

Aswin C Sankaranarayanan

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EDUCATION	Aug 2009 (Expected): Ph.D in Electrical Engineering , University of Maryland, College Park, MD Thesis advisor: Prof. Rama Chellappa May 2008: M.S. in Electrical Engineering , (part of Ph.D) University of Maryland, College Park, MD Aug 2003: B.Tech in Electrical Engineering , Indian Institute of Technology, Madras	
RESEARCH INTERESTS	Computer Vision: Projective geometry, Visual Tracking, Real time Systems Multi-Camera Systems: Multi-view geometry, Markerless Motion Capture Dynamical Systems: Inference techniques, Particle filtering, Importance sampling, Efficient implementations Compressive Sensing: Applications in surveillance and graphics	
RESEARCH EXPERIENCE	<i>Graduate Research Assistant</i> , Center for Automation Research University of Maryland, College Park, MD	August, 2003 - present
	<i>Research Intern</i> , Communication and Collaborative Systems Group Microsoft Research, Redmond, WA	Summer 2008
	<i>Research Intern</i> , Advanced Technology Team SET Corporation, Greenbelt, MD	Summer 2005, Winter 2006
	<i>Summer Intern</i> , Tata Institute of Fundamental Research Mumbai, India	Summer 2002
TEACHING EXPERIENCE	<i>Co-Instructor</i> , ENEE 241: Numerical Techniques in Engineering ECE Department, University of Maryland, College Park, MD Co-Instructor (25% work load) with Prof. Papamarcou as a part of the Future Faculty Fellowship. <i>Graduate Teaching Fellow</i> , ENEE731: Image Understanding, ENEE633: Pattern Recog. ECE Department, University of Maryland, College Park, MD In addition to TA duties, assisted in setting course projects and had many opportunities to deliver lectures for ENEE731 (Image Understanding) and ENEE633 (Statistical and Neural Pattern Recognition). <i>Graduate Mentor</i> , Gemstone Team University of Maryland, College Park, MD Assisting Prof. Chellappa in mentoring <i>Team Vision</i> , a three year undergraduate effort in developing vision based navigational aids for the blind and making University of Maryland blind friendly.	Spring 2008 Fall 2005, 2006 Fall 2006 - present
RESEARCH TOPICS	Multi-view Metric Estimation: Considered the problem of metric estimation from multiple cameras with overlapping fields of view [MOTION08][TIP*]. The tracking algorithm developed was also used for the	

FlexiView project, a virtual reality application for visualization of surveillance data. The theory developed guides the design of statistical estimation with noisy projective measurements [PIEEE08a][ICIP08a].

Computationally Efficient Particle Filters: Analyzed the challenges in hardware implementations of Particle filtering algorithms. Proposed algorithmic modifications to the generic particle filter tuned towards hardware implementations [ICCD05][TIP08]. The proposed algorithm makes the filter more conducive to parallel and pipelined implementations.

Compressive Sensing in Vision/Graphics: Addressed the challenges in data-acquisition in domains. This included acquisition of reflectance fields for characterizing scene illumination and reflectance properties of properties using compressive sensing approaches [JOSA*]. Similar techniques were used in the surveillance context to perform background subtraction using compressive measurements [ECCV08]. Direct estimation of background subtracted silhouettes allows for much higher compression ratios. The approach is also conducive for applications in multi-view tracking and visual hull reconstructions [ICIP08b].

Acoustic Video Tracking: Formulated a framework for tracking vehicles given acoustic and video observations from a co-located acoustic array and a video camera. The algorithm is robust to failures in individual modalities like visual occlusion and low acoustic SNR [TMM07].

Multi-Camera Head-Pose Tracking: Developed a real-time head pose tracking algorithm using multiple web-cameras [POSE*] for applications in video conferencing. Head pose information facilitates a more immersive user experience by allowing for gaze correction, face relighting and adaptive displays (Work done at Microsoft Research).

Fingerprint Vehicle for Verification across Non-Overlapping Views: Proposed the use of 3D structural and statistical textural maps for verification of vehicles across non-overlapping cameras [PIEEE08].

Bi-directional processing for Evaluation and Tracking Formulated a ground-truth-free strategy for evaluation of tracking algorithms [CVPR07] with subsequent modifications to improve tracking [ICCV2007].

Finite Fixed Point Motion Camouflage: Motion camouflage is a stealth behavior exhibited by insects. We devised control laws that allow predators to camouflage themselves with respect to finite fixed points.

AWARDS

Distinguished Dissertation Fellowship, Dept. of Electrical and Computer Engineering 2008-09
University of Maryland, College Park, MD

- The fellowships are awarded to outstanding students in the final stages of their dissertation work in recognition of excellence in research. ([URL](#))

Future Faculty Fellow, A. James Clark School of Engineering Spring 2007 - present
University of Maryland, College Park, MD

- Selected to participate in the Clark School's Future Faculty Program (FFP). FFP was introduced to increase the number of Clark School Ph.D. graduates who obtain academic positions, and in particular, faculty positions in prestigious engineering schools. ([URL](#))

Participant, IBM Emerging Leaders in Multimedia Workshop 2007 Oct 11-12, 2007
T. J. Watson Center

- One among 8 student selected world-wide to participate in IBM Emerging Leaders Workshop at the T. J. Watson Research Center. ([URL](#))([UMD Press Release](#))

INVITED TALKS

Statistical Estimation under Projective Transformations: Theory and Applications in Computer Vision, IBM Watson Research Center, October 2007.

Mixed state models for automatic target recognition and behavior analysis in video sequences, SPIE Defense and Security Symposium, Atlanta, March 2008.

Remote Biometrics for the Maritime Domain, ROBUST Biometrics Conference, Honolulu, November 2008.

- BOOK CHAPTERS [ENCY] R. Chellappa and A. C. Sankaranarayanan, *Surveillance*, Encyclopedia of Biometrics (to appear).
- [WILEY] R. Chellappa, A. Veeraraghavan and A. C. Sankaranarayanan, *Knowledge Extraction from Surveillance Sensors*, Wiley Handbook on Science and Technology for Homeland Security (to appear).
- JOURNALS [TMM07] V. Cevher, A. C. Sankaranarayanan, J. H. McClellan and R. Chellappa, *Target Tracking using a Joint Acoustic Video System*, IEEE Transactions on Multimedia. June 2007, Vol. 9, No. 5, pp. 715 - 727.
- [TIP08] A. C. Sankaranarayanan, A. Srivastava and R. Chellappa, *Algorithmic and Architectural Optimizations for Computationally Efficient Particle Filtering*, IEEE Transactions on Image Processing. May 2008, Vol. 17, No. 5, pp. 737 - 748.
- [PIEEE08] A. C. Sankaranarayanan, A. Veeraraghavan and R. Chellappa, *Distributed Detection, Tracking and Classification using a network of Video Cameras*, Proceedings of the IEEE (Special Issue on Distributed Smart Cameras). Oct 2008, Vol. 96, No. 10, pp. 1606 - 1624.
- [TIP*] A. C. Sankaranarayanan and R. Chellappa, *Statistical Estimation under Projective Transformations: Theory and Applications in Multi-view Problems*, IEEE Transactions on Image Processing (under review).
- [TPAMI*] W. Hao, A. C. Sankaranarayanan and R. Chellappa, *Online evaluation of Tracking Algorithms*, IEEE Transactions on Pattern Analysis and Machine Intelligence (under review).
- [JISP*] A. C. Sankaranarayanan, R. Patro, P. Turaga, A. Varshney and R. Chellappa, *Modeling and Visualization of Human Activities for Multi-Camera Networks*, EURASIP Journal on Image and Video Processing (under review).
- [TRENDS*] R. Chellappa, A. C. Sankaranarayanan, A. Veeraraghavan and P. Turaga, *Statistical Models and Methods for Applications in Computer Vision*, Current and Future Trends in Signal Processing (under review).
- SELECT CONFERENCE PUBLICATIONS [ECCV08] V. Cevher, A. C. Sankaranarayanan, M. Duarte, D. Reddy, R. Baranuik and R. Chellappa, *Compressive Sensing for Background Subtraction*, European Conference on Computer Vision, Marseilles, France, Oct 2008.
- [ICIP08a] A. C. Sankaranarayanan and R. Chellappa, *Stochastic Fusion of Multi-View Gradients*, IEEE Conference on Image Processing, San Diego, CA, Oct 2008
- [ICIP08b] D. Reddy, A. C. Sankaranarayanan, V. Cevher and R. Chellappa, *Compressed Sensing for Multi-View Tracking and 3-D Voxel Reconstruction*, IEEE Conference on Image Processing, San Diego, CA, Oct 2008.
- [ICASSP08] V. Cevher, A. C. Sankaranarayanan and R. Chellappa, *Factorized Variational Approximations for Acoustic Multi Source Localization*, ICASSP, Las Vegas, NV, April 2008.
- [MOTION08] A. C. Sankaranarayanan and R. Chellappa, *Optimal Multi-View Fusion of Object Locations*, IEEE Workshop on Motion and Video Computing, Copper Mountain, CO, Jan 2008.
- [ICCV07] W. Hao, R. Chellappa, A. C. Sankaranarayanan and R. Chellappa, *Robust Visual Tracking using the Time-reversibility Constraint*, IEEE International Conference on Computer Vision, Rio de Janeiro, Brazil,

Oct 2007.

[CVPR07] W. Hao, A. C. Sankaranarayanan and R. Chellappa, *Insitu Evaluation of Tracking Algorithms using Time Reversed Chains*, IEEE Conference on Computer Vision and Pattern Recognition, Minneapolis, MN, June 2007.

[ICASSP07] V. Cevher, F. Guo, A. C. Sankaranarayanan, and R. Chellappa, *Joint acoustic-video fingerprinting of vehicles, part II*, ICASSP 2007, Honolulu, HA, April 2007.

[ICCD05] A. C. Sankaranarayanan, R. Chellappa and A. Srivastava, *Algorithmic and Architectural Design Methodologies for Particle Filters in Hardware*, IEEE International Conference on Computer Design, San Jose, CA, Sept 2005.

[ICIP05] A. C. Sankaranarayanan, R. Chellappa and Q. Zheng, *Tracking Objects in Video using Motion and Appearance Models*, IEEE International Conference on Image Processing, Genoa, Italy, Sept 2005.

JOURNAL
PUBLICATIONS
(UNDER
PREPARATION)

[JOSA*] —, *Compressive Acquisition of Reflectance Fields*, Journal of Optical Society of America (under preparation).

[POSE*] —, *Real-time Pose Tracking from multiple cameras*, IEEE Transactions on Pattern Analysis and Machine Intelligence (under preparations).

COMPUTER SKILLS

- Programing Languages and Tools: Extremely proficient in C, C++ and Matlab. Have developed real time applications using C/C++ and OpenCV.
- Operating Systems: Unix/Linux, Windows.

PROFESSIONAL
ACTIVITIES

Reviewer: IEEE Transactions on Image Processing, IEEE Signal Processing Letters, EURASIP Journal on Advances in Signal Processing, Machine Vision and Applications, Journal of Signal Processing Systems, ICCV 2007, ICME 2007, ICME 2008, CVPR 2009.

VISA
STATUS/CITIZENSHIP

F-1/India

REFERENCES

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