Arash Abadpour

15+ Years of Applied AI — From Machine Vision to Autonomous Geospatial Systems

repo: *github.com/kamangir*

Experience

2025–current **Deputy CEO**, *Karband Eng. Co., Alborz, Iran*.
I lead initiatives in Geospatial AI and Unmanned Ground Vehicles (UGVs) — developing intelligent systems that move, sense, and learn from the world around them. My work bridges robotics, spatial data, and applied machine learning to create technologies that operate seamlessly in real environments. Alongside this, I'm passionate about AI education for youth. I believe that teaching kids to think in systems — to design, build, and experiment — is key to nurturing a generation capable of shaping technology with creativity and purpose. At the heart of my work is a simple idea: technology should serve both intelligence and integrity. Whether through autonomous robots, spatial analytics, or educational projects, I aim to help build an ecosystem of AI that is local, sustainable, and deeply human in its intention.

2022–2025 **Staff Software Engineer**, *EarthDaily Analytics, Vancouver, Canada*.
EarthDaily observes, verifies, & predicts changes to the Earth́s surface to help people understand & take action.

2022 **Senior Machine Learning Engineer (Computer Vision)**, *Vivid Machines, Toronto, Canada*.
Smart technology to help fruit and vegetable farmers optimize quality and yield.

2020–2022 **Vice President, Data Science**, *Savormetrics Inc., Mississauga, Canada*.
Deep Learning + Food Inspection = Increasing Profits. Reducing Waste. Improving Customer Satisfaction.

2019–2020 **Lead Data Scientist**, *Betterview Marketplace, San Diego, USA*.
Design, development, and deployment of a deep learning framework that consumes aerial images and other types of data relevant to the insurance industry and produces property insights.

2016–2019 **Senior Scientific Developer**, *Fio Corporation, Toronto, Canada*.
Design, development, and deployment of a learning-enabled machine vision system that visually identifies and analyzes rapid diagnostics tests (rdt) for infectious diseases such as HIV, Malaria, Dengue, Zika, and others. At inference time, the ML models are run on an android device with limited network and power access. Therefore, battery usage optimization and tolerance to long periods of disconnectivity were essential considerations. Traceability management for data and models was a vital component of this work due to national and international regulatory requirements.

+1 647 567 3487 ▪ ✉ arash.abadpour@gmail.com

2015–2016 **Research Scientist**, *Intellijoint Surgical, Waterloo, Canada*.
Extensions of the capabilities of a monocular infrared tracking system that was a component within the surgical navigation product that utilized machine vision to carry out and confirm geometrical measurements in-vivo. Also, worked on the inertial data that was produced by the system for validation and augmentation. Parameter estimation using least mean square and Levenberg-Marquardt cost function minimization.

2009–2015 **Researcher**, *Imaging Group, Epson Canada Limited, Toronto, Canada*.
Research and development on future products and concepts in the fields of visual inspection, symbology detection, 3d object detection and pose estimation, camera calibration (monocular, stereo, and depth/range), augmented and virtual reality, 3d scan/display systems (stereo, time-of-flight, structured light projection, and other depth sensors), depth processing (including bilateral upsampling, filtering, and registration and fusion of multiple depth and flat cameras using different variations of iterative closest point - icp), head-mounted displays, and robotics. Stochastic optimization in the presence of outliers using RANSAC and robustified cost minimization.

2001–2004 **Process Control Engineer**, *Karband Eng. Co., Alborz, Iran*.
Design, implementation and erection of PLC-based control systems for medium-sized machinery in pipe and profile production plants.

1998–2001, 2004–2009 **Research Assistant**, *University of Manitoba, Telecommunications Research Laboratories (TRLabs) Winnipeg and Biomechanics Laboratory, Sharif University of Technology*.
Network optimization, earthquake damage detection using satellite/aerial imagery, human gait analysis, 3d surface reconstruction, color image watermarking and data-hiding, visual encryption, image compression, color transfer, grayscale image colorization, computational photography, fuzzy clustering, skin detection, and pornography classification. Fuzzy modelling of multi-layer systems, especially within the field of pattern recognition, using Bayesian models.

Education

2005–2009 **Ph.D.**, *The University of Manitoba, Canada*.
Electrical and Computer Engineering Department

2003–2005 **Master of Science**, *Sharif University of Technology, Iran*.
Mathematics Science Department, Computer Science Group (Scientific Computation)

1996–2003 **Bachelor of Science**, *Sharif University of Technology, Iran*.
Electrical Engineering Department, Control Group

Patents

"*System, method and/or computer readable medium for non-invasive workflow augmentation*", WO Application Number WO2018094534A1, Priority Date 26 November 2016.

"*System, method and/or computer-readable medium for identifying and/or localizing one or more rapid diagnostic tests*", WO Application Number WO2018094533A1, Priority Date 26 November 2016.

"*Visual pattern recognition system, method and/or computer-readable medium*", WO Application Number WO2018094532A1, Priority Date 26 November 2016.

"*Systems and methods for tracker characterization and verification*", US Application Number US20170345177A1, Priority Date 27 May 2016.

"*Systems, methods and devices to scan 3d surfaces for intra-operative localization*", International Publication Number WO2017185170A1, Priority Date 28 April 2016.

"*Method for object pose estimation, apparatus for object pose estimation, method for object estimation pose refinement and computer readable medium*", Japanese Patent JP2013050947A, Publication Date 19 October 2016.

"*HMD Calibration with Direct Geometric Modeling*", US Patent US20160012643A1, Publication Date 14 January 2016.

"*HMD Calibration with Direct Geometric Modeling*", EU Patent No. 15175799.4 - 1902, Filing Date 8 July 2015.

"*System generating three-dimensional model, method and program*", Japanese Patent JP2015176600A, Publication Date 5 October 2015.

"*Holocam Systems and Methods*", US Patent US20150261184, Publication Date 17 September 2015.

"*Method and Apparatus for Improved Training of Object Detecting System*", US Patent US20140079314, Publication Date 20 March 2014.

"*Method for simulating impact printer output, evaluating print quality, and creating teaching print samples*", US Patent 8654398, Publication Date 18 February 2014.

"*Method and apparatus for object pose estimation*", US Patent 8467596, Publication Date 18 June 2013.

Technical Skills

Ummanned Ground Vehicles (UGV), *differential drive, multi-threaded vision and ultrasonic sensors, pytorch models, localized positioning systems, power management, field tests*.

Deep Learning, *object detection, object recognition, and semantic segmentation on satellite and aerial, mobile and static, RGB and multi-spectral cameras in production for insurance and agg*.

GeoSpatial AI, *active deep learning experience on Venus, Maxar (WorldView), Sentinel-1 and Sentinel-2, RCM, multi-spectral optical and SAR, in Python and Bash on the cloud for semantic segmentation, change detection, carbon sequestration, object detection, surveillance, and tasking*.

Geospatial, *rasterio, geojson, shape files, xarray, QGIS, gdal*.

Insurance, *aerial image analysis for roof and yard content and damage assessment and object detection, risk modelling*.

Agritech, *vertical farm/orchard vision applications, tree detection and localization, seed/blossom/fruit counting, size estimation, and plant statistics*.

Machine Vision, *camera models, triangulation, pose estimation*.

Machine Learning, *TensorFlow, PyTorch, MLFLow, Fiftyone, Roboflow, Yolo*.

Python, *OpenCV, Boto3, PyQt, PyMySQL, NumPy, SciPy, Matplotlib, scikit-learn, Pandas, Seaborn, Jupyter Notebooks, Django*.

Linux, *bash programming, Ubuntu, Raspbian*.

Cloud, *Amazon S3, Amazon SQS, Amazon EC2, GCS, slurm, Amazon SageMaker, AWS Batch, Argo Workflows*.

Databases, *MySQL, Amazon RDS, PostgreSQL*.

Software Development, *agile development, JIRA, git, gitlab, papertrail, ci/cd, docker*.

Hardware, *Jetson, integration w/ cameras and sensors, Raspberry Pi, 3D design and print, general electronics, general digital electronics, general circuits*.

Web, *Django, Flask, php*.

Other, *LaTeX, POV-Ray, IVT, PCL, CImg, OpenGL, Armadillo, Gandalf, Ceres Solver, and other open-source tools*.

Certifications

2022 **AWS Cloud Technical Essentials**.
By Amazon Web Services on Coursera

2019 **Deep Learning Specialization**, *Five-Course Specialization*.
By Andrew Ng (deeplearning.ai)

2017 **Neural Networks for Machine Learning**.
By the University of Toronto on Coursera

2017 **Machine Learning**.
By Stanford University on Coursera

2017 **Machine Learning**, *Four-Course Specialization*.
By the University of Washington on Coursera

2013 **Patents**, *Understanding Patents - An Introductory Course*.
McGill University School of Continuing Studies

Publications

Refereed Journal Papers

Arash Abadpour "*Rederivation of the Fuzzy-Possibilistic Clustering Objective Function through Bayesian Inference*", Fuzzy Sets and Systems, Accepted for Publication, October 2015

Arash Abadpour "*Incorporating spatial context into fuzzy-possibilistic clustering using Bayesian inference*", Journal of Intelligent and Fuzzy Systems, Accepted for Publication, August 2015

Arash Abadpour "*A Sequential Bayesian Alternative to the Classical Parallel Fuzzy Clustering Model*", Information Sciences, Volume 318, October 2015, Pages 28–47

Arash Abadpour "*On Applications of Pyramid Doubly Joint Bilateral Filtering in Dense Disparity Propagation*", 3D Research, Volume 5, Issue 2, 25 April 2014, Pages 1–20.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*Approximation Algorithms For Maximizing The Information-Theoretic Sum Capacity of Reverse Link CDMA Systems*", AEU - International Journal of Electronics and Communications, Volume 63, Issue 2, 4 February 2009, Pages 108–115.

Arash Abadpour and Shohreh Kasaei. "*A Novel Color Image Compression Method using Eigenimages*", Journal of Iranian Association of Electrical and Electronics Engineers - Volume 5, No.2, Fall and Winter 2008, Pages 45–53.

Arash Abadpour and Shohreh Kasaei. "*Color PCA Eigenimages and Their Application to Compression and Watermarking*", IEE Image & Vision Computing, Volume 26, Issue 7, July 2008, Pages 878–890.

Arash Abadpour and Shohreh Kasaei "*Principal Color and Its Application to Color Image Segmentation*", Scientia Iranica - Volume 15, No. 2, April 2008, Pages 238-245.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*Closed Form Solution for Maximizing the Sum Capacity of Reverse-Link CDMA System with Rate Constraints*", IEEE Transactions on Wireless Communications, Volume 7, Issue 4, April 2008, Pages:1179–1183.

Arash Abadpour, Attahiru Sule Alfa, and Jeff Diamond, "*Video-on-Demand Network Design And Maintenance Using Fuzzy Optimization*", IEEE Transactions on Systems, Man, and Cybernetics, Part B, April 2008, Volume 38, Issue 2, Pages: 404–420.

Arash Abadpour, Attahiru Sule Alfa, "*Approximate algorithms for maximizing the capacity of the reverse link in multiple-class CDMA systems*", in Operations Research and Cyber-Infrastructure, M. J. Saltzman, J. W. Chinneck, and B. Kristjansson, Eds. Springer, 2008, Pages: 237–252

Arash Abadpour and Shohreh Kasaei, "*An Efficient PCA-based Color Transfer*", Visual Communication & Image Representation, February 2007, Volume 18, Number 1, Pages, 15–34.

Arash Abadpour, Shohreh Kasaei, S. Mohsen Amiri, "*Fast Registration of Remotely-Sensed Images for Earthquake Damage Estimation*", EURASIP Journal on Applied Signal Processing, Volume 2006 (2006), Article ID 76462.

Arash Abadpour and Shohreh Kasaei. "*Unsupervised, Fast and Efficient Color Image Copy Protection*", IEE Proceedings Communications, October 2005, Volume 152, Issue 5, Pages 605–616.

Arash Abadpour and Shohreh Kasaei "*Pixel-based Skin Detection for Pornography Filtering*", Iranian Journal of Electrical and Electronic Engineering (IJEEE), July 2005, Volume 1, No. 3, Pages 21–41.

Refereed Conference Papers

Arash Abadpour and Chris Rampersad, "*Quantitative Measurement Of The Impact Of Five Degradations On Deep Learning Detection Of Aircraft In Medium-Resolution Satellite Imagery*", International Geoscience and Remote Sensing Symposium, Pasadena, California, 2023 (IGARSS 2023).

Arash Abadpour and Attahiru Sule Alfa, "*Approximate Algorithms for Maximizing the Capacity of the Reverse Link in Multiple-Class CDMA System*", Accepted in 11th INFORMS Computing Society Conference, Charleston 2009 (ICS'09).

Arash Abadpour, Attahiru Sule Alfa, and Jeff Diamond, "*Fuzzy Design of A Video-on-Demand Network*", Accepted in 7th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT 2007).

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*A More Realistic Approach to Information-Theoretic Sum Capacity of Reverse Link CDMA Systems in a Single Cell*", In the IEEE International Conference on Communications (ICC 2007), Glasgow, Scotland.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*Capacity-Share Controlled Information-Theoretic Sum Capacity of Reverse Link Single-Cell CDMA Systems*", In the 2007 IEEE 65th Vehicular Technology Conference, (VTC2007 Spring), Dublin, Ireland.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*Information-Theoretic Sum Capacity of Reverse Link CDMA Systems in A Single Cell, An Optimization Perspective*", In the 8th Annual Conference for Canadian Queueing Theorists and Practitioners, CanQueue 2006, Banff, Calgary, Canada.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*Closed Form Solution for QoS-Constrained Information-Theoretic Sum Capacity of Reverse Link CDMA Systems*", In the 2nd ACM Q2SWinet 2006, Torremolinos, Malaga, Spain.

Arash Abadpour and Shohreh Kasaei, "*Multi.Layer Representation of Grayscale Images and Its Generalization*", In the 14th Iranian Conference on Electrical Engineering (ICEE2006), Iran.

Arash Abadpour and Shohreh Kasaei, "*Deliberate distortion of color image and video resources for copyright protection*", In the 5th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT 2005), Athens, Greece, pages 369–374, 2005.

Arash Abadpour and Shohreh Kasaei, "*Comprehensive Evaluation of the Pixel-Based Skin Detection Approach for Pornography Filtering in the Internet Resources*", In the International Symposium on Telecommunications, (IST 2005), Pages 829–834, Shiraz, Iran, September 2005.

Arash Abadpour and Shohreh Kasaei, "*Wavelet-PCA-Based Compression Method for Color Images (Invited Paper)*", In the First Symposium on Wavelet and its Applications, Tehran, Iran, February 2005.

Arash Abadpour and Shohreh Kasaei, "*An Unsupervised Fast Color Transfer Method*", In the 13th Iranian Conference on Electrical Engineering (ICEE2005), Zanjan, Iran, 2005.

Arash Abadpour and Shohreh Kasaei, "*A New Fast Robust Color Image Watermarking Method using FPCA Clustering*", In the 10th Annual CSI Computer Conference (CSICC2005), Pages 246–251, Tehran, Iran, February 2005.

Arash Abadpour and Shohreh Kasaei, "*Fast Registration of Remotely Sensed Images*", In the 10th Annual CSI Computer Conference (CSICC2005), Pages 61–67, Tehran, Iran, February 2005.

Arash Abadpour and Shohreh Kasaei, "*New Tree Decomposition Method for Color Images*". In the 10th Annual CSI Computer Conference (CSICC2005), Pages 48–52, Tehran, Iran, February 2005.

Arash Abadpour and Shohreh Kasaei, "*A New Fast Fuzzy Method for Query Region Extraction from Color Images*". In the 10th Annual CSI Computer Conference (CSICC2005), Pages 53–59, Tehran, Iran, February 2005.

Arash Abadpour and Shohreh Kasaei, "*Novel Color Image Compression Method using Eigenimages*", In the third Conference on Machine Vision, Image Processing & Applications, (MVIP2005), volume 1, Pages 340–346, Tehran, Iran, Februrary 2005.

Arash Abadpour and Shohreh Kasaei, "*Novel Method for Unsupervised Fuzzy Change Detection in Multispectral Remotely Sensed Images*", In the third Conference on Machine Vision, Image Processing & Applications, (MVIP2005), Volume 1, Pages 270–277, Tehran, Iran, February 2005.

Arash Abadpour, S. Bagheri S, and Shohreh Kasaei, "*A New Method for Agent-based Color Clustering*", In the World Congress on Fuzzy Logic, Soft Computing and Computational Intelligence Theories and Applications (IFSA2005), Beijing, China, July 2005.

Arash Abadpour and Shohreh Kasaei, "*A New FPCA-Based Fast Segmentation Method for Color Images*", In the 4th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT 2004), Pages 72–75, Rome, Italy, December 2004.

Arash Abadpour and Shohreh Kasaei, "*A Fast and Efficient Fuzzy Color Transfer Method*", In the 4th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT 2004), Pages 491–494, Rome, Italy, December 2004.

Roya Narimani, Maryam HoviatTalab, **Arash Abadpour**, and Azadeh Yadollahi. "*Vibration Measurement And Analysis Using Image Processing Method*", In the proceedings of the 7th Biennial Conference on Engineering Systems Design and Analysis, (ESDA), Manchester, UK, July 19–22, 2004.

Maryam HoviatTalab, Roya Narimani, Azadeh Yadollahi, and **Arash Abadpour**, "*New Image-based System for Vibration Measurement, Specially Developed for Forced Human Vibration Analysis*", In the ASME International Mechanical Engineering Congress and RD&D Expo, (IMECE2004), Anaheim, California, November 13–19, 2004.

Arash Abadpour and Shohreh Kasaei, "*A New PCA-Based Robust Color Image Watermarking Method*", In the 2nd IEEE Conference on Advancing Technology in the GCC: Challenges, and Solutions (IEEE-GCC 2004), Pages 326–331, Manama, Kingdom of Bahrain, November 2004.

Arash Abadpour and Shohreh Kasaei, "*A New Principle Component Analysis Based Colorizing Method*", In the 12th Iranian Conference on Electrical Engineering (ICEE2004), Mashhad, Iran, May 2004.

Arash Abadpour and Shohreh Kasaei, "*New PCA-based Compression Method for Natural Color Images*". In International Workshop on Computer Vision, IPM, Tehran, Iran, April 2004.

Arash Abadpour and Shohreh Kasaei, "*Performance Analysis of Three Likelihood Measures for Color Image Processing*". In International Workshop on Computer Vision, IPM, Tehran, Iran, April 2004.

Arash Abadpour and Shohreh Kasaei, "*A New Parametric Linear Adaptive Color Space and its PCA-based Implementation*". In The 9th Annual CSI Computer Conference (CSICC2004), Volume 2, Pages 125-132, Tehran, Iran, February 2004.

F. Malekipour, **Arash Abadpour**, Farzam Farahmand, R. Narimany, "*Study of Effect of Number and Location of the Control Points on the Accuracy of 3D Reconstruction of Coordinates in Gait Analysis Systems*", In the 11th Iranian Annual Biomechanics Conference, Tehran, Iran, February, 2003 (Persian).

F. Malekipour, **Arash Abadpour**, Farzam Farahmand, R. Narimany, "*Performance Analysis of the Direct Linear Transform for Marker Reconstruction in Motion Analysis Applications*", In the First Seminar on Biomechanics and Human Motion Analysis, Imam Hospital, Tehran, Iran, November 2002 (Persian).

Arash Abadpour, Azadeh Yadollahi, "*Developing a Software Platform to Use Anaglyph Glasses for 3D Visualization*", National Computer Conference (NCC2003), Mashhad, Iran, 2003 (Persian).

Roya Narimani, Farzam Farahmand, G. Bashiri, **Arash Abadpour**, "*Developing a system for cinematic measurement of body movements by imaging*", In the 5th Iraninan Congress of Medical Physics (ICMP), Tehran, Iran, 2002, pp. 99-100 (Persian).

Dissertations

Ph.D. Thesis: "*QoS-Constrained Information Theoretic Capacity Maximization in CDMA Systems*", Electrical and Computer Engineering Department, University of Manitoba, Winnipeg, Manitoba, Canada, Supervised by Prof. Attahiru Sule Alfa (Ph.D.), 2005–2009.

M.Sc. Thesis: "*Color Image Processing using Principal Component Analysis*", Mathematics Science Department, Sharif University of Technology, Tehran, Iran, Supervised by Shohreh Kasaei (Ph.D.) and A. Daneshgar (Ph.D.), 2004–2005.

B.Sc. Thesis: "*Image Processing Integrated Debugging Environment*", Electrical Engineering Department, Sharif University of Technology, Tehran, Iran, Supervised by Bijan Vosoughi Vahdat (Ph.D.), 2001–2002.

Technical Reports

Arash Abadpour, Attahiru Sule Alfa, and Jeff Diamond, "*Video Streaming using Overlay Networks*", Technical Report, Telecommunication Research Laboratories (TRLabs), 2008.

Arash Abadpour, Attahiru Sule Alfa, and Jeff Diamond, "*Video-on-Demand Network Design And Maintenance Using Fuzzy Optimization*", Technical Report, Telecommunication Research Laboratories (TRLabs), 2007.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*Capacity-Share Controlled Information-Theoretic Sum Capacity of Reverse Link Single-Cell CDMA Systems*", Technical Report, University of Manitoba, 2006.

Arash Abadpour, Attahiru Sule Alfa, and Anthony C.K. Soong, "*A More Realistic Approach to Information-Theoretic Sum Capacity of Reverse Link CDMA Systems in a Single Cell*", Technical Report, University of Manitoba, 2006.

A. Amirfazli, K. Khoshi, Azadeh Yadollahi, **Arash Abadpour**, "*Converting Industrial Drawings Type A to Type E from Non-Vector Form to Vector Form II*", Research Proceedings, Sharif University of Technology, 2000–2001, pp. 31–39.

Roya Narimani, G. Bashiri, **Arash Abadpour**, "*Gait Analysis by Image Processing*", Research Proceedings, Sharif University of Technology, 1999–2000, pp. 187–195.

A. Amirfazli, K. Khoshi, Azadeh Yadollahi, **Arash Abadpour**, "*Converting Industrial Drawings Type A to Type E from Non-Vector Form to Vector Form I*", Research Proceedings, Sharif University of Technology, 1999–2000, pp. 25–36.

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