

CURRICULUM VITAE

Anup Basu, Professor
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A. Education

1990 Ph.D. (C.S.) University of Maryland, College Park, USA.

Worked as RA/Programmer with the Biostatistics department at Strong Memorial Hospital, Rochester, NY, 1984-86. Received an M.S. in Statistics from the University of Rochester during this period.

Worked as Programmer with Tata Consultancy Services, 1983-84.

1983 M.Tech. (C.S.) Indian Statistical Institute, India.

1980 B.S. (Math/Stat) Indian Statistical Institute, India.

B. Professional Experience

iCORE – Industrial Research Chair Professor, 2006-present

NSERC Industrial Research Chair, 2007-present

Professor, University of Alberta, Computing Science Department, 1999-present.
(Member of Canadian Delegation in MPEG-4 international committee for Multimedia standardization, Research advisor for Castle Rock Research and others.)

Associate Professor, University of Alberta, Computing Science Department, 1995-1999.

Director, Hewlett-Packard Imaging Systems Lab., University of Alberta, 1997 - 2000.

Guest Professor, Technical University of Austria, Graz, Institute for Computer Graphics, Fall 1996.
Adjunct Professor, TR Labs Edmonton, 1994-1995.

Assistant Professor, University of Alberta, Computing Science Department, 1990-1995.

Research Assistant, Computer Vision Laboratory, University of Maryland, 1987-1990.

Research Assistant and Programmer, Strong Memorial Hospital (Rochester, New York), Biostatistics Division, 1985-1986.

Assistant Systems Analyst, Tata Consultancy Services (India), 1983-1984.

C. Academic Awards

Fellowship, Indian Statistical Institute (ISI).

Fellowship, University of Rochester.

Award for outstanding academic performance, ISI, 1981.

D. Research interests and industrial applications of research

Research Areas: Computer Vision, Image Processing, Multimedia Communications, Internet Applications, High Resolution 3D Imaging & Graphics

Significant Research Contributions

- Initiated the applications of variable resolution (or foveation) emulating the animate visual systems for image/video compression and stereo visualization. Results have shown how intelligent pre-processing of images can not only lead to improved videoconferencing systems but can also enhance the quality of standard compression algorithms, such as JPEG, MPEG, and Wavelets; especially for communication at low bit-rates. I have also demonstrated the advantage of “intelligent” cell loss for image or video data transmitted over congested ATM networks. My publications clearly show that the traditional approach of treating all types of information as just a stream of bits in ATM switches is inadequate for congested networks. My work on foveated image compression and stereo visualization has been referenced and extended by several groups of researchers at New York University and University of Texas at Austin.
- Developed a simple closed-form solution for camera calibration, using only rotational movements. The other advantages of my method are that no calibration pattern is required, and point-to-point correspondence between image frames is not necessary unlike other active calibration approaches based on translational movements. The active method proposed by me uses some forms of moments over contours; making the resulting estimates extremely robust to noise. For example, the error in my method is LESS THAN 12% FOR A GAUSSIAN NOISE WITH AN AVERAGE OF 16 PIXELS. By comparison, the best known existing methods fail to produce meaningful results when a gaussian noise with an average exceeding 1 pixel is added to the feature points used in the calibration.

- Developed the first algorithm for determining the Optimum Aspect Ratio for Stereo Reconstruction.
- First to show that foveation optimizes 3D perception for stereo with vergence.
- Introduced a stereo panoramic imaging device using a single camera and a mirror surface.
- Developed a statistical approach for “Optimal Bandwidth Monitoring” for single server connections as well as for distributed multimedia retrieval. The approach provides an estimate based on statistical confidence level and has been shown to produce expected results based on real network tests.
- Developed the first Quantitative Metric for estimating the perceptual quality of 3D objects. This work is important for 3D communication based on perceptual quality.

Industrial Research Achievements

- Focus of my present research is on developing Multimedia Innovative Item types for computer adaptive testing, incorporating robust 3D transmission under packet loss; a project funded by iCORE, NSERC and industrial partners.
- Working on Medical Imaging for 4D integrated visualization of MRI and 3D structure, and measurement of changes pre- and post-surgery; a project funded by Alberta Innovation and Science.
- Worked on the Synthetic Natural Hybrid Coding (SNHC) component of MPEG-4 coding. SNHC is part of Working Group 11 (WG11) in MPEG-4. More specifically, I worked on detection and tracking of facial features, and displaying such information in a videoconferencing scenario through model-based coding and transmission.
- Research in Multimedia Teleconferencing and Telepresence was funded by several industries, including Panoramic Viewing Systems Inc. (PVSI), Telecommunications Research Labs (TRLabs), and NSERC University-Industry programs. I introduced several novel designs for real-time panoramic imaging, which were all implemented in hardware in collaboration with PVSI. Some of this work has been published, others have been used commercially by PVSI.
- Worked on designing robots capable of working under hazardous conditions and poor visibility. The project was funded by NSERC and Northern Underwater Systems (NUS).
- Collaborated with Zoomage Inc. starting from the initiation of the company several years ago, to build Super High Resolution digital imaging devices that are ideal for several applications that require high quality. Hardware and software were successfully built and are being used for Tunneling projects in Austria, R&D applications in Universities, Multimedia projects in Europe, and Medical Imaging in Alberta.

E. Selected list of grants

As lead applicant:

iCORE + Industry Research Chair in Multimedia - \$1,375,000, 2006-2012.

NSERC + Industry Research Chair in Perceptually Adaptive Multimedia - \$500,000, 2007-12.

Alberta Science and Research Authority (ASRA) ERATT grant - \$500,000, 2002-2009, in partnership with Keewetinok Lakes RHA, TelePhotogenics Inc. and IBM. Total project funds including industry contributions exceed \$2,000,000.

NSERC Research grant - \$39,900/yr., 2006-2010.

NSERC Equipment grant - \$49,000, 2000-2001.

Intellectual Infrastructure Partnerships Program (Govt. of Alberta) - \$140,000, 1998.

HP Imaging Systems Curriculum grant - only one to be awarded in Canada - \$365,000, 1996.

PVSI/NSERC CRD grant - \$155,000, 1996-1998.

TRlabs/NSERC IOR grant - \$80,000, 1995-1996.

NUS/NSERC CRD grant - \$252,000, 1993-1996.

Industrial Research Scholarships for students - over \$80,000 in the past 6 years.

Funding acquired for local industries:

I planned and prepared the following proposals, which were funded to support local industries:
National Research Council, IRAP funds for PVSI - \$115,000, 1995-96.

Helped PVSI obtain funding from Department of National Defence (Suffield, Alberta) estimated at \$200,000.

CANARIE funding for PVSI - \$300,000 (estimate), 1997-99.

Helped TelePhotogenics Inc. obtain sales and contracts from Tunnelling Institute in Graz, York University, Simon Fraser University, Keetinok Regional Health Authority (High Prairie), NoLimits G.M.B.H., NRC & others totaling close to \$1 million.

Selected list of grants (as co-applicant):

NSERC Strategic grant - \$173,000/yr., 1998-2002.

CAVE Stereo Visualization Equipment grant - \$430,000, 1998.

TeleLearning Networks of Centers of Excellence grant - \$59,000/yr. 1995-1999.

TeleLearning Networks of Centers of Excellence grant - \$30,000/yr. 1999-2001.

MACI (Multimedia Advanced Computing Infrastructure) - \$2 M for infrastructure and super computer facility development at University of Alberta and University of Calgary.

F. Selected list of publications

Selected refereed journal publications:

1. I. Cheng, A. Basu and R.G. Goebel, "Interactive Multimedia for Adaptive Online Education," *IEEE Multimedia*, in press, 2008.
2. I. Cheng, L. Ying, K. Daniilidis and A. Basu, "Robust and Scalable Transmission of Arbitrary 3D Models over Wireless Networks," *EURASIP Journal on Image and Video Processing*, Special Issue, 12 pages, in press, 2008.
3. M. Singh, A. Basu and M.K. Mandal, "Human activity recognition based on silhouette directionality," *IEEE Transactions on Circuits and Systems for Video Technology*, 14 pages, 2008.
4. I. Cheng and A. Basu, "An effective multimedia item shell design for individualized education: The CROME project," *Advances in Multimedia*, 2008.
5. I. Cheng and A. Basu, "Perceptually optimized 3D transmission over wireless networks," *IEEE Trans. on Multimedia*, 386-396, vol. 9, no. 2, Feb 2007.
6. I. Cheng, L. Ying and A. Basu, "Packet-loss modeling for perceptually optimized 3D transmission," *Advances in Multimedia*, 10 journal pages, 2007.
7. M. Singh, A. Basu and M.K. Mandal, "Event dynamics based temporal image registration," *IEEE Transactions on Multimedia*, 30 ms pages, in press, 2007.
8. T. Wang and A. Basu, "A note on 'A fully parallel 3D thinning algorithm and its applications'," *Pattern Recognition Letters*, 501-506, vol. 28, 2007.
9. M. Pi, C.S. Tong and A. Basu, "Fractal-based edge extraction and its application to textured image retrieval," *Journal of Electronic Imaging*, 013012-1 to 013012-9, Jan-Mar 2006.
10. V. Sanchez, M.K. Mandal and A. Basu, "Robust transmission of regions of interest in JPEG2000," *Journal of Electronic Imaging*, 013008-1 to 013008-6, Jan-Mar 2006.

11. Y. Pan, I. Cheng and A. Basu, "Quality metric for approximating subjective evaluation of 3D objects," *IEEE Transactions on Multimedia*, 269-279, April 2005.
12. M. Pi, M. Mandal and A. Basu, "Image retrieval based on histogram of fractal parameters," *IEEE Transactions on Multimedia*, 597-605, Aug. 2005.
13. M. Singh, M.K. Mandal and A. Basu, "Gaussian and Laplacian of Gaussian weighting functions for robust feature based tracking," *Pattern Recognition Letters*, 11 pages, 2005
14. M. Fiala and A. Basu, "Panoramic stereo imaging," *Computer Vision and Image Understanding*, 363-397, Feb. 2005.
15. V. Sanchez, A. Basu and M. Mandal, "Prioritized region of interest coding in JPEG2000," *IEEE Transactions on Circuits and Systems for Video Technology*, 1149-1155, Sep. 2004.
16. L. Yin, A. Basu and J.K. Chang, "Scalable edge enhancement for digital x-ray images with automatic optimization," *Pattern Recognition*, 1407-1422, July 2004.
17. M. Fiala and A. Basu, "Robot navigation using panoramic imaging," *Pattern Recognition*, 2195-2215, Nov. 2004.
18. I. Cheng and A. Basu, "QoS based video delivery with foveation," *Pattern Recognition Letters*, 2675-2686, vol. 24, 2003.
19. Y. Yu, I. Cheng and A. Basu, "Optimal adaptive bandwidth monitoring for QoS based retrieval," *IEEE Transactions on Multimedia*, 466-472, September 2003.
20. L. Yin, A. Basu and M. Yourst, "Active tracking and cloning of facial expression," *Int. Journal of AI Tools*, 279-295, vol. 12, #3, 2003.
21. M. Fiala and A. Basu, "Hough transform for feature detection in panoramic images," 12 printed pages, *Pattern Recognition Letters*, 2002.
22. A. Basu and H. Sahabi, "Analysis of depth estimation error for cylindrical stereo imaging", *Pattern Recognition*, 2549-2558, Nov. 2002.
23. L. Yin and A. Basu, "Generating realistic facial expressions with wrinkles for model based coding," *Computer Vision and Image Understanding*, vol. 84, pages 201-240, 2001.
24. M. Fiala and A. Basu, "Line segment extraction in panoramic images," *Journal of WSCG*, Vol. 10, Number 1, pages 179-186, 2002.
25. "Improving image and video transmission quality over ATM with foveal prioritization and priority dithering", (K. Wiebe and A. Basu), *Pattern Recognition Letters*, 905-915, 2001.

26. L. Yin, A. Basu, S. Bernoegger and A. Pinz, "Synthesizing realistic facial animations using energy minimization for model based coding", *Pattern Recognition*, 2000.
27. L. Yin and A. Basu, "Active face tracking for model-based coding," *Pattern Recognition Letters*, vol. 20, 1999, 651-657.
28. A. Basu and K. Wiebe, "Videoconferencing using spatially varying sensing," *IEEE Transactions on Systems, Man, and Cybernetics*, March 1998, 137-148.
29. K. Wiebe and A. Basu, "Modeling ecologically specialized biological visual systems," *Pattern Recognition*, 30 ms. pages, 1998.
30. A. Basu and K. Ravi, "Active camera calibration using pan, tilt, and roll," *IEEE Transactions on SMC*, 24 ms. pages, 1997.
31. H. Sahabi and A. Basu, "Analysis of depth perception with vergence and spatially-varying sensing," *Computer Vision, Graphics and Image Processing*, vol. 63, no. 3, May, pp. 447-461, 1996.
32. A. Basu, M.K. Jain and X. Li, "Improving boundary detection using variable resolution masks," *Pattern Recognition Letters*, 1207-1211, December, 1995.
33. A. Elnagar and A. Basu, "Motion detection using background constraints," *Pattern Recognition*, Vol. 28, No. 10, 1537-1554, 1995.
34. A. Basu and S. Licardie, "Alternative models for fish-eye lenses," *Pattern Recognition Letters*, 433-441, April 1995.
35. A. Basu and A. Elnagar, "Safety optimizing strategies for local path planning in dynamic environments," *International Journal of Robotics and Automation*, Vol. 10, No. 4, 130-142, 1995.
36. A. Basu, "Active calibration: Theory and implementation," *IEEE Transactions on SMC*, 256-265, February 1995. (Earlier version in IEEE CVPR proceedings, NY, June 1992.)
37. D. Murray and A. Basu, "Motion tracking with an active camera," *IEEE Transactions on PAMI*, 449-459, May 1994.
38. A. Elnagar and A. Basu, "Heuristics for local path planning," *IEEE Transactions on SMC*, 624-634, March/April 1993.
39. A. Basu, "Optimal discretization for stereo reconstruction," *Pattern Recognition Letters*, 813-820, Nov 1992.
40. X. Li and A. Basu, "Variable resolution character thinning," *Pattern Recognition Letters*, 241-248, April 1992.

41. A. Basu and J. Aloimonos, "A robust correspondenceless translation determining algorithm," *International Journal of Robotics Research*, October 1990, 35-59.
42. A. Basu and C.M. Brown, "Algorithms and Hardware for Efficient Image Smoothing," *Computer Vision, Graphics and Image Processing*, vol. 40, 1987, 131-146.

Selected publications in conference proceedings and presentation abstracts:

1. R. Shen, I. Cheng and A. Basu, "Multi-view camera calibration using a globe," OMNIVIS at ECCV, 8 pages, October 2008, Marseille, France.
2. M. Singh, I. Cheng, M. Mandal and A. Basu, "Optimization of symmetric transfer error for sub-frame video synchronization," European Conference on Computer Vision (ECCV), 8 pages, October 2008, Marseille, France.
3. I. Cheng, A. Badalov, C. Silva and A. Basu, "Effects of texture and color on the perception of medical images," IEEE EMB Conference, Vancouver, August 2008, 4 pages.
4. I. Cheng, C. Flores-Mir, P. Major and A. Basu, "Measuring and evaluating ground truth for boundary detection in medical images," IEEE EMB Conference, Vancouver, August 2008, 4 pages.
5. I. Cheng, R. Shen and A. Basu, "Automatic difficulty level estimation for Multimedia Item Types," IEEE ICALT, 5 pages, July 2008, Santander, Spain.
6. I. Cheng and A. Basu, "Graphics based Computer Adaptive Testing and Beyond," EUROGRAPHICS, Education paper, 8 pages, April. 2008, Crete, Greece.
7. M. Singh, M.K. Mandal and A. Basu, "A Confidence Measure and Iterative Rank-based Method for Temporal Registration," IEEE Int. Conf. on Acoustic Speech and Signal Processing (ICASSP), 4 pages, Las Vegas, April 2008.
8. I. Cheng and A. Basu, "Contrast Enhancement in Panoramic Images," OMNIVIS at IEEE Int. Conf. on Computer Vision, 8 pages, Oct. 2007, Rio, Brazil.
9. M. Singh, M.K. Mandal and A. Basu, "Confidence Measure for Temporal Registration of Recurrent Non-uniform Samples," PREMI, 8 pages, Calcutta, India, Dec. 2007.
10. I. Cheng, S. Nilufar, C. Flores-Mir and A. Basu, "Robust Airway Segmentation and Measurement in CT Images," Engineering in Medicine and Biology Conference, 4 pages, Aug 2007, Lyon, France.
11. S. Rodriguez, I. Cheng and A. Basu, "Multimedia Games for Learning and Testing Physics," IEEE Int. Conference on Multimedia and Expo (ICME), 2007 (4 pages).

12. I. Cheng and A. Basu, "An Effective Multimedia Item Shell Design for Individualized Education," IEEE ICME, 2007 (4 pages).
13. A. Basu, I. Cheng, G. Rao and M. Prasad, "Multimedia Adaptive Computer based Testing: An Overview," IEEE ICME, 2007 (4 pages).
14. I. Cheng and A. Basu, "Optimal aspect ratio for 3D TV," IEEE 3D TV Conference, 4 proceedings pages, KOS, Greece, May 2007.
15. I. Cheng, S. Nilufar, A. Basu and R. Goebel, "Shape Tracking and Registration for 4D Visualization of MRI and Structure," International Symposium on Visual Computing, Lake Tahoe, Nevada, 2006, 10 LNCS pages.
16. T. Wang and A. Basu, "Iterative Estimation of 3D Transformations for Object Alignment," International Symposium on Visual Computing, Lake Tahoe, Nevada, 2006, 10 LNCS pages.
17. M. Singh, A. Basu and M.K. Mandal, "Temporal Alignment of Time Varying MRI Datasets for High Resolution Medical Visualization," International Symposium on Visual Computing, Lake Tahoe, Nevada, 2006, 10 LNCS pages.
18. I. Cheng, L. Ying and A. Basu, "Packet Loss Modeling for Perceptually Optimized 3D Transmission," IEEE International Conference on Multimedia and Expo, 4 pages, Toronto, July 2006.
19. M. Singh, R. Thompson, A. Basu, J. Rieger and M.K. Mandal, "MRI video interpolation," IEEE International Conference on Image Processing, 4 pages, Atlanta, USA, October 2006.
20. T. Wang and A. Basu, "Automatic estimation of 3D transformations using skeletons for object alignment," IAPR/IEEE International Conference on Pattern Recognition, 4 pages, Hong Kong, August 2006.
21. B. Palit, A. Basu and M.K. Mandal, "Application of the discrete Hodge Helmholtz decomposition to image and video processing," PREMI, 6 pages, Calcutta, India, December 2005. In Springer Lecture Notes in Computer Science, Vol. **3776**/2005, pages 497-502.
22. L. Ying and A. Basu, "pcVOD: Internet peer-to-peer video-on-demand with storage caching on peers," International Conference on Distributed Multimedia Systems, 6 pages, Banff, September 2005.
23. A. Basu, I. Cheng and T. Wang, "Balanced incomplete designs for 3D perceptual quality estimation," in Special session of *IEEE International Conference on Image Processing* organized by G. Cortelazzo, Italy, 2005, 4 proceedings pages.
24. I. Cheng, L. Ying and A. Basu, "A perceptually driven model for transmission of arbitrary 3D models over unreliable networks," IEEE Symposium of 3D Processing, Visualization

- and Transmission, 8 pages, Special Session Presentation, Chapel Hill, NC, USA, June 2006.
25. I. Cheng and A. Basu, "Perceptually optimized 3D transmission over wireless networks," *SIGGRAPH, Web Program*, Technical Paper, 9 proceedings pages, Los Angeles, USA, August 2005.
 26. M. Singh, M. Mandal and A. Basu, "Visual gesture recognition for ground air traffic control using the radon transform," *IEEE IROS Conference*, 6 proceedings pages, Edmonton, Canada, 2005.
 27. Y. Liu, A. Basu and J.S. Kim, "3D model adaptation using interactive feedback," Indian Conference on Computer Vision, Graphics and Image Processing, Calcutta, India, December 2004, 6 proceedings pages.
 28. I. Cheng and A. Basu, "Reliability and judging fatigue reduction in 3D perceptual quality estimation," *IEEE International Conference on 3D Processing, Visualization and Transmission*, Thessaloniki, Greece, September 2004, 8 proceedings pages.
 29. M. Singh, M. Mandal and A. Basu, "Robust KLT tracking with Gaussian and Laplacian of Gaussian weighting functions," IEEE/IAPR International Conference on Pattern Recognition, Cambridge, UK, August 2004, 4 proceedings pages.
 30. I. Cheng and A. Basu, "3D Online retrieval based on perceptual quality," *SIGGRAPH Web Graphics Presentation*, Los Angeles, USA, July, 2004.
 31. L. Ying, A. Basu and S.K. Tripathi, "Multi-server Optimal Bandwidth Monitoring for Collaborative Distributed Retrieval", *IEEE International Symposium of Circuits and Systems*, Vancouver, Canada, May, 2004, 4 pages.
 32. I. Cheng, A. Basu and Y. Pan, "Parametric foveation for progressive texture and model transmission," *Eurographics*, Granada, Spain, September 2003, 4 proceedings pages.
 33. Y. Pan, I. Cheng and A. Basu, "Perceptual Quality Metric for Qualitative 3D Scene Evaluation," *IEEE International Conference on Image Processing*, Barcelona, 2003, (4 proceedings pages).
 34. M. Pi, A. Basu and M. Mandal, "A new decoding algorithm based on range block mean and contrast scaling," *IEEE International Conference on Image Processing*, Barcelona, 2003, (4 proceedings pages).
 35. I. Cheng, M. Bates and A. Basu, "Collaborative Online 3D Editing," *SIGGRAPH Web Graphics Presentation*, San Diego, USA, July, 2003.
 36. M. Pi, M. Mandal and A. Basu, "Image retrieval based on 2-D histogram of fractal parameters," *IEEE International Conference on Multimedia*, Baltimore, USA, July, 2003, (4 proceedings pages).

37. "Recognizing facial expressions using active textures with wrinkles," (L. Yin and A. Basu), *IEEE International Conference on Multimedia*, Baltimore, USA, July, 2003, (4 proceedings pages).
38. A. Basu, I. Cheng and Y. Yu, "Multi-server optimal bandwidth monitoring for QoS based retrieval," *IEEE International Symposium of Circuits and Systems*, Bangkok, May, 2003, 4 pages.
39. A. Basu, M. Pi, I. Cheng and M. Bates, "Distributed retrieval of wavelet images using bandwidth monitoring," *IAPR/IEEE International Conference on Pattern Recognition*, August 2002, Quebec City, (4 conference pages).
40. A. Basu, I. Cheng and Y. Pan, "Foveated online 3D visualization," *IAPR/IEEE International Conference on Pattern Recognition*, August 2002, Quebec City, (4 conference pages).
41. M. Fiala and A. Basu, "Panoramic stereo reconstruction for non-SVP optics," *Proceedings IAPR/IEEE International Conference on Pattern Recognition*, August 2002, Quebec City, (4 conference pages).
42. Y. Yu, A. Basu and I. Cheng, "Optimal adaptive bandwidth monitoring for QoS based retrieval," *IEEE International Symposium of Circuits and Systems*, Scottsdale, USA, May, 2002, 4 pages.
43. A. Basu, I. Cheng, A. Mistri and D. Wolford, "Scalable Visualization of Super High Resolution 3D Images for Museum Archiving," *SIGGRAPH Web Graphics Presentation*, San Antonio, USA, July 2002.
44. I. Cheng and A. Basu, "Super High Resolution 3D Imaging and Efficient Visualization," *IEEE 3Dpvt Conference*, Padova, Italy, 2002, 5 conference pages.
45. L. Yin, J. Chang and A. Basu, "Synthesis-based scalable image enhancement for digital radiography," *IEEE International Conference on Image Processing*, 2002, Rochester, NY, USA, (4 conference pages).
46. L. Yin and A. Basu, "Color-based mouth shape tracking for synthesizing realistic facial expressions," *IEEE International Conference on Image Processing*, 2002, Rochester, NY, USA, (4 conference pages).
47. M. Fiala and A. Basu, "Robot navigation using panoramic landmark tracking," *Proceedings Vision Interface*, May 2002, Banff, (8 conference pages).
48. A. Basu and I. Cheng, "QoS based video delivery with foveation," *IEEE International Conference on Image Processing*, Greece, October 2001, (4 conference pages).

49. I. Cheng, A. Basu, Y. Zhang and S. Tripathi, "QoS Specification and Adaptive Bandwidth Monitoring for Multimedia delivery," *IEEE EUROCON*, Slovakia, June, 2001, 4 conference pages.
50. I. Cheng, A. Basu and A. Mistri, "Zoomage: Super High Resolution Imaging & Visualization Tools," *Int. Cultural Heritage Informatics Meeting*, Milan, Italy, 2001, 5 conference pages.
51. L. Yin and A. Basu, "Texture decomposition and correlation thresholding for realistic low-bitrate model-based coding", *IEEE International Conference on Acoustic, Speech and Signal Processing*, June 2000, Turkey, (4 conference pages).
52. A. Basu and H. Sahabi, "Analysis of cylindrical stereo imaging", *IAPR/IEEE International Conference on Pattern Recognition*, August 2000, Spain, (4 pages).
53. L. Yin and A. Basu, "Partial update of active textures for efficient expression synthesis in model-based coding", *IEEE International Conference on Multimedia*, July 2000, NY, USA, (4 conference pages).
54. J. Baldwin and A. Basu, "3D estimation using panoramic stereo", *IAPR/IEEE International Conference on Pattern Recognition*, August 2000, Spain, (4 conference pages).
55. L. Yin and A. Basu, "Realistic animation using extended adaptive mesh for model based coding", *Energy Minimization Methods in Computer Vision and Pattern Recognition*, July 1999, UK, 269-284.
56. R. Shaffer, A. Basu and J. Harms, "Improving perceptual quality and network performance for transmission of H.263 video over ATM," *IEEE International Conference on Electronics, Circuits and Systems*, Greece, September 1999, (6 conference pages).
57. J. Baldwin, A. Basu and H. Zhang, "Panoramic video with predictive displays for telepresence," *Proc. IEEE International Conference on Robotics and Automation*, USA, May 1999, (6 conference pages).
58. L. Yin and A. Basu, "Analysis and synthesis of facial expressions for MPEG-4 system," *Proc. IEEE International Conference on SMC*, USA, 1998, pages 4608--4613.
54. S. Bernoegger, L. Yin, A. Basu and A. Pinz, "Eye Tracking and Animation for MPEG4 coding," *Proc. IAPR/IEEE International Conference on Pattern Recognition*, Brisbane, Australia, August, 1998, 4 proceedings pages.
59. L. Yin and A. Basu, "MPEG4 face modeling using fiducial points," *Proc. IEEE Int. Conference on Image Processing*, Santa Barbara, USA, October, 1997, 4 pages.

56. A. Basu and H. Sahabi, "Optimal non-uniform discretization for stereo reconstruction," Proc. IEEE International Conference on Pattern Recognition, Vienna, Austria, August 1996, (5 conference pages).
57. K. Wiebe and A. Basu, "Improving Image and Video transmission over ATM," Proc. IEEE International Conference on Pattern Recognition, Vienna, Austria, August 1996, (5 conference pages).
58. D. Southwell, A. Basu, M. Fiala and J. Reyda, "Panoramic Stereo," Proc. IEEE International Conference on Pattern Recognition, Vienna, Austria, August 1996, (5 conference pages).
59. D. Southwell, B. Vandergrind and A. Basu, "A conical mirror pipeline inspection system," Proc. IEEE International Conference on Robotics and Automation, Minneapolis, USA, April 1996, (6 conference pages).
60. K. Ravi and A. Basu, "An active technique for piecewise calibration of robot manipulators," Proc. IEEE IROS Conference, Pittsburg, USA, August, 1995, (6 conference pages).
61. A. Elnagar and A. Basu, "Robust detection of moving objects by a moving observer on planar surfaces," Proc. IEEE International Conference on Robotics and Automation, Nagoya, JAPAN, May 1995, (6 conference pages).
62. H. Sahabi and A. Basu, "VLSI design for variable-resolution teleconferencing," IEEE Proceedings of VLSI Design '95 Conference (in cooperation with ACM/IEEE), New Delhi, India, January 1995, (6 conference pages).
63. A. Basu and K. Wiebe, "Videoconferencing using spatially varying sensing with multiple and moving foveas," Proc. IEEE International Conference on Pattern Recognition, Jerusalem, Israel, October 1994, (5 conference pages).
64. A. Elnagar and A. Basu, "Path planning in dynamic environments using local information," Proc. IEEE Multisensor Fusion Conference, Las Vegas, Nevada, October 1994, (6 conference pages).
65. A. Basu, A. Sullivan and K. Wiebe, "Variable-resolution teleconferencing," Proc. IEEE International Conference on Systems, Man, and Cybernetics, Le Touquet, France, October 1993, (6 conference pages).
66. A. Basu and J. Aloimonos, "A robust algorithm for determining the translation of a rigidly moving surface, without correspondence for robotics application," Proc. IJCAI, 815-818, Milan, Italy, 1987.
67. J. Aloimonos and A. Basu, "Shape and Motion from Contour, without point to point correspondence: General principles," Proc. IEEE CVPR, 1986.

68. A. Basu et al., "Animate: An Interactive Color Graphics System for 3-D Displays," International Graphics Conference, Anaheim, California, 1986.

Books:

1. I. Cheng, G. Cortelazzo, A. Basu and S.K. Tripathi, "3D Online Multimedia: Processing, Visualization and Transmission," World Scientific Press, October 2008.
2. "Computer Vision: Systems, Theory, and Applications," Edited by A. Basu and X. Li, World Scientific Press, April 1993.

Book Chapter:

A. Basu and J. Baldwin, "A real-time stereo panoramic imaging system", Edited by R. Bensoman (Paris) and S.B. Kang (Microsoft), Springer Verlag, 2001.

Patents:

1. "Method and apparatus for super high resolution stereo imaging," (A. Basu), Canadian Patent #2,120,240, 2002.
2. "Method and apparatus for 3D scanning of objects with voids," (A. Basu), Canadian Patent #2,369,710, Sept. 2006.

G. Contribution to the Training of Highly Qualified Personnel

Currently supervised or co-supervised

Lihang Ying, Tao Wang, Meghna Singh, Hossein Azari and Feng Chen --- Ph.D. students.
Saul Rodriguez, Chris Kerr - MS students.

In addition, I co-supervise close to 15 part-time undergraduate and graduate assistants.

Already completed

Mark Fiala (Ph.D.), research officer, National Research Council, Ottawa.
Jonathan Baldwin (Ph.D.), research staff at Syncrude Research, Edmonton.
Lijun Yin (Ph.D.), assistant professor, SUNY, Binghamton.
Hossein Sahabi (Ph.D.) --- currently with CYRAS Communications Inc., California.
Stefan Bernoegger --- visiting Ph.D. student from Technical University of Graz, Austria.
Kevin Wiebe (Ph.D.) working as Vice-president for a software company in Vancouver.
Ashraf Elnagar (Ph.D.). Received an NSERC post-doctoral fellowship & worked with Simon Fraser University in 1994. He is at present the Chair at University in UAE.

Yixin Pan (MS) – working with a software company in Buffalo, NY.

Lin Cheng, M.S., Research Associate.
Yinzhe Yu (MS), continuing Ph.D. at University of Minnesota, USA.
Robert Shaffer (M.S., 1998) working in Nortel, Wireless group, Calgary.

Meghna Singh (M.S. 2004) continuing on PhD.
David Li (M.S. 2005) working in Hong Kong.
Yongjie Liu (M.S. 2005) working in China.
Yaohua Wu (M.S.2005) working in Hong Kong.
Zhibin Ann (M.S. 2005) working in Edmonton.
Biswaroop Palit (M.S. 2005) worked with Siemens, currently in India.
Kenneth Der (M.S. 1996) continuing as a PhD student.
Xiaolin Qiu and Warren Wong (MS 1996) working with companies in Toronto and Edmonton.
Kavita Ravi, M.S. 1994. Working in Lucent Technologies, USA.
Sydney Lee (M.S. 1994). Working with a software company in Calgary.
Raju Patil (M.S. 1994). Working on Ph.D. at the Robotics Institute, Carnegie Mellon University.
Sergio Licardie (M.S. 1993). Working on GPS with a company in Mexico City.
Alan Sullivan (M.S. 1993). Presently working with Govt. of Canada, Ottawa.
Don Murray (M.S. 1992). Worked with MacDonald Detwiler, and is now pursuing Ph.D. at UBC.
Manoj Jain (M.S. 1992). Working in Toronto.

Postdoctoral Supervision

Dr. Minghong Pi (post-doc.), 2000-2004.
Dr. David Southwell (post-doc. & research associate), 1994-1997. Currently, VP Hardware, YottaYotta, a Network Storage company in Edmonton/Seattle.
Dr. Qing Tan (Post-doc) 1995-1996, currently working with a software company in Edmonton.

H. Teaching interests:

My approach to teaching is to introduce practical problems to students, then interactively go through methods for solving these problems. I prefer introducing and discussing theoretical topics within the context of problem solving, rather than as isolated mathematical tools. I believe in integrating teaching with research, and include a project component in my courses whenever possible. This approach not only makes undergraduates motivated to pursue graduate studies, but also enhances interactions between students and researchers at all levels.

Over the next few years I would like to introduce more web-based applications into my courses. This is important to equip students with skills that will be very relevant to the new Internet based marketplace. I obtained funding from HP to create a new series of Multimedia related courses over the past decade.

Some of the Undergraduate courses that I have taught include:

- ❑ 3D Online Multimedia, Multimedia Technologies
- ❑ Digital Image Processing
- ❑ Computer Graphics
- ❑ Introduction to Algorithms

- Introduction to Data Structures in JAVA

Some of the Graduate courses that I have taught include:

- 3D Television
- 3D Multimedia
- Quality-of-Service (QoS) on the Internet
- Multimedia Communication
- Image Processing
- Computer Vision

I. Service to academic community

Served on many committees including PC for several IEEE Int. Conf. on Image Processing (ICIP), Computer Vision and Pattern Recognition (CVPR), ICCV, and Int. Conference on Pattern Recognition (ICPR); PC-chair at Vision Interface 1992; MPEG-4 committee member. Organized a Vision Interface conference. Served as the IEEE local computer and communication chapter chair. Currently I am an Associate Editor for Pattern Recognition Journal.

J. Recent Media Coverage



Multimedia Research Center

Nov 16, 2006
iCORE Chair Launch Event



UNIVERSITY OF ALBERTA

ExpressNews Home | November 17, 2006

Digital media research helps distance learning go further, faster
By [Andrew Bates](#), ExpressNews Staff

November 16, 2006 - Edmonton - There's no reason why children the world over shouldn't have access to the same education opportunities, according to the University of Alberta's newest iCORE research chair.

"Digital media can significantly expand the reach and impact of education," said Dr. Anup Basu, a U of A professor who was appointed as the iCORE/Sauter Inc. Industry Chair in Multimedia.

"Greater use of this technology could help us reach out to many parts of the world where a kindergarten to grade 12 education is now a dream."

Establishment of the chair network from left:

FEATURES
[Creative Commons: Can the legal framework around free content help?](#)
[Value: Can an OpenSource Part 2?](#)

OPINION
Geoff Colvin: [What's wrong with the world's best universities?](#)
Student View: [The role of OpenSource in business development](#)

ATHLETICS
[Cancer: Looking to speed up the fight](#)

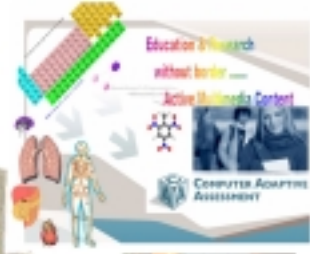
Additional stories:
[Radio: Taking it to the field](#)

U of A researcher suggests shift away from written tests in favour of computer exams

444 That's a good idea. More about using computers for test taking will be in the 11th issue of the journal.

Dr. Anup Basu, a professor at the University of Alberta, has suggested that students should be given computer-based exams instead of written tests. He says that this would allow students to take exams at their own pace and in their own environment, which would reduce stress and improve performance. He also suggests that computer-based exams could be used to assess a student's understanding of a subject in a more comprehensive way than written tests can.

Castle Rock Research Corp
Online Multimedia Education (CROME)



Department of Computing Science

