

Kinjal Shah

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EDUCATION

Johns Hopkins University, MSE in Robotics | GPA: 3.87 May 2021
Master's Thesis: Enabling Cognitive Load Aware User Interfaces for Mixed Reality

University of Pennsylvania, BSE in Bioengineering | GPA: 3.67 | *Magna Cum Laude* Aug 2016

The Wharton School, BS in Economics | GPA: 3.67 | *Magna Cum Laude* Aug 2016

WORK EXPERIENCE

Johns Hopkins University | Course and Teaching Assistant Baltimore, MD | Aug 2020-May 2021
Deep Learning (Spring 2021), **Haptic Interface Design for Human-Robot Interaction** (Fall 2020)

- Hosted office hours, graded assignments, and supported development of online course materials for 100+ students
- Advised students on final projects from project scoping through implementation, testing, and debugging

Accenture | Life Sciences Research and Development Consultant (2018-19), **Senior Analyst** (2017-18), **Analyst** (2016-17) Philadelphia, PA | Nov 2016-Apr 2019

- Designed R&D technology transformation road-map for clinical and pre-clinical functions at global biotechnology company
- Managed clinical cloud implementation from strategy definition through launch involving future state design, requirements gathering, user acceptance testing, and cross functional change management
- Assessed merger and acquisition options for Fortune 500 client facing loss of patent protection on key revenue generator

Goldman Sachs | Cross Divisional Product Management Intern Jersey City, NJ | May-Aug 2015

- Managed merger of 2 internal clearing brokers requiring technology impact assessments, regulatory review, and user testing

ThoughtTac | Market Research Lead Philadelphia, PA | Jan-April 2015

- Developed mobile health application prototype to deliver data driven personalized care to patients with schizophrenia
- Created business plan for early-stage start-up pitch competition, earning spot as one of 5 finalists

RESEARCH EXPERIENCE

Enabling Cognitive Load Aware User Interfaces for Mixed Reality Baltimore, MD | Jul 2020-Present
Thesis Advisor: Professor Mathias Unberath

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

- Conducted literature review to identify state-of-the-art methods for cognitive load estimation
- 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 user study to capture eye tracking data under varied light and cognitive load levels

Open Source: COVID-19 United States County-level Dataset Baltimore, MD | Mar-May 2020

https://github.com/JieYingWu/COVID-19_US_County-level_Summaries

Winner of Kaggle COVID-19 Dataset Award

- Gathered machine-readable dataset, including demographic, socioeconomic, climate, and healthcare metrics, that may affect the spread or consequences of epidemiological outbreaks

Automated Point-of-Care Pancreatic Cancer Diagnostic Philadelphia, PA | Aug 2015-May 2016

Research Advisor: Professor David Issadore

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

SKILLS

Programming, Embedded Systems, CAD: Python, C++, C#, MATLAB, Arduino, Raspberry PI, Git, SolidWorks

Mixed Reality: Unity, Microsoft HoloLens, Pupil Core, Human-AI Interfaces, Human Subjects Research, Haptic Interfaces

Machine Learning Libraries: PyTorch, TensorFlow, OpenCV

Relevant Coursework: Human Computer Interaction, Augmented Reality, Haptic Interface Design, Algorithms for Sensor Based Robotics, Deep Learning, Brain Computer Interfaces, Product Design, Venture Capital, Healthcare Policy

ENGINEERING PROJECTS

Early Fall Detection from Video Using 3D-CNNs

Baltimore, MD | Nov-Dec 2020

Winner of Intuitive Surgical Best Project Award

- Automated fall detection dataset generation using natural language descriptions to filter falls from 20000+ action videos
- Implemented transfer learning using 3D-ResNet action recognition model with supervised fine-tuning on fall datasets
- Developed video-processing engine combining neural 3D-pose estimation and optical flow analysis to determine fall speed

Intraoperative Guidance of Orthopaedic Instruments

Baltimore, MD | Jan-Jun 2020

Accepted to SPIE Medical Imaging 2021

- 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 | Sep 2019-Feb 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 haptic feedback algorithm to stimulate vibration motors via a Raspberry Pi in response to IMU sensor data

Algorithms for Sensor Based Robotics

Baltimore, MD | Jan-May 2020

- Implemented rapidly-exploring random tree (RRT), collision-free path planner using Rviz, MoveIt!, and ROS for UR5 robot
- Implemented beam model, odometry motion model, and particle filter localization in C++ to guide simulated mobile robot

PUBLICATIONS

Enabling Cognitive Load Aware User Interfaces for Mixed Reality

K Shah

Master's Thesis

A Calibration-free Workflow for Image-based Mixed Reality Navigation of Total Shoulder Arthroplasty

W Gu, **K Shah**, J Knopf, M Unberath

MICCAI 2021 Joint Workshop on Augmented Environments for Computer-Assisted Interventions

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

I Bataeva, **K Shah**, R Vijayan, R Han, N Sheth, G Kleinszig, S Vogt, G Osgood, JH Siewerdsen, A Uneri

SPIE Medical Imaging 2021

Causal model for cognitive load estimation in mixed-reality environments

K Shah, W Gu, M Unberath

Women in Machine Learning (WiML) 2020 - Poster Presentation

Feasibility of Image-based Augmented Reality Guidance of Total Shoulder Arthroplasty Using Microsoft HoloLens 1

W Gu, **K Shah**, J Knopf, N Navab, M 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

BD Killeen, JY Wu, **K Shah**, A Zapaishchykova, P Nikutta, A Tamhane, S Chakraborty, J Wei, T Gao, M Thies, M Unberath

Proposing a framework for evaluating haptic feedback as a modality for velocity guidance

K Shah*, S Ravichandar*, JD Brown

Haptics Symposium 2020: Work-in-Progress Track

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

Bioengineering Senior Design Award

2016

Ruhr Fellowship

2014

Advancing Women in Engineering Research Scholar

2013