-Sensing Units", *Science of the Total Environment*, 575(1):639-648, 2017.

22. N. Castell, F.R. Dauge, P. Schneider, M. Vogt, *U. Lerner*, **B. Fishbain**, D.M. Broday and A. Bartonova, "Can commercial low-cost sensor platforms contribute to air quality monitoring and exposure estimates?", *Environment International*, 99:293–302, 2017.

23. *L.D. Frolich*, D. Vizel-Ohayon, and **B. Fishbain**, "Spectral Methods for the Analysis of Bacteria in Water Wells", *Scientific Reports*, 7:799, 2017.

24. *Y.N. Golumbic*, D. Orr, A. Baram-Tsabari and **B. Fishbain**, "Between Vision and Reality: A Case Study of Scientists' Views on Citizen Science", *Citizen Science: Theory and Practice*, 2(1/6):1–13, 2017.

25. F. Kizel, Y. Etzion, R. Shafran-Nathan, I. Levy, **B. Fishbain**, A. Bartonova and D.M. Broday, "Node-to-node field calibration of wireless distributed air pollution sensor network", *Environmental Pollution*, 233:900-909, 2018.

26. *T. Asheri Arnon*, S. Ezra and **B. Fishbain**, "Contamination Detection of Water with Varying Routine Backgrounds by UV-Spectrophotometry", *Journal of Water Resources Planning and Management*, 144(9):04018056, 2018.

27. *A. Nebenzal* and **B. Fishbain**, "Long Term Forecasting of Nitrogen Dioxide in Metropolitan Areas Using the Discrete Time Markov Model", *Environmental Modelling and Software*, 107:175-185, 2018.

28. S. Kendler, I. Ron, S. Cohen, R. Raich, *Z. Mano* and **B. Fishbain**, "Detection and Identification of Sub-Millimeter Films of Organic Compounds on Environmental Surfaces Using Short-Wave Infrared Hyperspectral Imaging: Algorithm Development Using a Synthetic Set of Targets,", *IEEE Sensors Journal*, 19(7):2657-2664, 2019.

29. *U. Lerner*, *O. Hirshfeld* and **B. Fishbain**, "Optimal Deployment of a Heterogeneous Environmental Sensor Network", *Journal of Environmental Informatics*, 34(2):99-107, 2019.

30. *Y.N. Golumbic*, **B. Fishbain** and A. Baram-Tsabari, "User centered design of a citizen science air-quality monitoring project", *International Journal of Science Education, Part B*, 9(3):195-213, 2019.

31. *T. Asheri Arnon*, S. Ezra and **B. Fishbain**, "Water Characterization and Early Contamination Detection in Highly Varying Stochastic Background Water based on Machine Learning Methodology for processing Real-Time UV-Spectrophotometry", *Water Research*, 155:333-342, 2019.

32. S. Kendler, S. Cohen, R. Raich, S. Weiss, H. Levy, *Z. Mano*, **B. Fishbain**, I. Ron, "Detection and identification of Bacillus antharcis spores inside paper envelops using short-wave infrared hyperspectral imaging techniques", *Forensic Science International*, 301:e55-e58, 2019.

33. *A. Nebenzal*, **B. Fishbain**, S. Kendler, "Model-based dense air pollution maps from sparse sensing in multi-source scenarios", Environmental Modelling & Software, 128:104701, 2020.

34. T. Richter, **B. Fishbain**, A. Markus, G. Richter-Levin, H. Okon-Singer, "Using machine learning-based analysis for behavioral differentiation between anxiety and depression", *Scientific Reports*, 10:16381, 2020.

35. *Y.N. Golumbic*, A. Baram-Tsabari, **B. Fishbain**, "Science literacy in action: Understanding scientific data presented in a citizen science platform by non-expert adults", International *Journal of Science Education Part B: Communication and Public Engagement*, 10(3): 232-247, 2020.

36. S. Kendler, *A. Nebenzal*, D. Gold, P.M. Reed, and **B. Fishbain**, "The effects of air pollution sources / sensor array configurations on the likelihood of obtaining accurate source term estimations", *Atmospheric Environment*, 246:117754, 2021.

37. R. Aharoni, V. Klymiuk, B. Sarusi, S. Young, T. Fahima, **B. Fishbain** , S. Kendler, "Spectral light-reflection data dimensionality reduction for timely detection of yellow rust", *Precise Agriculture*, 22:267-286, 2021.

38. S. Kendler and **B. Fishbain**, "Crime Scene Investigation using Hyperspectral Imaging–Opportunities and Challenges", International Journal of Forensic Sciences (accepted)

39. Y. Salzer, H.H. Honig, R. Shaked, E. Abeles, A. Kleinjan-Elazary, *K. Berger*, S. Jacoby, **B. Fishbain** and S. Kendler, "Towards on-site automatic detection of noxious events in dairy cows", Applied Animal Behaviour Science (accepted).

Conference Proceedings in Papers Collections
Conferences proceedings that have been peer reviewed and were selected to appear in a journal's special issue dedicated to the conference.

40. **B. Fishbain**, *S. Moshenberg* and *U. Lerner*, "Optimal Noise Filtering of Sensory Array Gaseous Air Pollution Measurements", *Advances and New Trends in Environmental Informatics*, 275-285, 2017.

41. *A. Nebenzal* and **B. Fishbain**, "Hough-based Interpolation Scheme for Generating Accurate Dense Spatial Maps of Air Pollutants from Sparse Sensing", *International Federation for Information Processing (IFIP) Advances in Information and Communication Technology*, 2017.

42. **B. Fishbain** and E. Yafe, "Initial Assessment of Air Pollution and Emergency Ambulance Calls in 35 Israeli Cities", *From Science to Society - New Trends in Environmental Informatics*, 2018.

Books and chapters in books
1. **B. Fishbain**, *Surveillance, Monitoring and Traffic Video Systems*, VDM-Verlag Pub., Berlin, Germany, pp. 160, 2009. ISBN: 978-3-639-15240-1.

2. **B. Fishbain**, "Framework for Analyzing Environmental Indicators Measurements Acquired by Wireless Distributed Sensory Network - Air Pollution showcase", *Environmental Indicators* (Eds. R. Armon & O. Hänninen), 207-223, Springer, 2015.

Refereed papers in conference proceedings
1. Sh. Gepshtein, A. Shtainman, **B. Fishbain** and L.P. Yaroslavsky, "Restoration of atmospheric turbulent video containing real motion using elastic image registration", *Proc. the 2004 European Signal Processing Conference* (EUSIPCO-2004), 477-480, Vienna, Austria, 6-10 September 2004.

2. L.P. Yaroslavsky, **B. Fishbain**, A. Shteinman and Sh. Gepshtein, "Processing and Fusion of Thermal and Video Sequences for Terrestrial Long Range Observation Systems", *Proc. the 7th International Conference on Information Fusion*, 848-855, Stockholm, Sweden, June 2004.

3. L.P. Yaroslavsky, **B. Fishbain**, I.A. Ideses, D. Slasky and Z. Hadas, "Simple methods for real time stabilization of turbulent video", *ICO Topical Meeting on Optoinformatics*, 138-140, Saint-Petersburg, Russia, 4-7 September 2006.

4. L.P. Yaroslavsky, I.A. Ideses, **B. Fishbain**, R. Vistuch and L. Ridel, "3D Video from 2D MPEG streams, Methods and applications", *ICO Topical Meeting on Optoinformatics*, 136-137, Saint-Petersburg, Russia, 4-7 September 2006.

5. **B. Fishbain**, L.P. Yaroslavsky, I.A. Ideses, A. Shtern, and O. Ben-Zvi, "Real-time stabilization of long-range observation system turbulent video", *Proc. Real-Time Image Processing/Electronic Imaging 2007*, SPIE 6496:12-22, San-Jose, CA, USA, 28 January - 1 February 2007.

6. I.A. Ideses, L.P. Yaroslavsky, **B. Fishbain** and R. Vistuch, "3D video from compressed 2D video", *Proc. Stereoscopic Displays and Applications XVIII/Electronic Imaging*, SPIE 6490:28-35, San-Jose, CA, USA, 28 January - 1 February 2007.

7. I.A. Ideses, L.P. Yaroslavsky, I. Amit and **B. Fishbain**, "Depth map Quantization how much is Sufficient?", *Proc. 3DTV-Conference, Capture, Transmission and Display of 3D Video*, 1-4, Kos Island, Greece, 7-9 May 2007.

8. **B. Fishbain**, L.P. Yaroslavsky and I.A. Ideses, "Real Time Turbulent Video Perfecting by Image Stabilization and Super-resolution", *Proc. 7th IASTED International Conference on Visualization, Imaging, and Image Processing* (VIIP 2007), 213-218, Palma de Mallorca Spain, 29-31 August 2007.

9. I.A. Ideses, L.P. Yaroslavsky and **B. Fishbain**, "Depth Maps: Faster, Higher and Stronger?", *Proc. Three-Dimensional Image Capture and Applications/Electronic Imaging 2008*, SPIE 6805:1-11, San- Jose, CA, USA, 28 January - 1 February 2008.

10. L.P. Yaroslavsky, A. Agranovich, **B. Fishbain** and I.A. Ideses, "Precise differentiation can significantly improve the accuracy of optical flow measurements", *Proc. Image Processing: Algorithms and Systems VI/Electronic Imaging 2008*, SPIE 6812:11-19, San-Jose, CA, USA, 28 January - 1 February 2008.

11. L.P. Yaroslavsky, G. Shabat, **B. Fishbain** and I.A. Ideses, "Super- Resolution of Turbulent Video: Potentials and Limitations", *Proc. Image Processing: Algorithms and Systems VI/Electronic Imaging 2008*, SPIE 6812:5-13, San-Jose, CA, USA, 28 January - 1 February 2008.

12. **B. Fishbain**, L.P. Yaroslavsky, I.A. Ideses and F. Roffet-Crete, "No- Reference Method for Image Effective Bandwidth Estimation", *Proc. Image Quality and System Performance V/Electronic Imaging 2008*, SPIE 6808:0X-1 – 0X-11, San-Jose, CA, USA, 28 January - 1 February 2008.

13. **B. Fishbain**, L.P. Yaroslavsky and I.A. Ideses, "Real Time Turbulent Video Super-Resolution Using MPEG 4", *Proc. Real-Time Image Processing/Electronic Imaging 2008*, SPIE 6811:6-9, San-Jose, CA, USA, 28 January - 1 February 2008.

14. I.A. Ideses, **B. Fishbain** and L.P. Yaroslavsky, "Depth Map Manipulation for 3D Visualization", *Proc. IEEE 3DTV Conference*, 337 – 340, Istanbul Turkey, 28-30 May 2008.

15. L.P. Yaroslavsky, G. Shabat, **B. Fishbain**, B. G. Salomon and I. A. Ideses, "Non-uniform sampling, signal and image recovery from sparse data and the discrete sampling theorem", *Proc. Algorithms and Systems VII/Electronic Imaging 2009*, SPIE 7245A, San-Jose, CA, USA, 18-22 January 2009.

16. I.A. Ideses, L.P. Yaroslavsky and **B. Fishbain**, "Real-Time Depth Map Manipulation for 3D Visualization", *Proc. Real-time Image and Video Processing/Electronic Imaging 2009*, SPIE 7244:72440J-1 - 72440J-8, San-Jose, CA, USA, 18-22 January 2009.

17. **B. Fishbain**, I.A. Ideses, D. Mahalel and L.P. Yaroslavsky, "Real-Time Vision-Based Traffic Flow Measurements and Incident Detection", *Proc. Real-time Image and Video Processing/Electronic Imaging 2009*, SPIE 7244: 72440I-1 - 72440I-12, San-Jose, CA, USA, 18-22 January 2009.

18. **B. Fishbain**, Y.T. Yang and D.S. Hochbaum, "Real-time, Robust Target Tracking in Videos via Graph-cuts", *Real-Time Image and Video Processing/Electronic Imaging 2013*, SPIE 8656: 865602-1 – 865602-9, San-Francisco California, February 5-6, 2013.

19. Y. Etzion, D.M. Broday and **B. Fishbain**, "Analysis of image color and effective bandwidth as a tool for assessing air pollution at urban spatiotemporal scale", *Computational Imaging XI/Electronic Imaging 2013*, SPIE 8657:86570U-1 - 86570U-11, San-Francisco California, February 5-6, 2013.

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21. Y. Goldfeld, O. Rabinovitch, T. Quadflieg, **B. Fishbain**, and T. Gries, "Smart Textile Reinforced Concrete Sensory Structures", *7th European Workshop on Structural Health Monitoring*, La Cité, Nantes, France, July 8-11, 2014.

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27. *D. Brack*, *S. Scepanovic* and **B. Fishbain**, "Mapping and optimizing big space data - an international, Interdisciplinary and intercultural perspective on the space related data processes", *67th International Astronautic Congress*, Guadalajara, Mexico, 26–30 September, 2016.

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30. *A. Nebenzal* and **Barak Fishbain**, "Long Term Forecasting of Nitrogen Dioxide in Metropolitan Areas Using the Discrete Time Markov Model", *9th International Congress on Environmental Modelling and Software*, Fort Collins, CO, USA, June 24-28 2018.

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3. *T. Asheri*, S. Ezra, and **B. Fishbain**, "Detecting Contaminants via Ma- chine Learning", *US Provisional Patent #62/133,635*, 18-3-2015.

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Plenary, keynote or invited talks

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Presentations

2. L. Mihailescu, **B. Fishbain**, D.S. Hochbaum, J. Maltz, C.J. Moore, J. Rohel, L. Supic and K. Vetter, "Dynamic stand-off 3D gamma-ray imaging", *12th Symposium on Radiation Measurements and Applications* (SORMA), University of Michigan - Ann Arbor, USA, 24-27 May, 2010.

3. Y.T. Yang, **B. Fishbain**, D.S. Hochbaum, E.B. Norman and E. Swanberg "Multi-Pronged Approach for Detecting, Classifying and Identifying Special Nuclear Materials", *12th INFORMS Computing Society Conference*, Monterey, California, January 9-11, 2011.

4. **B. Fishbain**, D.S Hochbaum and Stefan Mueller, "Competitive Analysis of Minimum-Cut Maximum Flow Algorithms in Vision Problems", *12th INFORMS Computing Society Conference*, Monterey, California, January 9-11, 2011.

5. **B. Fishbain**, Y.T. Yang and D.S. Hochbaum, "Segmentation and Target Tracking Using Pseudoflow Algorithm Through Joint Utilization of Color and Coarse Motion Data", *12th INFORMS Computing Society Conference*, Monterey, California, January 9-11, 2011.

6. Y. Etzion, D.M. Broday, **B. Fishbain**, "Assessing PM Concentrations at Urban Spatiotemporal Scale by Image Analysis Based on the Image Effective Bandwidth Measure", *American Association for Aerosol Research 32nd Annual Conference*, Portland Oregon, September 30-October 4, 2013.

7. D.M. Broday, **B. Fishbain**, Y. Etzion, *I. Levy*, "Evaluation of Low-Cost PM Sensors, Intended for Use in a Dense Monitoring Grid", *American Association for Aerosol Research 32nd Annual Conference*, Portland Oregon, September 30-October 4, 2013.

8. *J. Shashank*, *I. Levy*, **B. Fishbain**, and D.M. Broday, "Application of distributed sensor networks for estimating exposures to air pollution in urban areas", *Conference of ISEE, ISES and ISIAQ on Environment and Health*, Basel, Switzerland August 19 - 23, 2013.

9. Y. Etzion, **B. Fishbain**, and D.M. Broday, "Assessing exposure to ambient air pollution at the urban temporal scale by analysis of image color and effective bandwidth", *Conference of ISEE, ISES and ISIAQ on Environment and Health*, Basel, Switzerland, August 19 - 23, 2013.

10. *U. Lerner*, *T. Yacobi*, *I. Levy*, S.A. Moltchanov, T. Cole-Hunter and **B. Fishbain**, "The effect of ego-motion on environmental monitoring", EPScon 2015 conference, Weizmann Institute, Rehovot, Israel.

11. *Y.N. Golumbic*, A. Baram-Tsabari, and **B. Fishbain**, "Participation of schools in scientific air quality research", *Annual Science and Environment Conference*, Hebrew University, Jerusalem, Israel, October 12-14, 2015.

12. N. Castell, *U. Lerner*, **B. Fishbain**, F. René Dauge, P. Schneider, M. Vogt and A. Bartonova, "Can low-cost sensors contribute to air quality assessment and citizen science?", *1st International European Citizen Science Association (ECSA) Conference*, Berlin, Germany, May 19–21, 2016.

13. *Y.N. Golumbic*, **B. Fishbain** and A. Baram-Tsabari, "Empowering citizens through citizen science. CITI-SENSE - The case study of Haifa, Israel", *1st International European Citizen Science Association (ECSA) Conference*, Berlin, Germany, May 19–21, 2016.

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15. *T. Yacobi*, Y. Etzion and **B. Fishbain**, "Assessing PM ambient levels from a set of still images", *2016 Annual convention of the Israel Society of Ecology and Environmental Sciences*, Tel-Aviv, Israel, June 21–23, 2016.

16. *A. Nebenzal* and **B. Fishbain**, "Long Term Forecasting of NO2 in Metropolitan Areas Using the Discrete Time Markov Model", *2016 Annual convention of the Israel Society of Ecology and Environmental Sciences*, Tel-Aviv, Israel, June 21–23, 2016.

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19. *T. Yacobi*, Y. Etzion, R. Jayaratne, M.M. Rahman, L. Morawska and **B. Fishbain**, "Assessing Exposure to Ambient Fine Particulate Matter Based on Digital Imagery", *International Society for Environmental Epidemiology Conference 2016*, Rome, Italy, September 1–4, 2016.

20. *U. Lerner*, *O. Hirshfeld* and **B. Fishbain**, "Optimal Deployment of a Heterogeneous Environmental Sensor Network", *International Society for Environmental Epidemiology Conference 2016*, Rome, Italy, September, 1–4, 2016.

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22. *Y.N. Golumbic*, **B. Fishbain** and A. Baram-Tsabari, "Presenting Scientific Data to Layman Users Practices", *2017 Annual convention of the Israel Society of Ecology and Environmental Sciences*, Tel-Aviv, Israel, June 21–23, 2016.

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24. *L. Frolich*, **B. Fishbain**, "Spectral Methods for the Analysis of Bacteria Counts in Water Wells", *World Environmental & Water Resources Congress*, Sacremento, CA, USA, May 21–25, 2017.

25. L. Perlman-Sela and **B. Fishbain**, "Integrated information modeling for resilient water infrastructure systems", *World Environmental & Water Resources Congress*, Sacremento, CA, USA, May 21–25, 2017.

26. *D. Drahler*, A. Wiener, H. Okon-Singer and **B. Fishbain**, "Associations between exposure to different air pollutants and several blood pressure (BP) parameters", *ISEE Young 2018 Early Career Researchers Conference on Environmental Epidemiology*, Freising, Germany, March 19–20, 2018.

27. *T. Asheri,* S. Ezra and **B. Fishbain** "Algorithm for Early Contamination Detection in Water with Highly Varying Stochastic Backgrounds Based on UV-Spectrophotometer Measurements", *World Environmental & Water Resources Congress*, Minneapolis, MN, USA, June 3–7, 2018.

28. A. Cominola, **B. Fishbain**, "Combining water network models and machine learning methods in adaptive network models for resilient water infrastructure systems", *World Environmental & Water Resources Congress*, Pittsburgh, PA, USA, May 19-23, 2019.

29. A. Cahan, U. Lerner, **B. Fishbain**, M. Bursztynm, "Blood Pressure Variability is Associated with Heart Rate in Large Outpatient Population", 29th *European Meeting on Hypertension and Cardiovascular Protection*, Milan, Italy, June 21-24, 2019.

30. J.A. Torres-Matallana, U. Leopold, B. Fishbain, "Geostatistical space-time prediction of air quality pollutants in Israel", *Spatial Statistics*, Sitges, Spain, July 10-13, 2019.

31. J.A. Torres-Matallana, U. Leopold, B. Fishbain, "Geostatistical analysis of air quality pollutants in Israel", *the European Colloquium on Theoretical and Quantitative Geography (ECTQG)*, Domaine Thermal of Mondorf-Les-Bains, Luxemburg, September 5-9, 2019.

32. *O. Vernik* & **B. Fishbain**, "Mathematical Estimation of Particulate Air Pollution Levels by Multi-angle Imaging", *Environmental & Health: Complex Interactions, Annual Conference of the Environmental & Health Fund*, Tel-Aviv, Israel, December, 15, 2019.

33. J. Hollis, R. Raich, J. Kim, **B. Fishbain**, S. Kendler, "Foreground signature extraction for an intimate mixing model in hyperspectral image classification", *45th International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2020)*, May 4-8, 2020.

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35. *Gal Perlman,* Roy Elkayam, **Barak Fishbain**, "Complex Water System Management in the Age of IoT", *World Environmental & Water Resources Congress*, Henderson, NV, USA, May 17-21, 2020.

Participation in organizing conferences

1. *7th IASTED International Conference on Visualization, Imaging, and Image Processing*, (VIIP 2007), Palma de Mallorca Spain, 29-31 August, 2007. **Session Chair**.

2. *1st Workshop on Special Topics in Homeland Nuclear Security*, Berkeley, CA, USA, July 22-24, 2009. **Organization Committee**, **Coordinator**.

3. *Real-Time Image and Video Processing*, SPIE Photonics Europe, Brussels Belgium, April 12-16, 2010. **Organization Committee**.

4. *12th INFORMS Computing Society Conference*, Monterey, CA USA, January 9–11, 2011. **Organization Committee**.

5. *Real-Time Image and Video Processing*, SPIE, San Francisco, CA, USA, January, 23-27, 2011. **Organization Committee**.

6. *The 4th ACM SIGSPATIAL International Workshop on Computational Transportation Science* (IWCTS 2011), November 1, 2011, Chicago, Illinois, USA. **Program Committee**.

7. *Real-Time Image and Video Processing*, SPIE, San Francisco, CA, USA, January, 22-26, 2012. **Organization Committee**.

8. *The 5th ACM SIGSPATIAL International Workshop on Computational Transportation Science* (IWCTS 2012), November 6, 2012, Redondo Beach, CA, USA. **Program Committee**.

9. *Real-Time Image and Video Processing, SPIE, San Francisco*, CA, USA, February, 3 – 7, 2013. **Organization Committee**.

10. *Real-Time Image and Video Processing*, SPIE, Brussels Belgium, April, 14-17, 2014. **Program Committee**.

11. *Real-Time Image and Video Processing*, SPIE, San Francisco, CA, USA, February 8 – 12, 2015. **Program Committee**.

12. *Real-Time Image and Video Processing*, SPIE, Brussels, Belgium, April 7, 2016. **Program Committee**.

13. *Environmental & Water Resources Institute (EWRI) Congress*, West Palm Beach, FL, USA, May 22–26, 2016. **Session Chair**.

14. *2016 Annual convention of the Israel Society of Ecology and Environ- mental Sciences*, Tel-Aviv, Israel, June 21–23, 2016. **Session Chair**.

15. *Security and Sensing Symposium*, SPIE, Anaheim, CA, USA, 9–13 April 2017. **Program Committee**.

16. *Environmental & Water Resource Institute (EWRI) Congress*, American Society of Civil Engineers (ASCE), Sacramento, CA, USA, 21-25 May 2017. **Session Chair, Program Committee**.

17. *Enviroinfo*, Belval, Luxembuorg, 13-15 Sep 2017. **Program Committee**.

18. *Environmental & Water Resources Institute (EWRI) Congress*, American Society of Civil Engineers (ASCE), 3-7 June 2018. **Track Co-Chair** (Emerging and Innovative Technologies Track).

19. *Real-Time Image and Video Processing*, SPIE, Orlando Florida, USA, April 15-19, 2018. **Program Committee**.

20. *Enviroinfo, Garching,* Germany, 5–7 Sep 2018. **Program Committee**.

21. Environmental & Water Resources Institute (EWRI) Congress, American Society of Civil Engineers (ASCE), Pittsburgh, PA, USA, 19-23 May 2019. **Track Chair** (Emerging and Innovative Technologies Track).

22. *Environmental & Water Resources Institute (EWRI) Congress*, American Society of Civil Engineers (ASCE), Henderson, NV, USA, 17-21 May 2020. **Track Chair** (Emerging and Innovative Technologies Track).

23. *EnviroInfo 2020*, Nicosia, Cyprus, Sep. 23-25, 2020. Program Committee.

24. *EnviroInfo 2021*, Berlin, Germany, Sep. 27-29, 2021. Program Committee.