Vinay Bettadapura

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Research Interests

Computer Vision, Machine Learning and Ubiquitous Computing

Education

- **Georgia Institute of Technology**, Atlanta, USA

  Ph.D., Computer Science (August 2010 - December 2015)
  Computational Perception Laboratory, College of Computing. **GPA: 4.0 / 4.0**
  Thesis: Leveraging contextual cues for dynamic scene understanding
  Advisor: Prof. Irfan Essa

- **Columbia University**, New York, USA

  Master of Science, Computer Science (January 2009 – May 2010)
  The Fu Foundation School of Engineering and Applied Science. **GPA: 3.89 / 4.0**

- **Visvesvaraya Technological University**, Belgaum, India

  Bachelor of Engineering in Electronics and Communications (June 2002 – June 2006)

Work Experience

1. **Google**, Mountain View, USA
   Senior Software Engineer (January 2016 - Present)

   Working with the AI Perception group (under Research and Machine Intelligence) on activity and event understanding from video, audio, and other sensor data.

2. **Google**, Mountain View / Atlanta, USA
   Software Engineering Intern (May 2013 – December 2015)

   Worked with the AI Perception group on event understanding from videos and with the Google Geo (Earth and Maps) team on improving the quality of satellite imagery.

3. **Google**, Mountain View, USA
   Software Engineering Intern (May 2012 – August 2012)

   Worked with AI Perception group's Video Content Analysis team in developing algorithms and building systems for object detection and categorization in YouTube videos.

4. **Subex Limited**, Bangalore, India
   Software Engineer (June 2006 – December 2008)

   Design and development of telecommunication fraud protection and anomaly detection systems. Worked on modeling user behavior, data mining for anomalies, and the design and development of the back-end, database and web-based front-end systems.

Research Experience

1. **Research Assistant**, Georgia Tech (August 2010 - December 2015)

   Advisor: Prof. Irfan Essa

   - Long-term activity recognition, skill assessment and functional categorization from videos and other time-series data.
   - *PerSEAS (Persistent Stare Exploitation and Analysis System):* DARPA project on surveillance and activity recognition from aerial image sequences of vehicles and people.
   - Surgical skill assessment and skill categorization from surgery videos.
   - *ADAMS (Anomaly Detection at Multiple Scales):* DARPA project on characterizing and detecting anomalies in massive data-sets to detect insider threats against a background of normal everyday activities.

2. **Research Assistant**, Columbia University (January 2010 – May 2010)

   Advisor: Prof. Peter Belhumeur

   - *Visual Attributes for Face Verification:* Face verification in the wild, with uncontrolled settings and with non-cooperative subjects.
   - *Leaf Snap: An Electronic field Guide:* Simplifying the process of plant species identification from photographs of their leaves, using mobile devices like the iPhone and the iPad.

Publications

1. A. Zia, Y. Sharma, **V. Bettadapura**, E. Sarin, I. Essa, "Video and Accelerometer-Based Motion Analysis for Automated Surgical Skills Assessment", *International Journal of Computer Assisted Radiology and Surgery (**IJCARS**)*, Accepted for publication, 2018.

2. **V. Bettadapura**, C. Pantofaru, I. Essa, "Leveraging Contextual Cues for Generating Basketball Highlights", *Proc. ACM Multimedia (**ACM MM 2016***), Amsterdam, Netherlands, October 2016 **[Oral]**.

3. A. Zia, Y. Sharma, **V. Bettadapura**, E. Sarin, T. Ploetz, M. Clements, I. Essa, "Automated Video-Based Assessment of Surgical Skills for Training and Evaluation in Medical Schools", *International Journal of Computer Assisted Radiology and Surgery (**IJCARS**)*, 11(9), pp. 1623-1636, 2016.

4. **V. Bettadapura**, D. Castro, I. Essa, "Discovering Picturesque Highlights From Egocentric Vacation Videos", *Proc. IEEE Winter Conference on Applications of Computer Vision (**WACV 2016**)*, Lake Placid, USA, March 2016.

5. A. Zia, Y. Sharma, **V. Bettadapura**, E. Sarin, M. Clements, I. Essa, "Automated Assessment of Surgical Skills Using Frequency Analysis", *Proc. 18th International Conference on Medical Image Computing and Computer Assisted Interventions (**MICCAI 2015**)*, Munich, Germany, October 2015.

6. D. Castro, S. Hickson, **V. Bettadapura**, E. Thomaz, G. Abowd, H. Christensen, I. Essa, "Predicting Daily Activities From Egocentric Images Using Deep Learning", *Proc. 19th International Symposium on Wearable Computing (**ISWC 2015**)*, Osaka, Japan, September 2015.

7. **V. Bettadapura**, I. Essa, C. Pantofaru, "Egocentric Field-of-View Localization Using First-Person Point-of-View Devices", *Proc. IEEE Winter Conf. on Applications of Computer Vision (**WACV 2015**)*, Hawaii, USA, January 2015. **We won the best paper award**.

8. **V. Bettadapura**, E. Thomaz, A. Parnami, G. Abowd, I. Essa, "Leveraging Context to Support Automated Food Recognition in Restaurants", *Proc. IEEE Winter Conf. on Applications of Computer Vision (**WACV 2015**)*, Hawaii, USA, January 2015.

9. Y. Sharma, **V. Bettadapura**, et al., “Video Based Assessment of OSATS Using Sequential Motion Textures”, *Proc. MICCAI Workshop on Modelling and Monitoring of Computer-Assisted Intervention (**M2CAI 2014**)*, Boston, USA, September 2014. **Our paper received an honorable mention (2nd place)**.

10. T. E. Senator, et al., “Detecting Insider Threats in a Real Corporate Database of Computer Usage Activity”, *Proc. 19th ACM SIGKDD Conf. on Knowledge Discovery and Data Mining (**KDD 2013**)*, Chicago, USA, August 2013.

11. **V. Bettadapura**, G. Schindler, T. Ploetz, I. Essa, "Augmenting Bag-of-Words: Data-Driven Discovery of Temporal and Structural Information for Activity Recognition", *Proc. 26th IEEE Conf. on Computer Vision and Pattern Recognition (**CVPR 2013**)*, Portland, USA, June 2013.

12. E. Thomaz, **V. Bettadapura**, G. Reyes, M. Sandesh, G. Schindler, T. Ploetz, G. Abowd, I. Essa, “Recognizing Water-Based Activities in the Home Through Infrastructure-Mediated Sensing”, *Proc. 14th ACM Conf. on Ubiquitous Computing (**UbiComp 2012**)*, Pittsburgh, USA, September 2012.

13. **V. Bettadapura**, “Face Expression Recognition and Analysis: The State of the Art”, *Tech Report, arXiv:1203.6722*, April 2012.

14. **V. Bettadapura**, D. R. Sai Sharan, “Pattern Recognition with Localized Gabor Wavelet Grids”, *Proc. IEEE Int. Conf. on Computational Intelligence and Multimedia Applications*, vol. 2, pp. 517-521, Sivakasi, India, December 2007.

15. **V. Bettadapura**, B. S. Shreyas, C. N. S. Ganesh Murthy, “A Back Propagation Based Face Recognition Model, Using 2D Symmetric Gabor Features”, *Proc. IEEE Int. Conf. Signal Processing, Communication and Networking*, pp. 433-437, Chennai, India, February 2007.

16. **V. Bettadapura**, B. S. Shreyas, “Face Recognition Using Gabor Wavelets”, *Proc. 40th IEEE Asilomar Conference on Signals, Systems and Computers*, pp. 593-597, Pacific Grove, California, October 2006.

Patents

1. C. Pantofaru, V. Bettadapura, K. Bharat, I. Essa, “Systems and methods for attention localization using a first-person point-of-view device”, *United States Patent 9600723*.

Awards

2. Won the **best paper award at WACV** (IEEE Winter Conference on Applications of Computer Vision), Hawaii, USA (January 2015)

3. Our paper received an **honorable mention (2nd place) at M2CAI** (Modeling and Monitoring of Computer Assisted Interventions), Boston, USA (September 2014)

4. **2nd prize** in the *International IEEE Myron Zucker Undergraduate Student Design* contest, Tampa, USA (October 2006)

5. Awarded the undergraduate **Rolling Trophy** for securing the **1st Rank** with the highest aggregate percentage for the 2006 engineering class, Bangalore, India (June 2006)

Technical Skills

1. *Areas of expertise:* Computer Vision and Machine Learning, real-time systems, video understanding,

2. *Technical skills / languages:* **C++, Ruby**, **OpenCV**

Professional Activities

Reviewer / Program Committee member for:

- **Conferences:**
  - Eurographics, 2017
  - International Symposium on Wearable Computing (**ISWC**), 2016
  - ACM International Conference on Ubiquitous Computing (**UbiComp**), 2016
  - IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2016
  - IEEE Winter Conference on Applications of Computer Vision (**WACV**), 2016
  - International Symposium on Wearable Computing (**ISWC**), 2015
  - ACM International Conference on Ubiquitous Computing (**UbiComp**), 2015
  - Machine Vision of Animals and Their Behaviors (**MVAB**), 2015
  - IEEE Winter Conference on Applications of Computer Vision (**WACV**), 2015
  - IEEE European Conference on Computer Vision (**ECCV**), 2014
  - IEEE International Conference on Computer Vision (**ICCV**), 2013
  - IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2012

- **Journals:**
  - Elsevier Computer Vision and Image Understanding (**CVIU**)
  - Springer Multimedia Systems
  - IEEE Intelligent Systems
  - IEEE Transactions on Multimedia
  - SciTechnol Journal of Computer Engineering and Information Technology (**JCEIT**)
  - Elsevier Journal of Visual Communication and Image Representation (**JVCI**)