Goa University

School of Physical and Applied Sciences

University Science and Instrumentation Centre

B.Voc in Electronics, Instrumentation and Computer Networking

Report on

"ATAL FDP on IMAGING SPECTROSCOPY AND MACHINE LEARNING"

1. Title of the Event/Activity/program	ATAL FDP on IMAGING SPECTROSCOPY AND MACHINE LEARNING
2. Date and Time	**9th to 14th Jan 2023: 7pm-9pm (online)** **16th to 20th Jan 2023 : 9am-5pm (offline)**
3. Mode of conduct (Physical/Online)	Hybrid
4. School/ Directorate/ Section	University Science and Instrumentation Centre, SPAS, Goa University
5. Collaborating Agency/School/Directorate	AICTE TRAINING AND LEARNING (ATAL) ACADEMY
6. Detail of the Resource Person (Brief biodata)	**Prof. Raghavendra Ramachandra**, Professor, Department of Information Security and Communication Technology Faculty of Information Technology and Electrical Engineering, Gjøvik, Norway 2. **Prof. G. M. Naik**, Professor of High Academic Grade in Electronics, Former Dean of Natural Sciences, Goa University 3. **Dr. Lokesh C. Tribedi**, (Group Leader), Full Professsor (H), Department of Nuclear and Atomic Physics, Tata Institute of Fundamental Research, Mumbai, India 4. **Dr. Rajesh Kushawaha,** Assistant Professor, Scientist, Physical Research Laboratory

	Ahmedabad 5. **Prof. Vithal Tilvi**, Professor, Research, Development & Innovation Goa State Higher Education Council, DHE, Goa 6. **Dr. Kiran Raja**, Associate Professor, Department of Computer Science, Faculty of Information Technology and Electrical Engineering, Gjøvik, Norway 7. **Dr. Pankaj Wasnik**, Principal Research Scientist, Sony Research India Pvt. Ltd., Bengaluru, India 8. **Dr. Anil Rane**, Assistant Professor, Institute of Psychiatry & Human Behaviour, Government of Goa 9. **Prof. Rajendra Gad**, Vice- Dean, School of Physical and Applied Sciences, Goa University 10. **Dr. Narayan Vetrekar**, Assistant Professor, School of Physical and Applied Sciences, Goa University
7. Number of Faculty attended/participated	22
8. Number of Student attended / participated	20
9. No. of external students/faculty/other participants	-
10. The objectives of the Program/activity/event	This Two-week Faculty Development Program (FDP) focuses on Fundamentals of Imaging Spectroscopy and machine learning. The objective is to enrich enthusiasts in the field with recent trends and research in the Imaging Spectroscopy in modern applications. Further, the major focus would be to provide conceptual and training of various machine learning algorithms such as Deep Learning, Tensor Flow, etc., along with hands-on training implementation to deliver the practical skills to the participants. Finally, FDP would be focused on using machine learning algorithms in imaging spectroscopy for different applications.
11. Description of the Program/activity/event	The Faculty Development Programme was organized from 09th to 20st January 2022 by University Science Instrumentation Centre under the School of Physical and Applied Sciences, Goa University. In these two weeks of Faculty Development Programme various related topics based on Imaging Spectroscopy and Machine learning were discussed and deliberated by renowned resource persons in these areas. The FDP was financially supported by AICTE Training and learning academy. A total of 45

	Participants registered for the programme from the electronics and computer science background. They comprised of faculties, Ph.D student and post graduate students from Goa and other states such as Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Puducherry and Delhi. The two weeks of FDP were conducted in two phases. The phase I of this progamme was conducted in an on-line mode from 9th to 14th January 2023 and the lectures of these session were scheduled from 7:00pm to 9:30pm as per IST. While the phase II of this programme was conducted in in offline mode from 16th to 20th January 2023. The offline week was manly based explaining the theory and practical hand-on using Matlab and Python.
12. Benefit/Key outcomes of the Program/activity/event	Participants were able to gain the comprehensive knowledge and training in the Imaging Spectroscopy and Machine Learning, Emerging research areas in imaging spectroscopy and Machine learning algorithms. Further, participants were benefitted by key highlights of NEP 2020, Best teaching learning practices, Time and stress management and Research methodology concepts.
13. Enclosures with report	URL OF THE EVENT : https://drive.google.com/drive/folders/1Ju8bC19Lusaf5Ye5FlTTrjJjlJBtTcxu?usp=sharing (online) BROCHURE PHOTOS: https://drive.google.com/drive/folders/1HGV6ovMAGWfu7RWEU7S5nLAZWppmOUWq https://drive.google.com/drive/folders/1H35yhS6mbZofhqPiglqz-RFXqIOjtyfb https://drive.google.com/drive/folders/1cZ5OjFWHq94CRWeNzApbreF8f3HaXMkF https://drive.google.com/drive/folders/1V-J7lMujDok0qAVXXytkqPelSoyLrhgk

Signature:

Name of coordinator: Prof. Rajendra Gad

Designation: Dean

Signature

Dean/Director/Head

Seal of the School/Directorate/University

School of Physical and Applied Sciences
Goa University

Following are the list of participants approved for FDP.

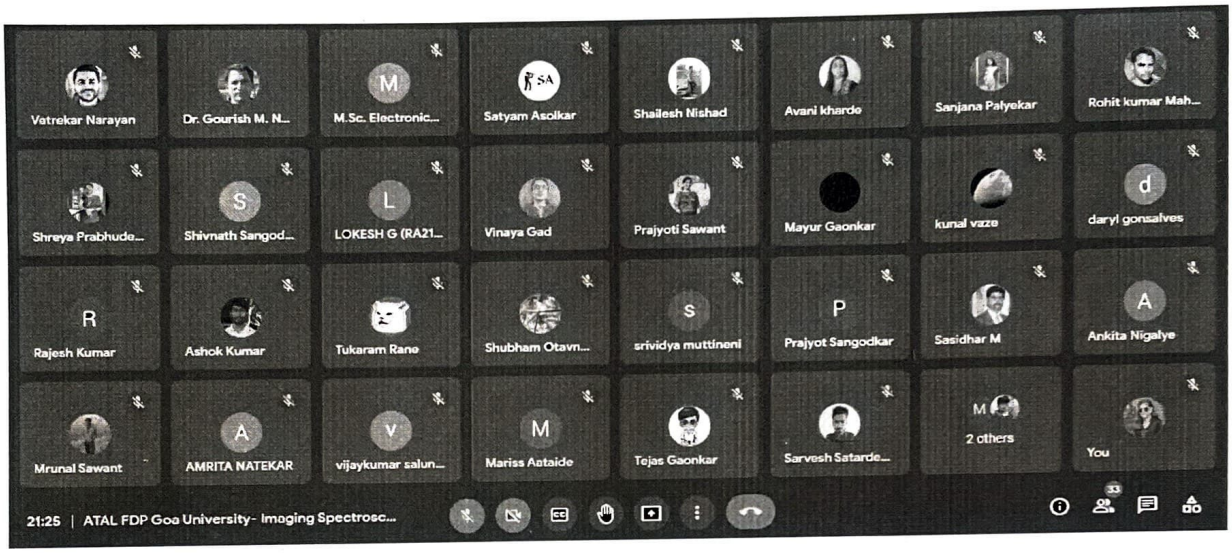
Name

1. Dr. Koteswara Rao kodepogu
2. Mr. LOKESH GOPINATH
3. Mr. ANIL KUMAR PALLIKONDA
4. Mr. CHETLA CHANDRA MOHAN
5. Mrs. Ranjana Battur
6. Dr. ASHISH KUMAR MOURYA
7. Dr. MUTTINENI SASIDHAR
8. Mr. MUTTINENI PRAPUL
9. Dr. PUJA SHASHI
10. Dr. Sandeep Babu Gawali
11. Miss Marissa Lourdes de Ataide
12. Mrs. Shreya Sanket Prabhudesai
13. Mr. RAJESHKUMAR.M
14. Mrs. yogini prabhu
15. Mrs. Avani Anil Kharde
16. Dr. VADIVEL
17. Dr. Sabeena Beevi K
18. Mr. Mrunal Vishwanath Sawant
19. Mr. pramil kumar sinha
20. Mr. Ashok kumar
21. Mr. Chandra Mohan Mahto
22. Mr. Anil Kumar mishra
23. Mr. Alexander R
24. Mr. mayur sanjay gaonkar
25. Miss Sanjivani Deelip Palekar
26. Mrs. MUTTINENI SRIVIDYA
27. Mr. Sunny Rathee
28. Mr. Daryl Gonsalves
29. Miss Sanjana Palyekar
30. Mr. Rutik Shrirang Shanbhag
31. Mr. Rohit kumar mahato
32. Mr. Shivnath alias Hrutvik Suryakant Sangodkar
33. Mr. Kunal Kishor Vaze
34. Mr. Prajyot Sangodkar
35. Miss Ankita Ajit Nigalye
36. Mr. Narayan Shankar Gaonkar
37. Mr. Tukaram Ulhas Rane
38. Mr. Vijaykumar Anand Salunke
39. Mr. Shaileshkumar Laluram Nishad
40. Dr. Marlon Darius Sequeira
41. Mr. Vaman Govekar
42. Mr. Satyam Satyawan Asolkar
43. Mr. Shubham Otavanekar
44. Mr. Sanchai S.Mhamal
45. Miss Krishna Patel
46. Dr. Aniketh Gaonkar
47. Mr. Abhijeet Dattatray Borkar

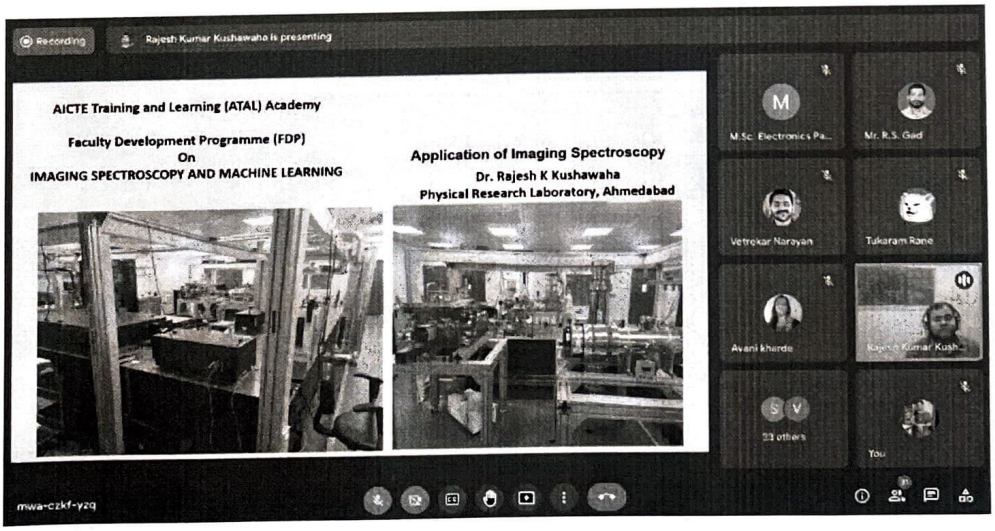
PHOTOS:

Week 1:

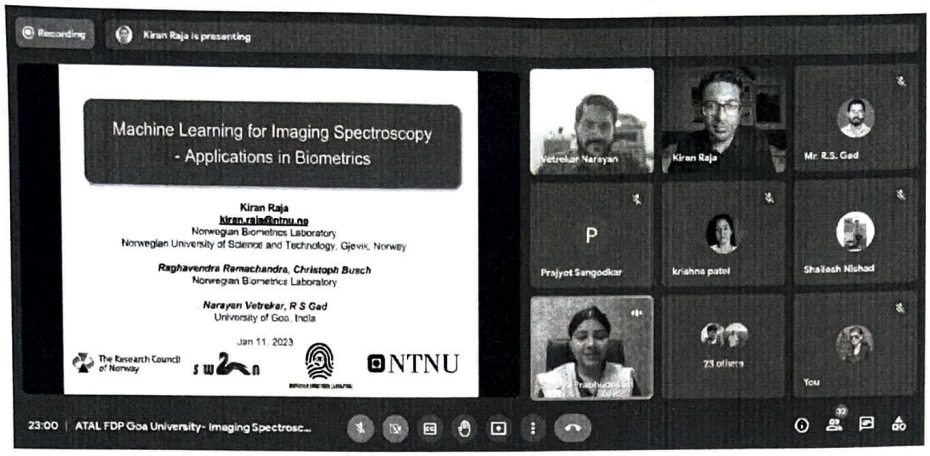
The FDP started on 09th January 2022 with the Day 1 session on Accelerator based atomic molecular sciences: Some basics and applications by Dr Lokesh C Tribedi, Tata Institute of Fundamental Research, Mumbai.



On the 2nd day of the ATAL FDP, 10th January 2022 Dr. Rajesh Kushawaha, Physical Research Laboratory, ISRO, Ahmedabad, delivered a lecture on various areas where spectroscopy is used and presented with case studies.

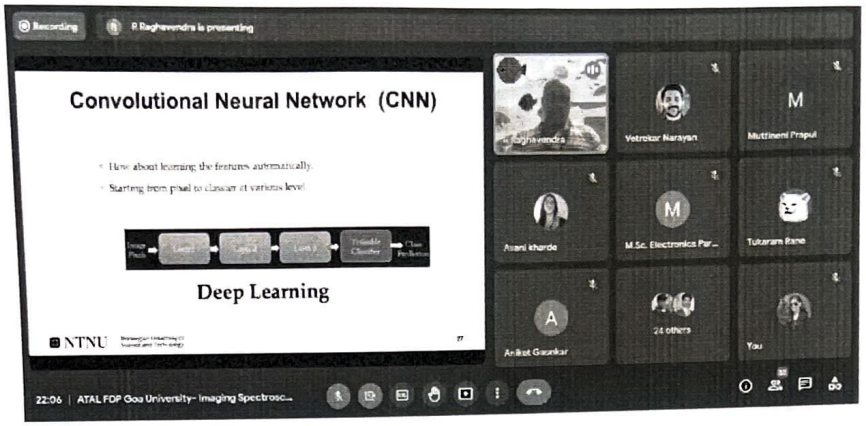


On the 3rd day of the online, Dr. kiran Raja, NTNU Norway; gave a talk on basics and applications of biometrics where he focused mainly on spectral face detection and challenges involved in it. He also focused on estimating gender using machine learning.

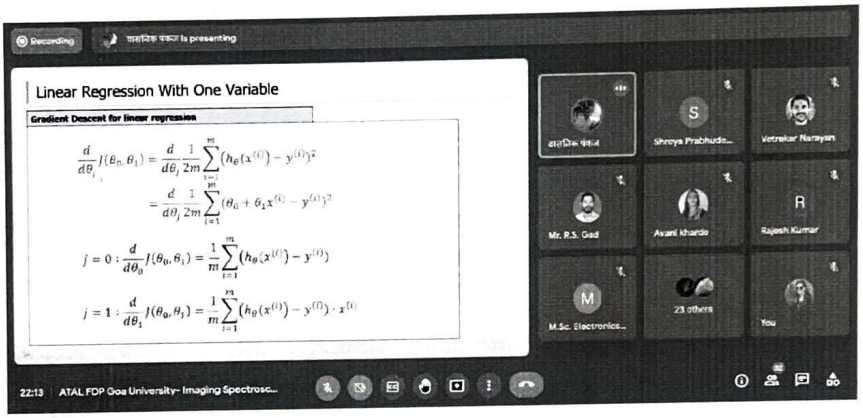


On the 4th day of the ATAL-FDP, Prof. Gaurish Naik, Former Dean of Natural Sciences, Goa University; delivered the lecture on National education policy 2020 where he spoke about importance and evolution of NEP. Prof Gaurish also guided the participants on the guidelines of programmes like dual degree programme, twinning programme and joint degree programme under NEP 2020.

On day 5 of this FDP, Prof. Raghavendra Ramachandra, NTNU, Norway; gave a comprehensive introduction to deep learning and its applications. In his session 1, he spoke about the popular cnn networks like AlexNet, Resnet etc. In session 2, he spoke about numerical and categorical features, Recurrent neural network and text data processing.

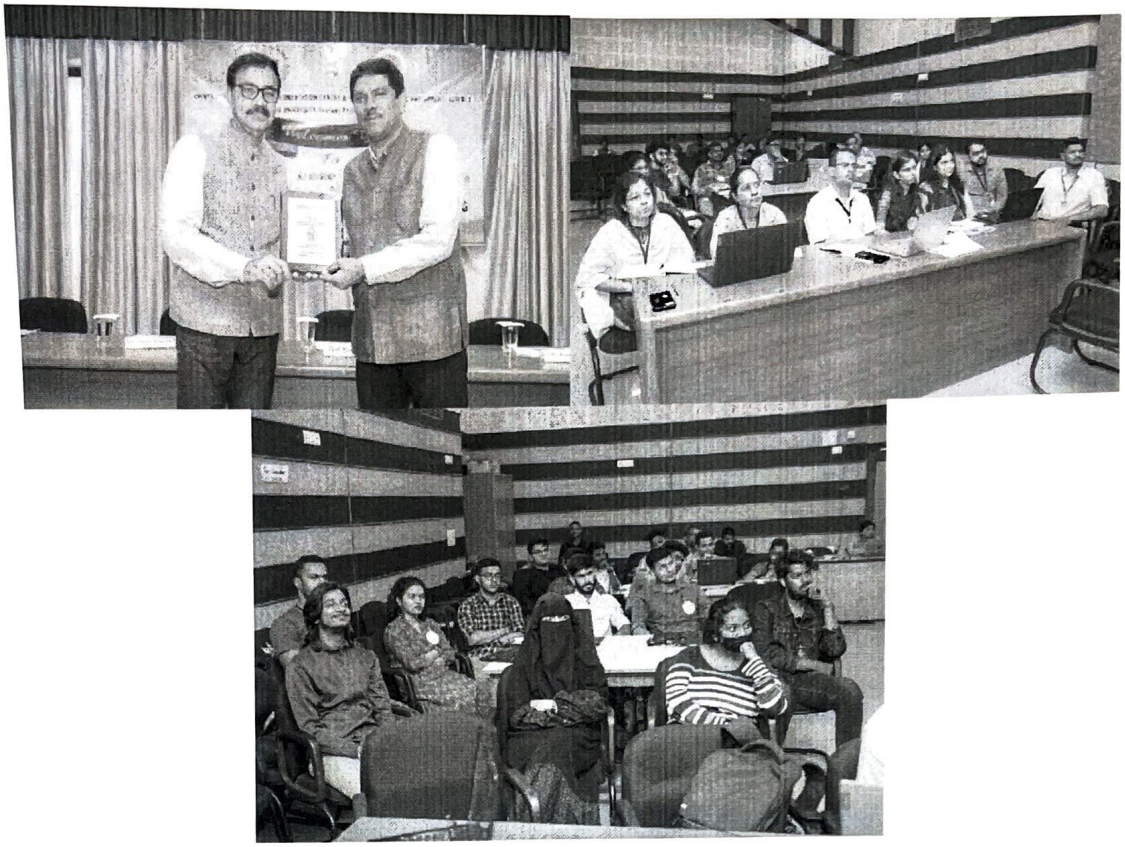


On the last day of the online session, Dr. Pankaj Wasnik, Principal research Scientist, at Sony research India pvt ltd, Bangalore spoke about bias and variance, linear regression, regularization, structured and unstructured data processing and their relation in learning the algorithm.

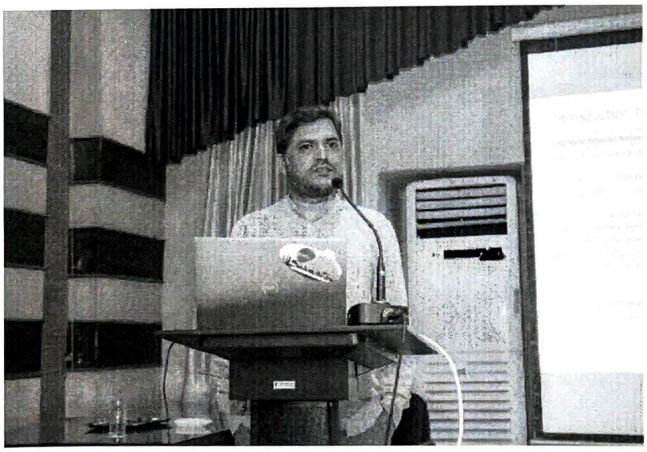


Week 2:

The inaugural function was conducted in offline mode in the second week of the ATAL-FDP where Prof. Gad, Vice dean SPAS, welcomed the guest and gave brief introduction about the FDP programme. There were total 14 technical sessions conducted during the two week FDP. Six session were conducted in Online mode and 8 sessions were in Offline mode.



On the first day of the offline session, two sessions were conducted and both were delivered by Dr. Pankaj Wasnik who continued his lecture with introduction to neural networks and deep learning where the topics covered included CNN basics, various padding operations, 3D convolution and image classification. In session 2 of, we had a session on introduction to tensorFlow by Dr. Pankaj Wasnik followed by a hands on session with it. Both these lectures were hands-on with the Python programming.

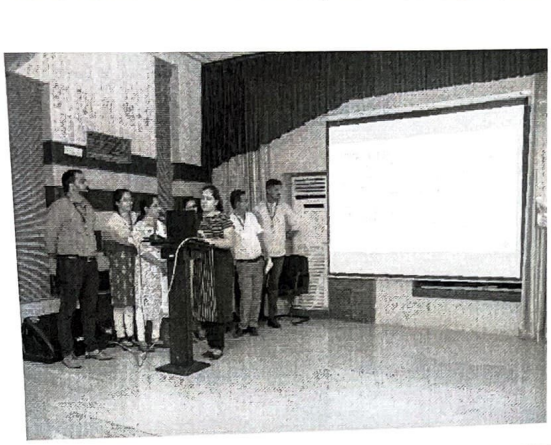
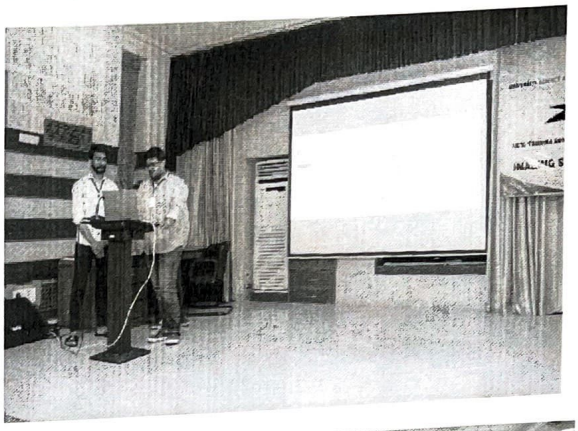


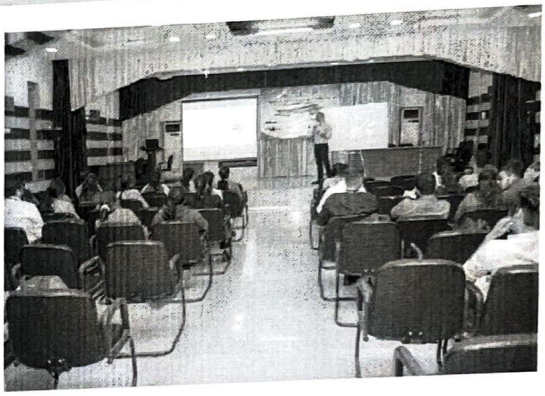
On Day 2 of offline session, the participants were divided into five groups and they were told to present their understanding of a research article 1. Each group was given 5

minutes of duration to present the article. This session was based on the group activity, presentation and organizing skills and on the understanding level of the article, and this was evaluated by Prof. Rajendra S. Gad. Later, we gave a hands on session on MATLAB based data acquisition, data preprocessing and its various techniques for classification using classical algorithms on Goa University multispectral facial biometrics. As a part of the ATAL FDP, all the participants had an opportunity to visit the national institute of Oceanography at Dona Paula in the evening session. The functioning of the NIO and its research areas were inaugurated by Dr. Narsinh Thakur, Senior principal scientist at NIO, and Dr. Supriya Shet Tilvi, Principal scientist at NIO and their team.

Day 3 of the offline session commenced with article 2 presentation by all five groups, followed by a hands on session on different feature extraction techniques such as wavelets, HOG, LBP and two class classification problem using MATLAB by Dr.

Narayan Vetrekar. In the evening session, Dr. Kiran Raja continued his lecture on spectral face biometrics where he provided us a practical session on data normalization, multiclass classification, discriminant functions, and metrics using MATLAB



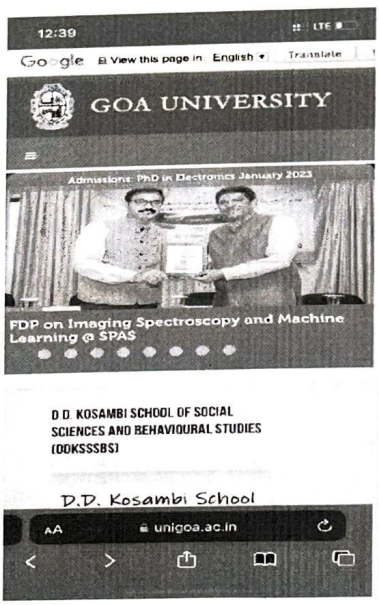
Day 4 of the offline session, Dr. Digamber Porob presented the application of artificial intelligence in lighting with many examples and a group activity where each group gave presented different ideas on usage of light and AI. Followed by this, a session 13 was addressed by Dr. Anil Rane, Institute of Psychiatry & Human Behaviour (IPHB), Govt. of Goa on stress and time management where he provided various tips to handle stress.


Day 5, the session was delivered by Prof. Raghavendra Ramachandra, Professor, Department of Information Security and Communication Technology, Norwegian University of Science and Technology (NTNU), Gjøvik, Norway. Major focus of this talk

was to demonstrate the advancement and how to address the challenges using imaging spectroscopy in different application. FDP concluded with the valedictory session.




This is the brief summary of all the sessions conducted on two week FDP on Imaging Spectroscopy and Machine Learning. Following are some social media/ print media publicity images



PATRON

Prof. Harilal B. Menon

Honourable Vice-Chancellor, Goa University

ORGANISING COMMITTEE

Prof. Kaustubh Priolkar- Convener

Dr. Jivan Parab- Member

Mrs. Shreya Prabhudesai- Member

Dr. Sandeep Gawali- Member

Dr. Aniketh Gaonkar- Member

Dr. Marlon Darius Sequeira- Member

COORDINATOR

Prof. Rajendra Gad

Vice-Dean, School of Physical and Applied Science
Goa University

CO-COORDINATOR

Dr. Narayan Vetrekar

Asst. Professor, School of Physical and Applied Sciences, Goa University

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About the University

Goa University was established under the Goa University Act of 1984 (Act No. 7 of 1984) and commenced operations on 1 June 1985. The University took over the enhanced role of Centre of Post-Graduate Instruction and Research (CPIR) which was set after the liberation of Goa by India in December 1961, by the University of Bombay (now Mumbai), in June 1962. Since 1985 Goa University offers graduate and post-graduate studies and research programmes. It is currently (2014-19) accredited to the National Assessment and Accreditation Council (NAAC) in India with A Grade. The National Institutional Ranking Framework (NIRF) has currently (2021) ranked the University at 96 among the Indian Universities. Among the QS World University Rankings for 'BRICS countries 2019', Goa University is among the group of 241-250 universities. QS University rankings has ranked Goa University in the range of 61-65 among Indian Universities for the year 2022 and among the QS World University Rankings for 'QS Asia University Rankings 2022', Goa University is among the group of 501-550 universities.

About the Department

University Science Instrumentation Centre (USIC) is a central instrumentation facility of the university consisting of Electronics, Mechanical and Glass Blowing workshops managed by faculties, officers and trained technicians. The work undertaken by USIC can be broadly classified as Analytical services for sophisticated instruments, Maintenance of equipment of Language and Science Laboratory, Fabrication of teaching aids, Development of new instruments, thus covering entire objective of USIC.

AICTE Training and Learning (ATAL) Academy

ATAL

Faculty development Programme (FDP)

On

IMAGING SPECTROSCOPY AND MACHINE LEARNING

From

9th to 20th January 2023

Organised by

University Science and Instrumentation Centre
School of Physical and Applied Science

GOA UNIVERSITY
गोवा विश्वविद्यालय
Knowledge is Divine

Goa University
Taleigao Plateau, Goa, India, 403206

FDP TIMETABLE (OFFLINE)

Time	Day 1 (16/01/2023)	Day 2 (17/01/2023)	Day 3 (18/01/2023)	Day 4 (19/01/2023)	Day 5 (20/01/2023)
09:00- 09:30am	Breakfast				
09:30-10:00am	Inauguration	Research Methodology	Article 1 & 2 Discussion	National Education Policy (NEP) 2020	Demonstrating the Case Study
10:00-10:30am					
10:30-11:00am	Tea Break				
11:00-11:30am	Deep Learning				
11:30-12:00 noon			Machine Learning for Imaging Spectroscopy- I		
12:00-12:30pm		Teaching Practice		MCQ	Visit Report (Team)
12:30-01:00pm					
01:00-1:30pm				Lunch	
01:30-02:00pm	Lunch				
02:00-02:30pm				Time and stress management	Reflection Journal
02:30-03:00pm	Tensor Flow	Visit to NIO Goa	Machine Learning for Imaging Spectroscopy- I		
03:00-04:00pm					Feedback
04:00-04:30pm			Machine Learning for Imaging Spectroscopy- II		Valedictory
04:30-05:00pm					
5:00-5:30pm					

About the FDP

This Two-week Faculty Development Program (FDP) focuses on Fundamentals of Imaging Spectroscopy and machine learning. The objective is to enrich enthusiasts in the field with recent trends and research in the Imaging Spectroscopy in modern applications. Further, the major focus would be to provide conceptual and training of various machine learning algorithms such as Deep Learning, Tensor Flow, etc., along with hands-on training implementation to deliver the practical skills to the participants. Finally, FDP would be focused on using machine learning algorithms in imaging spectroscopy for different applications.

Guidelines for participation

1. The FDP is open for faculty members of the AICTE approved institutions, Research Scholars, PG Scholars, participants from Govt., Industry and staff of host Institution.
2. Follow the guidelines declared in the FDP to submit your daily attendance.
3. An assessment test will be conducted on the last day of the programme for all the participants.
4. Certificate shall be issued to the participants who are registered on ATAL Portal and having 80% attendance and more than overall 70% marks in assessment test.

Contact Details

Mrs. Shreya Prabhudesai : **9763385618**

Dr. Narayan Vetrekar : **9423211264**

Important Information

- **Week 1:** 9th – 14th January 2023
- **Time:** 7 PM to 9:30 PM (Monday – Saturday)
- **Week 2:** 16th – 20th January 2023
- **Time:** 09:30 AM to 04:00 PM (Monday – Friday)
- **Target Audience:** Assistant Professors/Associate Professors/Ph.D. scholars/PG students
- **Capacity:** Min/Max Limit- 30/50 participants from the HEIs from the same city/within 100 km of host institute.
- **Mode of Conduction:** Blended/Hybrid
- **Learning Platform:** Zoom/ Google Meet
- **Venue:** Goa University, Taleigao Plateau, Goa
- **Coordinator:** Prof. Rajendra Gad, Vice-Dean, SPAS, Goa University
- **Co-Coordinator:** Dr. Narayan Vetrekar, Asst. Professor, SPAS, Goa University
- **Registration fees:** Free (First come-first-serve-bases)
- **Participants can register for the FDP in the AICTE ATAL portal: https://www.aicte-india.org/atal**
- **Last date of Registration:** 31st December 2022
- **Confirmation of Registration:** 2nd January 2023

Highlights

- Insight on recent trends in Imaging Spectroscopy and Machine Learning
- Industrial visits.
- Visit to nearby Institute of National Importance.
- Focus on Emerging research areas in Imaging Spectroscopy and Machine Learning
- Hands on sessions in demonstrating the cases study in the thematic area.
- Analysis & reflection of quality research journal articles in the proposed field.
- Session on National Education Policy (NEP) 2020 Implementation.
- Session on Indian values & ethos, Classroom conduct & behaviour (teaching learning psychology)
- Sessions on Life Skills such as time and stress management
- Sessions on Research Methodology for upcoming researchers

Resource Persons:

1. **Prof. Raghavendra Ramachandra**, Professor, Department of Information Security and Communication TechnologyFaculty of Information Technology and Electrical Engineering, Gjøvik, Norway
2. **Prof. G. M. Naik**, Professor of High Academic Grade in Electronics, Former Dean of Natural Sciences, Goa University
3. **Dr. Lokesh C. Tribedi**, (Group Leader), Full Professsor (H), Department of Nuclear and Atomic Physics, Tata Institute of Fundamental Research, Mumbai, India
4. **Dr. Rajesh Kushawaha,** Assistant Professor, Scientist, Physical Research Laboratory Ahmedabad
5. **Prof. Vithal Tilvi**, Professor, Research, Development & Innovation Goa State Higher Education Council, DHE, Goa
6. **Dr. Kiran Raja**, Associate Professor, Department of Computer Science, Faculty of Information Technology and Electrical Engineering, Gjøvik, Norway
7. **Dr. Pankaj Wasnik**, Principal Research Scientist, Sony Research India Pvt. Ltd., Bengaluru, India
8. **Dr. Anil Rane**, Assistant Professor, Institute of Psychiatry & Human Behaviour, Government of Goa
9. **Prof. Rajendra Gad**, Vice- Dean, School of Physical and Applied Sciences, Goa University
10. **Dr. Narayan Vetrekar**, Assistant Professor, School of Physical and Applied Sciences, Goa University

FDP TIMETABLE (ONLINE)

Time	Day 1 (9/01/2023)	Day 2 (10/01/2023)	Day 3 (11/01/2023)	Day 4 (12/01/2023)	Day 5 (13/01/2023)	Day 6 (14/01/2023)
07:00- 07:50pm	Imaging Spectroscopy-I	Imaging Spectroscopy-II	Hyperspectral & Multispectral Imaging	Application of Imaging Spectroscopy	Machine Learning I	Machine Learning II
07:50- 08:00pm	Break					
08:00- 08:50pm	Imaging Spectroscopy-I	Imaging Spectroscopy-II	Hyperspectral & Multispectral Imaging	Application of Imaging Spectroscopy	Machine Learning I	Machine Learning II
08:50- 09:00pm	Break					
09:00-09:30pm	Interaction	Interaction	Interaction	Interaction	Interaction	Interaction

Course Outcome

Participants will be able to gain the comprehensive knowledge and training in the Imaging Spectroscopy and Machine Learning, Emerging research areas in imaging spectroscopy and Machine learning algorithms. Further, participants understand key highlights of NEP 2020, Best teaching learning practices, Time and stress management and Research methodology concepts.

How to Apply?

Registration:Link: - https://www.aicte-india.org/atal

- After clicking on this link, please login yourself with your username and password.
- After successful login, Please click on Workshops
- After clicking on Workshop link, On the dashboard:
  - Select state as Goa
  - Select Month as January
  - Select Thrust area as Engineering
- After doing this you can apply for the Faculty Development Programme on "Imaging Spectroscopy And Machine Learning" Organised by University Science and Instrumentation Centre, School of Physical and Applied Science-Goa University"
- Just click on + button to apply for workshops.
- FDP Application Number: 1650625059

Accommodation

With limited rooms available, accommodation shall be provided to outstation participants on first-come-first-serve basis.

We are very much delighted to conduct this Two-week FDP and expect your co-operation throughout the programme.