Manu Gopakumar

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EDUCATION

Stanford University, Stanford, CA — August 2020-Present

- PhD in Electrical Engineering (GPA: 4.18)

Carnegie Mellon University, Pittsburgh, PA — August 2019-May 2020

- Master of Science in Electrical and Computer Engineering (QPA: 4.00)

Carnegie Mellon University, Pittsburgh, PA — August 2016-May 2019

- Bachelor of Science in Electrical and Computer Engineering (QPA: 4.00)

UNIVERSITY RESEARCH

Time-Multiplexed Neural Holography: September 2021-January 2022

- Developed AI framework for optimizing holograms displayed on highly-quantized high speed MEMs-based spatial light modulators
- Demonstrated state-of-the-art natural defocus and high image quality for dynamic holographic displays with a variety of content types
- Joint first author for publication at SIGGRAPH (citation: Choi, Suyeon, et al. "Time-multiplexed Neural Holography: A flexible framework for holographic near-eye displays with fast heavily-quantized spatial light modulators." *ACM SIGGRAPH 2022 Conference Proceedings*. 2022.)

Neural 3D Holography: December 2020-May 2021

- Developed neural network based forward model to model aberrations produced in physical setup
- Used forward model to generate high quality 3D content for holographic displays
- Joint first author for publication at SIGGRAPH Asia (citation: Choi, Suyeon, et al. "Neural 3D holography: Learning accurate wave propagation models for 3D holographic virtual and augmented reality displays." *ACM Transactions on Graphics (TOG)* 40.6 (2021): 1-12.)

Cell-type Selective Neuron Stimulation: December 2017-November 2019

- Implemented and analyzed models for specific mammalian neuron cell types
- Designed and implemented strategies for selectively stimulating specific neuron models
- Collaborated with biological and experimental groups to test strategies on brain slices
- Published strategies at IEEE EMBS Conference on Neural Engineering (citation: Gopakumar, Manu, et al. "Cell-type Selective Stimulation of Neurons Based on Single Neuron Models." *2019 9th International IEEE/EMBS Conference on Neural Engineering (NER)*. IEEE, 2019.)

INDUSTRY RESEARCH

Research Internship with NVIDIA, Santa Clara, CA: May 2021-September 2021

- Developed algorithmic framework for optimizing high-quality holograms in compact filter-free holographic displays
- Published details in Optics Letters (citation: Gopakumar, Manu, et al. "Unfiltered holography: optimizing high diffraction orders without optical filtering for compact holographic displays." *Optics letters* 46.23 (2021): 5822-5825.)
- Assisted on and presented subsequent SIGGRAPH publication using this algorithmic framework to enable ultra-thin holographic virtual reality glasses (citation: Kim, Jonghyun, et al. "Holographic glasses for virtual reality." *ACM SIGGRAPH 2022 Conference Proceedings*. 2022.)

PROJECTS

Depth and All-in-focus Imaging with Coded Aperture: October 2019-December 2019

- Generated simulated coded aperture captures using SceneNet RGB-D dataset
- Developed all-in-focus image generation and depth estimation pipeline
- Fabricated coded aperture to capture and process coded aperture images

Uncertainty-aware Monocular Visual Odometry: October 2019-December 2019

- Utilized deep neural network to estimate monocular depth as a classification problem
- Generated uncertainty metric to be associated with monocular depth estimates
- Used depth estimation to generate point clouds and adapted Iterative Closest Point (ICP) to account for uncertainty while estimating pose

TEACHING AND MENTORSHIP

SHTEM Summer Internship Mentor: June 2022-August 2022

- Mentored a group of high school students for a summer research internship through the Stanford SHTEM program
- Guided interns on a project developing Unity scripts for on-demand custom light field datasets that the students packaged as a paper accepted to the 2022 IEEE MIT URTC

EE267 Virtual Reality Course Assistant: April 2022-June 2022

- Course assistant for virtual reality course designed to give students an overview of the hardware and software aspects of virtual reality
- Guided students through student-proposed final projects and problem sets emphasizing hands-on programming of VR headsets from shading computation to IMU-based tracking

LEADERSHIP AND AWARDS

Stanford Graduate Fellowship: Reed-Hodgson Fellow — August 2020-Present
Carnegie Mellon University Dean's List — February 2017-May 2020
Activities Board Lectures Chair — January 2017-May 2019
Student Dormitory Council Vice President — May 2017-May 2018

REFERENCES

Gordon Wetzstein (email: gordonwz@stanford.edu)
Aswin Sankaranarayanan (email: saswin@andrew.cmu.edu)
Pulkit Grover (email: pgrover@andrew.cmu.edu)

RELEVANT COURSEWORK

Fundamentals of Signal Processing	Cloud Computing	Image and Video Processing
Intro. to Embedded Systems	Optimization	Geometry-based Methods in Vision
Computational Photography	Nano-Bio-Photonics	Physics-based Methods in Vision
Visual Computing Systems	Modern Optics	Interactive Computer Graphics
Computer Graphics in the Era of AI	Virtual Reality	Neural Models for 3D Geometry