

# Sourangsu Banerji

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Lead Optical Engineer at Momentum Optics Inc., CO, USA.

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## Summary and Research Interests

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My research interests lie at the intersection of computer science, electromagnetics, optics, photonics, and advanced manufacturing. My aim is to design and develop advanced intelligent hardware-software systems through employing computational approaches that are neither time-consuming nor memory-intensive yet readily scalable. My Ph.D. work was centered on optical inverse design, where powered by new algorithms, design approaches, and advanced fabrication processes, I demonstrated a series of "extreme" or "thought to be impossible" results. Among many transformative findings, my work showed ultra-thin cameras that are capable of imaging objects placed at dissimilar distances, i.e., as close as millimeters apart from the camera and as far as meters, in focus, simultaneously. I also demonstrated single flat-lenses operating with an extreme bandwidth across several decades of the electromagnetic spectrum, which could enable in the future compact multispectral imaging systems operating from the mm-wave to the UV. Moreover, I showed how machine learning can help in engineering amongst the smallest integrated photonic devices, which could fuel a future Moore's law for photonics. During my research career, I received several awards, including the best paper award in Imaging Systems and Applications at the 2019 OSA Imaging and Applied Optics Congress. I am author or co-author of 25+ journal articles, 30+ conference proceeding papers, 1 book chapters, 40+ conference presentations, and have delivered 3 invited talks and seminars. My h-index is 16+ with 800+ citations according to Google Scholar.

## Education

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**Ph.D.** in Electrical and Computer Engineering

Aug.'2016-Dec.'2020

[University of Utah, Salt Lake City, UT, USA](#)

- Advisor: [Prof. Berardi Sensale-Rodriguez](#)
- Dissertation: *Solving Optical Inverse Design Problems through Computational Methods*

**M.S** in Electrical and Computer Engineering

Aug.'2016-Dec.'2019

[University of Utah, Salt Lake City, UT, USA](#)

**B.Tech.** in Electronics and Communication Engineering

Sept.'2010-Jul.'2014

[West Bengal University of Technology, Kolkata, WB, India](#)

- Advisor: [Prof. Arpan Deyasi](#)
- Dissertation: *Study of Electronic and Electromagnetic Properties of One-Dimensional Photonic Crystal*

## Professional Experience

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[Momentum Optics Inc., Longmont, CO, USA](#)

Jan.'2021-Present

**Lead Optical Engineer**

Apr.'2021-Present

- Key achievement:

✓ Developed computational framework of optical manufacturing tools for laser based fabrication.

# Sourangsu Banerji

## Senior Optical Engineer

Jan.'2021-Apr.'2021

- Key achievement:
- ✓ Developed software tools for computational modeling of novel optics.

[Oblate Optics Inc., San Diego, CA, USA](#)

Jan.'2021-Jun.'2021

## Partner Technical Advisor (Contractual: Part-Time)

- Key achievement:
- ✓ Developed optical systems that enable flat lenses to be designed and characterized using industry-standard lens design software Zemax and Code V.

[University of Utah, Salt Lake City, UT, USA](#)

Sept.'2016-Dec.'2020

## Graduate Research Assistant

[Terahertz Optoelectronics Research Group](#)

- Advisor: [Prof. Berardi Sensale-Rodriguez](#)
- Research activity: Computational diffractive optics; digital metamaterials; plasmonics.
- Key achievements:
- ✓ Developed an algorithm (**GDABS**) for designing planar free-space diffractive optical devices with a lower computation space and time complexity (up to ~10-100X times). (**Patent pending**)
- ✓ Developed a machine-learning algorithm (**b-ARLA**) for designing on-chip integrated nanophotonic devices.

[Cognizant Technology Solutions India Pvt. Ltd., Kolkata, WB, India](#)

Jan.'2015-May'2016

## Programmer Analyst

- Key achievement:
- ✓ Developed an IBM I.D. toolkit for automated mail integration over the client-server (handling capacity ~50,000).

[West Bengal University of Technology, Kolkata, WB, India](#)

Jul.'2013-Aug.'2014

## Research Assistant

- Advisor: [Prof. Arpan Deyasi](#)
- Research activity: Photonic crystals; fundamental physical bounds in bandgap engineering.
- Key achievements:
- ✓ Developed an analytical framework for the study of band structures and wave propagation in 1D photonic crystals.

[Indian Statistical Institute, Kolkata, WB, India](#)

Feb.'2012-Nov.'2014

## Visiting Research Student

[Mathematical Genomics Research Group](#)

- Advisor: [Prof. Pabitra Pal Chowdhury](#)
- Research activity: fractals, image compression techniques.
- Key achievements:
- ✓ Developed an image compression technique based on fractals.

[Variable Energy Cyclotron Center, Kolkata, WB, India](#)

Dec.'2012-Jan.'2013

## Winter Research Intern

[Mechanical Engineering Group \(Cryogenic Instrumentation Section\)](#)

- Advisor: [Dr. Tamal Kumar Bhattacharya](#)
- Research activity: Data acquisition module design for collecting synchrotron data; TCP/Modbus protocols.
- Key achievements:
- ✓ Developed a GUI for remote control of the synchrotron facility; later adopted into other units due to robust design.

# Sourangsu Banerji

## Teaching Experience

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University of Utah, Salt Lake City, UT, USA

Jan.'2017-May'2017

Graduate Teaching Assistant

Department of Electrical and Computer Engineering

- **EC 3200 (Introduction to Semiconductor Physics)**

- Tutored students on solid-state physics, optics, and electronics. Office hour assistance to students. Organized additional one-to-one sessions for students in need of further assistance. Graded homework, student presentations, and exams. Designed and conducted laboratory sessions.

University of Utah, Salt Lake City, UT, USA

Sept.'2016-Dec.'2016

Graduate Teaching Assistant

Department of Electrical and Computer Engineering

- **EC 3300 (EM Theory & Transmission Lines)**

- Tutored students on basic electromagnetic theory. Office hour assistance to students. Graded homework, student presentations, and exams. Designed and conducted laboratory sessions.

University of Utah, Salt Lake City, UT, USA

Sept.'2016-Dec.'2016

Graduate Teaching Assistant

Department of Electrical and Computer Engineering

- **EC 5410/6322 (Microwave Engineering-I)**

- Office hour assistance to students. Graded homework, student presentations, and exams. Proposed final course projects for the students.

## Scientific Contributions

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### Journal Papers

1. Wei Jia, Apratim Majumder, **Sourangsu Banerji**, Rajesh Menon, and Berardi Sensale-Rodriguez, "[Ammonia Optical Gas Sensing Based on Graphene-Covered Silicon Microring Resonators: A Design Space Exploration](#)", Microelectronics Journal, Volume-111, May 2021.
2. **Sourangsu Banerji**, Yu Shi, Vivian Song-En Su, Udayan Ghosh, Jacqueline Cooke, Yong Lin Kong, Lei Liu, and Berardi Sensale-Rodriguez, "[Inverse Designed THz Spectral Splitters](#)", IEEE Microwave and Wireless Component Letters, March 2021.
3. **Sourangsu Banerji**, Apratim Majumder, Alexander Hamrick, Rajesh Menon, and Berardi Sensale-Rodriguez, "[Ultra-compact integrated photonic devices enabled by machine learning and digital metamaterials](#)", OSA Continuum, Volume-2(4), January 2021.
4. Apratim Majumder, Monjurul Meem, **Sourangsu Banerji**, Berardi Sensale-Rodriguez, and Rajesh Menon, "[Versatile Diffractive Flat Optics](#)", Optics and Photonics News, Volume- 31(12), December 2020.
5. **Sourangsu Banerji**, \* Monjurul Meem, \* Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, "[Super-resolution imaging with an achromatic multi-level diffractive microlens array](#)", Optics Letters, Volume- 45(22), November 2020. (\*denotes equal contribution)
6. **Sourangsu Banerji**, Jaqueline Cooke and Berardi Sensale-Rodriguez, "[Impact of Fabrication Errors and Refractive Index on Multilevel Diffractive Lens Performance](#)", Scientific Reports, Volume-10, September 2020.

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7. Monjurul Meem, **Sourangsu Banerji**, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Inverse-designed flat lens for imaging in the visible & near-infrared with diameter > 3mm and NA=0.3](#)”, Applied Physics Letters, Volume-117(4), August 2020.
8. **Sourangsu Banerji**, Apratim Majumder, Alexander Hamrick, Rajesh Menon, and Berardi Sensale-Rodriguez, “[Machine learning enables design of on-chip integrated silicon T-junctions with footprint of  \$1.2\ \mu\text{m} \times 1.2\ \mu\text{m}\$](#) ”, Nano Communication Networks, Volume-25, August 2020.
9. **Sourangsu Banerji**, and Berardi Sensale-Rodriguez, “[Inverse designed achromatic flat lens operating in the ultraviolet](#)”, OSA Continuum, Volume-3(7), July 2020.
10. Monjurul Meem, **Sourangsu Banerji**, Apratim Majumder, Christian Pies, Timo Oberbiermann, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Large-area, high-NA Multi-level Diffractive Lens via inverse design](#)”, Optica, Volume-7(3), March 2020.
11. **Sourangsu Banerji**, \* Monjurul Meem, \* Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Extreme Depth-of-focus Imaging with a flat lens](#)”, Optica, Volume-7(3), March 2020. (\*denotes equal contribution)
12. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Fernando Vasquez Guevara, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Ultra-thin near infrared camera enabled by a flat multi-level diffractive lens](#)”, Optics Letters, Volume-44(22), November 2019.
13. **Sourangsu Banerji**, \* Monjurul Meem, \* Apratim Majumder, Curt Dvornik, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Single flat lens enabling imaging in the short-wave infra-red \(SWIR\) band](#)”, OSA Continuum, Volume-2(10), October 2019. (\*denotes equal contribution)
14. Monjurul Meem, \* **Sourangsu Banerji**, \* Apratim Majumder, Fernando Vasquez Guevara, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Broadband lightweight flat lenses for longwave-infrared imaging](#)” Proceedings of the National Academy of Sciences (PNAS), Volume-116(43), October 2019. (\*denotes equal contribution)
15. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Fernando Vasquez Guevara, Berardi Sensale-Rodriguez and Rajesh Menon, “[Imaging with flat optics: metalenses or diffractive lenses?](#)” Optica, Volume-6(6), June 2019.
16. **Sourangsu Banerji**, and Berardi Sensale-Rodriguez, “[A Computational Design Framework for Efficient, Fabrication Error-Tolerant, Planar THz Diffractive Optical Elements](#)”, Scientific Reports, Volume-9, April 2019.
17. Sara Arezoomandan, Hugo Condori Quispe, Ashish Chanana, Prashanth Gopalan, **Sourangsu Banerji**, Ajay Nahata, and Berardi Sensale-Rodriguez, “[Graphene–dielectric integrated terahertz metasurfaces](#),” Semiconductor Science and Technology, Volume-33(10), September 2018. (Invited article) **[Cover Image for Issue “Special Issue on Terahertz Devices”]**
18. **Sourangsu Banerji**, and Arpan Deyasi, “[Simulating Reflectivity Property for Propagating Wave inside One-Dimensional Photonic Crystal with Different Material Systems](#)”, Journal of Electron Devices, Volume-21, March 2015.
19. **Sourangsu Banerji**, “[Group Theoretic Approach to Study Transfer Matrix Method in One Dimensional Photonic Crystals](#)”, GESJ: Physics, Volume-11(1), July 2014.

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20. **Sourangsu Banerji**, Sayan Bose, Abhishek Halder, Subhasis Mandal, and Arpan Deyasi, “[Comprehensive Review on Band Structure, Density of States and Wave Propagation inside One-Dimensional Photonic Crystal](#)”, International Journal for Research in Applied Science and Engineering Technology, Volume-2(4), April 2014.
21. **Sourangsu Banerji**, Abhishek Halder, Arpan Deyasi, Sayan Bose, and Subhasis Mandal, “[Analytical Computation of Density of States of One-Dimensional Photonic Crystal under Polarized Incident Wave for Different Materials](#)”, Journal of Electron Devices, Volume-19, April 2014.
22. **Sourangsu Banerji**, “[Design and Implementation of an Unmanned Vehicle using a GSM Network without Microcontrollers](#)”, Journal of Electrical Engineering, Volume-14(1), April 2014.
23. Abhishek Halder, **Sourangsu Banerji**, Sayan Bose, Subhasis Mandal, and Arpan Deyasi, “[Computing Density of States of One-Dimensional Photonic Crystal under P-Polarized Incident Wave](#)”, International Journal of Modern Communication Technologies & Research, Volume-2(3), March 2014.
24. **Sourangsu Banerji**, “[To Study the Effect of Grating Length on Propagating Modes in Bragg Filters with  \$\text{Al}\_x\text{Ga}\_{\(1-x\)}\text{N}/\text{GaN}\$  Material Composition](#)”, International Journal of Advanced Science and Technology, Volume-63, February 2014.
25. **Sourangsu Banerji**, “[Upcoming Standards in Wireless Local Area Networks](#)”, Wireless & Mobile Technologies, Volume-1(1), August 2013.
26. **Sourangsu Banerji**, and Rahul Singha Chowdhury, “[On IEEE 802.11: Wireless LAN Technology](#)”, International Journal of Mobile Network Communications & Telematics, Volume-3(4), August 2013.
27. **Sourangsu Banerji**, and Rahul Singha Chowdhury, “[Wi-Fi & WiMAX: A Comparative Study](#)”, Indian Journal of Engineering, Volume-2(5), March 2013.
28. **Sourangsu Banerji**, “[Design and Implementation of developed an Unmanned Vehicle using a GSM Network with Microcontrollers](#)”, International Journal of Science, Engineering and Technology Research, Volume-2(2), February 2013.

## Journal Papers (under review)

1. Orrin Kigner, Monjurul Meem, Brian Baker, **Sourangsu Banerji**, Philip Hon, Berardi Sensale- Rodriguez, and Rajesh Menon, “[Monolithic all-Silicon Flat lens for broadband LWIR Imaging](#)”, arXiv: 2103.14939 [physics.optics], March 2021.
2. Monjurul Meem,\* **Sourangsu Banerji**,\* Apratim Majumder, Juan Garcia, Philip Hon, Berardi Sensale- Rodriguez, and Rajesh Menon, “[Imaging from the Visible to the Longwave Infrared wavelengths via an inverse-designed flat lens](#)”, arXiv: 2001.03684 [physics.optics], January 2020. (\*denotes equal contribution)

## Preprints (not peer-reviewed)

1. **Sourangsu Banerji**, \* Monjurul Meem, \* Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon “[Imaging over an unlimited bandwidth with a single diffractive surface](#)”, arXiv: 1910.07928 [physics.optics], July 2019. (\*denotes equal contribution)
2. **Sourangsu Banerji**, “[Effects of Foreign Direct Investment \(FDI\) in the Indian Economy](#)”, hal-00846825, July 2013.

# Sourangsu Banerji

## Book Chapters

1. Arpan Deyasi, **Sourangsu Banerji**, Sayan Bose, and Abhishek Halder, “[Analytical Computation of Band Structure of 1D Photonic Crystal under Normal Incidence of Electromagnetic Wave](#)”, Lecture Notes in Electrical Engineering: Computational Advancement in Communication Circuits and Systems, Part 6: Advances in Devices and Circuit, Volume-335, Chapter 36, September 2014.

## Patents

1. **Sourangsu Banerji**, and Berardi Sensale-Rodriguez, “Optimization algorithm for nanophotonic structures” (Patent pending).

## Keynote and Invited Talks

1. **Sourangsu Banerji**, and Berardi Sensale-Rodriguez, “[3D-printed diffractive terahertz optical elements through computational design](#)”, SPIE Defense + Commercial Sensing, Baltimore, MD, USA, 10982, May 2019.
2. **Sourangsu Banerji**, Ashish Chanana, Hugo Condori, Sara Arezoomandan, Ajay Nahata, and Berardi Sensale- Rodriguez, “[Demonstration of computational THz diffractive optical elements enabled by a modified direct binary search technique](#)”, 43rd International Conference on Infrared, Millimeter and Terahertz Waves, Nagoya, NP, Japan, September 2018. [[Best Student Paper Award \(Runner Up\)](#)]
3. **Sourangsu Banerji**, “Simulation Tool to Design Diffractive Lenses”, Undergraduate Computer Science Capstone Project Seminar Series, University of Utah, Salt Lake City, UT, USA May 2017.

## Contributed Talks (peer-reviewed)

1. Monjurul Meem, Apratim Majumder, **Sourangsu Banerji**, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Xenos peckii's Compound Eye Structure Inspired Flat Microlens Array for Super-resolution Imaging](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2021.
2. Monjurul Meem, Apratim Majumder, **Sourangsu Banerji**, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Achromatic Broadband Visible Imaging with a 10cm Flat Lens](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2021.
3. Monjurul Meem, Apratim Majumder, **Sourangsu Banerji**, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Free-form Broadband Flat Lens for F-Number and Numerical Aperture Decoupling](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2021.
4. **Sourangsu Banerji**, Yu Shi, Udayan Ghosh, Jacqueline Cooke, Yong Lin Kong, Lei Liu, and Berardi Sensale- Rodriguez, “[Computational Design of THz Spectral Splitters](#)”, 45th International Conference on Infrared, Millimeter and Terahertz Waves, Buffalo, USA, November 2020.
5. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Juan Garcia, Philip Hon, Christian Pies, Timo Oberbiermann, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Inverse Designed Flat Optics for Imaging Applications In The IR And Beyond](#)”, 45th International Conference on Infrared, Millimeter and Terahertz Waves, Buffalo, USA, November 2020.
6. **Sourangsu Banerji**, Alex Hamrick, Apratim Majumder, Rajesh Menon, and Berardi Sensale-Rodriguez, “[Ultra-compact Design of Power Splitters via Machine Learning](#)”, IEEE Photonics Conference, Vancouver, Vancouver, Canada, September 2020 (virtual).

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7. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Juan Garcia, Philip Hon, Christian Pies, Timo Oberbiermann, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Inverse Designed Flat Optics with Diffractive Lenses](#)”, Optical Society of America Imaging and Applied Optics Congress, Vancouver, Canada, June 2020. **[Best Student Paper Award (Finalist)]**
8. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Curt Dvornch, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Imaging Large-Area Ultra-Broadband Achromatic Flat Lens for Imaging in the SWIR](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2020.
9. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Single Flat lens enables Extreme Depth of Focus Imaging](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2020.
10. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Ultra-thin Near-infrared Camera via Single Flat lens for Wide-angle Imaging](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2020.
11. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Imaging across an Unlimited Bandwidth: is it possible?](#)” CLEO: Applications and Technology, San Jose, CA, USA, May 2020.
12. **Sourangsu Banerji**, Alex Hamrick, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Designing Ultra-Compact Silicon T-junctions using Machine Learning](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2020.
13. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Fernando Vasquez Guevara, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Multi-Level Diffractive Lenses for Real-Time Long-Wave IR Imaging](#)”, 44th International Conference on Infrared, Millimeter and Terahertz Waves, Paris, France, September 2019.
14. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Metalenses or diffractive lenses for imaging?](#)”, Optical Society of America Imaging and Applied Optics Congress, Munich, Germany, June 2019. **[Best Paper Award]**
15. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Achromatic Broadband Diffractive Lenses for Focusing and Imaging in LWIR](#)”, Optical Society of America Imaging and Applied Optics Congress, Munich, Germany, June 2019.
16. Apratim Majumder, **Sourangsu Banerji**, Kazumasa Miyagawa, Monjurul Meem, Mark Mondol, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Programmable metamaterials & metasurfaces for ultra-compact multi- functional photonics](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2018.
17. Monjurul Meem, **Sourangsu Banerji**, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Flat Lenses for Ultra-lightweight Longwave-Infrared Broadband Imaging](#)”, CLEO: Applications and Technology, San Jose, CA, USA, May 2018.
18. **Sourangsu Banerji**, Ashish Chanana, Hugo Condori, Ajay Nahata, and Berardi Sensale-Rodriguez, “[Efficient Design of Diffractive THz Lenses for Aberration Rectified Focusing via Modified Binary Search Algorithm](#)”, CLEO: Science and Innovations, San Jose, CA, USA, May 2017.
19. Yunshan Wang, **Sourangsu Banerji**, Jieying Mao, Sara Arezoomandan, Berardi Sensale Rodriguez, and Steve Blair, “[Modification of UV Surface Plasmon Resonances in Aluminum Hole-Arrays with Graphene](#)”, SPIE Optics + Photonics, San Diego, CA, USA, August 2017.



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20. Yunshan Wang, **Sourangsu Banerji**, Jieying Mao, Sara Arezoomandan, Berardi Sensale Rodriguez, and Steve Blair, “[Modification of UV Surface Plasmon Resonances in Aluminum Hole-Arrays with Graphene](#)”, CLEO: Science and Innovations, San Jose, CA, USA, May 2017.
21. Arpan Deyasi, and **Sourangsu Banerji**, “[On the Comparative Analysis of the Band Structure of One-Dimensional Photonic Crystal with Different Material Composition under Oblique Wave Incidence](#)”, National Level Conference on Frontline Research in Computer, Communication, and Device, Kolkata, WB, India, December 2015.
22. **Sourangsu Banerji**, and Arpan Deyasi, “[Application of Group Theory in Transfer Matrix Technique for Band Structure Calculation in 1D Photonic Crystal](#)”, International Conference on Computer, Communication, and Control, Kolkata, WB, India, September 2015.
23. Arpan Deyasi, and **Sourangsu Banerji**, “[Computing Photonic Eigen-Modes and Bandwidth for 1D Photonic Crystal with Different Material Compositions](#)”, 2nd National Conference on Emerging Trends in Engineering & Sciences, Kolkata, WB, India, July 2015.
24. Arpan Deyasi, and **Sourangsu Banerji**, “[Analysis of Reflectivity for Propagating Wave inside 1D Photonic Crystal with Different Material Systems](#)”, International Conference on Computing, Communication & Manufacturing, Kolkata, WB, India, December 2014.
25. Arpan Deyasi, **Sourangsu Banerji**, Abhishek Halder, and Sayan Bose, “[Theoretical Investigation on Photonic Bandgap Tailoring in One-Dimensional Photonic Crystal using Different Numerical Methods](#)”, International Conference on Devices, Circuits and Communications, Kolkata, WB, India, September 2014.
26. Sayan Bose, Abhishek Halder, **Sourangsu Banerji**, and Arpan Deyasi, “[First-order Calculation of Band Structure of One-Dimensional Photonic Crystal](#)”, National Conference on Materials, Devices, and Circuits in Communication Technology, Burdwan, WB, India, February 2014.
27. **Sourangsu Banerji**, Arpan Deyasi, Abhishek Halder, and Sayan Bose, “[Comparative Study of Density of States of 1D Photonic Crystal for Different Polarization Conditions of Incident Wave](#)”, National Conference on Materials, Devices, and Circuits in Communication Technology, Burdwan, WB, India, February 2014.

## Contributed Abstracts (peer-reviewed)

1. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Juan Garcia, Philip Hon, Christian Pies, Timo Oberbiermann, Berardi Sensale-Rodriguez, and Rajesh Menon, “[Inverse Designed Flat Optics with Multilevel Diffractive Lenses](#)”, SPIE Optics + Photonics, San Diego, CA, USA, August 2020.
2. **Sourangsu Banerji**, Yu Shi, Palal Ghosh, Vivian Song-En Su, Jacqueline Cooke, Yong Lin Kong, Lei Liu, and Berardi Sensale-Rodriguez, “[3D printable compact THz spectral splitters via inverse design](#)”, SPIE Optics + Photonics, San Diego, CA, USA, August 2020.
3. Xueling Cheng, **Sourangsu Banerji**, Jieying Mao, Sara Arezoomandan, Ting Zhang, Steve Blair, and Berardi Sensale Rodriguez, and Yunshan Wang, “[UV surface plasmon resonance modification by graphene Pi plasmon resonance](#)”, SPIE Optics + Photonics, San Diego, CA, USA, August 2019.
4. **Sourangsu Banerji**, Monjurul Meem, Apratim Majumder, Berardi Sensale-Rodriguez, and Rajesh Menon. “[Imaging with ultra-lightweight flat lenses: visible near-IR to long-wave IR](#)”, SPIE Optics + Photonics, San Diego, CA, USA, August 2019.



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5. **Sourangsu Banerji**, Ashish Chanana, Hugo Condori, Ajay Nahata, and Berardi Sensale-Rodriguez, “[Modified direct binary search: an algorithm for designing aberration corrected diffractive THz lenses](#)”, SPIE Optics + Photonics, San Diego, CA, USA, August 2018.
6. **Sourangsu Banerji**, Monjurul Meem, Ashish Chanana, Ajay Nahata, Rajesh Menon and Berardi Sensale-Rodriguez, “[From Visible to THz: Planar Optics for Lightweight, Small Form-Factor High-Precision, Energy Efficient Laser Applications](#)”, São Paulo School of Advanced Science (SPSAS) + XVI Jorge André Swieca School on Non linear and Quantum Optics, Sao Paulo, SP, Brazil, July 2018. [[Student Poster Award](#)]
7. **Sourangsu Banerji**, Hugo Condori, Ashish Chanana, Ajay Nahata, and Berardi Sensale-Rodriguez, “[Aberration Rectified THz Beam Focusing via Diffractive Lens Design Using a Modified Direct Binary Search Algorithm](#)”, 2018 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting, Boston, MA, USA, July 2018.
8. **Sourangsu Banerji**, Yunshan Wang, Jieying Mao, Sara Arezoomandan, Steve Blair, and Berardi Sensale Rodriguez, “UV Surface Plasmon Resonance Modification in Aluminum Nanohole-Arrays Using Graphene”, Electronic Materials Conference (EMC), Notre Dame, IN, USA, June 2017.

## Scientific Honors, Awards, and Recognitions

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### **Best Student Paper Award (Finalist)** (2020)

Award Committee: [Optical Society of America](#)

- For the paper titled “Inverse Designed Flat Optics with Diffractive Lenses”

### **Virtual Conference Award** (2020)

Award Committee: [University of Utah](#)

- To present my research at the IEEE Photonics Conference (virtual).

### **OSAF/CLEO Presentation Grant Award** (2020)

Award Committee: [Optical Society of America \(OSA Foundation and the Incubic/Milton Chang Travel Fund\)](#)

- To present my work at CLEO: Laser Science and Applications at San Jose, CA, USA.

### **Best Paper Award** (2019)

Award Committee: [Optical Society of America](#)

- For the paper titled “Metalenses or diffractive lenses for imaging?”

### **Best Student Paper Award (Runner Up)** (2018)

Award Committee: [The International Society of Infrared, Millimeter, and Terahertz Waves](#)

- Best Student Paper Award (Runner Up) for “Demonstration of Computational THz Diffractive Optical Elements Enabled by a Modified Direct Binary Search Technique.” (Top 6 out of 150+ submissions)
- Keynote Talk “Demonstration of Computational THz Diffractive Optical Elements Enabled by a Modified Direct Binary Search Technique.”

### **SPIE Chapter Officer Travel Award** (2018)

Award Committee: [Society of Photographic Instrumentation Engineers \(SPIE\)](#)

- To attend the "Leadership Workshop" at SPIE Optics + Photonics, San Diego, CA, USA.
- To present research at SPIE Optics + Photonics, San Diego, CA, USA.

### **Student Poster Award** (2018)

Award Committee: [São Paulo School of Advanced Science \(SPSAS\) + XVI Jorge André Swieca School on Non-linear and Quantum Optics \(SWIECA\)](#)

- For the paper titled "From Visible to THz: Planar Optics for Lightweight, Small Form-Factor High-Precision, Energy Efficient Laser Applications."

# Sourangsu Banerji

- Selected among 25 candidates from all over the world and invited to attend the São Paulo School of Advanced Science (SPSAS) + XVI Jorge André Swieca School on Nonlinear and Quantum Optics (SWIECA), organized by the Center for Lasers and Applications, located inside the Nuclear and Energy Research Institute, IPEN, at the University of São Paulo (USP) in Brazil.

## University of Utah Graduate School Travel Assistance Award (2018)

Award Committee: [University of Utah](#)

- To present research at CLEO: Laser Science and Applications, San Jose, CA, USA.

## SPIE Optics + Photonics Travel Award (2017)

Award Committee: [Society of Photographic Instrumentation Engineers \(SPIE\)](#)

- To present research at SPIE Optics + Photonics at San Diego, CA, USA.

## University of Utah Graduate Fellowship (2016)

Award Committee: [University of Utah](#)

- A one-year fellowship that is reserved for a limited number of Ph.D. applicants. The fellowship provides for support during the first year at a level of \$21,000/year.

## Research Funding

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### [Amazon Cloud Credits for Research Program](#)

- **Proposal:** Free Space Optical Devices Based on Computational Design of Diffractive Optic Elements
- **Status:** Completed
- **Funding amount:** \$10,000

### [NSF INTERN Program](#)

- **Proposal:** Advancing compatibility of novel flat lenses with commercial lens design processes
- **Status:** Completed
- **Funding amount:** \$15,555

## Technical Skills

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- **General** : Windows, Linux
- **Programming Languages** : Java, C/C++, Python
- **Database** : SQL (Oracle DB, MySQL, PostgreSQL)
- **Measurement Tools** : Toptica THz CW system, VDIE THz Tx-Rx synthesizer, THz imager, CMOS/CCD image sensors, NKT Photonics laser system, Optical bench measurements.
- **Software Packages** : Lumerical, MATLAB®, Code V, ANSYS HFSS®, CST Microwave Studio, Zemax, COMSOL Multiphysics, FRED
- **Fabrication** : Greyscale Photolithography (Diffractive Optic Elements)

## Professional Service

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### Reviewer

- **OSA Journals:** Optics Express, Optical Materials Express, Journal of Optical Society of America B, Journal of Optical Society of America A, Photonics Research, OSA Continuum
- **IEEE Journals:** Journal of Lightwave Technology, IEEE Transactions on THz Science and Technology
- **Nature Journals :** Scientific Reports
- **AIP Journals:** APL Photonics, Applied Physics Letters
- **IOP Journals:** Journal of Physics D: Applied Physics
- **Degruyter Journals:** Advanced Optical Technologies

# Sourangsu Banerji

## Professional Society Memberships

- Member, [Society of Photographic Instrumentation Engineers \(SPIE\)](#) (2016 - present).
- Member, [Optical Society of America \(OSA\)](#) (2017 - present).
- Member, [Institute of Electrical and Electronics Engineers \(IEEE\)](#) (2017 - present).

## Media and Press (Selected)

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- [1] [Flat Lens One of Year's Top Tech](#) – UoU Engineering, December 2020.
- [2] [Researchers Create Focus-Free Camera with New Flat Lens](#) - OSA.org, March 2020.
- [3] [Flat Lens for Focus-Free Imaging](#) - Optics & Photonics News, March 2020.
- [4] [Flat lens offers route to focus-free imaging](#) - Optics.org, March 2020.
- [5] [Researchers create focus-free camera with new flat lens](#) - Phys.org, March 2020.
- [6] [One lens to rule them all: smartphones with multiple cameras and blurry photos could become a thing of the past as engineers create a flat lens that doesn't need focusing](#) - Daily Mail UK, March 2020.
- [7] [Thin to Win](#) – News Wise, November 2019.
- [8] [Ultra-thin lens being developed in Utah to change future smartphones and drones](#) - Fox 13 News, November 2019.
- [9] [New Lens Could Provide Thermal Imaging Capabilities in More Compact Camera](#) – Photonics.com, November 2019.
- [10] [New Cheap, Thin, and Light Camera Lens for Thermal Imaging](#) - azooptics.com, November 2019.
- [11] [New lens 20 times thinner than human hair set to replace camera bumps](#) - Daily Mail UK, November 2019.
- [12] [Engineers develop thin, lightweight lens that could produce slimmer camera phones, longer-flying drones](#) - Science Daily, November 2019.
- [13] [New lens design could lead to slimmer smartphones, longer-flying drones](#) - The Times of India (ET Telecom), November 2019.
- [14] [ECE Student wins Best Paper](#) - Utah ECE News, July 2019.
- [15] [Sourangsu Banerji, University of Utah, USA, discusses his work in the next generation of metasurfaces](#) - OSA Stories, August 2018.
- [16] [New tech may lead to 'Star Wars' style 3D holograms](#) - Deccan Chronicle, July 2017.

A full list can be found here:

[https://github.com/Sourangsu/sourangsu.github.io/blob/master/files/press\\_coverage\\_2019\\_2020.xlsx](https://github.com/Sourangsu/sourangsu.github.io/blob/master/files/press_coverage_2019_2020.xlsx)