Summary

Umesh Adiga, Ph.D.

Staff Engineer *Thermo Fisher Scientific Inc.,*
Email: umesh.adiga@gmail.com **Ph.: 971 330 7948**

Experience :
Staff Engineer, Thermo Fisher Scientific Inc., (2017-till date);
Principal Engineer, T D Williamson Inc.(2014 – 2017);
Principal Scientist (Scientist VI) Air Force Research Laboratory (contracted via UES Inc.)
Senior Image Processing Engineer, Ikonisys Inc. (2008-2009);
Lead Computer Scientist, General Electric (2006-2008);
Computer Scientist, Lawrence Berkeley National Laboratory (LBNL), Berkeley, 2002-2006

Education:
Ph.D., Indian Statistical Institute, 94-99;
M.S. (Computer Science), Lincoln College, Oxford University, UK;
M.E. (Electronics) SGGS College of Engg. and Tech., Marathwada University, India;
B.E. (Electronics & Communication) Govt BDT College of Engg., Mysore University, India.

Scholarships and Fellowships: **1.** Postdoctoral Research Fellowship, Lawrence Berkeley National Laboratory, (Jan 2002 – May2005), **2.** Wellcome-Trust Postdoctoral Fellowship, Oxford University, 1999-2001, **3.** Wellcome-Trust scholarship, Oxford University, 2000-2001, **4.** Senior Research Fellowship Indian Statistical Institute, 1996-1999, **5.** Guest Scientist Research Fellowship, GSF-Munich, Germany, 1996-1997, **5.** Junior Research Fellowship and Senior Research Fellowship, Indian Statistical Institute, 1994-2000, **6.** Graduate Aptitude Test for Engineering (GATE) Scholarship, Ministry of Human Resources, Govt. of India, 1991-1993.

Patents and publications: Seven patents and few more in the pipeline, over fifty publications in international journals, conferences, etc.

Volunteer Work: I am a member of the project proposal review board for NIH's SBIR/STTR project funding. I am also a regular reviewer/referee for the IEEE transaction manuscripts submitted for the review/publication.

Details:

Umesh Adiga, Ph.D.

Staff Engineer
Thermo Fisher Scientific Inc.,
5350 Dawson Creek Dr., Hillsboro, OR 97124
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13089, NW Saltzman Ct
Portland OR 97229

Ph.: 971 330 7948

(U.S. Citizen)

Experience :

1. **Staff Engineer** (Image/Signal Processing and Pattern Recognition)
   Thermo Fisher Scientific Inc., Hillsboro, OR 97124 (2017 -)

2. **Principal Engineer** (Image/Signal Data Processing and Machine Learning):
   T D Williamson Inc. Salt Lake City, Utah (2014 – 2017).

3. **Principal Scientist (Scientist VI)** (Biomedical Image Analytics and Material Science data analytics)**:**
   Air Force Research Laboratory (WPAFB) contracted through **UES Inc**., Dayton, Ohio (2009 – 2014; 6 months of gap in 2011 when I worked on explosives detection at **SAIC**).

4. **Senior Image Processing Engineer:** (Biomedical Image Analysis)
   Ikonisys Inc. New Haven, CT (2008-2009)

5. **Lead Computer Scientist/Engineer:** (Medical and Biological Image Analysis)
   General Electric Global Research, (Imaging Technologies), Niskayuna, NY (2006-2008)

6. **Computer Scientist:** (Biomedical Image analysis, Confocal and Electron Cryo Microscopy)
   Lawrence Berkeley National Laboratory (LBNL), Berkeley, California, USA, 2002-2006

7. **Postdoctoral Research Associate:** (Confocal Microscopy Image analysis for functional imaging)
   University of Arizona (Neural Systems Memory and Aging) and Rensselaer Polytechnic Institute (ECSE), USA, June 2001 – Jan 2002.

8. **Postdoctoral Research Scientist:** (Image and Signal processing for human genetics)
   Oxford University, (Wellcome Trust Centre for Human Genetics), UK, Oct 1999 – June 2001.

9. **Guest Scientist:** (Confocal microscopy image analysis for prostate cancer research)
   Institute for Health and Environmental Research, GSF, Munich, Germany, 1996-1997.

10. **Lecturer:** Kalpataru Institute of Technology, Bangalore University, India, Jul 1993- Oct 1994

11. **Engineer Trainee (Intern)**, Philips, Bombay, India during 1989 and 1990-91.

Education:

1. **Doctor of Philosophy.** (Image Processing and Pattern Recognition)
   Indian Statistical Institute, 94-99.

2. **Master of Science** (Computer Science),
   Lincoln College, **Oxford University**, UK.

3. **Master of Engineering** (Electronics)
   SGGS College of Engg. and Tech., **Marathwada University**, India.

4. **Bachelor of Engineering** (Electronics & Communication)
   Govt BDT College of Engg. and Tech., **Mysore University**, India.

Certificates:

1. Data Science Certificate, Harvard Univ. EdX
2. Statistical Learning, Stanford Univ. EdX course
3. Data Science and Machine Learning certificate by Springboard (in progress)

Scholarships and Fellowships:

1. **Postdoctoral Research Fellowship,**
   Lawrence Berkeley National Laboratory, (Jan 2002 – May2005),
2. **Postdoctoral Research Associate Fellowship**
   University of Arizona, 2001 and Rensselaer Polytechnic Institute, 2001,
3. **Wellcome-Trust Postdoctoral Fellowship,**
   Oxford University, 1999-2001,
4. **Wellcome-Trust scholarship,**
   Oxford University, 2000-2001,
5. **Senior Research Fellowship**
   Indian Statistical Institute, 1996-1999,
6. **Guest Scientist Research Fellowship**,
   GSF-Munich, Germany, 1996-1997,
7. **Junior Research Fellowship**
   Indian Statistical Institute, 1994-1996,
8. **Graduate Aptitude Test for Engineering (GATE) Scholarship,**
   Ministry of Human Resources, Govt. of India, 1991-1993.

Patents:

1. Method and system for dye assessment (in tumor margins)
   (US patent US 20100104513 A1)
2. System and methods for determining cardiac axis
   (US patent US8165377 B2)
3. System and method for detecting and eliminating one or more defocused or low contrast-to-noise images
   (Patent US8588503 B2; EP2283463A4, EP2283463B1)
4. Pulmonary emboli detection
   (European patent # 11152643.0 – 2218 and US patent US 8,542,893 B2)
5. Systems and Methods for Processing Low Contrast Images
   (Patent #: 9,147,104)
6. Automated high-speed metallographic System
   (Patent # 9, 528, 915)
7. Smart Metrology of Microscope Images
   (Patent #FE2505US1-NAT)

Few more additional patent and a trade secret have been filed or in process pipeline.

Publications

1. **Umesh Adiga**, Debbie Taylor, Brian Bell, Larissa Ponomareva, Thomas J. Lamkin, Mapping Infected Cell Phenotype, in **IEEE Trans. On Biomedical Engineering**, vol. 59, no. 8, Aug. 2012.
2. **Umesh Adiga**, Debbie Taylor, Brian Bell, Larissa Ponomareva, Stephen Kanzlemar, Ryan Kramer, Sandra Nelson, Thomas J. Lamkin, Automated Analysis and Classification of Infected Macrophages using Bright-field Amplitude Contrast Data, **J. of Biomolecular Screening**,Vol. 17, No. 3, 2012 (online published Nov. 2011).
3. Wah Chiu, Chao Yang, Wen Jiang, Donghua Chen, Esmong Ng, **Umesh Adiga**, "Estimating Contrast Transfer Function and associated Parameters by Constrained Nonlinear Optimization", J. of **Microscopy**, Vol. 233, pp. 391-403, 2009.
4. **Umesh Adiga,** Malladi R., Gonzalez R.F., Solorzano C.O., "A robust methodology for the analysis of breast cancer tissue blocks", **IEEE Trans. on Image Processing**, Vol. 15, Issue 8, 2006.
5. **Umesh Adiga**, William Baxter, Bimal Rath, Beate Rockel, Richard Hall, Jochim Frank, Robert Glaeser, "Particle picking by segmentation: A comparative study with SPIDER based manual particle picking", J. of **Structural Biology**, vol. 152, Issue 3, pp. 211-220, 2005.
6. **Umesh Adiga**, R. Malladi, W. Baxter, RM Glaeser, "A Binary Segmentation Approach for Boxing Ribosome Particles in Cryo Micrographs", J. of **Structural Biology**, Vol. 145, pp. 142-151, 2004.
7. Gang Lin, **Umesh Adiga,** Jon Guzawski, Kathy Olson, Carol Barnes, Badri Roysam, "A Hybrid 3D Watershed Algorithm Incorporating Gradient cues and Object Models for Automatic Segmentation of Nuclei in Confocal Image Stacks" Int. J. of **Cytometry,** Vol. 56A, pp. 23-36, 2003 (Patented by RPI).
8. **Umesh Adiga** and Jonathan Flint, "An Efficient Tool for Genetic Experiments: Agarose Gel Image Analysis", **Pattern Recognition** Vol. 36, pp. 2453-2461, 2003.
9. **Umesh Adiga,** "Segmentation of Volumetric Tissue Images using constrained active models," J. **Computer Methods and Programs in Biomedicine,** Vol. 71, pp. 91-104, 2002.
10. **Umesh Adiga,** "An Integrated System for Feature Evaluation of 3-D Images of a Tissue Specimen," J. **Analytical Cellular Pathology,** Vol. 24, pp. 47-58, 2002.
11. **Umesh Adiga**, "An integrated approach for segmentation of 3-D confocal images of a tissue specimen", J. **Microscopy Research and Techniques**, Vol. 54, pp. 260-270, 2001.
12. **Umesh Adiga** and B. B. Chaudhuri, "An efficient method based on watershed and rule based merging for segmentation of 3-D histo-pathological images", J. **Pattern Recognition**, Vol. 34/7, pp-1449-1458, 2001.
13. **Umesh Adiga**, A. Bhomra, MG. Turri, A. Nikod, S. Datta, P. Jeavons, R. Mott, J. Flint, "Automation of analysis of agarose gel images". J. **Bioinformatics**, Vol. 17, pp. 1084-1089, 2001.
14. **Umesh Adiga,** B. B. Chaudhuri, "Efficient methods for noise reduction and enhancement of confocal microscopy images", J. **MICRON**, Vol. 32, pp. 363-370, 2001. Awarded an honorarium by the publisher.
15. **Umesh Adiga,** Sam JL Knight, and B. B. Chaudhuri, "Characterization and automatic counting of FISH signals in 3-D tissue images", J. **Image Analysis and Stereology**, Vol. 20, No. 1, pp. 41-52, 2001.
16. **Umesh Adiga,** and B. B. Chaudhuri, "Region based techniques for segmentation of volumetric histo-pathological images", J. **Computer Methods and Programs in Bio-Medicine**, Vol. 61, No. 1, pp. 23-47, 2000
17. **Umesh Adiga** and B. B. Chaudhuri, "Segmentation and counting of FISH signals in confocal microscopy images", J. **MICRON**, Vol. 31, No. 1, pp. 5-15, 2000.
18. **Umesh Adiga** and B. B. Chaudhuri "Deformable models for segmentation of CLSM images and its application in FISH signal analysis", J. **Analytical Cellular Pathology**, Vol. 18, No. 4, pp. 211-225, 1999.
19. **Umesh Adiga** and B. B. Chaudhuri, "An efficient cell segmentation tool for confocal microscopy tissue images for quantitative evaluation of FISH signals", J. **Microscopy Research and Techniques**, Vol. 43, 1-20, 1998.
20. K. Rodenacker, M. Aubele, P. Hutzler and **Umesh Adiga**, "Groping for quantitative 3D image analysis: an Approach to Quantitative Evaluation of Fluorescence in situ Hybridization in thick tissue sections of prostate carcinoma", J. **Analytical Cellular Pathology**, Vol. 15, pp. 19-29, 1997.
21. **Umesh Adiga** and T. R. Sontakke, "Nuclear Magnetic Resonance Imaging - a Review", **J. of Inst. of Engineers (India)**, Vol. 73, pp. 57-63, 1993.

In conference proceedings:

22. Umesh Adiga, Derek Higgins, Aditee Shrotre, Sang Hoon Lee, Mark T. Biedrzycki, Dan Nelson, Metrology of 3D-NAND structures using machine learning assisted fast marching level-sets algorithm, In **Proceedings of SPIE 2020, Advanced Lithography**, Feb. 2020.

23. Mark Beidrizciki, Umesh Adiga,..., Andrew Barnum, Rose Marie Haynes, Jason Arjavac, Alain Mousa, Anne-Laure Charley, Phillipe Leray, Dmitry Batuk, EUV photoresist reference metrology using TEM tomography, In **Proceedings of SPIE 2020, Advanced Lithography**, Feb. 2020.

24. John Flanagan, Hayley Johanesen, Mark Biedrzycki, Jack Hager, Justin Roller, Jason Arjavac, Dan Nelson, **Umesh Adiga,** Metrology of Semiconductor Devices using Machine Learning and Active Shapes, International Conference on Frontiers of Characterization and Metrology for Nanoelectronics (FCMN) 2019.

25. Umesh Adiga, et al, Metrology of 3D NAND in electron micrographs by scale space snakes, Proceedings Volume 10959, Metrology, Inspection, and Process Control for Microlithography XXXIII; SPIE Advanced Lithography**, 2019**, San Jose, California, United States.

26. Micah Ledoux, James Clarke, Brett Avedisian, Chad A. Rue, Umesh Adiga, Mark Biedrzycki, Gas-enhanced PFIB surface preparation enabled metrology and statistical analysis of 3D NAND devices, Proceedings Volume 10959, Metrology, Inspection, and Process Control for Microlithography XXXIII; Event: **SPIE Advanced Lithography**, 2019, San Jose, California, United States

27. **Umesh Adiga**, Murali Gorantla, …, Yoon-Suk Choi, Building 3D Microstructure Database using an Advanced Metallographic Serial Sectioning Technique and Robust 3D Segmentation Tools, Proceedings of the 2nd World Congress on **Integrated Computational Materials Engineering**: ICME 2013

28. **Umesh Adiga**, Debbie Taylor, Brian Bell, Larissa Ponomareva, Stephen Kanzlemar, Derek Tepe, Sandra Nelson, Thomas J. Lamkin, Modeling Phenotypic Changes in Macrophages Infected by *Francesella*, Poster presentation In **Chemical and Biological defense science and technology conference**, Orlando, Florida, 2010

29. Brian Bell, **Umesh Adiga**, Debbie Taylor, Larissa Ponomareva, Stephen Kanzlemar, Derek Tepe, Sandra Nelson, Thomas J. Lamkin, Real Time High Content Analysis of Bacterial infections of human monocyte derived macrophages, Poster presentation In **Chemical and Biological defense science and technology conference**, Orlando, Florida, 2010

30. **Umesh Adiga**, Daniel Blezek, "Automated Cardiac Short Axis Acquisition from a Free-breathing Non-gated FIESTA" Accepted for presentation in **ISMRM 2007**, Berlin, Germany.

31. **Umesh Adiga**, B.B. Chaudhuri and K. Rodenacker, "Semi-automatic segmentation of tissue cells from confocal microscopy images", In **IEEE Proceedings of 13th Int. Conf. on Pattern Recognition**, ICPR-96, 3, pp. 494-497, Vienna, Austria, 1996.

32. **Umesh Adiga,** and B. B. Chaudhuri, "Segmentation of histo-pathological images by surface following using constrained snakes", In **IEEE Proceedings of 14th International Conference on Pattern Recognition**, ICPR-98, pp. 1674-1676, Brisbane, Australia, 1998.

33. **Umesh Adiga** and B. B. Chaudhuri, "Analysis of volumetric images of filamentous bacteria in industrial sludge", In **IEEE Proceedings of 14th International Conference on Pattern Recognition**, ICPR-98, pp. 1735-1737, Brisbane, Australia, 1998.

34. **Umesh Adiga** and B. B. Chaudhuri, "Segmentation of 3-D histo-pathological images using snakes and its application in quantitative evaluation of FISH signal", In Proceedings of **2nd International Conference on Medical Image Understanding and Analysis**, MIUA-98, Leeds, UK, 1998.

35. **Umesh Adiga** and B. B. Chaudhuri, "Automatic segmentation of 3-D cells from confocal microscopy images and its application in FISH signal evaluation", In **Proceedings of 16th International CODATA Conference**, CODATA-98, New Delhi, 1998.

36. **Umesh Adiga** and B. B. Chaudhuri, "Classification of prostate tumor specimen based on cytological and histological features measured from 3D images", In **Proceedings of 16th International CODATA Conference**, CODATA-98, New Delhi, 1998

37. **Umesh Adiga** and B. B. Chaudhuri, "Quantitative evaluation of bacteria in industrial sludge by 3-D image analysis", In **Proceedings of 16th International CODATA Conference**, CODATA-98, New Delhi, 1998.

38. **Umesh Adiga** and B. B. Chaudhuri, "Automatic prostate cancer grading system based on 3-D histo-pathological images", In **Proceedings of IAPR workshop on Machine Vision and Applications**, MVA-98, Chiba, Japan, 1998.

39. **Umesh Adiga** and B. B. Chaudhuri, "Active surfaces for the segmentation of the volumetric histo-pathological images", In **Proceedings of Indian Conf. on CVGIP**, IIT, New Delhi, 1998, pp. 36-44.

40. **Umesh Adiga** and B. B. Chaudhuri, "Characterization and automatic counting of FISH signals in 3-D tissue images", **10th International Congress on Stereology**, Melbourne, Australia.
41. **Umesh Adiga** and B. B. Chaudhuri, "Watershed with rule-based merging for efficient cell segmentation", **10th International Congress on Stereology**, Melbourne, Australia.
42. Saurabh Roy, **Umesh Adiga,** B. Roysam, "Quantitative Evaluation of Hippocampus Tissue for Functional Imaging**", ISAC - XXI International Congress of International Society for Analytical Cytology**, 2002 (Student Award).
43. RF Gonzalez, **Umesh Adiga,** A. Idica, T. Deshcamps, R. Malladi, C. Ortiz de Solórzano, "Automatic segmentation of structures in normal and neoplastic mammary gland tissue sections", SPIE Proceedings of **Photonic West Conference**, SanJose, California, 2003, pp. 4964-26
44. **Umesh Adiga,** R. Malladi, RM Glaeser, "Automated particle selection based on binary segmentation", presented in **Gordon Conference** on Three-dimensional Electron Microscopy, New London, NH, USA, June 2003.

In Tech. Reports and Theses:

45. **Umesh Adiga**, R. Malladi, Robert M. Glaeser, "Extraction of Macromolecule Images from cryoEM Micrographs", Technical Report No. LBNL-52387, Lawrence Berkeley National Laboratory, University of California, Berkeley, USA, 2003.
46. **Umesh Adiga,** R. Malladi, W. Baxter, RM Glaeser, "A Binary Segmentation Approach for Boxing Ribosome Particles in Cryo Micrographs", Technical Report No. LBNL-52585, Lawrence Berkeley National Laboratory, University of California, Berkeley, USA, 2003.
47. **Umesh Adiga,** R. Malladi, "A Contour Based Approach for segmentation of particles in CryoEM", Technical Report No. LBNL-53906, Lawrence Berkeley National Laboratory, University of California, Berkeley, USA, 2003.
48. **Umesh Adiga**, B. Roysam, and B.B. Chaudhuri, Segmentation of volumetric histological data obtained using confocal microscope: a review, LBNL-54478, 2003.
49. **Umesh Adiga,** Adam Idica, Rodrigo F Gonzalez, Carlos O Solorzano, "An Efficient Approach to Segmentation of Cell-nuclei in Tissue Images: Application to Breast Tissue Blocks", Technical Report No. LBNL-54445, Lawrence Berkeley National Laboratory, University of California, Berkeley, USA, 2004.
50. **B.E. thesis**: Development of continuous heart beat rate monitor based on LDR, Mysore University, India, 1990.
51. **M.E. thesis**: Review of nuclear magnetic resonance imaging, Marathwada University, India, 1993.
52. **M.S. thesis**: Automation of agarose gel analysis, Oxford University, UK, 2001.
53. **Ph.D. thesis**: Design and development of a quantitative evaluation system for the 3D images of prostate cancer tissue obtained using multi-spectral confocal imaging, Indian Statistical Institute, India, 1999.

Other:

1. Reviewer of manuscripts for several journals including IEEE Trans. on Image Processing, IEEE Trans. on Pattern Analysis and Machine Intelligence, Cytometry, Biomolecular Screening, etc.
2. Reviewer of SBIR phase-1 and phase-2 projects for NIH

Detailed work experience in projects:

1. **Staff Engineer** (Computer Vision and Pattern Recognition): Thermo Fisher Scientific Inc., Hillsboro, OR 97124.
    - Active contour models for 3D-NAND memory cell metrology (SEM and TEM micrographs)
    - Fast marching level sets for metrology of flash memory, gates and logic devices (SEM and TEM micrographs)
    - Multiple features, multi scale, multi template matching to identify objects of interest in electron micrographs
    - Novel methods for fast and smart drift corrected frame integration.
    - Machine learning based object classification.
    - Testing for curtains by machine learning and curtain effect removal in electron micrographs
    - Metrology of semiconductor devices using electron tomograms.
    - Analysis of EDX data

- Data-fusion based image reconstruction from multiple spectral images of semiconductor devices.

2. **Principal Engineer** (Image/Data Processing and Machine Learning): **T D Williamson Inc.** Salt Lake City, Utah (2014 – till present).
    - Successfully completed automated weld scanner, automated seam scanner, automated bad sensor regions scanner, seam axial planar pit scanner.
    - Successful completion of complex corrosion detection, multiple sensor data fusion and sizing and generalized pit scanner.
    - Successful implementation of multi-sensor data classification to identify pipe type.
    - Currently working on multiple initiatives on data fusion and appropriate sizing of corrosion in the pipes.
3. **Principal Scientist (Scientist VI)** (Image Analytics and Data Fusion)**: AFRL (WPAFB) / UES Inc**., Dayton, Ohio (2009 - 2014).
    - Label-free Cell Analysis for Viability Exploration (CAVE) (Chief Investigator and developer, funded by NIH SBIR support; to end 2/2014).
    - Characterization of structural and functional materials through Optical and electron microscopy data (Principal Investigator and Developer: Complete data analysis package for RoboMet.3D; Image acquisition system based on Zeiss RDK and Rockwell Drivers; AI based Automated Industrial Metallography system; Titanium microstructure analyzer; Products and patents with UES Inc.)
    - Have completed expert system development for tracking fast moving bacteria in 4D (3D+T) data and measuring biophysical properties of bacterial motility (Complete Algorithm design and implementation: In collaboration with UC Medical School).
    - Have completed development of multi spectral 4D cell image data (both phase contrast image analysis and stained image analysis) segmentation, labeling followed by extraction of thousands of features per cell to build connectivity maps between chemical treatment, siRNA knockout and Targetron in a large scale host-pathogen Interactome project. (Algorithm design, complete implementation and testing. Product and Patents with AFRL)
    - Automatic exploratory informatics software development
    - Quantitative evaluation of nano-structured dielectric materials using electron tomography leading to structural finger printing of the material (Ongoing research).
    - Several project proposals in the field of image analytics for life/bio sciences and material sciences are under review at NIH, NSF and AFRL; have received funding for label-free cell viability analytics.
    - Automated segmentation and feature measurement system for characterization of Titanium alloys. (Principal Investigator and Developer: Product and Patent with UES Inc.).
4. **Senior Image Processing Engineer: Ikonisys Inc**. New Haven, CT (2008-2009)
    - High content and high throughput bio and pathological tissue data analysis
    - Circulating tumor cell detection (Segmentation, antibody-based feature analysis)
    - Cervical fetal cell detection (Segmentation, FISH based feature analysis)
    - Feature analysis (Morphological, texture, frequency domain) of cervical specimens and antibody expressions for cancer cell detection
    - Model based accurate detection of FISH signals
5. **Lead Computer Scientist/Engineer: General Electric** Global Research, (Imaging Technologies), (2006-2008)
    - Pulmonary Emboli detection in lung CT (Tech. Lead; Patents with GE)
    - Real time analysis of left ventricle orientation in MRI (part of the one touch cardiac project; technology developer; Patents with GE)
    - Software development for CT Perfusion image analysis for stroke (Initiative and Tech. Lead)
    - Applications development for dual energy CT (Patents application pending with GE).
    - Digital pathology: Towards quantifying architectural changes in the tissue (Initiative and Tech Lead).
    - Zebrafish Analysis Tool Development (Initiative and Tech. Lead; Patents with GE)
    - Tumor margin characterization for dye quality analysis (Software Development Tech Lead; Patents with GE)
    - Tomosynthesis based threat detection for security
    - Auto-pilot software for locomotives (Tech. lead; Patent application is pending with GE)

- Video anti-piracy software development (project member, software design and development)
- Vehicle detection in aerial images of an occluded environment (Design and development)

6. **Computer Scientist: Lawrence Berkeley National Laboratory**, Berkeley, California, USA, 2002-2006 (including postdoc duration at LBNL).
    - Electron microscopy image analysis for characterizing pathologically important variations (project initiation and Tech. lead)
    - Particle picking and quality indexing for single particle reconstruction (Tech. lead)
    - Algorithm design and software development for multi-spectral breast cancer image data.
    - Project initiation to explore the correlation between initial genetic variation and successive histological changes in cancer development based on 3D data obtained by confocal microscopy.
7. **Postdoctoral Research Associate: University of Arizona** (Neural Systems Memory and Aging) and Rensselaer Polytechnic Institute (ECSE), USA, June 2001 – Jan 2002.
    - Design, development of automated image analysis software for functional analysis of the hippocampus activity at sub-cellular resolution (patent with RPI)
8. **Postdoctoral Research Scientist: Oxford University**, (Wellcome Trust Centre for Human Genetics), UK, Oct 1999 – June 2001.
    - Design and development of signal processing software to reduce error in reading the allele sizes in human genetics research
    - Design and development of image analysis software for differentiating heterozygous and homozygous alleles in gel plate runs.