

# 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](https://github.com/JieYingWu/COVID-19_US_County-level_Summaries)  
*Winner of Kaggle COVID-19 Dataset Award*

## Work Experience

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### 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

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*Causal model for cognitive load estimation in mixed-reality environments*

**Kinjal Shah**, Wenhao Gu, Mathias Unberath

Women in Machine Learning (WiML) 2020

## Publications

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*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://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

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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

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