

Praneeth Chakravarthula

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Education and Experience

- 2021 **Postdoctoral Researcher**, Princeton University
Computer Science. Advisor: *Felix Heide*
- Doctor of Philosophy**, University of North Carolina at Chapel Hill
Computer Science. Advisor: *Henry Fuchs*
- 2019 **Master of Science**, University of North Carolina at Chapel Hill
Computer Science.
- 2016 **Master of Technology**, Indian Institute of Technology Madras
Specialization in Signal Processing. Advisor: *Kaushik Mitra* and *Shanti Bhattacharya*
- 2015 **Bachelor of Technology**, Indian Institute of Technology Madras
Electrical Engineering

Employment

- May '20 – Aug '20 **Research Intern, Facebook Reality Labs**
– Mentor: *Dr. Max Parsons*
- Jun '19 – Sep '19 **Research Intern, Microsoft Research Cambridge.**
– Mentors: *Dr. Andreas Georgiou* and *Joel Kollin*
- May '18 – Aug '18 **Research Intern, NVIDIA Research.**
– Mentors: *Dr. Kaan Aksit* and *Dr. David Luebke*
- May '17 – Aug '17 **Research Intern, NVIDIA Research.**
– Mentors: *Dr. Kaan Aksit* and *Dr. David Luebke*
- May '14 – Sep '14 **Visiting Researcher, MIT Media Lab**
– Supervisor: *Dr. Pattie Maes*
- May '13 – Sep '13 **Visiting Researcher, NUS Singapore**
– Supervisor: *Dr. Ravi Poovaiah* and *Ajanta Sen*

Fellowships and Awards

- 2022 **Mistletoe Research Fellowship**, Momental Foundation, Unfettered Research Grant.
- Best Paper Award**, IEEE ISMAR.
- Best Paper Award**, SIGGRAPH.
- Best Paper Award Honorable Mention**, SIGGRAPH.
- Spotlight Poster**, ICCP.
- 2020 **Best Student Paper Award**, OSA Biophotonics Congress.
- Optical Design Award**, SPIE Photonics West.
- 2019 **Best Paper Nominee**, IEEE Virtual Reality.
- Timothy L. Quigg Student Inventor of the Year Award**, Dept. of CS, UNC.
- 2018 **Best Paper Award**, IEEE ISMAR.
- Best in Show Award**, SIGGRAPH Emerging Technologies.
- Optical Design Award**, SPIE Photonics.
- 2014 **Samsung Innovation Award**

Grant Proposal Activity

■ National Science Foundation

Deep Learning-Based Tracking of Eyes and Lens Shape from Purkinje Images for Holographic Augmented Reality Glasses.

PI: Henry Fuchs. Submitted September 2020.

– Conducted preliminary experiments and participated in writing the proposal. I am named as one of the two PhD graduate Research Assistants.

■ Facebook Sponsored Research Grant

Towards a Physics-based Understanding of Holographic Image Quality.

PI: Henry Fuchs. Awarded: \$195,653. November 2020.

– Conducted preliminary experiments and participated in writing the proposal. I am named as the sole PhD graduate Research Assistant.

■ Intel Research Gift Grant

Towards Real-time Rendering for Holographic Displays.

PI: Henry Fuchs. Awarded: \$106,000. April 2020.

– Conducted preliminary experiments and participated in writing the proposal. I am named as the sole PhD graduate Research Assistant.

■ NSF Award 1840131.

Enhancing Human Capabilities through Virtual Personal Embodied Assistants in Self-Contained Eyeglasses-Based Augmented Reality (AR) Systems.

PI: Henry Fuchs. Awarded: \$2,190,000. September 2018.

– Conducted preliminary experiments and participated in writing the proposal.

■ Google Focused Research Award

Comprehensive Eye-tracking via Deep Learning for Improved Near-eye Mixed Reality Displays.

PI: Henry Fuchs. Awarded: \$92,000. November 2017.

– Conducted preliminary experiments and participated in writing the proposal. I am named as the sole PhD graduate Research Assistant.

Patents




- Praneeth Chakravarthula, Henry Fuchs. Methods, systems, and computer readable media for dynamic vision correction for in-focus viewing of real and virtual objects. **US Patent 10,319,154**
- Praneeth Chakravarthula, Felix Heide. Methods, systems, and computer readable media for improved digital holography and display incorporating same. **US Patent Application 16,710,845**
- Nicolas Pegard, Hoss Eybposh, Nick Cairra, Mathew Atisa, Praneeth Chakravarthula. High-speed computer generated holography using convolutional neural networks. **US Patent Application 17,235,476, Currently licensed by Intelligent Imaging Innovations, Inc..**
- Praneeth Chakravarthula, Felix Heide. Methods, systems, and computer readable media for hardware-in-the-loop phase retrieval for holographic displays. **Patent pending**

Selected Publications

- 1 Praneeth Chakravarthula, Ethan Tseng, Henry Fuchs and Felix Heide: *Hogel-free Holography*, in: ACM Transactions on Graphics (Proceedings **SIGGRAPH**) 2022.
- 2 Wang, Yujie*, Praneeth Chakravarthula*, Qi Sun and Baoquan Chen: *Joint Neural Phase Retrieval and Compression for Energy- and Computation-Efficient Holography on the Edge*, in: ACM Transactions on Graphics (Proceedings **SIGGRAPH**) 2022, *equal contribution.


- 3 Duinkharjav, Budmonde, **Praneeth Chakravarthula**, Rachel Albert, Anjul Patney and Qi Sun: *Image Features Influence Reaction Time: A Learned Probabilistic Perceptual Model for Saccade Latency*, in: ACM Transactions on Graphics (Proceedings **SIGGRAPH**) 2022.
- 4 Shi, Zheng, Yuval Bahat, Seung-Hwan Baek, Qiang Fu, Hadi Amata, Xiao Li, **Praneeth Chakravarthula**, Wolfgang Heidrich and Felix Heide: *Seeing Through Obstructions with Diffractive Cloaking*, in: ACM Transactions on Graphics (Proceedings **SIGGRAPH**) 2022.
- 5 Deng, Niancheng, Zhenyi He, Jiannan Ye, Budmonde Duinkharjav, **Praneeth Chakravarthula**, Xubo Yang and Qi Sun: *FoVNeRF: Foveated Neural Radiance Fields for Virtual Reality*, in: IEEE Transactions on Visualization and Computer Graphics 2022.
- 6 **Chakravarthula, Praneeth**, Zhan Zhang, Okan Tursun, Piotr Didyk, Qi Sun and Henry Fuchs: Gaze-Contingent Retinal Speckle Suppression for Perceptually-Matched Foveated Holographic Displays, in: IEEE Transactions on Visualization and Computer Graphics 2021.
- 7 **Praneeth Chakravarthula**, Ethan Tseng, Tarun Srivastava, Henry Fuchs and Felix Heide: *Learned hardware-in-the-loop phase retrieval for holographic near-eye displays*, in: ACM Transactions on Graphics (Proceedings **SIGGRAPH Asia**) 2020.
- 8 Xia, Xinxing, Yunqing Guan, Andrei State, **Praneeth Chakravarthula**, Tat-Jen Cham and Henry Fuchs: *Towards Eyeglass-style Holographic Near-eye Displays with Statically Expanded Eyebox*, in: IEEE International Symposium on Mixed and Augmented Reality (**ISMAR**), 2020.
- 9 Lu, Conny, **Praneeth Chakravarthula**, Yujie Tao, Steven Chen and Henry Fuchs: *Improved vergence and accommodation via Purkinje Image tracking with multiple cameras for AR glasses*, in: IEEE International Symposium on Mixed and Augmented Reality (**ISMAR**), 2020.
- 10 Eybposh, M Hossein, Nicholas W Caira, Matthew Atisa, **Praneeth Chakravarthula** and Nicolas C Pégard: *Enhanced Two-photon Absorption with Deep Learning-based Computer Generated Holography*, in: **Frontiers in Optics**, Optical Society of America, 2020.
- 11 Eybposh, M Hossein, Nicholas W Caira, Mathew Atisa, **Praneeth Chakravarthula** and Nicolas C Pégard: *DeepCGH: 3D computer-generated holography using deep learning*, in: **Optics Express** 2020.
- 12 **Praneeth Chakravarthula**, Yifan Peng, Joel Kollin, Henry Fuchs and Felix Heide: Wirtinger holography for near-eye displays, in: ACM Transactions on Graphics (Proceedings **SIGGRAPH Asia**) 2019.
- 13 Xia, Xinxing, Yunqing Guan, Andrei State, **Praneeth Chakravarthula**, Kishore Rathinavel, Tat-Jen Cham and Henry Fuchs: Towards a switchable AR/VR near-eye display with accommodation-vergence and eyeglass prescription support, in: IEEE transactions on visualization and computer graphics (**TVCG**) 2019.
- 14 Akşit, Kaan, **Praneeth Chakravarthula**, Kishore Rathinavel, Youngmo Jeong, Rachel Albert, Henry Fuchs and David Luebke: Manufacturing application-driven foveated near-eye displays, in: IEEE transactions on visualization and computer graphics (**TVCG**) 2019.
- 15 **Praneeth Chakravarthula**, David Dunn, Kaan Akşit and Henry Fuchs: *FocusAR: Auto-focus augmented reality eyeglasses for both real world and virtual imagery*, in: IEEE transactions on visualization and computer graphics (**TVCG**) 2018.
- 16 Deng, Nianchen, Zhenyi He, Jiannan Ye, **Praneeth Chakravarthula**, Xubo Yang and Qi Sun: Foveated Neural Radiance Fields for Real-Time and Egocentric Virtual Reality, in: Under review.

Service

- Organizer  International workshop on Vision Augmentation, IEEE VR 2019
International workshop on Perception and Graphics, 2019
- Program Committee  International Conference on Computational Photography (ICCP) 2022
International Symposium on Mixed and Augmented Reality (ISMAR) 2022
ACM Symposium on Eye Tracking Research and Applications (ETRA) 2021
ACM Symposium on Eye Tracking Research and Applications (ETRA) 2020
- Reviewer  ACM SIGGRAPH,
ACM SIGGRAPH Asia,
Nature Scientific Reports,
OSA Optics Express,
ACM Transactions on Graphics (TOG),
ACM Transactions on Computer-Human Interaction (TOCHI),
IEEE Transactions on Visualization and Computer Graphics (TVCG),
IEEE Access,
IEEE Virtual Reality (VR),
IEEE International Symposium on Mixed and Augmented Reality (ISMAR),
ACM Symposium on Eye Tracking Research and Applications (ETRA),
ACM User Interface Software and Technology (UIST),
Virtual Reality Software and Technology (VRST)

References

Henry Fuchs

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Joel Kollin

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