Beiyu Lin

Curriculum Vitae

Assistant Professor
Department of Computer Science
The University of Texas - Rio Grande Valley
E-mail: beiyu.lin@utrgv.edu
Website : https://beiyulincs.github.io/

Education

2016–2020 **PhD, Computer Science**, Washington State University, Pullman, WA, Advisor: Diane J. Cook.
Topic: Population-level behavior analysis based on smart environment sensor data
Focus on data mining, machine learning and healthcare

2013–2015 **Master of Science in Mathematics**, Washington State University, Pullman, WA.

2011–2013 **Master of Science in Applied Math**, State University of New York, Stony Brook, NY.

2007–2011 **Bachelor of Science in Math and Applied Math**, Shanghai Maritime University, China.

Professional Experience

8/2020-now **Assistant Professor**, Computer Science, the University of Texas – Rio Grande Valley, Texas, US.

2015-2020 **Graduate Research Assistant**, Electrical Engineering and Computer Science, WSU.

Summer 2019 **Software Engineer Intern**, Dell EMC, Seattle, WA.
Wrote an analytic application of sensor data from cars in Brisbane, Australia. This application ingested streaming data, analyzed and predicted the traffic flow. The visualization is an hourly-based heat-map with location markers. When users click a marker, a bar chart will pop up with the predicted traffic flow.

Summer 2019 **Instructor**, School of Electrical Engineering and Computer Science, WSU.

Summer 2018 **Software Engineer Intern**, Honeywell, Atlanta, GA.
Worked on the Honeywell Aerospace Development Team for Low Altitude Authorization and Notification Capability Unmanned Aircraft System Service Supplier. Used Python and JavaScript to develop Honeywell USS Product, including developing data/user interface and authorization service. Helped out other projects, including flight plane engine, edge to cloud, memory leak and dashboard.

2014–2015 **Instructor**, Department of Mathematics, WSU.

2013–2014 **Teaching Assistant**, Department of Mathematics, WSU.

Funding Support (as a faculty)

10/2020 (Sole) PI: Google exploreCSR (funded by Google Research USD $18,000).
one of the 50 awardees around the world for the 2020 academic year

10/2020 (Sole) PI: Google Cloud COVID-19 research credits (funded by Google Cloud USD $1,500).

Scholarships (as a student)

2020 Professional Development Grants (funded by graduate & professional student association).

2020 Knowledge Discovery and Data Mining (KDD) (student registration award funded by NSF and SIGKDD).

2020 ACM Conference on Recommender Systems (registration fee waived).

2019 SIAM International Conference on Data Mining (funded by NSF and Intel), Canada.

2019 ACM-IMS Interdisciplinary Summit on the Foundations of Data Science (funded by NSF), CA.

2019 Grace Hopper Celebration of Women in Computing (registration fee was funded by GHC), FL.

2019 Analytics and Data Summit (registration fee was funded by Oracle Academy), CA.

2019 Strata Data Conference (funded by O'Reilly Media), CA.

2018 Google I/O, Mountain View, CA.

2017 Google Summer of Code Mentor Summit, Sunnyvale, CA.

2017 Grace Hopper Celebration (funded by Computer Science Department at WSU), FL.

2015 Mathematical Science Research Institute: Summer School on Incompressible Fluid Flows, CA.

2015 The Institute for Mathematics and its Applications: Workshop for Women in Analysis and PDE, MN.

2010-2011 2^{nd} Prize Scholarship, Shanghai Maritime University.

Grant Writing

10/2020 Letter of Intent: Understanding behavior differences between people with Alzheimer's disease and healthy populations, *Pilot Study Program for the Rio Grande Valley Alzheimer's Disease. (Letter of Intent was selected and invited to the next step: submit a full proposal.)*

10/2020 PI: Adaptive System for Web pages based on Mouse Movement Patterns, *Salesforce Research. Co-PIs are Dr. Tyler Derr at Vanderbilt and Dr. Apurva Narayan at UBC Okanagan Campus.*

10/2020 PI: Towards Adaptive Systems: Learning Human Behavior via Ambient Data, *Internal Proposal for Oak Ridge Associated Universities*.

10/2020 Co-PI: Towards Human-Robot Collaboration in Warehouses: Behavior Modeling via Multimodal Ambient Sensing, *Amazon Research. Lead by Dr. Tapomayukh Bhattacharjee at Cornell*.

09/2020 Co-PI: Engineering Research Center for Trustworthy Human and Intelligent Vehicle Collaborations, *NSF. Lead by Dr. Junmin Wang at UT-Austin*.

09/2020 PI: Modeling Human Routine Behavior via Deep Inverse Reinforcement Learning, *Google Cloud*.

08/2020 PI: Google exploreCSR, *Google Research*.

Honors and Awards

2020 Nomination for Graduate Student Instructor Excellence Award (a university-wide), GPSA, WSU.

2019 2^{nd} Place, 3-Minute Thesis Competition, Voiland College of Engineering & Architecture.

2019 The Computer Science Department Representative to Compete Three Minutes Thesis.

2014 Award for Excellence Teaching Assistant (a university-wide), Graduate & Professional Students Association.

2011 Award for Outstanding Undergraduate Thesis, Shanghai Maritime University.

2010 Volunteer Star of the World Expo. International Registered Exhibitions, Shanghai, China.

2009 Outstanding Individual of China Ocean Shipping Company, Shanghai Maritime University.

2009 Excellent Summer Practice Paper Award, Shanghai Maritime University.

Research Projects

2020–present **Generative Adversarial Imitation Learning on Mobility**.

2020–present **Spatio-temporal Imitation Learning**.

2020–present **Location Preferences Study via Adversarial Inverse Reinforcement Learning**.

2020–present **Sequential Decision Making for Active Learning in Real Time**.
collaborate with Dr. Xiaowei Jia at the University of Pittsburgh

2020–present **Graph Wavelet Modeling for Transportation**.
collaborate with Dr. Zhiqian Chen at Mississippi State University

2020–present **Small Sample Data for Clustering**.
collaborate with Dr. Apurva Narayan at the University of British Columbia Okanagan Campus

2019–2020 **Understanding Behavior Differences Among Subpopulations Using Inverse Reinforcement Learning**, *funded by National Institutes of Health (NIH)*.
With a strong relationship between behavior habits and health status, we utilize a data-drive approach to understand behavior patterns and study the dynamic between situations and actions. The findings may allow technology to help improve people's habits and health status.

2018–2019 **Constructing Markov Models of Human Behaviors Based on Smart Home Sensor Data**, *funded by National Science Foundation (NSF); collaborated with College of Nursing*.
While pervasive computing technologies for observing human behavior are becoming mainstream, we construct stochastic models based on smart home sensor data among population subgroups as a purpose of discovering actionable routine strategies that are associated with better health status.

2017–2018 **Iterative Design of Visual Analytics for a Clinician-in-the-loop Smart Home**, *funded by National Institutes of Health (NIH); collaborated with clinicians, psychologists and nurses*.
With the increasing health needs of the coming "age wave", we design a clinician-in-the-loop visual interface, that provides clinicians with patient behavior patterns, derived from smart home data. The technology offers the potential to perform remote monitoring for supporting self-management.

2016–2018 **Designing an Ecologically-Valid Formal Model of Human Activity Patterns**, *funded by National Science Foundation (NSF)*.
Formal modeling and analysis of human behavior is a popular topic in disciplines ranging from psychology to economics. We propose a formal model of indoor routine behavior based on automatically-sensed and recognized activities. These findings may be used to automate diagnoses and design customized behavioral interventions.

2015–2018 **Analyzing the relationship between human behavior and indoor air quality in smart homes**, *funded by Department of Energy (DOE) and Environmental Protection Agency Science To Achieve Results; collaborated with people from civil and environmental engineering*.
Because the quality of the air we experience inside and outside buildings may accompany behavior changes, we apply data science and machine learning technologies in smart home environments to understand the types of behavior that measurably impact indoor air quality.

Patent

2014 Glimm, James, Jimmie Goode, Beiyu Lin, Nicholas Pezolano, and Svetlozar Rachev. "Real time evaluation of financial returns based on nearly elliptical models." U.S. Patent Application 14/163,674, filed July 31, 2014.

Teaching Experience

Fall 2020 Instructor, Computer Science I (C++) for Majors, UTRGV (45 undergraduates) *eval: 4.51/5*

Fall 2020 Instructor, Seminar in Computer Science, UTRGV (27 graduates) *eval: 4.48/5*

Summer 2019 Instructor, Program Design and Development in C, WSU (10 undergraduate students)

Summer 2015 Instructor, College Algebra, WSU (over 30 undergraduate students)

Fall14/Spring15 Instructor, Mathematics for Business and Economics, WSU (over 90 undergraduate students)

Students

10/2020-now Sonny Chauhan (B.S. at Rensselaer Polytechnic Institute, intern in the lab)

08-10/2020 Yifeng Yu (B.S. at the University of Southern California, intern in the lab)

08-10/2020 Shariful Islam (incoming M.S. at UTRGV) *(submitted a student abstract to AAAI'21.)*

Fall 2020 Kaiqun Fu (Ph.D. at Virginia Tech, co-advising)

Fall 2020 Mingyuan Wang (Ph.D. at Florida State University, co-advising)

Fall 2020 Debangsha Sarkar (M.S. at University of British Columbia Okanagan Campus, co-advising)

Publications

Journal Articles

2020 Beiyu Lin and Diane J Cook. Analyzing Sensor-Based Individual and Population Behavior Patterns via Inverse Reinforcement Learning. *Sensors*, volume 20, page 5207, 2020

2020 Beiyu Lin, Diane J Cook, and Schmitter-Edgecombe Maureen. Using continuous sensor data to formalize a model of in-home activity patterns. *Journal of Ambient Intelligence and Smart Environments*, pages 1–19. IOS Press, 2020.

2019 Yibo Huangfu, Nathan M Lima, Patrick T O'Keeffe, William M Kirk, Brian K Lamb, Shelley N Pressley, Beiyu Lin, Diane J Cook, Von P Walden, and Bertram T Jobson. Diel variation of formaldehyde levels and other vocs in homes driven by temperature dependent infiltration and emission rates. *Building and Environment*, volume 159, page 106153. Elsevier, 2019.

2018 W Max Kirk, Madeline Fuchs, Yibo Huangfu, Nathan Lima, Patrick O'Keeffe, Beiyu Lin, Tom Jobson, Shelley Pressley, Von Walden, Diane Cook, et al. Indoor air quality and wildfire smoke impacts in the pacific northwest. *Science and Technology for the Built Environment*, volume 24, pages 149–159. Taylor & Francis, 2018.

2018 Alireza Ghods, Kathleen Caffrey, Beiyu Lin, Kylie Fraga, Roschelle Fritz, Maureen Schmitter-Edgecombe, Christopher Hundhausen, and Diane J Cook. Iterative design of visual analytics for a clinician-in-the-loop smart home. *IEEE journal of biomedical and health informatics*, volume 23, pages 1742–1748. IEEE, 2018.

2017 Beiyu Lin, Yibo Huangfu, Nathan Lima, Bertram Jobson, Max Kirk, Patrick O'Keeffe, Shelley N Pressley, Von Walden, Brian Lamb, and Diane J Cook. Analyzing the relationship between human behavior and indoor air quality. *Journal of Sensor and Actuator Networks*, volume 6, page 13, 2017.

2013 Zining Sheng, Beiyu Lin, and Zhang Shibing. Testing unit roots of first-order autoregressive process with stable distributions errors. *Chinese Journal of Applied Probability and Statistics*, volume 29, pages 443–448, 2013.

Conference

2020 X. Jia, B. Lin, J. Zwart, J. Sadler, A. Appling, S. Oliver, and J. Read. Graph-based Reinforcement Learning for Active Learning in Real Time: An Application in Modeling River Networks, *SIAM International Conference on Data Mining (SDM)*, 2020. (acceptance rate of 21.25%)

2018 A. Musser, B. Lin, D. Cook, B. Jobson, M. Kirk, N. Lima, P. O'Keeffe, S. Pressley, V. Walden,Y. Huangfu, and B. Lamb. Simulations of indoor air quality based on future climate conditions. *15th Conference of the International Society of Indoor Air Quality and Climate*, 2018

2018 A. Musser, B. Lin, D. Cook, B. Jobson, M. Kirk, N. Lima, P. O'Keeffe, S. Pressley, V. Walden, Y. Huangfu, and B. Lamb. The major role of temperature on indoor concentrations of air toxic vocs in 9 houses based on in-situ high time resolution measurements. In *the 15th Conference of the International Society of Indoor Air Quality and Climate*, 2018.

2018 A. Musser, B. Lin, D. Cook, B. Jobson, M. Kirk, N. Lima, P. O'Keeffe, S. Pressley, V. Walden, Y. Huangfu, and B. Lamb. Indoor air toxic gases levels in a net-zero energy house under multiple ventilation system settings. In *the 15th Conference of the International Society of Indoor Air Quality and Climate*, 2018.

Tutorial/Posters/Abstracts

2020 Beiyu Lin, Xiaowei Jia, Zhiqian Chen, Studying Spread Patterns of COVID-19 based on Spatiotemporal Data, *SIAM International Conference on Data Mining (SDM) Tutorial.*

2020 Beiyu Lin. Human location preferences via imitation learning. *Infrastructure and Construction Webinar - Urban Planning Session*, 2020.

2020 Beiyu Lin. Smart home residents' behavior analysis. *Academic Showcase, Pullman, Washington State University*, 2020.

2019 Beiyu Lin. Population level behavior analysis and its applications in healthcare. *Ph.D. Forum at SIAM International Conference on Data Mining Doctoral Forum, Alberta, Canada*, 2019.

2019 Beiyu Lin. Constructing an ecologically-valid formal markovian model of human activity patterns. *General Poster Session at Grace Hopper Celebration, Orlando, FL*, 2019.

2018 Beiyu Lin. Identifying and modeling the patterns of human activity routines. *Research Exposition at Graduate and Professional Student Association, Pullman, WA*, 2018.

Articles in preparation (names in underlines are the students I mentored)

01/2021 Full paper: Beiyu Lin, Xiaowei Jia, Zhiqian Chen, Web User Behavior Modeling, target place: *International Joint Conference on Artificial Intelligence (IJCAI).*

01/2020 Full paper: Guangyu Meng, Qisheng Jiang, Kaiqun Fu, Beiyu Lin, ChangTien Lu, Zhiqian Chen, target place: Abrupt Wavelet Network on the Traffic Accidents Impact Analysis, *IJCAI*.

02/2021 Full paper: Sonny Chauhan, Beiyu Lin, Deep Inverse Reinforcement Learning for Behavior Modeling, target place: *Knowledge Discovery and Data Mining (KDD).*

02/2021 Full paper: Debangsha Sarkar, Apurva Narayan, Beiyu Lin, Core Points Selection for Small Sample Data, target place: *Knowledge Discovery and Data Mining (KDD).*

Invited Talks

12/2020 Department of Surgery, School of Medicine, the University of Texas Rio Grande Valley.

10/2020 Computer Science Seminar, the University of British Columbia Okanagan Campus.

09/2020 Neuroscience Research Seminar, School of Medicine, the University of Texas Rio Grande Valley.

09/2020 Human–Computer Interaction Seminar, the University of Texas Rio Grande Valley.

09/2020 Open Problem in Computer Science Seminar, the University of Texas Rio Grande Valley.

09/2020 Society of Photographic Instrumentation Engineers, the University of Texas Rio Grande Valley.

04/2020 Population-level behavior analysis at Singapore Management University, Virginia Wesleyan University (both cancelled since already accepted an offer).

03/2020 Population-level behavior analysis at Zhejiang University at Ningbo (China;virtual), Shandong University of Science and Technology (China;virtual), Merrimack College, Colby College, University of Texas Rio Grande Valley, University of New Haven (virtual), Dominican University (virtual).

03/2020 Programming in C, Pomona College (cancelled).

03/2020 Support Vector Machine, University of Rutgers (virtual).

03/2020 Stack in C, University of Connecticut (virtual).

03/2020 Society of Women Engineers, Undergraduate Research Mixer Event, WSU.

10/2019 Guest lecture, Machine Learning and its Applications at School of Economic Sciences, WSU.

03/2019 Guest lecture, Support Vector Machine for the class Introduction to Machine Learning, WSU.

03/2019 Analysis of Sensor Data Using Oracle Advanced Analytics, Analytics and Data Summit, CA.

Media Coverage/Impact

11/2020 ValleyMorningStar (newspaper in Harlingen, TX): UTRGV wins computer exploring award

11/2020 BrownsvilleHerald (newspaper in Brownsville, TX): UTRGV wins computer exploring award

11/2020 The Monitor (newspaper in Starr and Hidalgo counties): UTRGV wins computer exploring award

11/2020 UTRGV Newsroom: UTRGV one of 50 institutions to earn Google exploreCSR award

07/2019 Journal of Biomedical and Health Informatics: Medical Informatics

06/2019 ScienceDaily: Researchers uncover indoor pollution hazards

06/2019 WSU Insider: Researchers uncover indoor pollution hazards

06/2019 Nexus Newsfeed: Researchers uncover indoor pollution hazards

07/2015 WSU Insider: Researchers look into a future life indoors

Volunteer

Fall 2018	Mentor, ACM-W (for a women student from a low socioeconomic family) at WSU
Summer 2018	Instructor, Black Girls CODE, Atlanta, GA
Summer 2018	Mentor, Honeywell STEM program for High School Teachers
Summer 2017	Mentor, Google Summer of Code, Anita Borg Institute

Professional Services

Program Committee

International Conference on Intelligent Environments (IE), 2021
International Joint Conference on Artificial Intelligence (IJCAI), 2021
Web Mining and Content Analysis track, WWW, 2021
ACM Student Research Competition, SIGCSE 2021.
International Workshop on Big Data Reduction, IEEE International Conference on Big Data, 2020
SmartStudents'19, a workshop of IEEE International Conference on Smart Computing 2019

Reviewer

International Conference on Human-Computer Interaction – INTERACT 2021
The ACM Transactions on Knowledge Discovery from Data
IEEE International Conference on Big Data
International Journal of Environmental Research and Public Health
Web Search and Data Mining (WSDM'21)
MDPI Sustainability
Sensors
Remote Sensing
Applied Sciences Journal from MDPI
International Conference on Human-Computer Interaction – INTERACT 2019
DataKind: Reviewer for Google AI Impact Challenge
Journal of Scientific Research and Reports (Science Domain International)
IEEE Transactions on Big Data