Vinay Bettadapura

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Research Interests

Computer Vision, Machine Learning and Ubiquitous Computing

Work Experience

1. **Google**, Mountain View, USA
   Senior Staff Software Engineer (May 2023 - Present)
   Staff Software Engineer (November 2019 - May 2023)
   Senior Software Engineer (November 2017 - November 2019)
   Software Engineer (January 2016 - November 2017)

   Tech Lead and Manager in Google Research's Perception group. Founding member and lead for core on-device and server-side platforms that enables human understanding research and powers human-centric perception pipelines across many Google products such as Cloud, Nest, Photos, YouTube, Meet, etc to deliver delightful and helpful features to millions of users.

   Also Uber TL for infrastructure and models / algorithms for content understanding and annotation of large-scale video corpora (e.g. YouTube, Photos, etc) enabling novel features and improvements to Search and Recommendations, Responsible AI, Trust and Safety, etc.

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.

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)

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)*, January 2018.

2. A. Zia, Y. Sharma, **V. Bettadapura**, E. Sarin, I. Essa, "Video and Accelerometer-Based Motion Analysis for Automated Surgical Skills Assessment", *Proc. Information Processing in Computer-Assisted Interventions (IPCAI 2017)*, Barcelona, Spain, June 2017.

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

4. 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.

5. **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.

6. 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.

7. 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.

8. **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**.

9. **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.

10. 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)**.

11. 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.

12. **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.

13. 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.

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

15. **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.

16. **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.

17. **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 directing content generation using a first-person point-of-view device", *United States Patent 10110850*.

2. 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

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

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

5. **2nd prize** in the *International IEEE Myron Zucker Undergraduate Student Design* contest, Tampa, USA (October 2006)

6. 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, Machine Learning, People-centric perception in videos, Video Understanding,

2. *Languages:* **C++**

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**)