Kinjal Shah

(908) 315 6945 • kshah31@jhu.edu • kinjshah.com

Education

Johns Hopkins University, MSE in Robotics — Baltimore, MD
Laboratory for Computational Sensing and Robotics, Whiting School of Engineering | GPA: 3.86 — May 2021

- Masters Thesis: Cognitive Load Aware User Interfaces for Mixed Reality Environments
- Research Interests: AI for Social Good, AR/VR, Accessibility, Human-AI Interfaces, Haptics
- Relevant coursework: Augmented Reality, Haptic Interface Design, Machine Learning, Deep Learning, Human Computer Interaction, Computer Integrated Surgery, Algorithms for Sensor Based Robotics

University of Pennsylvania, BSE in Bioengineering — Philadelphia, PA
School of Engineering and Applied Science | *Magna Cum Laude* — Aug 2016

- Relevant coursework: Brain Computer Interfaces, Bioengineering Modeling and Design, Biomicrofluidics

The Wharton School, BS in Economics — Philadelphia, PA
Concentration in Operations, Information, and Decisions | *Magna Cum Laude* — Aug 2016

- Relevant coursework: Product Design, Venture Capital, Healthcare Policy, Decision Processes

Research Experience

Cognitive Load Aware User Interfaces for Mixed Reality Environments — Baltimore, MD
Thesis Advisor: Professor Mathias Unberath — July 2020-Present

Accepted to Women in Machine Learning (WiML) Workshop 2020 - Poster Presentation

- Designing causal models to enable detection of cognitive state changes via pupil tracking *in-the-wild*
- Developing workload aware intelligent agents for mixed reality applications using human-centered design process
- Creating dataset capturing eye motion under varying environmental conditions and cognitive demand

Automated Point-of-Care Pancreatic Cancer Diagnostic — Philadelphia, PA
Research Advisor: Professor David Issadore — Aug 2015-May 2016

Bioengineering Senior Design Award, First Honorable Mention – SEAS Senior Design Competition

- Detected pancreatic cancer cell derived exosomes from human serum at concentrations modeling precancerous stages by developing an automated, microfluidics based point-of-care diagnostic device
- Created automated, cost-effective, on-chip serum processing and diagnosis protocol involving 3D printed encasing designed using SolidWorks, Arduino based microcontroller, and image processing using MATLAB

Engineering Projects

Early fall detection from video using 3D-CNNs — Baltimore, MD
Winner of Intuitive Surgical Best Project Award — Nov 2020-Present

- Adapted 3D-ResNet architecture to perform frame wise classification of falls using temporal information from video feed
- Implemented transfer learning approach using model pre-trained on Kinetics-700 action recognition dataset and performed supervised fine-tuning on fall datasets

Intraoperative Guidance of Orthopaedic Instruments — Baltimore, MD
Accepted to SPIE Medical Imaging 2021 — Jan 2020-June 2020

- Implemented and evaluated performance of U-Net and Mask R-CNN architectures for guidewire detection task
- Designed simulated dataset generation pipeline enabling generalization to clinical images with 87% recall and 90% precision

Haptic Feedback for Upper Limb Motion Guidance — Baltimore, MD
Accepted to 2020 Haptics Symposium Work-in-Progress Track — Sep 2019-Jan 2020

- Developed wearable device prototype to enable motion guidance for rehabilitation through cutaneous haptic feedback
- Designed velocity tracking and haptic feedback algorithm to control two vibration motors via a Raspberry Pi based on inertial measurement unit (IMU) data in Python

Open Source Initiatives

COVID-19 United States County-level Dataset
`https://github.com/JieYingWu/COVID-19_US_County-level_Summaries`
Winner of Kaggle COVID-19 Dataset Award

Work Experience

Johns Hopkins University
Baltimore, MD

Course Assistant: Machine Learning - Deep Learning — Spring 2021
Teaching Assistant: Haptic Interface Design for Human-Robot Interaction — Fall 2020

- Conducted office hours, graded assignments, and supported online delivery of course
- Mentored students in completion of final projects

Accenture
Philadelphia, PA

Life Sciences Consultant (2018-19), **Senior Analyst** (2017-18), **Analyst** (2016-17) — 2016-2019

- Designed R&D technology strategy road-map for transformation initiative at a global biotechnology company
- Managed clinical cloud implementation from strategy definition through launch involving future state design, requirements gathering, user acceptance testing, and change management
- Assessed merger and acquisition options for client facing loss of patent protection on key revenue generator

Poster Presentations

Causal model for cognitive load estimation in mixed-reality environments
Kinjal Shah, Wenhao Gu, Mathias Unberath
Women in Machine Learning (WiML) 2020 - Poster

Publications

Intraoperative Guidance of Orthopaedic Instruments Using 3D Correspondence of 2D Object Instance Segmentations
Irina Bataeva, **Kinjal Shah**, Rohan Vijayan, Runze Han, Niral Sheth, Gerhard Kleinszig, Sebastian Vogt, Greg Osgood, Jeffrey H. Siewerdsen, Ali Uneri
SPIE Medical Imaging 2021

Feasibility of Image-based Augmented Reality Guidance of Total Shoulder Arthroplasty Using Microsoft HoloLens 1
Wenhao Gu, **Kinjal Shah**, Jonathan Knopf, Nassir Navab, Mathias Unberath
Outstanding Paper Award
MICCAI 2020 Joint Workshop on Augmented Environments for Computer-Assisted Interventions
Journal of Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization

A County-level Dataset for Informing the United States' Response to COVID-19
Benjamin D. Killeen, Jie Ying Wu, **Kinjal Shah**, Anna Zapaishchykova, Philipp Nikutta, Aniruddha Tamhane, Shreya Chakraborty, Jinchi Wei, Tiger Gao, Mareike Thies, Mathias Unberath
`https://github.com/JieYingWu/COVID-19_US_County-level_Summaries`
`https://arxiv.org/pdf/2004.00756.pdf`

Proposing a framework for evaluating haptic feedback as a modality for velocity guidance
Kinjal Shah*, Shweta Ravichandar*, Jeremy D. Brown
Haptics Symposium 2020: Work-in-Progress Track

Honors and Awards

Intuitive Surgical Best Project Award	2020
MICCAI 2020 Student Participation Award	2020
Computer-Integrated Surgical Systems and Technology Project Award	2020
LCSR Faculty Scholarship	2019-2021
Ruhr Fellowship	2014
Advancing Women in Engineering Research Scholar	2013

Skills

- Programming and Embedded Systems: Python, C++, C#, MATLAB, Arduino, Raspberry PI
- Mixed Reality: Unity, Microsoft HoloLens, Pupil Core
- Machine Learning Libraries: PyTorch, TensorFlow, OpenCV
- CAD: SolidWorks, 3D Printing