Kavya Puthuveetil

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Education

Carnegie Mellon University (CMU), Robotics Institute, Pittsburgh, PA — Fall 2022 – Present
PhD Student in Robotics, advised by Zackory Erickson

Virginia Commonwealth University (VCU), Richmond, VA — Fall 2018 – Spring 2022
Bachelor of Science in Biomedical Engineering, Minor in Mathematics
GPA: 4.0/4.0

Relevant Experience

Graduate Researcher, Robotic Caregiving and Human Interaction Lab, CMU — 2022 – Present
Advised by Zackory Erickson

- Introduced a graph neural network (GNN)-based dynamics modeling approach for manipulation of bedding over people, demonstrating successful sim2real transfer of our method in a human study with 12 participants
- In collaboration with Robotics and Intelligent Vehicles Research (RIVeR) Lab at Northeastern University (led by Taskin Padir), developed a novel spectroscopic method for robotic perception without contact and manipulation of liquids
- Investigating the impact of robot errors on trust in physical human-robot interaction tasks like bed bathing and feeding
- Funded by the National Science Foundation (NSF) Graduate Research Fellowship

Undergraduate Researcher, Robotic Caregiving and Human Interaction Lab, CMU — 2021 – 2022
Advised by Zackory Erickson

- Began developing and training GNNs, implemented in torch-geometric, in simulation for time-efficient prediction of deformable cloth dynamics when manipulated over humans
- Built framework for optimizing over pre-trained dynamics models, using covariance matrix adaptation evolution strategy (CMA-ES) to find cloth manipulation trajectories for a bedding manipulation task

Summer Undergraduate Research Experience (SURE) REU in Robotics, Healthcare Robotics Lab, Georgia Tech — 2021
Advised by Zackory Erickson and Charles C. Kemp

- Investigated autonomous bedding manipulation around people laying supine in bed
- Presented reinforcement learning and self-supervised learning approaches, implemented using RLLib and Keras respectively, to bedding manipulation in simulation, implemented in Assistive Gym (uses PyBullet as physics engine)
- Transferred simulation-trained bedding manipulation models to the Stretch RE-1 mobile manipulator, controlled via ROS

Undergraduate Researcher, Advanced Signal Processing in Engineering and Neuroscience Lab, VCU — 2019 – 2021
Advised by Dean Krusienski

- Developed a MATLAB application to archive and synchronize data streams from multiple monitoring devices, including transcranial doppler (TCD), near-infrared spectroscopy (fNIRS), hemodynamics, used during pediatric cardiac surgery

Student Researcher, Soft Functional Materials Lab, VCU — 2016 – 2019
Advised by Christina Tang

- Developed a low-cost device that leverages shear force for controlled nanofiber fabrication and deposition
- Investigated the effect of polymer solution characteristics on fiber formation using the shear force spinning technique in three polymer systems via rheology, SEM image analysis, and goniometry

Honors and Awards

NSF Graduate Research Fellowship 2022
Recognizes and supports outstanding graduate students in NSF-supported STEM disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutions
Provides a $34,000 stipend, as well as a $12,000 cost-of-education allowance to the graduate institution, for three years

IEEE Robotics and Automation Society (RAS) Travel Grant - ICRA 2022 2022
Awarded on a competitive basis to student members of RAS with accepted ICRA 2022 papers

Best Global Health Hack - Abt Associates, Technica 2020
One of three winners out of 29 submissions in the Global Health category at the world's largest all-women and non-binary hackathon
In a team of three, developed a web application to help users evaluate the credibility of reproductive health information found online

Best Education Hack - Bloomberg, Technica 2019
Winner out of 49 submissions in the Education category at the world's largest all-women and non-binary hackathon
In a team of three, developed a web application to help K-12 students find/create STEM programs in their area

Wright Engineering Access Scholarship 2020 – 2022

Provost Merit Scholarship 2018 – 2022

Qimonda Endowed Scholarship 2018 – 2020

Dean's List, VCU 8 semesters (2018 – 2020)
Recognizes students each semester their semester GPA is 3.5 or greater

Publications and Presentations

Publications

"Robust Body Exposure (RoBE): A Graph-based Dynamics Modeling Approach to Manipulating Blankets over People"
Under Peer Review, arXiv:2304.04822, 2023
Kavya Puthuveetil, Sasha Wald, Atharva Pusalkar, Pratyusha Karnati, and Zackory Erickson

"SLURP! Spectroscopy of Liquids Using Robot Pre-Touch Sensing"
IEEE International Conference on Robotics and Automation (ICRA), 2023
Nathaniel Hanson*, Wesley Lewis*, **Kavya Puthuveetil***, Donelle Furline, Akhil Padmanabha, Taskin Padir, and Zackory Erickson (*equal contribution)

"Bodies Uncovered: Learning to Manipulate Real Blankets Around People via Physics Simulations"
IEEE Robotics and Automation Letters (RA-L)*, 2022 (*also presented at ICRA 2022)
Kavya Puthuveetil, Charles C. Kemp, and Zackory Erickson

"Brain-controlled Assistive Robotics and Prostheses" (Book Chapter)
Robotics in Physical Medicine and Rehabilitation, 1st edition, 2021
Kavya Puthuveetil and Dean Krusienski

"Shear Force Fiber Spinning: Process Parameter and Polymer Solution Property Considerations"
Polymers, 2019
Arzan C. Dotivala, **Kavya Puthuveetil**, and Christina Tang

Presentations

"Development of an application for real-time acquisition and synchronization of data from operative patient monitoring instruments"
Society for Neuroscience (SfN) Global Connectome, 2021 (Abstract submission and oral poster presentation)
Kavya Puthuveetil, Archana Venkatesan, Raymond Hang, and Dean J. Krusienski

Mentorship

M.S. Students

Atharva Pusalkar, CMU, MRSD — Spring 2023
Automatic point cloud capture and registration from three RGBD cameras for bedding manipulation project

Undergraduate Students

Kendra Givens, Middle Tennessee State University, CS — Summer 2023
RISS 2023, exploring reversibility-aware optimization techniques for invertible bedding manipulation

Alexandra Gillespie, Colby College, Computational Psychology — Summer 2023
RISS 2023, development of capacitive sensing techniques for robotic liquid perception and manipulation

Sasha Wald, CMU, CS — 2022 – Present
Investigating human trust in the face of robotic errors when performing assistive physical human-robot interaction tasks

Wesley Lewis, University of Virginia, CS — 2022 – Present
RISS 2022, development of multimodal (spectroscopy and visuo-tactile) sensing techniques for robotic liquid perception and manipulation

Outreach

FIRST LEGO League, Referee, Robot Design Judge, Head Referee, Judge Advisor — 2016 – 2021

FIRST Robotics Competition Technical Mentor, Maggie L. Walker Governor's School — 2018 – 2020
Sole woman technical mentor, particularly involved in outreach and mentorship with girls on the team and in the community

Leadership and Extracurricular Activities

Institute of Electrical and Electronics Engineers (IEEE) Student Member — 2022 – Present

IEEE Robotics and Automation Society (RAS) Student Member — 2022 – Present

Biomedical Engineering Society at VCU — 2018 – 2022
Mentor in BMES mentorship program, provided academic and research advising to underclassmen (2020-2021)

EarthHacks at VCU, Hacker Experience Lead — 2019 – 2020
Organizer for hackathon focused on developing solutions for environmental challenges, involved in logistics and fundraising