# Arash Abadpour

# Education

2005–2009 Ph.D., University of Manitoba.

Electrical and Computer Engineering Department

2003–2005 Master of Science, Sharif University of Technology.

Mathematics Science Department, Computer Science Group (Scientific Computation)

1996–2003 **Bachelor of Science**, Sharif University of Technology.

Electrical Engineering Department, Control Group

1992–1996 **High school**, Exceptional Talents High School.

Diploma in Physics and Mathematics

## Fields of Work

**Image Processing**, General Image Processing, Color Image Processing, Image Processing for Robotics Applications, Bilateral and Trilateral Filtering.

**Computational Photography**, Color Transfer, Colorization, Image Fusion.

**Machine Vision**, 3D Object Detection, Object Pose Estimation, Visual Inspection.

**Range–Data Processing**, Depth Sensors, RGBD Acquisition and Filtering, Depth Fusion, Depth Up–Sampling and Noise-Reduction.

**Human–Machine Interface**, Augmented and Virtual Reality, 3D Scan/Display Systems.

**Pattern Recognition**, Bayesian Inference, Stochastic Optimization, Unsupervised Clustering, Fuzzy Clustering.

**Symbology**, Symbology Design, Symbology Detection..

**Image Data Management**, *Image Encryption, Visual Watermarking, Data Hiding in Visual Information.* 

# Languages

#### English.

Fluent in Reading, Listening, Speaking, and Writing (TOEFL CBT: 273/300).

# Skills

**Computer Programming**, C/C++ and Python.

**Patents**, Keyword creation, patent search, patent review, invention disclosures and algorithm description.

MATLAB, C/MEX and Object-Oriented Programming, Octave.

Web Programming, php and MySQL.

**Other**, LaTeX, POV-Ray, OpenCV, IVT, PCL, Clmg, OpenGL, Armadillo, Gandalf, and other open-source tools.

## Honors & Awards

- 2008–2009 **Scholarship**, *Telecommunication Research Labs (TRLabs), Winnipeg.* \$24,000
- 2007–2008 **Scholarship**, *Telecommunication Research Labs (TRLabs)*, *Winnipeg.* \$24,000
- 2006–2007 **Scholarship**, *Telecommunication Research Labs (TRLabs)*, *Winnipeg.* \$12,000
- 2006–2007 **Fellowship**, Edward R. Toporeck Graduate Fellowship in Engineering. \$4,288
- 2006–2007 **Scholarship**, University of Manitoba International Graduate Student Scholarship (IGSS). \$5,000
- 2005–2006 **Scholarship**, *Telecommunication Research Labs (TRLabs), Winnipeg.* \$12,000
  - **Finalist Candidate**, *University of Manitoba Graduate Fellowship (UMGF)*. \$16,000
  - 2005 **Scholarship**, Iranian Telecommunications Research Center (ITRC). \$1,000
  - 2005 Paper Praised, The Third Conference on Machine Vision, Image Processing & Applications, (MVIP2005), Tehran, Iran.
    Novel Method for Unsupervised Fuzzy Change Detection in Multispectral Remotely Sensed Images
  - 2004 **Paper Praised**, 9th Annual CSI Computer Conference (CSICC2004), Tehran, Iran.
    - A New Parametric Linear Adaptive Color Space and its PCA-based Implementation
  - 2002 **4th Place**, 7–th National Scientific Olympiad for Masters Students.

**11th Place**, National M.Sc. Examination for Computer Sciences.

- 2002 **5th Place**, *National M.Sc. Examination for Computer Engineering*. Artificial Intelligence
- 1996 **234th Place**, *Iranian National University Entrance Examination*.
- 1995 Silver Medal, Iranian National Computers Olympiad.

2002

1995 **Silver Medal**, Iranian National Mathematics Olympiad.

# Community Activities

2011-Current **Training**, On topics related to citizen journalism, blogging, use of numbers and statistics in journalism, web security and digital hygiene, and others..

2011-2014 **Jury Member**, Jury Member for DW–World Best of Blogs (The BOBs), Persian language.

2008-Current **Articles**, Comments published in Persian BBC Website, DW-World Website, Article 19, and others.

Details in http://abadpour.com/?page\_id=488

2007-Current **Presentations and Conferences**, Panelist and conference presenter on issues related to Digital Literacy and the use of the Internet in Iran in different conferences.

2007–Current **Translation Services**, Translation of English training manuals to Persian for bloggers and social activists on issues related to the new media for Reporters without Frontiers (RSF), Electronic Frontier Foundation (EFF) and others.

2007–2008 **Social Commentary**, Observer for France24 TV Station.

2006-Current Interviews, Harvard Law School's Global Voices Online, nana.co.il, ABC Radio National, Radio Zamaneh, BBC, Voice of America, DW–World, Radio Free Europe, and other media sources.

2004-Current **Blogging**, Bilingual (Persian/English) blogging at kamangir.net.

2002–2005 **Expert Service**, *Expert for allexperts.com*. Delphi and Computer Sciences Branches

1998 **Executive Experience**, Head of the publication committee of the first National Student Conference on Electrical Engineering.

## Passed Courses

- Understanding Patents, Summer course offered by IPIC at McGill University.
- Queuing Performance Analysis, Matrix Analytical Methods in Queueing.
- General Mathematics, Engineering Mathematics, Differential Equations, Statistics and Probability Theory, Numerical Analysis, Advanced Numerical Analysis, Graph Theory.
- Computer Programming (Pascal), Advanced Computer Programming (C++), Data Structure and Algorithms, Advanced Mathematical Programming.
- Signal Processing, Advanced Digital Image Processing, Digital Video Processing.
- Logic Circuits, Machine Language, Microprocessors.
- Neural Networks.
- Fuzzy Sets.
- Electrical Circuits, Electronics, Industrial Electronics, Electrical Machines, Control Systems, Modern Control, Industrial Control, Digital Control.

# Experience

Professional Work (2001–Current)

2009–Current Researcher, Imaging Group, Epson Canada Limited.

Responsible for performing research on and providing solutions for problems in the field of Visual Inspection, Symbology Detection, 3D Object Detection and Pose Estimation,

of Visual Inspection, Symbology Detection, 3D Object Detection and Pose Estima Camera Calibration, Augmented and Virtual Reality, 3D Scan/Display Systems.

2001–2004 Process Control Engineer, Karband Eng. Co..

Responsible for design, implementation and erection of PLC-based control systems for medium-sized machinery in pipe and profile production plants.

Research Assistant (1998–2009)

- 2005–2009 **Capacity Optimization in CDMA system**, Attahiru Sule Alfa (Ph.D.), University of Manitoba.
- 2005–2009 Caching and Planning in Video on Demand Networks, Attahiru Sule Alfa (Ph.D.) and Jeff Diamond (Ph.D.), Telecommunications Research Laboratories (TRLabs), Winnipeg.
  - 2005 **Content–Based Pornography Filtering**, Shohreh Kasaei (Ph.D.) and Ali Talebpour (Ph.D.), Image Processing Research Laboratory, Sharif University of Technology & Tebian Institute.
- 2004–2005 **Fuzzy Clustering**, Saeed Bagheri Shouraki (Ph.D.), Sharif University of Technology.
- 2004–2005 **Earthquake Damage Detection using Remotely Sensed Images**, Shohreh Kasaei (Ph.D.), M. Nakamura (Ph.D.), and Y. Kosugi (Ph.D.), Image Processing Research Laboratory, Sharif University of Technology & Tokyo University of Technology.
- 2003–2005 **Color Image Processing**, Shohreh Kasaei (Ph.D.), Image Processing Research Laboratory, Sharif University of Technology.
- 2000–2001 **3D Motion Analyzer**, Farzam Farahmand (Ph.D.) and Roya Narimani (M.Sc.), Biomechanics Laboratory, Sharif University of Technology.
- 2000–2001 **3D Surface Reconstruction**, Joint Project of Sharif University of Technology and SAPCO.
- 2000–2001 **Human Forced Vibration Analysis**, Maryam HoviatTalab (M.Sc.) and Roya Narimani (M.Sc.), Biomechanics Laboratory, Sharif University of Technology.
- 2000–2001 **3D Human Organ Reconstruction**, Farzam Farahmand (Ph.D.) and Roya Narimani (M.Sc.), Biomechanics Laboratory, Sharif University of Technology.
  - 2000 **Sharif Pedobarography**, Farzam Farahmand (Ph.D.) and Roya Narimani (M.Sc.), Biomechanics Laboratory, Sharif University of Technology.
- 1999–2000 **Hardcopy Drawing to Vector Form Conversion**, A.Amirfazli (Ph.D.), Sharif University of Technology.

1998–1999 **Sharif Human Motion Analyzer Project**, Farzam Farahmand (Ph.D.) and Roya Narimani (M.Sc.), Biomechanics Laboratory, Sharif University of Technology.

Teacher's Assistant (2004–2007)

- 2007 **Communication Systems**, *Dr. Pradeepa Yahampath*, *University of Manitoba*. Undergraduate Course
- 2007 **Digital Control**, *Dr. Wai–Keung Fung, University of Manitoba*. Undergraduate Course
- 2006 **Digital Control**, *Dr. Wai–Keung Fung, University of Manitoba*. Undergraduate Course
- 2005 Advanced Digital Image Processing, Dr. Shohreh Kasaei, Sharif University of Technology.
  Graduate Course
- 2004 Advanced Digital Image Processing, Dr. Shohreh Kasaei, Sharif University of Technology.
  Graduate Course

Instructor (2005)

2005 **Digital Image Processing**, Computer Engineering Faculty, Shariati University. Undergraduate Course

# **Patents**

- "Method for simulating impact printer output", US Patent Application Number 20130242354, Publication Date 19 September 2013.
- "Method And Apparatus For Object Pose Estimation", US Patent Application Number 20130051626, Publication Date 28 February 2013.
- "Classified Title", filed with the U.S. Patent Office on September 18, 2012.

Declassified titles will be posted upon the completion of the patent procedure.

## **Publications**

Refereed Journal Papers

**Arash Abadpour** "Rederivation of the Fuzzy–Possibilistic Clustering Objective Function through Bayesian Inference", Submitted to Fuzzy Sets and Systems, March 2014

**Arash Abadpour** "On Applications of Pyramid Doubly Joint Bilateral Filtering in Dense Disparity Propagation", 3D Research, Accepted for Publication, March 2014

**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 Pornog-raphy Filtering*", Iranian Journal of Electrical and Electronic Engineering (IJEEE), July 2005, Volume 1, No. 3, Pages 21–41.

# Refereed Conference Papers

**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.

## Internet Research

**Arash Abadpour**, Contribution included in "Internet Freedom: Snapshots of the Case of Iran", Transparency for Iran, March 2014.

Laurent Giacobino, **Arash Abadpour**, Collin Anderson, Fred Petrossian, and Caroline Nellemann, "Whither Blogestan: Evaluating Shifts in Persian Cyberspace", Iran Media Program and Annenberg School for Communication, University of Pennsylvania, March 2014.

**Arash Abadpour**, "Thoughts on the Iranian internet question", in Computer Crimes in Iran: Online Repression in Practice, Article 19, December 2013.

**Arash Abadpour**, "An Open Letter to the Future President of Iran, Iranian Internet users describe better Internet in an open letter to Dr. Hassan Rouhani, the President–elect of Iran.", June 2013.

Alaadin Al-Radhi, **Arash Abadpour**, Fahd Btayneh, Fred Andon Petrossians, Rafik Dammak, and Mohamed Omran, "Internet Governance, The Quest for an Open Internet in the Middle East and Northern Africa", Hivos, June 2013.

**Arash Abadpour** and Collin Anderson, "Fights, Adapts, Accepts: Archetypes of Iranian Internet Use", Iran Media Program and Annenberg School for Communication, University of Pennsylvania, March 2013.

#### References are available upon request.

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