

Kinjal Shah

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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: AI for Social Good, AR/VR, Accessibility, Human-AI Interfaces, Haptics
- 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, Information, and Decisions | *Magna Cum Laude* | GPA: 3.67

Aug 2016

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

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

- Designing predictive models for detection of cognitive state changes from pupillometry data in unconstrained environments
- Developing workload aware intelligent agents for mixed reality applications using human-centered design process
- Creating dataset capturing eye motion under varying environmental conditions with cognitive demand annotations

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

- 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
- Detected pancreatic cancer cell derived exosomes from human serum at concentrations modeling precancerous stages

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 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

Course Assistant: Machine Learning - Deep Learning

Teaching Assistant: Haptic Interface Design for Human-Robot Interaction

Baltimore, MD

Spring 2021

Fall 2020

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

Accenture

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

Philadelphia, PA

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://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