

Mahesh Ramachandran

4444 A. V. Williams Building,
Center for Automation Research,
University of Maryland, College Park,
Maryland 20742, USA

mahेशr@umiacs.umd.edu
Phone: (240) 678 2659
<http://www.umiacs.umd.edu/users/mahेशr/>

Objective

A full-time position involving research, development and analysis in the broad area of Signal Processing (flexible starting date).

Research Interests

- Video Processing: Video Compression, Multi-view Video Coding, Stabilization and Mosaicking
- Computer Vision: Image Registration, Object Tracking, Structure from Motion, Face Tracking
- Sensor Fusion: Fusion of Video with Inertial Sensors and GPS.
- Pattern Recognition, Machine Learning and Optimization theory.

Education

Ph.D. in Electrical Engineering, University of Maryland, College Park, MD.

Expected graduation: Spring 2010 (Advisor: Prof. Rama Chellappa)

Thesis topic: *Video processing with inertial measurements*, GPA: 3.92/4.00

M.S. in Electrical Engineering, December 2007, University of Maryland, College Park, MD.

Major: Communications and Signal Processing, Minor: Control Systems, GPA: 4.00/4.00

B.Tech in Electrical Engineering, May 2003, Indian Institute of Technology Madras, India.

Major: Communication Systems, Minor: Operations Research, GPA: 8.97/10.00

Thesis: *Automatic Speech Recognition using Hidden Markov Models*

Research & Professional Experience

Graduate Research Assistant

June 2004 – Present

Center for Automation Research

University of Maryland, College Park

Worked under the supervision of Prof. Chellappa on a Multi-University Research Initiative (MURI) project on vision algorithms and applications for aerial platforms.

- **Scalable structure from motion:** I was the first to propose a bilinear algorithm to solve for the structure and motion in the Euclidean reference frame from a video sequence using inertial measurements.
- **Moving object detection using telemetry information:** I proposed algorithms to stabilize and mosaic images, and detect moving objects using additional metadata available along with a video sequence.
- **Image stabilization:** I proposed algorithms for stabilizing and mosaicking low-resolution videos captured from aerial platforms. I used quality metrics derived from the image gradients to build video mosaics.
- **Facial expression analysis:** I proposed a method to convert faces with expression into neutral faces using a generic CANDIDE face model. I demonstrated improvement in face recognition performance when expression-normalized faces were used for face recognition.
- **Multi-view video coding:** I proposed a homography-based multi-view compression scheme for distributed video coding in a camera network.

Software Engineering Intern

May 2008 – August 2008

Google Inc.

Mountain View, California

I worked in the Google StreetView project.

- **Pose-estimation using Vision and Inertial sensors:** I proposed an algorithm for fusing pose-estimates from vision (SFM) and inertial sensors. I implemented the algorithm in C++ and integrated it into the Google StreetView codebase.

Graduate Research Intern

May 2007 – Aug 2007

I worked in the Visualization and Computer Vision Laboratory (VCV).

- **Face model registration from multiple cameras:** I worked on the problem of registering a 3D face model to a human face from a set of images obtained from different viewpoints.

GE Research Center

Niskayuna, New York

Graduate Teaching Assistant

Aug 2003 – May 2004

I instructed the Circuits and Systems Laboratory course. My role involved giving recitations, designing experiments, evaluating homeworks etc.

Dept. of Electrical Engineering

University of Maryland, College Park

Visiting Research Student

May 2002 – August 2002

I worked in the School of Technology and Computer Science (STCS).

- **Speech recognition system using HMMs:** I developed a HMM based speech recognition system for Indian language words in C++.

Tata Institute of Fundamental Research

Mumbai, India

Publications

Book Chapters

1. M. Ramachandran, A. Veeraraghavan, and R. Chellappa. “Video Stabilization and Mosaicing,” *The Essential Guide to Video Processing*, A. Bovik (Ed.), Elsevier Inc., 2008.

Journals

1. M. Ramachandran, and R. Chellappa. “Video Stabilization using Additional Information.” *In preparation for journal submission*.
2. M. Ramachandran, A. Veeraraghavan, and R. Chellappa. “A Fast Bilinear Structure from Motion Algorithm using a Video Sequence and Inertial Sensors,” *Under revision in IEEE Transactions on Pattern Analysis and Machine Intelligence*.

Refereed Conference Papers

1. A. Veeraraghavan, M. Ramachandran, and M. Mareboyana. “Homography based Distributed Video Coding for a Network of Cameras,” *Proceedings of IEEE Intl. Conf. on Image Processing (ICIP)*, 2008.
2. M. Ramachandran, A. Veeraraghavan, and R. Chellappa. “Fast Bilinear SFM using Side Information,” *Proceedings of IEEE Intl. Conf. on Computer Vision (ICCV)*, 2007.
3. M. Ramachandran, and R. Chellappa. “Stabilization and Mosaicing of Airborne Videos,” *Proceedings of IEEE Intl. Conf. on Image Processing (ICIP)*, October 2006.
4. M. Ramachandran, S. Zhou, D. Jhalani, and R. Chellappa. “A Method for Converting a Smiling Face to a Neutral Face with Applications to Face Recognition,” *Proceedings of IEEE Intl. Conf. on Acoustics, Speech and Signal Processing (ICASSP)*, March 2005.
5. X. Mei, M. Ramachandran, and S. Zhou. “Video Background Retrieval using Mosaic Images,” *Proceedings of IEEE Intl. Conf. on Acoustics, Speech and Signal Processing*, March 2005.

Professional & Volunteering Activities

- *Conference presentations:* Presented my work at various conferences such as ICCV, ICIP, ICASSP.
- Guest lectures in the course on Image Understanding (ENEE731) taught by Prof. Chellappa.
- *VC pitch:* I presented a Venture Capital pitch titled “Augmented Reality and Navigation for Blind People” in the Venture Fair (2009), where I presented my work and its potential applications towards visual aids for the blind.
- *Reviewer:* 1) IEEE Transactions on Image Processing (TIP), 2) IEEE International Conference on Computer Vision (ICCV), 3) IEEE International Conference on Image Processing (ICIP).
- Work with a non-profit organization, the ‘Life in Yoga’ foundation, and help with raising funds and organizing Yoga sessions in the DC area.

Honors

- Awarded Graduate Scholarship (GRA+GTA) upon admission into the graduate program in the University of Maryland College Park.
- Ranked 5 out of around 120 students graduating from the B.Tech program (class of 2003) in Electrical Engineering from Indian Institute of Technology Madras.
- Ranked 224 out of over 1,20,000 candidates (top 0.2%) appearing for IIT Joint Entrance Examination 1999
- Ranked 220 out of over 1,00,000 candidates (top 0.2%) appearing for Rourkee Entrance Examination 1999

Talks

- “Structure from Motion and Stabilization using inertial sensors”, Qualcomm(San Diego), Nov 2009.
- “Structure from Motion and Stabilization using inertial sensors”, SRI Intl. and Apple Inc., Sep 2009.
- “Fast Bilinear SFM using inertial sensors”, NAVTEQ (Chicago), April 2009.
- “Video processing using additional information”, ECEGSA seminar series, March 2009.
- “Fusing vision and inertial sensors for pose estimation”, Google Geo Tech Talk series, August 2008.
- “Multi-view face model registration”, GE Research VCV seminar series, August 2007.

Skills and Course Projects

- Languages: Objected Oriented Programming in C++, Java, C, Visual C++, Pascal, HTML
- Software tools: Matlab, OpenCV, Spice, Orcad, Labview.
- Operating systems: Windows, LINUX (shell scripting in bash, csh).
- Relevant coursework: Communications and Signal Processing, Video and Image Processing, Computer Vision, Pattern Recognition and Machine Learning, Probability and Random Processes, Advanced Analytic Methods (Stochastic Calculus) etc, Optimal Control, Convex Optimization.
- Relevant Course Projects:
 - Implementation and evaluation of MPEG-4/H.264 video compression standards and JPEG/JPEG2000 image compression standards.
 - Subband coding, linear prediction and spectral estimation of digital audio.
 - Implementation of medical image reconstruction algorithms.

References

- **Prof. Rama Chellappa**, Dept. of Electrical and Computer Engineering, University of Maryland, College Park, MD 20742. (rama@cfar.umd.edu)
- **Prof. Ankur Srivastava**, Dept. of Electrical and Computer Engineering, University of Maryland, College Park, MD 20742. (ankurs@umd.edu)
- **Dr. Vaibhav Vaish**, Senior Software Engineer, Google Inc., Mountain View, CA. (vvaish@google.com)