Rajesh Menon

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Rajesh combines his expertise in nanofabrication, computation and optical engineering to impact several fields including inverse-designed photonics, flat lenses and unconventional imaging. His research has produced over 142 peer-reviewed publications, 41 patents, and 4 spin-off companies. His lab has graduated 10 PhD students, 3 of whom are women. Rajesh is a Fellow of the OSA, and Senior Member of the IEEE and of the SPIE. Among his other honors are a NASA Early Stage Innovations Award, the NSF CAREER Award and the International Commission for Optics (ICO) Prize. Rajesh currently directs the Laboratory for Optical Nanotechnologies at the University of Utah, where he is a tenured Associate Professor. He received S.M. and Ph.D. degrees from MIT. He currently serves on, and has served on the Program Committees of the IEEE Photonics Conference, EIPBN, OSA Imaging Systems and Applied Optics Congress, CLEO (Complex media and metamaterials), among many others, and was an Associate Editor of Optics Express, one of the largest Optics journals in the world. He also serves on the high-profile Emerging Technologies Task Force of the IEEE and the Selection committee of the OSA Felds Medal for Biophotonics.

Most significant recent contributions:

- 1st experimental demonstrations of key milestones in flat optics (collaboration with Sensale-Rodriguez) as listed below. The technology is being commercialized by Oblate Optics, Inc., a company that has licensed IP from the U.
    - Largest diameter lens (2020).[1]
    - Largest operating bandwidth (2019).[2]
    - First broadband operation (2016).[3]
    - Smallest f# and large-volume manufacturing process.[4]

- 1st experimental demonstrations of optics-free cameras.[5] These advances based upon cycle-consistent deep neural networks is now incorporated into the curriculum of a new class that I'm teaching this Spring, Computational Photography.

- 1st experimental demonstrations of absorption-free spectral imaging with wide ranging applications in remote sensing to micro-endoscopy.[6] The technology is being commercialized by Lumos Imaging, Inc. that has licensed IP from the U.

- 1st experimental demonstrations of lens-free computational deep-brain microscopy (collaborations with Steve Blair, and Utah Neuroscience, Biology), an approach that was invented at the U.[7] This technology has now been incorporated into my Spring course, Computational Photography.

- 1st experimental demonstrations of inverse-designed nanophotonics (tied with Stanford), which included a series of papers[8] as well as one of the first known patents in this field. Inverse design is now a widely accepted methodology already incorporate into all the major commercial design tools.

- 1st experimental demonstrations of flat-spectrum-splitting-solar concentrators, which led to joint IP at Utah and at MIT. The technology was commercialized by PointSpectrum, Inc. The technology was incorporated into the curriculum of my Fall course, Optics for Energy.

- Invented and experimentally demonstrated a low-power super-resolution optical lithography technique that combines innovations in optics and photochemistry.[9]

- Advised over 32 undergraduate research projects, the vast majority of which were funded by UROP, NSF REU or the German Research Foundation (DaaD).

- Trained 10 post-doctoral scientists and visiting researchers.

References:

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2. M. Meem, S. Banerji, A, Majumder, J. C. Garcia, O. Kigner, P. Hon, B. Sensale-Rodriguez & R. Menon, "Imaging from the visible to the longwave infrared via an inverse-designed flat lens," *Opt. Exp.* 29(13) 20715-20723 (2021)
3. P. Wang, N. Mohammad and R. Menon, "Chromatic-aberration-corrected diffractive lenses for ultra-broadband focusing," *Sci. Rep.* 6, 21545 (2016)
4. A. Majumder, M. Meem, R. Stewart and R. Menon, "Broadband point-spread function engineering via a free-form diffractive microlens array," *Opt. Exp.* 30(2) 1967-1975 (2022).
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6. P. Wang and R. Menon, "Ultra-high sensitivity color imaging via a transparent diffractive-filter array and computational optics," *Optica* 2(11) 933-939 (2015).
7. Ganghun Kim and R. Menon, "An ultra-small 3D computational microscope," *Appl. Phys. Lett.* **105** 061114 (2014).
8. B. Shen, P. Wang, R. C. Polson and R. Menon, "An integrated-nanophotonic polarization beamsplitter with 2.4μm X 2.4μm^2 footprint," *Nature Photonics*, 9, 378-382 (2015).
9. N. Brimhall, T. L. Andrew, R. V. Manthena and R. Menon, "Breaking the far-field diffraction limit in optical nanopatterning via repeated photochemical and electrochemical transitions in photochromic molecules,"*Phys. Rev. Lett.* 107, 205501 (2011).