# Qi Sun

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## EDUCATION

**Doctor of Philosophy**                                             08/2013 - 05/2018
Computer Science, Stony Brook University, *Stony Brook, NY*
Advisor: Distinguished Professor Arie Kaufman
Dissertation: Computational Methods for Immersive Perception
🏆 **IEEE VR 2019 Best Dissertation Award**

**Bachelor of Science**                                                      08/2013
Mathematics, Taishan Honors College, Shandong University, China          10/2010 - 08/2013
Computer Science, Shandong University, China                             09/2009 - 10/2010

## EMPLOYMENT

**Assistant Professor**                                                   01/2021 -
**Tandon School of Engineering, New York University**

**Research Scientist**                                                06/2018 - 01/2021
**Adobe Research**, *San Jose, CA*

**Research Intern**                                                   07/2017 - 09/2017
**Adobe Research**, Procedural Imaging Group, *San Jose, CA*
With by Paul Asente, Cynthia Lu and Li-Yi Wei

**Research Intern**                                                   04/2017 - 07/2017
**NVIDIA Research**, New Experiences Group, *Redmond, WA*
With Anjul Patney, Morgan McGuire, Omer Shapira, Aaron Lefohn and David Luebke

**Research Intern**                                                   06/2016 - 08/2016
**NVIDIA Research**, New Experiences Group, *Santa Clara, CA*
With Fu-Chung Huang, Joohwan Kim and David Luebke

**Research Intern**                                                   11/2012 - 02/2013
**Microsoft Research Asia**, Hardware Computing Group, *Beijing, China*

## RESEARCH INTERESTS

My research bridges computer graphics, VR/AR, human perception, and physical realisms in digital twins and interaction. Beyond academic publications, my research has also been demonstrated to hundreds of users, attracted major media (e.g., BBC) reports, won an IEEE VR best dissertation award, and transferred to commercial systems reaching 40,000+ customers.

## PUBLICATIONS

**Major Journal/Conference Papers:**

15  **Image Features Influence Reaction Time: A Learned Probabilistic Perceptual Model For Saccade Latency**
Budmonde Duinkharjav, Praneeth Chakravarthula, Rachel Brown, Anjul Patney, **Qi Sun**
ACM Transactions on Graphics (SIGGRPAH 2022)

14 **Joint Neural Phase Retrieval And Compression For Energy- And Computation-Efficient Holography On The Edge**
Yujie Wang, Praneeth Chakravarthula, **Qi Sun**, Baoquan Chen
ACM Transactions on Graphics (SIGGRPAH 2022)

13 **Dually Noted: Layout-Aware Annotations With Smartphone Augmented Reality**
Jing Qian, **Qi Sun**, Curtis Wigington, Han Han, Tong Sun, Jennifer Healey, James Tompkin, Jeff Huang
ACM Conference on Human Factors in Computing Systems (CHI) 2022

12 **Larger Visual Changes Compress Time: The Inverted Effect of Asemantic Visual Features on Interval Time Perception**
Sandra Malpica, Belen Masia, Laura Herman, Gordon Wetzstein, David Eagleman, Diego Gutierrez, Zoya Bylinskii, **Qi Sun**
PLOS One 2022

11 **Instant Reality: Gaze-Contingent Perceptual Optimization For 3D Virtual Reality Streaming**
Shaoyu Chen, Budmonde Duinkharjav, Xin Sun, Li-Yi Wei, Stefano Petrangeli, Jose Echevarria, Claudio Silva, **Qi Sun**
IEEE Transactions on Visualization and Computer Graphics (Proceedings of IEEE VR) 2022

10 **Leveraging Human Visual Perception For An Optimized Virtual Reality Experience**
**Qi Sun**
IEEE Computer Graphics and Applications (Invited) 2021

9 **Gaze-Contingent Retinal Speckle Suppression For Holographic Displays**
Praneeth Chakravarthula, Zhan Zhang, Okan Tarhan Tursun, Piotr Didyk, **Q. Sun**, Henry Fuchs
IEEE Transactions on Visualization and Computer Graphics (Proceedings of ISMAR) 2021

8 **Tailored Reality: Perception-Aware Scene Restructuring For Adaptive VR Navigation**
Zhi-Chao Dong, Wenming Wu, Zenghao Xu, **Q. Sun**, Guanjie Yuan, Ligang Liu, Xiao-Ming Fu
ACM Transactions on Graphics 2021

7 **Deep Multi Depth Panoramas for View Synthesis**
K. Lin, Z. Xu, B., P. Srinivasan, Y. Hold-Geoffroy, S. DiVerdi, **Q. Sun**, K. Sunkavalli, R. Ramamoorthi
European Conference on Computer Vision (ECCV) 2020

6 **Eccentricity Effects on Blur and Depth Perception**
**Qi Sun**, Fu-Chung Huang, Li-Yi Wei, David Luebke, Arie Kaufman, Joohwan Kim
Optics Express Vol. 28 No. 5, 2020

5 **DiffTaichi: Differentiable Programming for Physical Simulation**
Yuanming Hu, Luke Anderson, Tzu-Mao Li, **Qi Sun**, Nathan Carr, Jonathan Ragan-Kelley, Frédo Durand
International Conference on Learning Representations (ICLR) 2020

4 **Learning to Reconstruct 3D Manhattan Wireframes from a Single Image**
Yichao Zhou, Haozhi Qi, Simon Zhai, **Qi Sun**, Zhili Chen, Li-Yi Wei, Yi Ma
ICCV 2019 (Oral Presentation, 4.3% acceptance rate)

3 **Reducing Simulator Sickness with Perceptual Camera Control**

Ping Hu, **Qi Sun**, Piotr Didyk, Li-Yi Wei, Arie Kaufman
ACM Transactions on Graphics (SIGGRAPH Asia 2019)

2 **Towards Virtual Reality Infinite Walking: Dynamic Saccadic Redirection**
**Qi Sun**, Anjul Patney, Li-Yi Wei, Omer Shapira, Jingwan Lu, Paul Asente, Suwen Zhu, Morgan McGuire, David Luebke, Arie Kaufman
ACM Transactions on Graphics (SIGGRAPH 2018) [BBC interview]

1 **Perceptually-Guided Foveation for Light Field Displays**
**Qi Sun**, Fu-Chung Huang, Joohwan Kim, Li-Yi Wei, David Luebke, Arie Kaufman
ACM Transactions on Graphics (SIGGRAPH Asia 2017)

0 **Mapping Virtual and Physical Reality**
**Qi Sun**, Li-Yi Wei, Arie Kaufman
ACM Transactions on Graphics (SIGGRAPH 2016)

**Other Papers & Posters**

8 **Modeling And Optimizing Human-In-The-Loop Visual Perception Using Immersive Displays: A Review**
**Qi Sun**, Budmonde Duinkharjav, Anjul Patney
SID Display Week 2022

7 **Has Half the Time Passed? Investigating Time Perception at Long Scales**
Sandra Malpica, Belen Masia, Laura Herman, Gordon Wetzstein, David Eagleman, Diego Gutierrez, Zoya Bylinskii, **Qi Sun**
Vision Science Society 2020

6 **A Transparent Display with Per-Pixel Color and Opacity Control**
TJ Rhodes, Gavin Miller, **Qi Sun**, Daichi Ito, Li-Yi Wei
SIGGRAPH 2019 Emerging Technologies

5 **Benefits of 3D Immersion for Virtual Colonoscopy**
Koosha Mirhosseini, **Qi Sun**, Krishna Gurijala, Bireswar Laha, Arie Kaufman
IEEE Visualization Workshop on 3DVis 2014

4 **Data-Driven Human Motion Synthesis Based on Angular Momentum Analysis**
Ping Hu, **Qi Sun**, Xiangxu Meng, and Jingliang Peng
IEEE International Symposium on Circuits and Systems, ISCAS 2013

3 **Modeling 3D Faces from Samplings via Compressive Sensing**
**Qi Sun**, Yanlong Tang, and Ping Hu
International Conference on Digital Image Processing, 2013

2 **Kinect-Based Automatic 3D High-Resolution Face Modeling**
**Qi Sun**, Yanlong Tang, Ping Hu, and Jingliang Peng
International Conference on Image Analysis and Signal Processing 2012

1 **Buyers Satisfaction in A Virtual Fitting Room Scenario Based on Realism of Avatar**
**Qi Sun**, Seyedkoosha Mirhosseini, Ievgeniia Gutenko, Ji Hwan Park, Charilaos Papadopoulos, Bireswar Laha, Arie Kaufman
IEEE Symposium on 3D User Interfaces, 3DUI 2015

**Books:**

1 **Real VR: Digital Immersive Reality**
Springer Lecture Notes in Computer Science 2020 (Dagstuhl Book Chapter)

## SELECTED PRESS/MEDIA

**Adobe Glasswing Transparent Display.**
The Verge, CNET, Axios, Next Reality, Printed Electronics World, TechHQ etc.

**Towards Virtual Reality Infinite Walking.**
BBC News (personal interview), SIGGRAPH blog, IEEE, Adobe News, NVIDIA Blog, Two Minute Papers, Stony Brook News, Road to VR, Hackaday, VR Focus, VR World, Inverse, ScienceDaily, eurekAlert, newsAtlas, Sohu.com (Chinese), RedShark News, VR Soldier, Stylus, InAVate, 4gamer (Japanese) Virtual Reality Magazine (German), Microsiervos (Spanish) etc.

**Mapping Virtual and Physical Reality.**
SIGGRAPH Technical Papers Preview, Business Wire, Seamless Virtual Reality News (Japanese), leiphone.com/sina.cn etc. (Chinese), Tencent gameinstitute, Game II DOOSAN Gallery New York.

**Perceptually-Guided Foveation for Light Field Displays.**
Road to VR, Seamless Virtual Reality News (Japanese).

## TEACHING/ADVISING

**Instructor**
Information Visualization, NYU                                                      2021 Fall


**Guest Lecturer**
CSE 564: Visualization, Stony Brook University                          2018 Spring
Frontiers of Computing Studies, Peking University                    2019 Summer
GAMES-CN Webinar                                                                    2017

**Teaching Assistant**
CSE 214: Computer Science II, Stony Brook University                 2013 Fall

**Graduate Mentor**
CSE 593: Independent Study in Computer Science, Stony Brook University  2013 Fall, 2014 Spring

**Advisees**
Yuanming Hu, PhD student at MIT
Sandra Malpica, PhD student at University of Zaragoza
Yichao Zhou, PhD student at UC Berkeley
Dushyant Goyal, Master at SBU. Now machine learning research engineer at Element Inc.

## INVITED TALKS

**Modeling and Optimizing Human Behaviors in XR**
NASA XR Technical Interchange meeting                                       2022


**Human-Centered Immersive Graphics**
University of Zaragoza, Spain                                                      2021
Rochester University, NY                                                            2021

| | |
|---|---|
| University of Sydney, Australia | 2021 |
| New York University, Brooklyn, NY | 2020 |
| Boston University, Boston, MA | 2020 |
| University of North Carolina, Chapel Hill, NC | 2020 |
| University of Texas, Dallas, TX | 2020 |
| University of Illinois, Chicago, IL | 2020 |
| Dartmouth College, Hanover, NH | 2020 |

**Human Learning: Understanding and Computing the Eyes and Brain in VR**

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|---|---|
| Schloss Dagstuhl, Wadern, Germany | 2019 |
| Max-Planck-Institut für Informatik, Saarbrücken, Germany | 2019 |
| Microsoft Research Asia, Beijing, China | 2019 |

**Industrial Innovations in the Age of VR/AR**

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|---|---|
| Wayfair Inc., Boston, MA | 2019 |

**Towards Virtual Reality Infinite Walking, Talk & Live Demo**

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|---|---|
| Adobe Tech Summit, San Francisco, CA | 2019 |
| GPU Technology Conference (GTC), San Jose, CA | 2018 |

**Computational Methods for Immersive Perception**

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|---|---|
| Harvard University, Cambridge, MA | 2018 |
| University of Florida, Gainesville, FL | 2018 |
| Adobe Research, San Jose, CA | 2017 |

## AWARDS

| | |
|---|---|
| NVIDIA Applied Research Accelerator Award | 2022 |
| IEEE VR 2019 Best Dissertation Award | 2020 |
| Stony Brook Computer Science Special Chair Fellowship | 2013 - 2014 |
| Outstanding Bachelor Thesis Award of Shandong Province, China | 2013 |

## SERVICE

**Co-Editor**

| | |
|---|---|
| MDPI Applied Sciences Special Issue on "New Frontiers in Virtual Reality (VR) Systems" | 2021 |
| Frontiers in Virtual Reality on "Virtual Reality for Telepresence" | 2021 |

**Chairing**

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|---|---|
| IEEE ISMAR, Video Chair | 2022 |

**Conference Program Committee**

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|---|---|
| Pacific Graphics | 2022 |
| ACM Symposium on Applied Perception (SAP) | 2022 |
| Eurographics Symposium on Rendering | 2022 |
| IEEE ISMAR | 2021-2022 |
| ACM SIGGRAPH Asia XR and VR Theater | 2020-2021 |
| Grace Hopper Celebration (GHC) | 2020 |
| ACM ETRA Short Papers | 2020-2021 |
| ACM CHI Late-Breaking Works | 2020-2021 |

| ACM SIGGRAPH Asia Technical Briefs and Posters | 2019 |
|---|---|
| ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (i3D) | 2019-2022 |

**PhD Thesis Committee**

| Zhenyi He, New York University | 2021 |
|---|---|

**Reviewer**

ACM SIGGRAPH (Asia), Nature Scientific Reports, ACM CHI, IEEE Visualization, IEEE Transactions on Visualization and Computer Graphics, Computer Graphics Forum (CGF), ACM Transaction on Graphics (TOG), ACM User Interface Software and Technology (UIST), ACM VRST, ACM i3D, IEEE 3D User Interfaces (3DUI), IEEE VR [both Conference and Journal tracks], IEEE ISMAR, ACM Symposium on Applied Perception (SAP), ACM ETRA, IEEE Access, Wiley Computer Animation and Virtual Worlds, IEEE Consumer Electronics Magazine, IEEE Transactions on Emerging Topics in Computing, Virtual Reality Software and Technology (VRST), Springer Virtual Reality, MDPI Applied Sciences, The Visual Computer

**Other**

| Committee Member, NYU CSE PhD Program | 2021 |
|---|---|
| Co-Organizer, NYU CSE New PhD Student Welcome | 2021 |
| Mentor, NYU GLASS Program | 2021 |
| Mentor, NYU CUSP Capstone Project | 2021 |
| NYU Center for Urban Science and Progress postdoctoral search committee | 2021 |
| National Science Foundation (NSF) panelist | 2020 |
| Adobe Research PhD fellowship committee | 2018 - 2019 |
| Adobe Research Women-in-Technology Scholarship committee | 2019 |

## SOFTWARE CREDITS

Adobe Dimension

## GRANTED PATENTS

**Controlling an augmented reality display with transparency control using multiple sets of video buffers**
Tenell Glen Rhodes Jr, Gavin Stuart Peter Miller, Li-Yi Wei, **Qi Sun**
US10847117, granted 2020-11-24

**Saccadic redirection for virtual reality locomotion**
**Qi Sun**, Anjul Patney, Omer Shapira, Morgan McGuire, Aaron Lefohn, David Luebke
US10573061B2, granted 2020-02-25

**Path planning for virtual reality locomotion**
**Qi Sun**, Anjul Patney, Omer Shapira, Morgan McGuire, Aaron Lefohn, David Luebke
US10573071B2, granted 2020-02-25

**Adjusting an Angular Sampling Rate during Rendering Utilizing Gaze Information**
**Qi Sun**, Fu-Chung Huang, Joohwan Kim and David Luebke
US10395624B2, granted 2019-08-27

**System and Method for Generating a Progressive Representation Associated with Surjectively Mapped Virtual and Physical Reality Image Data**
Arie Kaufman, **Qi Sun** and Li-Yi Wei
US10403043B2, granted 2019-09-03