Kinjal Shah

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EDUCATION

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

University of Pennsylvania, Dual Degree Program | *Magna Cum Laude* | GPA: 3.67 — Aug 2016
School of Engineering and Applied Science, BSE in Bioengineering
The Wharton School, BS in Economics

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 in final projects from project scoping through implementation, testing, and debugging

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

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

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 and Embedded Systems:** Python, C++, C#, MATLAB, Arduino, Raspberry PI, Git
- **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

Cockroach-Machine-Interface: Prosthesis Model Philadelphia, PA | Apr 2015

- Built modulation circuit to receive human motion and deliver stimuli to a cockroach leg causing the firing of action potentials
- Programmed signal processing algorithm in MATLAB to convert human motion into target frequencies

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://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
AE-CAI Outstanding Paper 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