

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: 3.87

May 2021

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

University of Pennsylvania, BSE in Bioengineering

Philadelphia, PA

School of Engineering and Applied Science | *Magna Cum Laude* | GPA: 3.67

Aug 2016

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

The Wharton School, BS in Economics

Philadelphia, PA

Concentration in Operations Management | *Magna Cum Laude* | GPA: 3.67

Aug 2016

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

Research Experience

Enabling Cognitive Load Aware User Interfaces for Mixed Reality

Baltimore, MD

Thesis Advisor: Professor Mathias Unberath

July 2020-Present

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

- Developed predictive models for detection of cognitive state changes from pupillometry data in unconstrained environments
- Built real-time signal processing pipeline for multi-sensor time series data while maintaining temporal alignment
- Designed experimental protocols for a user study to capture eye motion under varying environmental conditions and cognitive demand levels

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

- Developed on-chip diagnostic protocol to detect pancreatic cancer cell derived exosomes at precancerous concentrations
- Created control system with Arduino, image processing platform with MATLAB, and 3D printed encasing with SolidWorks

Engineering Projects

Early fall detection from video using 3D-CNNs

Baltimore, MD

Winner of Intuitive Surgical Best Project Award

Nov 2020-Jan 2021

- 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 surgical guidewire detection
- 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 haptic feedback algorithm to stimulate vibration motors via a Raspberry Pi in response to IMU sensor data

Skills

- Programming and Embedded Systems: Python, C++, C#, MATLAB, Arduino, Raspberry Pi
- Mixed Reality: Unity, Microsoft HoloLens, Pupil Core, Human-AI Interfaces, User Study Design, Haptic Interfaces
- Machine Learning Libraries: PyTorch, TensorFlow, OpenCV

Work Experience

Johns Hopkins University

Research Assistant: ARCADE Lab

Baltimore, MD

May 2021-Present

- Enabling workload aware intelligent agents for mixed reality applications using human-centered design process
- Progressing thesis work towards larger scale user study

Course Assistant: Machine Learning - Deep Learning

Jan 2021-May 2021

Teaching Assistant: Haptic Interface Design for Human-Robot Interaction

Aug 2020-Dec 2020

- Conducted office hours, graded assignments, and mentored students in completion of final projects

Accenture

Philadelphia, PA

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

Nov 2016-Apr 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://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

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

Honors and Awards

Intuitive Surgical Best Project Award

2020

AE-CAI Outstanding Paper 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