SPIE
Student Chapter
Indian Institute of Space Science and Technology

ANNUAL REPORT (2016-2017)
<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 July, 2016</td>
<td>OUTREACH PROGRAM</td>
<td>Members visited Kollam Govt. School to teach basic optics.</td>
</tr>
<tr>
<td>17 August, 2016</td>
<td>VISITING LECTURE by Dr. N. Apurv Chaitanya from PRL Ahmedabad</td>
<td>Topic of the talk: Nonlinear interaction of structured optical beams.</td>
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<tr>
<td>14 September, 2016</td>
<td>STUDY TOUR / LAB VISIT</td>
<td>School students have visited our lab facility.</td>
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<tr>
<td>14 October, 2016</td>
<td>GUEST LECTURE by Prof. Steen Grüner Hanson, Denmark Technical University</td>
<td>Topic of the talk: Speckles – how to analyze, utilize and commercialize.</td>
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<tr>
<td>16 November, 2016</td>
<td>STUDY TOUR / LAB VISIT</td>
<td>School students have visited our lab facility.</td>
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<tr>
<td>10 December, 2016</td>
<td>OUTREACH PROGRAM</td>
<td>Members visited Harvest Mission School, pongode, Trivandrum to teach basic optics.</td>
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<tr>
<td>21 December, 2016</td>
<td>STUDY TOUR / LAB VISIT</td>
<td>School students have visited to our lab facility.</td>
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<tr>
<td>10 January, 2017</td>
<td>VISITING LECTURE by Dr. Alok Kumar Singh, University of Stuttgart, Germany.</td>
<td>Topic of the talk: 3D Imaging with Scattering medium.</td>
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<tr>
<td>1 February, 2017</td>
<td>WORKSHOP - ‘SEEING THE UNSEEN BY LIGHT’</td>
<td>A talk delivered by Dr. Rakesh Kumar Singh, Associate Professor, IIST and workshop on the same.</td>
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<tr>
<td>15 February, 2017</td>
<td>CHAPTER MEETING</td>
<td>A meeting was conducted with all the present members of SPIE IIST chapter for the Selection of Chapter officers.</td>
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<tr>
<td>10 March, 2017</td>
<td>OUTREACH PROGRAM</td>
<td>Talk delivered by Dr. Rakesh Kumar Singh in Krishnammal Women’s College, Coimbatore.</td>
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<tr>
<td>3 &amp; 4 March, 2017</td>
<td>World of Illusions - EXHIBITION</td>
<td>An exhibition was conducted on 3rd and 4th of March in the aegis of Indian Institute of Space Science and Technology in which several experiments based on basic and advanced concepts of light were exhibited.</td>
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<tr>
<td>4 March, 2017</td>
<td>HOLOGRAPHY WORKSHOP</td>
<td>Demonstrations and holography workshop was conducted in the adaptive optics lab and students could make their own holograms.</td>
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<tr>
<td>4th April 2017</td>
<td>Interaction and meeting of SPIE members</td>
<td>An informal meeting of members to interact more personally.</td>
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About SPIE @ IIST 2016-2017

The SPIE chapter at IIST associated with the applied optics lab at our facility, has been very much successful this year in bringing together people from interdisciplinary fields in performing experiments in the lab, training the undergrads and exposing them to current line of research, by conducting several scientific talks, demonstrations, outreach programs. Student meetings are conducted to discuss new ideas. New undergrads in the streamline of Engineering physics, and also graduate students with specialization in Optical Engineering have joined our SPIE chapter this year.

Using the Quality Lighting Teaching (QLT) Kit from SPIE we gave demonstrations in schools after taking ideas and suggestions given through hangouts and tutorials arranged by this QLT kit program. Two students from the chapter were accepted for the SPIE officer travel grant for the SPIE Optics + Photonics conference this year.

------------------------------------ Our Lab ---------------------------------------------

Applied and Adaptive Optics Lab at IIST
SPIE IIST CHAPTER conducted a workshop on ‘SEEING THE UNSEEN BY LIGHT’ which was done by the IIST Chapter members KUMAR RISHAV and YAGYA MALIK on 1st Feb, 2017 at Indian Institute of Space Science and Technology.
This consisted of a talk delivered by Dr. Rakesh Kumar Singh, Associate Professor, IIST.
Dr. Rakesh emphasized on topics such as Speckle imaging, polarization and Digital Holography and also gave a small abstract on all fields where research in going on in the Optics Lab of IIST.

The Talk was followed by a demonstration cum workshop, which was conducted in the Adaptive and Applied Optics Lab of IIST where experiments based on Polarization, Speckle imaging and Digital Holography were presented and a lot of students showed interest and participated in it. Students were shown those experiments which were theoretically explained by Dr. Rakesh Sir in the talk initially.
Mr. Shalabh Mishra (SPIE Member) explaining formation of Speckles.

Demonstration on Polarization by Mr. Sreelal (SPIE Member).

Demonstration of wavefront sensors by Surya Gautam (SPIE Member).
WORLD OF ILLUSIONS - EXHIBITION

An exhibition was conducted on 3rd and 4th of March in the aegis of Indian Institute of Space Science and Technology in which several experiments based on basic and advanced concepts of light were exhibited. Experiments based on TIR, Laser Sensors, Peppers Ghost, Infinite well etc. was shown. This was an event during the Annual Technical Festival ‘Conscientia’ of IIST.
Demonstrations of optics exhibition along with the display of posters on Light pollution given by SPIE as part of Quality Lighting and Training kit program.

Demonstration of Infinite LED wall.

The glimpses and highlights of the event is upload on the SPIE IIST YouTube Channel

https://www.youtube.com/watch?v=uC2UvJQSR38&t=35s
HOLOGRAPHY WORKSHOP

Around 100 students of a near-by school were brought to IIST to get the basic knowledge and concepts of optics.

After the presentation and demonstration, a holography workshop was conducted in the adaptive and applied optics lab and students could make their own holograms. Interested students were allowed to bring their own objects of which they want to record the holograms. A Hologram of a lady statue is recorded and reconstructed image has shown below.
Lectures by visiting professors

“Speckles – how to analyze, utilize and commercialize” by Prof. Steen Grüner Hanson on 14th October 2016

Prof. Hanson is associated with Department of Photonics Engineering, Denmark Technical University.

Abstract of his talk - A matrix-based method for analyzing statistical issues within coherent optics was being discussed followed by a description of a series measurement system.

This includes measuring mechanical properties, such as velocity, rotational speed, as well as novel touch pad concepts and wavemeters. Emphasis will be put on simple, non-contact, low-cost systems that can be easily commercially implemented. In short: the talk was intended for inspiring the audience to embrace the concept of speckles, and thus be able to bring forward new ideas.
Professor Steen Hanson had stayed in IIST for 7 days and beside his talk he had a good discussion with the Research scholars and M. tech students. Those discussions were very useful and here one of the student has shared his views.

One of most humble and logical man, I met Prof. Steen Hanson during his visit to Indian Institute of Space Science and Technology under SPIE student chapter. He was very helpful in discussing some of the experimental aspects related to my work in speckles. We had an in-depth discussion on the nature of speckles during propagation and the transformation they undergo during the same. Since my work was based on cross-correlation based on temporal averaging, he also focused more on size of speckles i.e. transverse as well as longitudinal and its effects on the nature of correlation function 2D or 3D. There was also extensive discussion on how the change in correlation function should follow which was later on gleaned and derived by me to prove the same. I am grateful to SPIE student chapter for giving me an opportunity to meet such a personality and also being able to share such constructive and prolific time.

Shalabh Mishra
Mtech Student

“Nonlinear interaction of structured optical beams” by - Dr. N. Apurv Chaitanya from Physical Research Laboratory, Ahmedabad.

Summary of his lecture -
We have extended the application of higher order light matter interaction into a relatively unexplored field- ‘generation of coherent structured beams’. We have generated optical beams in various spatial profiles including Gaussian beam, Laguerre Gauss beams, “perfect” vortex beams, Airy beam and hollow Gaussian beam in demanding spectral and temporal domains which otherwise cannot be accessed through the principles of linear optics.
“3D Imaging with Scattering medium” by Dr. Alok Kumar Singh from University of Stuttgart, Germany

Dr. Alok Kumar Singh, who has done masters from IIT, Delhi and PhD. from Stuttgart University, delivered a talk on 10th Jan 2017 at IIST.
Talk delivered by Dr. Rakesh Kumar Singh, in the Women’s College, Coimbatore on 10 March, 2017.

The title of the talk was ‘Optical Imaging’.
SPIE OUTREACH PROGRAMS

SPIE members visited Kollam Govt. College, as a part of SPIE OUTREACH Program to demonstrate and teach basic optics.
(L to R: Pramod Panchal, Madhu V Nair, Sreelal, Darshika Singh, Vinu R. V., Annie)
SPIE OUTREACH PROGRAMS

SPIE members visited Harvest Mission School, Trivandrum as a part of SPIE OUTREACH Program to demonstrate and teach basic optics.
SPIE OUTREACH PROGRAMS

Student Lab Visit: Students from nearby schools were invited to visit our optics facility.
This year two of students from IIST chapter (KUMAR RISHAV and YAGYA MALIK) are selected for the SPIE officer travel grant to attend the SPIE Optical Metrology, Munich 2017 going to be held from 24th Jun- 29th Jun 2017.

Last year conference visit by our student members (Swapnil Singh and Shreeya Natrajan) attended the SPIE Optics + Photonics conference 2016.
Interaction and meeting of SPIE members

Several informal meeting were held time to time to discuss various issues with SPIE-IIST chapter members to have their opinion on our chapter activities and their continual active support for our chapter.

We had a meeting on 15 Feb, 2017 to discuss regarding the Chapter Officers. Also we had a meeting regarding the future plans.
RESEARCH ACTIVITIES DONE BY STUDENT MEMBERS

- Measuring polarization vector from the diffused light.
- Correlation tuning by spatial light modulator.
- Determining helicity and topological structure of coherent vortex beam from laser speckle.
- Anisotropy imaging using polarization and angular multiplexing.
- Sparsity assisted approach for imaging from laser speckle.
- Lensless complex amplitude image retrieval through a visually opaque scattering medium.
- Efficiently using Compressed Sensing technique on Fourier Transform Holography.
- Initiated a simple, effective and most widely applicable method to study and quantify manipulation in correlation structure, in the field of coherence and polarisation.
- Determining Ellipsometric parameters of a thin film using Ghost imaging.
- Study of Quantum aberration of beam propagating through atmospheric turbulence.
- Investigation on Anisotropic samples using coherent interferometer.
- Quantitative phase imaging: Scalar and Vectorial domain analysis.
Future plans

- **Topical meeting on Applied and Adaptive Optics on 11-13\(^{th}\) August 2017.**
- **Planning to have a visit to one of the ISRO unit with the student members after the start of the coming academic year.**
- **Collaborate with ‘Nirmaan’, IIST’s social cause group to have SPIE Outreach programs to various schools and colleges of Trivandrum. This year we had an outreach program with the help of Nirmaan team.**
- **Organize a symposium for paper presentation in optics and photonics to bring together the common minds of this generation.**
- **Planning to have specific events and competitions in our college annual technical fest which would specifically be organized by the SPIE chapter members.**

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**Indian Institute of Space Science Technology (IIST) in association with OSI (Optical Society of India), will organize an international topical meeting on Applied and Adaptive optics in India during 11.08.2017 to 13.08.2017.**

*(See next page for details)*

Trivandrum, 29\(^{th}\) May 2017

Mr. Pramod Panchal

Chapter President
Indian Institute of Space Science and Technology (IIST) in association with OSI (Optical Society of India), OSA (Optical Society of America) and SPIE (USA) will organize an international topical meeting on Applied and Adaptive Optics for the first time in India during 11.08.2017 to 13.08.2017. This topical meeting will have Plenary Lectures, Invited lectures and Poster presentations only and there will not be any contributed papers. The meeting is expected to cover topics like, Diffractive Optics, Optical fabrication and Testing, Opto-Mechanical Design, Freeform Optics, Optical design, Optical metrology, Optical Non Destructive Testing, Imaging through atmospheric turbulence, Wave front Sensing and correction, Stellar Speckle Interferometry, Biomimetic mirrors, Fiber optics sensors, Digital holographic interferometry and microscopy, Speckle Interferometry, Diffraction Topography, Optical Coherence Tomography, LIDAR etc.

Registration Fees

1. Indian Participants: Rs. 5,000.00
2. OSI Members: Rs. 4,000.00
3. Student Participants: Rs. 2,000.00
4. Foreign Delegates: USD 450.00
5. Foreign Student participants: USD 200.00
6. Foreign Student Participants: USD 100.00

Note: Retired Professors and Scientists who are invited to deliver Plenary/Invited lectures and Research scholars who are not getting fellowships in India need not pay the registration fees. Depending upon availability of funds, TA/DA will be given to deserving students who do not have any funds for travel from their parent organization. Registration fees include conference kit, lunch, dinner and break time tea/coffee and snacks on all 3 days.

Address for all correspondences

The Secretary,
INTOPMAA-2017
Department of Physics, IIST,
Valiamala (PO), Trivandrum - 695547, INDIA
E-mail: secretaryintopmaa@gmail.com
## Expenditure

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Unspent money from last year (2016)</td>
<td>₹ 48138</td>
</tr>
<tr>
<td>Money obtained from SPIE as chapter activity grant (2017)</td>
<td>₹ 70000</td>
</tr>
<tr>
<td>Total money left for the session 2016-17</td>
<td>₹ 118138</td>
</tr>
<tr>
<td>IIST SPIE chapter webpage subscription/awareness campaign(2016-17)</td>
<td>₹ 8000</td>
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<tr>
<td>Expenses for visiting lecturer programs(2016-17)</td>
<td>₹ 32400</td>
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<tr>
<td>Expenses for arranging Optics exhibition, outreach programs, workshop and Meetings(2016-17)</td>
<td>₹ 22500</td>
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<tr>
<td>Cumulative expenditure till 29th May 2017</td>
<td>₹ 62900</td>
</tr>
<tr>
<td>Money left for further activities for the session 2017-18</td>
<td>₹ 55328</td>
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</tbody>
</table>

On behalf of Chapter member

Mr. Surya Gautam

Treasurer

29/05/2017
LIST OF STUDENT MEMBERS AND FACULTY MEMBERS

Dr. Rakesh Kumar Singh (Faculty Member)

SOUMYA ASOKAN
NOEL CHAWANG
BHAVANA DINESH
LEKSHMI ESWAR
SURYA GAUTAM
YERRANNAIDU GOLLANGI
VIPIN KUMAR
ARUNITA KUMARI
SREELAL M.
YAGYA MALIK
SHALABH MISHRA
JIGYASA NIGAM
PRAMOD PANCHAL
DARSHIKA SINGH
AJAY POTDAR
MADHU POTTEKAT
YASH PRAJJWAL
UTHAMAPRIYA R.
KUMAR RISHAV
SOURADEEP ROY CHOU DHURY
SWAPNIL SINGH
ARNAV TAMRAKAR
PRANAV TIWARI
SAI MEGHANA TUNIMIPATI
ANNIE VARGHESE
GAYATRI VIJAYAN
AMEEN YASIR
Newly elected chapter officers 2017-2018

President: Pramod Panchal
Vice President: Lekshmi E
Treasurer: Surya Gautam
Secretary: Yagya Malik
Co-secretary: Arunita Kumari
Advisor: Rakesh Kumar Singh

Contacts:
Dr. Rakesh Kumar Singh: krakeshsingh@iist.ac.in
Mr. Pramod Panchal: pramod.panchal25@gmail.com

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THE END
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