# 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 — Jan 2020-Present

- 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

*Submitted to SPIE Medical Imaging 2021*

- 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

## 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 (Under Submission)

*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
***Best 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

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|---|---|
| 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