OBJECTIVE

To seek a full-time R&D position in one or more of the following fields: Image/Video Processing, Computer Vision, Pattern Recognition and Machine Learning.

CITIZENSHIP: Indian

WORK AUTHORIZATION STATUS: Currently in Optional Practical Training period with a valid Employment Authorization Document. Can start work immediately.

QUALIFICATION

- Strong background in Video Analysis, Image Processing, Computer Vision and Pattern Recognition: theories, algorithms and implementation.
- Strong background in Data Structures and Computer Algorithms.
- Proficient in Matlab and C/C++.
- Experienced in Python, Java Servlets, JavaScript, Oracle and PL/SQL

EDUCATION

University of South Florida **07/2005 - 01/2008**
Ph.D. (Computer Science & Engineering)
Advisor: Prof. Sudeep Sarkar
Department of Computer Science & Engineering
Thesis: *Representation and Learning for Automated Sign Language Recognition*
Successfully defended on Jan 17th, 2008
GPA: 3.91/4.0

University of South Florida **08/2003 - 07/2005**
M.S. (Computer Science)
Advisor: Prof. Sudeep Sarkar
Department of Computer Science & Engineering
Thesis: *A Vision-Based Approach for Unsupervised Modeling of Signs Embedded in Continuous Sentences*

Regional Engineering College, Rourkela, India **09/1997 - 05/2001**
(Now called National Institute of Technology, Rourkela)
B.E. (Computer Science & Engineering)

RESEARCH EXPERIENCE

Graduate Student (External): **Automated Molecular Imaging Group, The Scripps Research Institute, La Jolla, CA** **01/2007 - 11/2007**

Molecular Imaging & Reconstruction

- Developed an unsupervised classification algorithm to improve 3D reconstructions of protein macromolecules from extremely noisy digital images captured using an electron microscope. Several digital images of the molecule that have the same viewing parameters are averaged to improve the signal to noise ratio. We developed an automated algorithm to identify and reject

images of molecules having inconsistent viewing parameters, or having extremely low signal to noise ratio.

- Developed an algorithm to estimate the astigmatism present in the micrographs captured using an electron microscope, using a RANdom SAmple Consensus (RANSAC)-based approach. When the astigmatism – a parameter in the contrast transfer function of an electron microscope – is not estimated and corrected for, the resolution of 3D reconstruction suffers significantly.
- Developed an expertise in pipeline-based automated processing of molecular imaging and reconstruction. It includes automated contrast enhancement of micrographs, automated particle picking and classification of particles, and 3D reconstruction of macromolecules.

Tools Used: Matlab, Python

Graduate Research Assistant: Computer Vision & Image Analysis Research Laboratory, USF **08/2003 - 12/2006**

Video Analysis

- Developed an algorithm for American Sign Language (ASL) recognition by analyzing video sequences of an ASL signer. Unlike previous approaches, we do not require the signer to wear specialized colored gloves, and we do not need explicit tracking of the body parts.
- Developed a random sampling-based algorithm for capturing the shapes and spatial configurations of objects in an image using low-level primitives, e.g. edge points, and efficiently computing the histograms used for representing motion.
- Proposed a novel technique for embedding histograms into a low-dimensional space by preserving the probabilistic distances like Bhattacharya, Matusita, Chernoff, Kullback Leibler (KL) and symmetric-KL distance measures.
- Implemented the interpolation of motion sequences and empirically showed that it improves recognition accuracy.

Gesture Recognition and Human Activity Classification

- Developed a detection-based algorithm for gesture recognition and activity classification without performing tracking, and by using global pose changes instead. Showed results of the algorithm on public datasets.

Learning from Multiple Video Sequences

- Developed a probabilistic framework based on Iterated Conditional Modes to automatically learn individual signs from video sequences of continuous sign language sentences.

Tools Used: Matlab, C++

WORK EXPERIENCE

Software Engineer: **Satyam Computer Services Limited, India** **06/2001 - 06/2003**

- Worked as a team member in the development of a database backed web application for handling the entire repair cycle of trailer units. Client: GE-TIP, USA

- Worked as a team member in the development of a web application for monitoring and updating inspection data of mobile houses collected using handheld devices. Client: GE-ModSpace, USA

Tools Used: Java Servlets, Oracle, PL/SQL

Undergraduate Intern: **Software Technology Parks of India, Hyderabad, India**
05/2002 - 07/2002

- Performed a case study of the DATACOM setup at the STPI, Hyderabad.

TEACHING EXPERIENCE

University of South Florida

Instructor:
- Analysis of Algorithms (Undergraduate), Summer 2004

Teaching Assistant:
- Data Structures (Undergraduate), Fall 2006
- Data Structures (Undergraduate), Spring 2004
- Data Structures (Undergraduate), Fall 2003

PUBLICATIONS

- **S. Nayak**, S. Stagg, P.W. Lau, B. Carragher and C.S. Potter, "Affinity propagation-based classification applied to single particle analysis and reconstruction", To be submitted to *Journal of Structural Biology*, Feb. 2008.

- **S. Nayak**, S. Sarkar, and B. Loeding, "Finding Recurrent Patterns from Continuous Sign Language Sentences for Automated Extraction of Signs", To be submitted to *Computer Vision and Image Understanding*, Feb. 2008.

- **S. Nayak**, S. Sarkar, and B. Loeding, "Distribution-based dimensionality reduction applied to articulated motion recognition", Accepted for publication in *Transactions on Pattern Analysis and Machine Intelligence*, Jan. 2008.

- **S. Nayak**, S. Sarkar, and B. Loeding, A. Karshmer, "Continuous Sign Language Recognition", Young Researchers' Consortium at *International Conference on Computers Helping People with Special Needs*, Jul. 2006.

- **S. Nayak**, S. Sarkar, and B. Loeding, "Unsupervised Modeling of Signs Embedded in Continuous Sentences", IEEE Workshop on *Vision for Human-Computer Interaction* in conjunction with CVPR, Jun. 2005.

- **S. Nayak**, S. Sarkar, and K. Sengupta, "Modeling Signs using Functional Data Analysis", *Indian Conference on Computer Vision, Graphics and Image Processing*, Dec. 2004.

RELEVANT GRADUATE COURSE WORKS

Geometrical and Statistical Pattern Recognition, Computer Vision, Digital Image Processing,

Introduction to Theory of Algorithms, Data Mining, Randomized Algorithms, Advanced Linear Algebra, Operating Systems, Computer Architecture.

RELEVANT COURSE PROJECTS

- **Hand tracking:** Designed a multi-modal hand tracking algorithm using both pixel intensity and 3D depth information. A smart scheme was devised to integrate intensity and depth information to increase the robustness of the system.

- **Circle detection**: Implemented a Hough Transform based circle detector for microarray images.

- **Optical character recognition:** Implemented and tested various classifiers for a scanned characters dataset, including minimum distance classifier, k- Nearest Neighbor classifier, and Reduced Nearest Neighbor classifier.

TALKS

- Young Researchers' Consortium at *International Conference on Computers Helping People with Special Needs*, July 2006.
- IEEE Workshop on *Vision for Human-Computer Interaction* in conjunction with CVPR, June 2005.

HONORS

- Selected for the 1st Google Workshop for Women Engineers held at Mountain View, CA, in January 2006.
- Meritorious Girls Scholarship: Awarded by the State Govt. for earning the 5th position among all women candidates who appeared for Joint Entrance Examination (1997) for admission into Engineering Colleges in the state of Orissa, India, 1997-2001.

REFERENCES

Dr. Sudeep Sarkar: Professor, Department of Computer Science and Engineering, University of South Florida, Tampa, FL. (sarkar@csee.usf.edu)

Dr. Bridget Carragher: Associate Professor, Automated Molecular Imaging Group, The Scripps Research Institute, La Jolla, CA. (bcarr@scripps.edu)

Dr. Barbara Loeding: Associate Professor, Department of Special Education, University of South Florida, Lakeland, FL. (bloeding@gmail.com)