

Tanvi Banerjee

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Web site: <https://sites.google.com/a/knoesis.org/tanvibanerjee/>

WORK EXPERIENCE

Assistant Professor, Computer Science & Engineering

Wright State University, Dayton, OH

Fall 2016- present

Research Assistant Professor,

The Ohio Center of Excellence in Knowledge-enabled Computing,
Wright State University, Dayton, OH

2015 - 2016

Instructor, Computer Science & Engineering

Wright State University, Dayton, OH

2014 - 2016

Postdoctoral Researcher, Kno.e.sis

The Ohio Center of Excellence in Knowledge-enabled Computing,
Dayton, OH

2014 - 2015

EDUCATION

Ph. D, Electrical and Computer Engineering

University of Missouri - Columbia, MO

Dissertation: *Combining Activities of Daily Living & Scene
Understanding for Continuous Assessment of Behavior Patterns
Using Depth Data*

2010 – 2014

M.S., Electrical and Computer Engineering

University of Missouri - Columbia, MO

2008 - 2010

B.S., Electronics and Telecommunications Engineering

Pune University - Pune, India

2003 - 2007

RESEARCH INTERESTS:

- Healthcare applications using wearable as well as non-wearable sensors
- Using machine learning techniques to classify sensor data, data fusion, big data analytics
- Activity recognition using multimodal sensing
- Computer vision: real-time, multi-camera human surveillance
- Fuzzy logic: linguistic interpretation of activity data, linguistic description of video

EXPERIENCE

Research Experience (2014 - present)

Currently working on projects involving big data for mining people's beliefs on topics related to gender-based violence using a combination of social media and other information sources. Also working on kHealth (knowledge enabled semantically empowered) projects which use sensor technology for detecting and predicting health-related events associated with asthma, dementia, and

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other health conditions using smartphone technologies. Have also played an active role in grant writing (see Section on Grants below).

Teaching Experience (2013 - present)

Wright State University

- **Spring 2016: Computer Organization (CEG 3310).** Undergraduate class explaining compilers, processors, and machine instructions and assembly language.
- **Fall 2015: Machine Learning (CS 7830).** Graduate class to teach topics including regression, neural networks, evolutionary computation, and clustering.
- **Spring 2015, Spring 2016: Web Information Systems (CS 4800/6800).** Working on an innovative flipped classroom approach for Web Information Systems course
- **Spring 2015, Fall 2014: Digital System Design (CEG 3320).** This course describes the techniques required for digital computer hardware and design. Topics include switching algebra and switching functions, logic design of combinational and sequential circuits.

University of Missouri - Columbia

- **Spring 2014: Introduction to Electrical and Computer Engineering (ECE 1000).** This course gives an introduction to data acquisition using a theremin circuit and Matlab.
- **Fall 2013: Computing for Embedded Systems (ECE 3320).** This course describes the software end of embedded system development. Topics include C programming, object oriented concepts, UML, software debugging, and multi-threading.

Graduate Research Assistant (2008 - 2014)

Developed unobtrusive video monitoring technologies to assist in ‘Aging in Place’ for older adults through data analytics.

Funding agency: National Science Foundation

Intern, INRIA, team PULSAR (now STAR) (May 2010 – August 2010)

Worked on detecting apathetic Alzheimer’s using data collected from older adults at the Nice City Hospital, France, using computer vision techniques on video data. My mentor for the project was **Francois Bremond**.

JOURNAL PUBLICATIONS (*STUDENT AUTHORS)

- [J1] H. Purohit, **T. Banerjee**, V. Shalin, A. Sheth, A. Hampton, N. Bhandutia, “Gender-Based Violence in 140 Characters or Fewer: A #BigData Case Study of Twitter”, *First Monday*, 21, 2016.
- [J2] **T. Banerjee**, J. M. Keller, M. Popescu, and M. Skubic, “Recognizing Complex Instrumental Activities of Daily Living Using Scene Information and Fuzzy Logic” *Computer Vision and Image Understanding (CVIU)*, Volume 140, November 2015, Pages 68-82, 2015.
- [J3] **T. Banerjee**, M. Yefimova, J. M. Keller, M. Skubic, “Trend Analysis of Sit-to-Stand Parameters Using Depth Data from Real Apartments,” under review, *Journal of Ambient Intelligence and Smart Environments*.

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- [J4] M. Rantz, **T. Banerjee**, E. Cattoor, S. Scott, M. Skubic, M. Popescu, "Automated Fall Detection with Quality Improvement "Rewind" to Reduce Falls in Hospital Rooms," in press, *Journal of Gerontological Nursing Technology Innovations*, 2013.
- [J5] **T. Banerjee**, M. Skubic, J. M. Keller, & C. C. Abbott, "Sit-To-Stand Measurement For In Home Monitoring Using Voxel Analysis," vol.18, no.4, pp.1502-1509, *IEEE Transactions in IT and Biomedicine*, 2014 (now *BHI*).
- [J6] **T. Banerjee**, J. M. Keller, M. Skubic, & E. Stone, "Day or Night Activity Recognition from Video Using Fuzzy Clustering Techniques," vol.22, no.3, pp.483-493, *IEEE Transactions in Fuzzy Systems*, 2014.
- [J7] W. Romine, & **T. Banerjee**, "Customization of Curriculum Materials in Science: Motives, Challenges, and Opportunities," *Journal of Science Education and Technology*, Vol. 21, pp. 38-45, 2012.
- [J8] W. Romine, **T. Banerjee**, L. Barrow & W. Folk, "Exploring the impact of knowledge and social environment on influenza prevention and transmission in Midwestern United States high school students," *European Journal of Health and Biology Education*, Vol. 1, pp. 75-115, 2012.

CONFERENCE PUBLICATIONS (*STUDENT AUTHORS)

- [C1] B. Schneider* & T. Banerjee, "Preliminary Investigation of Walking Motion Using a Combination of Image and Signal Processing", accepted, 2016 International Conference on Computational Science and Computational Intelligence (CSCI'16: December 15-17, 2016, Las Vegas, USA).
- [C2] A. Yazdavar*, H. Olimat*, **T. Banerjee**, K. Thirunarayan, J. Pathak, A. Sheth, "Analyzing Depressive Symptoms in Twitter", accepted, *23rd NIMH Conference on Mental Health Services Research, MHSR 2016: Harnessing Science to Strengthen the Public Health Impact*.
- [C3] W. L. Romine, **T. Banerjee**, W. R. Folk, L. H. Barrow, "What Motivates High School Students to Take Precautions Against the Spread of Influenza? Latent Modeling of Compliance with Preventative Practice: A Data Science Approach." Accepted, *International Conference on Health Informatics and Medical Systems (HIMS)*, Las Vegas, Nevada, July 25-28, 2016.
- [C4] **T. Banerjee**, A. Yazdavar, A. Hampton, H. Purohit, V. L. Shalin, & A. P. Sheth, "Identifying pragmatic functions in social media indicative of gender-based violence beliefs." Manuscript submitted for publication (2016).
- [C5] P. Anantharam, K. Thirunarayan, S. Marupudi, A. Sheth, **T. Banerjee**, "Understanding City Traffic Dynamics Utilizing Sensor and Textual Observations" *AAAI*, 2016.
- [C6] **T. Banerjee**, P. Anantharam, W. L. Romine, L. Lawhorne, A. Sheth, "Evaluating a Potential Commercial Tool for Healthcare Application for People with Dementia" *International Conference on Health Informatics and Medical Systems (HIMS)*, Las Vegas, Nevada, July 27-30, 2015.
- [C7] P. Anantharam, **T. Banerjee**, A. Sheth, K. Thirunarayan, S. Marupudi, V. Sridharan, S. G. Forbis, 'Knowledge-driven Personalized Contextual mHealth Service for Asthma Management in Children', *IEEE 4th International Conference on Mobile Services*, New York, USA, June 27 - July 2, 2015.
- [C8] M. Yefimova, Z. Hajihashemi, **T. Banerjee**, D. L. Woods, M. Popescu, M. Rantz, M. Skubic, & J. M. Keller, "Daily Routines of Older Adults: A Novel Method of Measurement." *67th Scientific Meeting of the Gerontological Society of America*, Washington DC. November, 2014.

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- [C9] M. Enayati, **T. Banerjee**, M. Popescu, M. Skubic, M. Rantz, "A_Novel_Web-Based Depth Video Rewind Approach toward Fall Preventive Interventions in Hospitals" *IEEE International Conference of the Engineering in Medicine and Biology Society (EMBC)*, Chicago, Illinois, August 26-30, 2014.
- [C10] **T. Banerjee**, M. Enayati, J. M. Keller, M. Skubic, M. Popescu, and M. Rantz, "Monitoring Patients in Hospital Beds Using Unobtrusive Depth Sensors," *IEEE International Conference of the Engineering in Medicine and Biology Society (EMBC)*, Chicago, Illinois, August 26-30, 2014.
- [C11] A. R. Buck, **T. Banerjee**, and J. M. Keller, "Evolving a Fuzzy Goal-Driven Strategy for the Game of Geister," *IEEE Congress on Evolutionary Computation*, Beijing, China, July 6-11, 2014.
- [C12] **T. Banerjee**, J. M. Keller, M. Skubic, "Building a Framework For Recognition of Activities of Daily Living from Depth Images Using Fuzzy Logic," *IEEE International Conference on Fuzzy Systems*, Beijing, China, July 6-11, 2014.
- [C13] M. Yefimova, Z. Hajjhashemi, **T. Banerjee**, D. Woods, M. Popescu, M. Skubic, M. Rantz, M. & J. Keller, "Characterizing Trajectories of Daily Routines of Older Adults with Sensor Technology," *7th Western Institute of Nursing Communicating Research Conference*, Seattle, WA. April 10-12, 2014.
- [C14] **T. Banerjee**, J. M. Keller & M. Skubic, "Detecting Foreground Disambiguation of Depth Images Using Fuzzy Logic," *IEEE International Conference on Fuzzy Systems*, Hyderabad, India, July 7-10, 2013.
- [C15] Y. Li, **T. Banerjee**, M. Popescu & M. Skubic, "Improvement of acoustic fall detection using Kinect depth sensing," *IEEE International Conference of the Engineering in Medicine and Biology Society (EMBC)*, Osaka, Japan, July 3-7, 2013.
- [C16] **T. Banerjee**, M. Rantz, M. Popescu, E. Stone, M. Li, M. Skubic, S. Scott, "Monitoring Hospital Rooms for Safety Using Depth Images," *AAAI in Eldercare: AI for Gerontechnology*, Arlington, VA, November 2-4, 2012.
- [C17] **T. Banerjee**, J. M. Keller & M. Skubic, "Resident Identification Using Kinect Depth Image Data and Fuzzy Clustering Techniques," *34th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, San Diego CA, August 28-September 1, 2012.
- [C18] **T. Banerjee**, J. M. Keller, Z. Zhou, M. Skubic & E. Stone, "Activity Segmentation of Infrared Images Using Fuzzy Clustering Techniques," *Proceedings, World Conference on Soft Computing*, San Francisco, May 23-26, 2011.
- [C19] **T. Banerjee**, J. Keller, M. Skubic M & CC. Abbott CC, "Sit-To-Stand Detection Using Fuzzy Clustering Techniques," *Proceedings, IEEE World Congress on Computational Intelligence*, Barcelona, Spain, July 18-23, pp. 1-8, 2010.
- [C20] F. Wang, W. Dai, E. Stone, **T. Banerjee**, J. Giger, J. Krampe, M. Rantz, M. Skubic, "Testing an In-Home Gait Assessment Tool for Older Adults," *31st Annual International IEEE EMBS Conference*, 2009.

PATENT

Patent No. US 8890937 B2, "Anonymized Video Analysis Methods and Systems," Marjorie Skubic, James M. Keller, Fang Wang, Derek Anderson, Erik Stone, Robert Luke, **Tanvi Banerjee**, Marilyn Rantz, Nov. 18, 2014.

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GRANTS:

- SCH: kHealth: Semantic Multisensory Mobile Approach to Personalized Asthma Care (co-PI). NIH R01 HD087132-01. Funded.
- Modeling Social Behavior for Healthcare Utilization in Depression, \$1,934,525, 2015-2019. (postdoc) NIH R01 MH105384-01A1. Funded.
- Hazards SEES: Social and Physical Sensing Enabled Decision Support for Disaster Management and Response, \$1,975,000, 2015-2019 (postdoc) NSF EAR. Funded.
- TWC SBE: Medium: Context-Aware Harassment Detection on Social Media, 925,104, 2015-2018 (postdoc) NSF CNS. Funded.
- NSF LEADER: Scaling Up SCALE-UP: Leveraging LEADER Consortium Female Faculty Mentoring for NTE STEM Female Faculty in Implementing SCALE-UP Pedagogy. Internal Grant, \$5000. (co-PI) Funded.

REVIEWER FOR THE FOLLOWING JOURNALS:

- Sensors
- IEEE Transactions in Fuzzy Systems (TFS)
- Journal of Ambient Intelligence and Smart Environments (JAISE)
- International Conference on Pervasive Computing Technologies for Healthcare (Pervasive Health)
- Transactions on Cyber-Physical Systems
- Mathematical Problems in Engineering

PROGRAM COMMITTEE MEMBER FOR THE FOLLOWING CONFERENCES:

- ACM Soft Applied Computing's Cognitive Computing Workshop (October, 2016)
- Big Data'15
- ISSNIP'15
- CSC'15
- Session Chair for HIMS 2016, Session - Medical Systems and Devices and Monitoring Tools.
- Session Chair for HIMS 2015, Session - Medical Devices and Supporting Systems.

MENTOR AND COMMITTEE MEMBER FOR THE FOLLOWING STUDENTS:

- Co-advisor for Master's Student
 - Vaikunth Sridharan (2015 - present)
- Master's Thesis Committee member for
 - Jeremy Brunn
 - Surendra Marupudi
 - Abhiram Tatineni
 - Swapnil Soni
- Independent Study Mentor for
 - Sayali Sheode (Graduate, non-thesis, Summer 2016)
 - Justin Scothorn (Undergraduate, Summer 2016)
 - Melvin Bryant (Undergraduate, Summer 2015)

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- Kushal Shah (UG Research Intern, Fall 2014 - Spring 2015)
- Garvit Bansal (UG Research Intern, Fall 2014 - Spring 2015)

SERVICE:

Member Representative for National Center for Women & Information Technology
(November, 2016 - present)

AWARDS/TALKS

1. Invited talk at Duke University's launch of the Health Innovations Lab on "Analyzing Physical and Cognitive Decline in Older Adults Using Sensing Technologies", November 15, 2016.
2. Presented a talk to the Women in Science and Engineering (WiSE) group on "Geometry for Activity Analysis Using Computer Vision" at Dayton Regional STEM School, 2016.
3. Shortlisted to attend the **Data Science Innovation Lab 2016: Mobile Health**, Lake Arrowhead, California, June 15-19, 2016.
4. Shortlisted for the **NIH and RCUK sponsored Transatlantic Data Science Workshop**, NIH campus, Bethesda, Maryland, March 1-2, 2016.
5. **NSF Review Panelist for the Graduate Research Fellowship Program**, 2016.
6. Presented a talk on "Women in Computer Science" at Dayton Regional STEM School, 2015.
7. Awarded the **IEEE CIS Outstanding Student Travel Award** for Conference Travel (\$800), 2014.
8. Awarded the **John D. Bies International Travel Award** for Conference Travel (\$1,863), 2014.
9. **2nd place** in the **Research and Creative Arts Forum**, Engineering Category, University of Missouri for my talk "Trend Analysis of Sit-to-Stand Parameters Using Depth Data from Real Apartments", (\$125 cash prize and certificate), 2014.
10. **2nd place** in IEEE Computational Intelligence Society's International Gaming Competition along with Doctoral student Andrew Buck (\$300 cash prize), 2013.
11. Invited judge for **Research and Creative Arts Forum** for undergraduate research, 2013.
12. University of California Los Angeles (UCLA) **IPAM Scholarship** to attend Computer Vision Summer School, (full subsidy from NSF for travel and stay), 2013.
13. **1st place** in poster competition for the **IEEE Computational Intelligence Society**, University of Missouri for my poster "Detecting Foreground Disambiguation (Occlusion Detection) Using Fuzzy Logic" for occlusion detection on depth image data using a fuzzy rule based system (\$200 cash prize), 2012.
14. Received **NSF Travel Award** for AAAI conference, Arlington, VA, (\$1000), 2012.
15. **1st place** in the **Research and Creative Arts Forum**, Health and Medicine Category, University of Missouri for my talk "Activity Segmentation in Older Adults Using Kinect Sensors" (\$200 cash prize), 2012.
16. Scholarship recipient for **National Merit Scholarship** in India, 2002.