

# KISHORE KUMAR REDDY

Computer Vision Lab  
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<http://scholar.google.com/citations?user=Eq8hUO8AAAAJ>

## SUMMARY

- Interested in developing practical real-time computer vision systems to solve real-world problems.
- Primary research focus is on Action/Activity/Gesture recognition in videos taken from YouTube (Consumer Videos), aerial platforms (Aircraft), rooftop surveillance cameras, and Kinect Sensor with depth information.
- Worked on Video Image Retrieval and Analysis Tool (VIRAT) project for three years and led UCF computer vision group in VIRAT Phase II.
- Partly involved in PASCAL challenge, KINECT Gesture challenge and Automated Low-Level Analysis and Description of Diverse Intelligence Video (ALADDIN) project.
- Developed two challenging action recognition datasets “UCF50” and “UCF-Aerial-Rooftop-Ground” (UCF-ARG) and released for public use.
- Built action recognition system “KEYS” and presented a live demo at ICCV 2009 in Japan.
- Worked and led a team on an NIH project to detect and segment brain tumor in MRI images.

## EDUCATION

**August 2012** **Doctor of Philosophy** in Electrical Engineering (GPA 4.0/4.0)

*Advisor: Prof. Mubarak Shah*

University of Central Florida, Orlando, FL, USA

*Thesis: Action Recognition Using Particle Flow Fields*

**March 2006** **Master of Science** in Electronic Systems and Engineering Management

Fachhochschule Südwestfalen, Soest, Germany / Bolton University, UK (Dual Degree)

**April 2002** **Bachelor of Technology** in Electronics and Communication Engineering

Jawaharlal Nehru Technological University, Hyderabad, A.P, India

## TECHNICAL SKILLS

**Programming Languages** C, C++, Matlab.

**Operating Systems** Linux (CentOS and Ubuntu), Windows.

**Applications / Libraries** Visual Studio, LabVIEW, ITK, openCV.

## RESEARCH EXPERIENCE

August 2008 - **Graduate Research Assistant**, University of Central Florida, USA

Present *Advisors: Prof. Mubarak Shah, Dr. Pingkun Yan*

**Video Image Retrieval and Analysis Tool (VIRAT) project** (*Aug 2008 – Feb 2012*)

- Formulated experiments to test different action recognition algorithms on AP Hill aerial videos provided by DARPA which were recorded using Electro-Optical/Infra-Red (EO/IR) sensor from a military aircraft flying at a height of over 1000 meters. The videos are aligned and the moving objects are tracked using in-house system COCOA.
- Integrated two action recognition algorithms “Bag of Visual Words” and “Lagrangian Particle Trajectories” into the VIRAT DARPA system developed by Lockheed Martin and Kitware as part of VIRAT project. The algorithms were converted to C++ for integration.

**Action recognition** (*Jan 2009 – present*)

- Developed an algorithm to perform multiple action recognition, incremental action recognition and action localization using feature-trees. (*Jan 2009 – Jun 2009*)
- Demonstrated an action recognition system “KEYS” live at ICCV2009 conference held in Japan. It is developed in C++ based on feature-trees algorithm for real-time action recognition. New action categories can be added to the system on the fly. (*Mar 2009 – Sep 2009*)
- Demonstrated improvement in accuracy on different action recognition datasets by using scene context information in conjunction to any motion descriptor. The datasets include UCF11, UCF50, HMDB51 and a sample from TRECVID dataset released as part of ALADDIN project. (*Oct 2010 – May 2011*)
- Developed a new video representation “Particle Flow Fields” based on optical flow and particle advection and experimentally showed that it outperforms optical flow and gradients. Particle Flow Fields showed good performance on Kinect Gesture Recognition dataset in a “One-Shot-Learning” framework. (*Sep 2011 – present*)

**GPS location from image/video** (*Jun 2009 – Jul 2009*)

- Involved in developing a proposal that uses the concept of feature-trees and local interest points to geolocate images and videos. The project was eventually funded by Intelligence Advanced Research Projects Activity (IARPA).

**Smartphone to detect human actions** (*Jan 2011 – May 2011*)

- Conceived and helped solve the task of performing action recognition using data from accelerometers on smart phones. UCF-iPhone dataset was generated by recording data from an Inertial Measurement Unit (IMU) on an Apple iPhone 4 for 9 different actions performed by different actors.

**Image classification and segmentation** (*Jul 2009 – Oct 2009*)

- Developed a framework to use feature-trees and modified Bag of Features approach for image classification and segmentation in PASCAL dataset.

**Brain tumor detection and segmentation in MRI images** (*May 2009 – Nov 2011*)

- Developed a discriminative approach for automatic brain tumor detection and segmentation in MRI images for a project funded by National Institutes of Health.
- Demonstrated the use of multiple modalities in MRI and also experimentally showed the use of texture features like LBP and HOG along with intensity to train a discriminative classifier to do reliable pixel level tumor detection.
- Also developed a framework to use confidence scores from discriminative classifiers to improve the accuracy in different segmentation algorithms.

**Datasets released for public** (*Jun 2010 – May 2011*)

- Led a team of 10 people to develop one of the biggest action recognition datasets: UCF50. This dataset has about 6676 videos taken from YouTube and has 50 different action categories. (*Jul 2010 – Oct 2010*)
- Also, led a team of 15 people to develop a unique action recognition dataset UCF-ARG where the action is simultaneously captured from a ground camera, a rooftop camera at 100 feet and a remotely controlled aerial camera mounted on a helium balloon. (*Jun 2010 – May 2011*)

May 2011 -  
August 2011

**Research Assistant** (Intern), Kitware Inc., Clifton Park, NY, USA  
*Advisors: Dr. Naresh Cuntoor, Dr. Amitha Perera*

- Investigated the performance of 3D gradients for action recognition task in aerial videos taken from an aircraft and performed extensive testing on aerial and rooftop videos in VIRAT dataset. The designed 3D-STHOG descriptor is incorporated into VIRAT DARPA system for testing.
- Analyzed the sensitivity of 3D-STHOG to scale, frame rate and also to translation of bounding boxes that might occur due to errors in tracking and tested for performance on six different action recognition datasets.

August 2006 - **Graduate Research Assistant**, University of Central Florida, USA  
 August 2008 *Advisor: Dr. Aman Behal*

- CONTROL DESIGN: Designed adaptive “Multi Input Multi Output” (MIMO) control for aeroelastic vibration suppression using Tuning Functions, Adaptive Back Stepping and Output Feedback methods.
- SYSTEM IDENTIFICATION: Employed Volterra kernels for non-parametric modeling and system identification on systems like “Gammamotor Neurons”, “Aeroelastic Wing Section”, and “Circulating Fluidized Bed Systems”.

January 2006 - **Graduate Research Assistant**, Clarkson University, USA  
 August 2006 *Advisor: Dr. Aman Behal*

- Designed an “Adaptive Output Feedback” controller for aeroelastic vibration suppression on a nonlinear wing section.

July 2005 - **Research Assistant**, Haute école valaisanne, Sion, Switzerland  
 January 2006 *Advisor: Dr. Gilbert Maitre*

- JPEG2000 technology was tested using Kakadu Software and re-designed to be implemented on an Embedded System to investigate the advantages of Co-design.

August 2003 - **Research Assistant (Volunteer)**, Fachhochschule Südwestfalen, Germany  
 July 2005 *Advisor: Dr. Gerhard Petuelli*

- Signal Processing for Predictive Maintenance: Data Acquisition was done on CNC machine using vibration sensors and data was analyzed to investigate faults in the machinery and also predict break downs using neural networks and fuzzy logic.

January 2002 - **Internship**, Indian Space Research Organization, Sriharikota, India  
 April 2002 *Advisor: Mr. K. Srinivasa Rao, Prof. P. Nageswara Rao*

- “Microcontroller Based PCM Frame Synchronizer” was built on PC ADD-ON CARD compatible to an ISA Bus (Project done as a part of my final year B.Tech).

## TEACHING ASSISTANT

**University of Central Florida, Orlando, FL, USA**  
 2008 Fall Introduction to Robotics, Advisor: Gita Reese Sukthankar  
 2008 Spring Linear Control Systems, Advisor: Dr. Michael G. Haralambous  
 2007 Fall Linear Control Systems, Advisor: Dr. Zhihua Qu  
 2007 Spring Introduction to Digital Circuits, Advisor: Dr. Brian Petrasko

**Clarkson University, Potsdam, NY, USA**  
 2006 Spring Introduction to Digital Design, Advisor: Dr. Abul N. Khondker

## PUBLICATIONS

### COMPUTER VISION

- [1] **Kishore K. Reddy** and Mubarak Shah, “Recognizing 50 Human Action Categories of Web Videos”, *Machine Vision and Applications (MVA)*, **September 2012. (Journal)**.

- [2] **Kishore K. Reddy**, Naresh Cuntoor, Amitha Perera, Mubarak Shah and Anthony Hoogs, "Human Action Recognition in Large-Scale Datasets Using Histogram of Spatiotemporal Gradients", to appear in Advanced Video and Signal-Based Surveillance (**AVSS**), **September 2012. (Poster)**
- [3] **Kishore K. Reddy**, Berkan Solmaz, Pingkun Yan, Nicholas G. Avgeropoulos, David J. Rippe and Mubarak Shah, "Confidence Guided Enhancing Brain Tumor Segmentation in Multi-Parametric MRI", International Symposium on Biomedical Imaging (**ISBI**), **April 2012. (Oral)**
- [4] Corey McCall, **Kishore Reddy**, and Mubarak Shah, "Macro-Class Selection for Hierarchical K-NN Classification of Inertial Sensor Data", Second International Conference on Pervasive and Embedded Computing and Communication Systems (**PECCS**), **February 2012. (Oral)**
- [5] Sangmin Oh, Anthony Hoogs, Amitha Perera, Naresh Cuntoor, Chia-Chih Chen, Jong Taek Lee, Saurajit Mukherjee, JK Aggarwal, Hyungtae Lee, Larry Davis, Eran Swears, Xioyang Wang, Qiang Ji, **Kishore Reddy**, Mubarak Shah, Carl Vondrick, Hamed Pirsiavash, Deva Ramanan, Jenny Yuen, Antonio Torralba, Bi Song, Anesco Fong, Amit Roy-Chowdhury, Mita Desai, "A Large-scale Benchmark Dataset for Event Recognition in Surveillance Video", Computer Vision and Pattern Recognition (**CVPR**), **June 2011. (Poster)**
- [6] **Kishore Reddy**, Jingen Liu, and Mubarak Shah, "Incremental Action Recognition Using Feature-Tree", Int'l Conference on Computer Vision (**ICCV**), **September 2009. (Poster)**

#### CONTROL SYSTEMS

- [7] V.M. Rao, A.K. Jain, **K.K. Reddy**, and A. Behal, "Experimental Comparison of Digital Implementations of Single-Phase PFC Controllers", IEEE Transactions on Industrial Electronics, Vol. 55, No. 1, pp. 67-78, **January 2008**.
- [8] V.M. Rao, A.K. Jain, **K.K. Reddy**, and A. Behal, "Nonlinear Control of a Single Phase Unity Power Factor Rectifier: Design, Analysis, and Experimental Results", IEEE Transactions on Control Systems Technology, **September 2007**.
- [9] V.M. Rao, A. Behal, A. K. Jain, and **K. K. Reddy**, "Experimental Comparison of Digital Control Techniques for Single Phase Power Factor Correction," IEEE Transactions on Industrial Electronics, **December 2007**.
- [10] **K.K. Reddy**, J. Chen, A. Behal, and P. Marzocca, "Multi-Input/Multi-Output Adaptive Output Feedback Control Design for Aeroelastic Vibration Suppression", AIAA Journal of Guidance, Control, and Dynamics, Vol. 30, No. 4, pp. 1040-1048, **July-August 2007**.
- [11] V.M. Rao, **K.K. Reddy**, A. Behal, and A.K. Jain, "Modeling, Control, and Experimental Results for a Single Phase One Quadrant Unity Power Factor Rectifier", Proc. of the IEEE Conference on Decision and Control, San Diego, CA, pp. 6223-6228, **December 2006**.

#### DEMOS (COMPUTER VISION)

- [12] Sangmin Oh, Anthony Hoogs, Amitha Perera, Naresh Cuntoor, Chia-Chih Chen, Jong Taek Lee, Saurajit Mukherjee, JK Aggarwal, Hyungtae Lee, Larry Davis, Eran Swears, Xiaoyang Wang, Qiang Ji, **Kishore Reddy**, Mubarak Shah, et al., "AVSS 2011 demo session: A large-scale benchmark dataset for event recognition in surveillance video", Advanced Video and Signal-Based Surveillance (**AVSS**), **August 2011**.
- [13] **Kishore Reddy**, Jonathan Pook, Jingen Liu, and Mubarak Shah, "KEYS: Real-time Action Recognition Using Feature-Tree", International Conference on Computer Vision (**ICCV**), **September 2009**.

#### PROFESSIONAL SERVICES

##### Reviewer

- IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)
- Computer Vision and Image Understanding (CVIU)
- IEEE Transactions on Image Processing (TIP)

- IEEE Transactions on Systems, Man and Cybernetics (TSMC)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- ELSEVIER Neurocomputing
- Machine Vision and Applications (MVAP)

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**REFERENCES**

Provided upon request