Henry Quach

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Optical Design & Analysis Portfolio: www.henryquach.org

EDUCATION

UNIVERSITY OF ARIZONA

PH.D. IN OPTICAL SCIENCES
Exp. Dec 2022 | Tucson, AZ

M.S. IN OPTICAL SCIENCES
Earned Dec 2020 | Tucson, AZ

DUKE UNIVERSITY

BS IN MECHANICAL ENGINEERING
Earned May 2017 | Durham, NC

SKILLS

OPTICAL DESIGN + ANALYSIS

Zemax OpticStudio • LightTools • FRED
Polaris-M (Polarization Raytracing)

OPTOMECHANICAL

Optical Alignment • Mount Design
Sensitivity Analysis • Error Budgeting

SolidWorks (Modeling + FEA)
3D Printing (SLA/FDM) • CNC
Fixture and Tooling Design

PROGRAMMING

Matlab • Mathematica • SQL • Python with OpenCV

Image Processing: Filtering, Convolution, Fourier Analysis, Interpolation, Fitting, Noise Removal, Zernike Decomposition

PUBLICATIONS

OPTICS LETTERS

Non-Planar Illumination Deflectometry for Axicon Measurement
Published June 2022.
H. Quach *et. al*

PHOTONICS

Surface Measurement of a Large Inflatable Reflector in Cryogenic Vacuum
Published Jan 2022.
H. Quach *et. al*

OPTICS EXPRESS

Infinite Deflectometry Enabling 2π-Steradian Measurement Range
Published Jan 2019
L. R. Graves, H. Quach *et. al*

EMPLOYMENT AND EXPERIENCE

LOFT GROUP, WYANT COLLEGE OF OPTICAL SCIENCES

GRADUATE RESEARCH ASSOCIATE | MAY 2018 – PRESENT | TUCSON, AZ

- *Large Optics Fabrication & Testing Group.* Advisor: Dr. Daewook Kim.
- *My Research*: design, model, and test novel optical systems to measure highly sloped, rough, and freeform surfaces in industrial and astronomical optics
- *Active Experiments*: visible and LWIR deflectometry systems; shape measurement of inflatable telescope reflectors; polarization cues for optical metrology; optical alignment algorithms.
- *What that usually entails*: synthesis and alignment of multi-DOF optical systems including: motion control, camera setup and calibration, illumination sources, and software written in Python or Matlab.

NIKON RESEARCH CORPORATION OF AMERICA

OPTICAL SCIENTIST INTERN | MAY 2022 – AUG 2022 | ORO VALLEY, AZ

- Worked with principal optical scientists on new architectures in laser processing and optical metrology. Comprehensively applied lens design, radiometry, optomechanical engineering, and image processing.
- Redesigned, built, and analyzed the performance of a multi-path, multi-λ (VIS, NIR, SWIR) imaging and illumination system in Zemax OpticStudio.
- Calibrated and characterized high-speed (2k+ fps) imaging systems using oscilloscopes, resolution targets, integrating spheres, power meters, and a monochromator.
- Completed academic literature and patent searches to explore the landscape for challenging interdisciplinary technical problems.

LAWRENCE LIVERMORE NATIONAL LABORATORY

OPTICAL ENGINEERING INTERN | MAY 2021 – AUG 2021 | LIVERMORE, CA

- Analyzed multiple-wavelength stray light and ghosts from a gigawatt laser system using FRED non-sequential raytracing software.
- Optically modeled multiple-reflection, tip/tilt, defocus image sensitivity between beamsplitters, windows, lenses, mirrors, and prisms.
- Wrote Matlab & SQL pipelines to unify laser shot data (calorimeters, pyrometers, and CMOS detectors) for temporal and spatial analyses.

INTUITIVE SURGICAL

MECHANICAL ENGINEER (FULL-TIME) | MAY 2017 – AUG 2018 | SUNNYVALE, CA

- Mechanical design and process engineering for complex robotic surgical instruments across da Vinci Xi and da Vinci SP product families.
- Designed and implemented tooling for laser welding, pneumatic crimping, seal lubrication, and Instron testing, from machined parts designs and drawings through process qualification (IQ/OQ/PQ).
- Coordinated with supplier, quality, and regulatory engineers to investigate, root-cause, and resolve defects in injection-molded and machined parts. Chassis, bearings, blades, seals, gears, wires, capstans!