Qi Sun

qisun@nyu.edu http://www.qisun.me March 28, 2024

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*

Research Intern 04/2017 - 07/2017
NVIDIA Research, New Experiences Group, *Redmond, WA*

Research Intern 06/2016 - 08/2016
NVIDIA Research, New Experiences Group, *Santa Clara, CA*

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

RESEARCH INTERESTS

My research bridges human-centered computer graphics and VR/AR with machine learning and computational cognition to create immersive performance and experiences that surpass the physical world. With broad support from NSF, DARPA, NASA, and industry, it has earned awards, including the IEEE VR Best Dissertation Award and various Best Paper Awards in venues such as ACM SIGGRAPH and IEEE ISMAR. Beyond academic publications, the research has been demonstrated to hundreds of users, featured in major media reports (e.g., BBC), and applied to commercial products, reaching over 40,000 customers.

AWARDS AND HONORS

IEEE VR 2024 Best Paper Honorable Mention Award 2024
IEEE VIS 2023 Best Paper Honorable Mention Award 2023
SIGGRAPH 2022 Best Paper Award 2022
SIGGRAPH 2022 Best Paper Honorable Mention Award 2022
ISMAR 2022 Best Journal Paper Award 2022

NVIDIA Applied Research Accelerator Award 2022
IEEE VR Best Dissertation Award 2020
Stony Brook Computer Science Special Chair Fellowship 2013 - 2014

STUDENT AWARDS

Budmonde Duinkharjav
1. Deborah Rosenthal, MD Award: NYU Outstanding Performance on PhD Qualification 2022
2. Snap Research Fellowship Honorable Mention 2022

FULL PUBLICATIONS

marked **my students and **myself** in bold

Refereed Journal

1. 🎗 **Modeling The Impact Of Head-Body Rotations On Audio-Visual Spatial Perception For Virtual Reality Applications**
   [Best Paper Honorable Mention Award] Edurne Bernal-Berdun, Mateo Vallejo, **Qi Sun**, Ana Serrano, Diego Gutierrez
   IEEE Transactions on Visualization and Computer Graphics (IEEE VR) 2024

2. **The Shortest Route Is Not Always the Fastest: Probability-Modeled Stereoscopic Eye Movement Completion Time in VR**
   Budmonde Duinkharjav, **Benjamin Liang**, Rachel Brown, Anjul Patney, **Qi Sun**
   ACM Transactions on Graphics (SIGGRPAH Asia 2023)

3. 🎗 **ARGUS: Visualization Of AI-Assisted Task Guidance In AR**
   S.C. Quispe, J. Rulff, E. McGowan, B. Steers, G. Wu, S. Chen, I. Roman, R. Lopez, E. Brewer, C. Zhao, J. Qian, K. Cho, H. He, **Q. Sun**, H. Vo, J.P. Bello, M. Krone, C. Silva
   [Best Paper Honorable Mention Award] IEEE Transactions on Visualization and Computer Graphics (VIS 2023)

4. **Reconstructing Room Scales with a Single Sound for Augmented Reality Displays**
   Benjamin Liang, **Andrew Liang**, Iran Roman, Tomer Weiss, **Budmonde Duinkharjav**, JP Bello, **Qi Sun**
   Journal of Information Display 24.1 (2023)

5. **Color-Perception-Guided Display Power Reduction For Virtual Reality**
   Budmonde Duinkharjav*, **Kenneth Chen***, Abhishek Tyagi, Jiayi He, Yuhao Zhu, **Qi Sun**
   ACM Transactions on Graphics (TOG) 41.6 (2022): 1-16. (SIGGRPAH Asia 2022)

6. **Force-Aware Interface Via Electromyography For Natural VR/AR Interaction**
   Yunxiang Zhang, **Benjamin Liang**, Boyuan Chen, Paul Torrens, S. Farokh Atashzar, Dahua Lin, **Qi Sun**
   ACM Transactions on Graphics (TOG) 41.6 (2022): 1-18. (SIGGRPAH Asia 2022)

7. 🎗 **FoV-NeRF: Foveated Neural Radiance Fields For Virtual Reality**
   Nianchen Deng, Zhenyi He, Jiannan Ye, **Budmonde Duinkharjav**, Praneeth Chakravarthula, Xubo Yang, **Qi Sun**
   [Best Journal Paper Award] IEEE Transactions on Visualization and Computer Graphics 28.11 (2022): 3854-3864 (Proceedings of ISMAR) 2022

8. 🎗 **Image Features Influence Reaction Time: A Learned Probabilistic Perceptual Model For Saccade Latency**
   Budmonde Duinkharjav, Praneeth Chakravarthula, Rachel Brown, Anjul Patney, **Qi Sun**
   [Best Paper Award] ACM Transactions on Graphics (TOG) 41.4 (2022): 1-15. (SIGGRPAH 2022)

9. 🎗 **Joint Neural Phase Retrieval And Compression For Energy- And Computation-Efficient Holography On The Edge**
   Yujie Wang, Praneeth Chakravarthula, **Qi Sun**, Baoquan Chen
   [Best Paper Honorable Mention Award] ACM Transactions on Graphics (TOG) 41.4 (2022): 1-16. (SIGGRPAH 2022)

10. **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 17, no. 3 (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 28.5 (2022)

12. **Leveraging Human Visual Perception For An Optimized Virtual Reality Experience**
    Qi Sun
    IEEE Computer Graphics and Applications 41.6 (2021): 164-170.

13. **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 27.11 (2021): 4194-4203. (Proceedings of ISMAR)

14. **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

———————————————Pre-NYU———————————————

15. **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

16. **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)

17. **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]

18. **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)

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

Refereed Conference

1. **Exploiting Human Color Discrimination For Memory- And Energy-Efficient Image Encoding In Virtual Reality**
Nisarg Ujjainkar, Ethan Shahan, **Budmonde Duinkharjav**, **Kenneth Chen**, **Qi Sun**, Yuhao Zhu
ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2024)

2. **Imperceptible Color Modulation For Power Saving In VR/AR**
Kenneth Chen, **Budmonde Duinkharjav**, Nisarg Ujjainkar, Ethan Shahan, Abhishek Tyagi, Jiayi He, Yuhao Zhu, **Qi Sun** ACM SIGGRAPH 2023 Emerging Technologies (SIGGRAPH '23). Article 8, 1–2.

3. **Toward Optimized VR/AR Ergonomics: Modeling And Predicting User Neck Muscle Contraction**
Yunxiang Zhang, **Kenneth Chen**,**Qi Sun**
ACM SIGGRAPH 2023 Conference Proceedings (pp. 1-12)

4. **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
Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems, pp. 1-15. 2022

5. **Modeling And Optimizing Human-In-The-Loop Visual Perception Using Immersive Displays: A Review**
Qi Sun, **Budmonde Duinkharjav**, Anjul Patney
SID Symposium Digest of Technical Papers (Vol. 53, No. 1, pp. 190-193)

——————————————————Pre-NYU——————————————————

6. **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

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

8. **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

9. **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

International Conference on Computer Vision (ICCV) 2019 (Oral Presentation)

10. **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

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

12. **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

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

14. **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

15. **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

Book Chapters

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

SOFTWARE CREDITS

Adobe Dimension

GRANTED PATENTS

Sharing of user markings between printed and digital documents
Tong Sun, **Qi Sun**, Jing Qian, CM Wigington
US11520974B2, granted 2022-12-06

Classifying panoramic images
Qi Sun, Li-Yi Wei, Joon-Young Lee, Jonathan Eisenmann, Jinwoong Jung, Byungmoon Kim
US10991085B2, granted 2021-04-27

Dynamic mapping of virtual and physical interactions
Qi Sun, Paul John Asente, Li-Yi Wei, Jingwan Lu
US10957103B2, granted 2021-03-23

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

KEYNOTE AND DISTINGUISHED TALKS

Toward Human-Centered XR: Bridging Cognition and Computation
CMU VACS 2024
Human-Centric Optical Designs and Architectures
Plenary Panel: SPIE Photonics West 2024
Co-Optimizing Human-System Performance in XR
36th Conference on Graphics, Patterns and Images (SIBGRAPI) 2023
University of Houston 2022
Digital Twins: New Frontiers Today
MIT Horizon Podcast 2022

OTHER INVITED TALKS

Co-Optimizing Human-System Performance in VR/AR
Ohio State University 2023
University of Maryland 2023
MIT 2022
Harvard University 2022
NVIDIA 2022
Stanford 2022
Intel 2022
Google 2022
General Motors 2022
NASA XR Technical Interchange meeting 2022
SID Display Week 2022
U.S. Food and Drug Administration (FDA) 2022
Meta Reality Labs 2022
Snap Inc 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
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
Wayfair Inc., Boston, MA 2019

Towards Virtual Reality Infinite Walking, Talk & Live Demo
Adobe Tech Summit, San Francisco, CA 2019
GPU Technology Conference (GTC), San Jose, CA 2018

Computational Methods for Immersive Perception
Harvard University, Cambridge, MA 2018
University of Florida, Gainesville, FL 2018
Adobe Research, San Jose, CA 2017

SELECTED PRESS/MEDIA

Image Features Influence Reaction Time.
ACM SIGGRAPH, EurekAlert!, NVIDIA Developer Blog, etc.

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).

FUNDED GRANTS

1. **CC* Data Storage: Distributed Fast Scalable Infrastructure for Emerging Media Research Data**
   National Science Foundation (NSF), Lead PI (Co-PI Robert Pahle, NYU)
   2022-09-01 to 2024-08-31
   Total: $499,907; My Share: $365,117

2. **Collaborative Research: CNS Core: HCC: Small: Enabling Efficient Computer Systems for Augmented and Virtual Reality: A Perception-Guided Approach**
   National Science Foundation (NSF), PI (Collaborative PI Yuhao Zhu, University of Rochester)
   2022-11-01 to 2025-10-31
   Total: $600,000; My Share: $300,000

3. **Multimodal, transparent and interpretable personal assistant**
   United States Department of Defense (DARPA), Co-PI (PI: Claudio Silva; Co-PI: He He, Juan Bello, Kyunghyun Cho, NYU)
   2021-11-23 to 2025-09-30
   Total: $5,000,000; My Share: (based on 15% effort) $752,808

4. **STTR PHASE I: Hyperrealistic extravehicular multi-astronaut training system with VR redirected walking**
   NASA, PI of academic subcontract (industrial PI: OrbitalOutpostX)
   2022-06-28 to 2023-04-28
   Total: $150,000; My Share: (50%) $75,000

5. **Adobe Gift Fund**
   Adobe Inc, PI
   Total: $ 65,000

6. **NYU MEGA seed grant**
   NYU, PI
   2023-01-01 to 2023-12-31
   Total: $30,000; My Share: $10,000

7. **NVIDIA applied research accelerator**
   NYU, PI
   in-kind GPU donations

8. **Intel academic donation program**
   NYU, PI
   in-kind GPU donations

PUBLIC EDUCATION

1. Effective User Studies in Computer Graphics
   Eurographics 2023

2. Visual Computing for Computer Architect
   ASPLOS 2023

NYU COURSES

1. Fall 2021 & Spring 2022 & Spring 2023 CS-GY 6313 Information Visualization

2. Fall 2022 & Fall 2023 CS-GY 9223 Virtual and Augmented Reality

GRADUATE ADVISEES

Budmonde Duinkharjav, PhD student at NYU, 2021 Spring-
Yunxiang Zhang, PhD student at NYU, 2022 Fall-
Kenneth Chen, PhD student (previously MSc) at NYU, 2023 Fall-

Luigia Than, current MSc Student at NYU, 2022 Fall-
Benjamin Liang, MSc student at NYU, 2022 Fall-
Qinchan Li, graduated MSc Thesis Student at NYU, 2021 Fall-2023 Spring
Xi Peng, graduated MSc Thesis Student at NYU, 2021 Fall-2023 Spring
Qin Ying Chen, graduated MSc Thesis Student at NYU, 2021 Spring-2023 Spring
Erica Chou, graduated MSc Thesis Student at NYU, 2021 Spring-2023 Spring

Edurne Bernal-Berdun, visiting PhD student from University of Zaragoza

PHD THESIS COMMITTEE

Dr. Zhenyi He, NYU Courant
Karl Rosenberg, NYU Courant
Ho-Hsiang Wu, NYU Steinhardt
Shaoyu Chen, NYU Tandon
Daniel Martin, University of Zaragoza
Luca Surace, Università della Svizzera italiana

SERVICE

Editor

Associate Editor, IEEE Transactions on Visualization and Computer Graphics (TVCG)	2023-
Associate Editor, ACM Transactions on Applied Perception	2023-
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

ACM Symposium on Applied Perception, Conference Chair	2023
IEEE VR, Publicity Chair	2023
IEEE ISMAR, Video and Registration Chair	2022

Conference Program Committee

SIGGRAPH	2024
SIGGRAPH Asia	2023
ACM Annual Symposium on Computer Animation (SCA)	2023
Computer Graphics International (CGI)	2023 - 2024
IEEE VR	2023
IEEE VGTC VR Best Dissertation Award	2022
ACM/SIGGRAPH conference on Motion, Interaction, and Games (MIG)	2022
Pacific Graphics	2022-2023
ACM Symposium on Applied Perception (SAP)	2022
Eurographics Symposium on Rendering	2022
IEEE ISMAR	2021-2024
ACM SIGGRAPH Asia XR and VR Theater	2020-2021
Grace Hopper Celebration (GHC)	2020,2023
ACM ETRA	2020-2021, 2023
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, 2024

National Science Foundation (NSF) panelist 2020, 2021

Reviewer

ACM SIGGRAPH (Asia), Nature Scientific Reports, Optics Express, 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, Computer & Graphics.

Internal

NYU Organizer, KAIST-NYU workshop on Metaverse	2023
Faculty Search Committee, NYU Shanghai, Urban x CS position	2023
Seminar Organizer, NYU CUSP Seminar Series	2023-2024
Committee Member, NYU CSE PhD Admission	2023-2024
Chair/Committee Member, NYU CUSP Fellowship program	2022-2023
Committee Member, NYU CUSP C-Faculty Committee	2023
Committee Member, NYU CSE Visiting Faculty	2023-2024
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	2021-2022
NYU Center for Urban Science and Progress Faculty Fellowship search committee	2021-2022
Adobe Research PhD fellowship committee	2018 - 2019
Adobe Research Women-in-Technology Scholarship committee	2019