Aamod Shanker

General Information

Graduate Student
Electrical Engineering and Computer Sciences,
University of California, Berkeley, CA - 94709

Email: aamod@berkeley.edu
Phone: 510-926-5525

Research Areas

Computational Imaging, Deep ultraviolet lithography, Phase Retrieval Algorithms, Topographical effects in photomasks

Education

University of California, Berkeley **2011 - Present**
Doctoral Student, Department of Electrical Engineering and Computer Sciences

Indian Institute of Technology **July 2007 - 2011**
Bachelor of Technology in Electronics and Electrical Communication Engineering

Projects and Research Experience

Quantifying thick mask effects in Optical Lithography
with Prof. Andrew Neureuther, Prof. Laura Waller; in collaboration with AMTC, Dresden
Thick mask electromagnetic edge effects in photomasks are analyzed by applying phase imaging methods on through-focus aerial images with 193nm light acquired on an aerial imaging (AIMS) tool. Thick mask edge effects can thus be directly measured for a range of masks and imaging conditions.

Defocus based phase recovery
with Prof. Laura Waller, Lei Tian
A general method for extracting the phase of a thin sample is developed by taking multiple images at a single defocused plane while varying the shape of the source. By using a coded source, rather than coded detection, we can remove moving parts from the imaging system after the object and potentially improve imaging resolution.

Publications/ Proceedings

A. Shanker, L. Tian, M. Sczyrba, F. Lange, B. Connolly, A. Neureuther, and L. Waller, "Characterizing the dependence of thick-mask edge effects on feature size and illumination angle using AIMS images," **SPIE Optical Microlithography XXVIII conference of Advanced Lithography** paper 9426-23, February 2015.

A. Shanker, L. Tian, M. Sczyrba, B. Connolly, A. Neureuther, and L. Waller, "Transport of intensity phase imaging in the presence of curl effects induced by strongly absorbing photomasks," **Applied Optics** 53, J1-J6 (2014).

A. Shanker, M. Sczyrba, B. Connolly, A. Neureuther, L. Waller, "Defocus based phase imaging for quantifying electromagnetic edge effects in photomasks", in **Fraunhofer IISB Lithography Simulation workshop**, September 2014, Hersbruck, Germany. *Invited

A. Shanker, M. Sczyrba, B. Connolly, F. Kalk, A. Neureuther, L. Waller, "Critical assessment of the Transport of Intensity method for phase recovery of photomask edge effects," in **SPIE Optical Microlithography XXVII conference of Advanced Lithography**, paper 9052-49, February 2014, San Jose, CA.

A. Shanker, L. Tian, L. Waller, "Defocus based phase recovery using structured illumination" **Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXI conference of Photonics West 2014**, paper 8949-27, February 2014, San Fransisco, CA

A. Shanker, M. Sczyrba, B. Connolly, F. Kalk, A.R. Neureuther, L. Waller, "Analysis of edge

effects in attenuating phase-shift masks using quantitative phase imaging" **Proc. SPIE 8880, Photomask Technology 2013 conference**, Monterey, CA

Y. Zhu, A. Shanker, L. Tian, L. Waller, and G. Barbastathis, "Low-noise phase imaging by hybrid uniform and structured illumination transport of intensity equation," **Optics Express** 22, 26696-26711 (2014).

Work /Teaching experience

- **Mentor Graphics, May - Aug 2014**: Intern at the Resolution Enhancement Techniques (RET) group working on Deep Ultraviolet (DUV) Lithography .
- **Vice-president, Photobears OSA/SPIE student chapter, 2012- 2013** : Joint student chapter of the SPIE and OSA at the University of California, Berkeley, organizing bi-weekly seminars, social events, outreach activities, including an exhibition at the Bay Area Science Fair Discovery Day 2013 with more than 30,000 attendees that year.
- **Graduate student instructor 2011-2013**
  Introduction to Optical Engineering, Spring 2013 : New course requiring content creation and leading discussion sections.
  Microelectronic circuits, Fall 2011 : Lab instructor for introductory circuits course

Awards

- **Cymer Award, SPIE Advanced Lithography 2015** Best student paper award at Optical Microlithography XXVIII meeting.
- **Sigmund Martin Heller Traveling Fellowship Recipient, 2015** Graduate fellowship for making possible advanced study through travel to other countries.
- **Qualcomm Innovation Fellowship 2014, Finalist**: for proposal "Super-resolution Phase Imaging for Mobile Point-of-Care Diagnostics", 34/130 teams made it to the final round.
- **MITACS Globalink Scholarship 2010**: Research scholarship at the University of Toronto, Canada
- **Todai Scholarship 2009- 2010**: Joint award University of Tokyo - Indian Institute of Technology