

Kinjal Shah

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Education

- Johns Hopkins University**, M.S.E. in Robotics Baltimore, MD
Laboratory for Computational Sensing and Robotics, Whiting School of Engineering | GPA: 3.76 2019-Present
- Masters Thesis: Cognitive Load Aware User Interfaces for Mixed Reality Environments
 - Relevant coursework: Augmented Reality, Haptic Interface Design for Human-Robot Interaction, Machine Learning, Deep Learning, Human Computer Interaction, Computer Integrated Surgery, Algorithms for Sensor Based Robotics
- University of Pennsylvania**, B.S.E. in Bioengineering Philadelphia, PA
School of Engineering and Applied Science | *Magna Cum Laude* | GPA: 3.67 2012-2016
- Relevant coursework: Brain Computer Interfaces, Bioengineering Modeling and Design, Biomicrofluidics
- The Wharton School**, B.S. in Economics Philadelphia, PA
Concentration in Operations, Information, and Decisions | *Magna Cum Laude* | GPA: 3.67 2012-2016
- Relevant coursework: Product Design, Venture Capital, Healthcare Policy, Decision Processes

Research Experience

- Cognitive Load Aware User Interfaces for Mixed Reality Environments** Baltimore, MD
Research Advisor: Professor Mathias Unberath July 2020-Present
- Accepted to Women in Machine Learning (WiML) Workshop 2020 - Poster Presentation*
- Developing causal models enabling detection of cognitive state changes via pupil tracking in-the-wild
 - Designing workload aware intelligent agents for mixed reality applications using human-centered design process
 - Conducting user studies to observe eye motion during tasks of varying difficulties
- Intraoperative Guidance of Orthopaedic Instruments** Baltimore, MD
Research Advisor: Dr. Ali Uneri Jan 2020-June 2020
- Accepted to SPIE Medical Imaging 2021 - Poster Presentation*
- Developed intraoperative image guidance method to automatically detect, triangulate, and localize orthopedic instruments
 - Implemented and evaluated performance of U-Net and Mask R-CNN architectures for guidewire detection task
 - Designed dataset generation pipeline to create training dataset from real pelvic radiographs with simulated guidewires
 - Successfully achieved generalization to real clinical images with 87% recall and 90% precision
- Haptic Feedback for Upper Limb Motion Guidance** Baltimore, MD
Research Advisor: Professor Jeremy D. Brown Sep 2019-Jan 2020
- Accepted to 2020 Haptics Symposium Work-in-Progress Track*
- 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
- 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

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

Teaching Assistant: Haptic Interface Design for Human-Robot Interaction

Fall 2020

- Conducted office hours, graded assignments, and supported first online delivery of course
- Mentored 33 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
- Developed data analytics approach to enable data-driven insights from historical, existing, and future data
- 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

Publications

Intraoperative Guidance of Orthopaedic Instruments Using 3D Correspondence of 2D Object Instance Segmentations

Irina Bataeva, **Kinjal Shah**, Rohan Vijayan, Runze Han, Nirali Sheth, Gerhard Kleinszig, Sebastian Vogt, Greg Osgood, Jeffrey H. Siewerdsen, Ali Uneri

SPIE Medical Imaging 2021 - Poster Presentation

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

LCSR Faculty Scholarship

2019-2021

MICCAI 2020 Student Participation Award

2020

Computer-Integrated Surgical Systems and Technology Project Award

2020

Ruhr Fellowship

2014

Advancing Women in Engineering Research Scholar

2013

Skills

- Programming: Python, C/C++/C#, MATLAB, Arduino
- Mixed Reality: Unity, Microsoft HoloLens, Pupil Core
- Machine Learning Libraries: TensorFlow, PyTorch
- CAD: SolidWorks, 3D Printing