SIDDHARTH SOMASUNDARAM

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Research Interests

Computational Imaging, Inverse Problems, Time-of-Flight Imaging, Optics

Education

Massachusetts Institute of Technology   **Sep. '22 – May '24**
Media Arts and Sciences (M.S.), <u>GPA</u>: 5.0/5.0   Cambridge, MA

University of California, Los Angeles   **Sep. '17 – Jun. '21**
Electrical Engineering (B.S.), <u>GPA</u>: 3.74/4.0   Los Angeles, CA

Research Experience

MIT Media Lab, Camera Culture Group | *Prof. Ramesh Raskar*   **Jul. '21 – Present**
Graduate Research Assistant (Research Associate from Jul. '21 – Aug. '22)   Cambridge, MA

- Exploiting transients for few-shot non-line-of-sight imaging using analytical and data-driven techniques.
- Analyzed 3D reconstruction bounds on two-bounce time-of-flight measurements using simulated results in Mitsuba.
- Captured experimental two-bounce lidar data using a single-photon avalanche diode (SPAD) and a time-correlated single photon counter (TCSPC).
- Wrote perspective piece on convergence of computational imaging, end-to-end imaging design, and inverse graphics.

Visual Machines Group | *Prof. Achuta Kadambi*   **Jan. '19 – Mar. '21**
Undergraduate Research Assistant   Los Angeles, CA

- Implemented physics-based models to estimate heart rate from image photoplethysmography (iPPG) signals in videos.
- Contributed three chapters and problem sets on "Polarization Imaging", "Multispectral Imaging", and "Programmable Illumination and Shading" to Computational Imaging textbook (available <u>online</u>, forthcoming MIT Press 2022).
- Trained neural network via transfer learning to perform pose estimation around corners using thermal images.

Integrated NanoMaterials Core Lab | *Prof. Diana Huffaker*   **Sep. '17 – Dec. '18**
Undergraduate Research Assistant   Los Angeles, CA

- Designed mid-wavelength infrared (MWIR) InAsSb nanowire photodetectors with photonic crystal gratings for focal plane arrays.
- Optimized optical absorption of nanowire arrays by finite-difference-time-domain (FDTD) simulation in Lumerical.
- Developed comprehensive 3D model combining FDTD and finite element method (FEM) to simulate photocurrent of 3D nanostructure in Sentaurus (poster pdf available upon request).
- Measured photoluminescense (PL) spectrum of InAs(Sb) photodetectors using Fourier-transform infrared (FTIR) spectrometer.

Internships

HRL Laboratories | *Dr. Thaddeus Ladd*   **Jun. '20 – Sep. '20**
Quantum Optics Research Intern (Remote)   Malibu, CA

- Designed optical directional and grating couplers in Lumerical for quantum communication applications.

The Aerospace Corporation | *Dr. William Lotshaw*   **Jun. '19 – Sep. '19**
Photonics Technology Engineer Intern   El Segundo, CA

- Developed material characterization capabilities for Photonics Technology Department by building and documenting a PL spectroscopy setup and numerical simulations.
- Built optical setup to enable measurement of weak PL signals by integrating FTIR spectrometer and lock-in amplifier for amplitude modulation spectroscopy experiments.
- Modeled InAsSb superlattice structures via simulation in Silvaco to understand carrier dynamics.
- Automated knife-edge characterization of Gaussian laser beam using instrument control in LabVIEW.

Technical Skills

Programming: Python, MATLAB, C/C++, LabVIEW
Computer Vision: OpenCV, PyTorch
Simulation: Mitsuba, Lumerical
Optoelectronics: SPAD, TCSPC

Honors/Awards

Academic: Outstanding B.S. in ECE (Finalist), HKN, UCLA Fast Track Scholar (top 15 ECE students in admitted class)
Research: Best Undergraduate Poster ("Thermal Non-Line-of-Sight Imaging", *UCLA ECE Annual Research Review 2019)*
Scholarships: Dan and Helen Low Scholarship in Engineering (UCLA 2019)

Publications

Please refer to my Google Scholar for a comprehensive list.

- **S. Somasundaram**, A. Dave, C. Henley, A. Veeraraghavan, R. Raskar, "Role of Transients in Two-Bounce Non-Line-of-Sight Imaging," **CVPR 2023**.

- C. Henley, **S. Somasundaram**, J. Hollmann, R. Raskar, "Detection and Mapping of Specular Surfaces Using Multibounce Lidar Returns," **Optics Express 2022**.

- **S. Somasundaram***, T. Klinghoffer*, K. Tiwary*, R. Raskar, "Physics vs. Learned Priors: Rethinking Camera and Algorithm Design for Task-Specific Imaging," **ICCP 2022**.

- D. Ren, K. Azizur-Rahman, Z. Rong, B. Juang, **S. Somasundaram**, M. Shahili, A. Farrell, B. Williams, D. Huffaker, "Room-Temperature Mid-Wavelength Infrared InAsSb Nanowire Photodetector Arrays with Al_2O_3 Passivation," **Nano Letters 2019**.

- D. Ren, Z. Rong, K. Azizur-Rahman, **S. Somasundaram**, M. Shahili, D. Huffaker, "Feasibility of Achieving High Detectivity at Short- And Mid-Wavelength Infrared Using Nanowire Photodetectors with P-N Heterojunctions," **Nanotechnology 2019**.

- D. Ren, Z. Rong, **S. Somasundaram**, K. Azizur-Rahman, B. Liang, D. Huffaker, "A Three-Dimensional Insight into Correlation Between Carrier Lifetime And Surface Recombination Velocity for Nanowires," **Nanotechnology 2018**.

- D. Ren, X. Meng, Z. Rong, C. Minh, A. C. Farrell, **S. Somasundaram**, K.M. Azizur-Rahman, B.S. Williams, D.L. Huffaker, "Uncooled Photodetector at Short-Wavelength Infrared Using InAs Nanowire Photoabsorbers on InP with P-N Heterojunctions," **Nano Letters 2018**.