

Activities of the IEEE GRSS Kolkata Chapter

The initiative for the IEEE Geoscience and Remote Sensing Society (GRSS) Kolkata Chapter was advanced by Prof. Ashish Ghosh in 2010. The Chapter was approved and began functioning on 19 September 2012. Since then, this academic society has strived to bring together, under a single umbrella, geoscience and remote sensing researchers from India, particularly from the northeastern part. This plan has promoted a boost in the knowledge-sharing process. The Kolkata Chapter is the second GRSS Chapter established in India.

Our first chair was Prof. Animesh Maitra, who presided over the activities of the Chapter during 2012–2016. He was succeeded by Prof. Ashish Ghosh (2017–2018). The current GRSS

The executive committee consists of

- ▶ Animesh Maitra (Calcutta University, Kolkata)
- ▶ Barun Raychaudhuri (Presidency University, Kolkata)
- ▶ Tulsi Bezbaruah (Gauhati University, Assam)
- ▶ Ashish Ghosh (Indian Statistical Institute, Kolkata)
- ▶ Imon Mukherjee (Indian Institutes of Information Technology, Kalyani)
- ▶ Debadatta Swain (Indian Institutes of Technology Bhubaneswar)
- ▶ Saurabh Das (Indian Institutes of Technology, Indore).

A dedicated webpage was recently developed for the Chapter (Figure 1). Information related to Chapter activities is available at <http://sites.ieee.org/kolkata-grss/>.

HISTORICAL SIGNIFICANCE

In most parts of the world, researchers are now interested in specializing in geographic information systems, geoscience, and remote sensing, having recognized the prospects of discoveries in the field. While India is a populated country with a high ratio of youth, there is always a big concern regarding the lack of skilled workers. As advancement in technology progressed, the public has realized the continuously growing importance of this sphere. India launched its first remote sensing satellite, *IRS-1A*, at Baikonur on 17 March 1988 [1], and, from then onward, there was no turning back. India accelerated its research and development toward

THIS ACADEMIC SOCIETY HAS STRIVED TO BRING TOGETHER, UNDER A SINGLE UMBRELLA, GEOSCIENCE AND REMOTE SENSING RESEARCHERS FROM INDIA.

Kolkata Chapter leadership is as follows:

- ▶ Prof. P.K. Nanda (Siksha 'O' Anusandhan University, Odisha), chair
- ▶ Prof. Susmita Ghosh (Jadavpur University, Kolkata), vice chair
- ▶ Dr. B. Uma Shankar (Indian Statistical Institute, Kolkata), vice chair
- ▶ Arijit De (Netaji Subhash Engineering College, Kolkata), secretary
- ▶ Sandip Nandi (Kalyani Government Engineering College, Kalyani), joint secretary
- ▶ Dr. Dalia Nandi (Indian Institutes of Information Technology, Kalyani), treasurer
- ▶ Dr. Swastika Mukherjee (Chakraborty) (Sikkim Manipal Institute of Technology, Sikkim), nominations chair.

Digital Object Identifier 10.1109/MGRS.2019.2956765
Date of current version: 6 March 2020



FIGURE 1. The QR code for the GRSS Kolkata Chapter webpage.

this domain, and today many industries are encouraged to use the tools in their businesses. The government uses a variety of these technologies for agriculture, forest cover analysis, irrigation, building planning, transportation, and many other applications [2], [3].

The main thrust toward research on remote sensing in India was inaugurated in Kolkata by the late Prof. Sisir Kumar Mitra [4]. In 1925, when Kolkata was called *Calcutta* and India was under British rule, a wireless laboratory was set up at the physics department of Calcutta University. For this reason, Kolkata has been a historically significant place in India in terms of carrying out the activities of geoscience and remote sensing.

GEOGRAPHICAL SPREAD

The Chapter headquarters is situated at Kolkata, West Bengal; however, the region that this Chapter includes is vast (Figure 2). It encompasses 13 Indian provinces: Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, and West Bengal. This geographical spread is reflected in the diversity of members of the Chapter. Although it initially started with only 15 members, the membership base has since increased fourfold. Presently, there are 69 members in total, with 10 senior members, 32 members, and 27 student members.

STUDENT CHAPTERS

The Chapter not only promotes research across the region but also aims to bring together interested young researchers. Recently, the Chapter aided in the creation of two Student Branch Chapters, located at the Netaji Subhash Engineering College, Kolkata, and the Sikkim Manipal Institute of Technology, Sikkim.

We were fortunate to attract more than 12 IEEE GRSS members, senior members, or fellows to these Student Chapter, which are making dynamic investments in each GRSS field. Student Chapters like these aim at providing novel opportunities to share knowledge by tutoring and holding conferences and meetings revolving around common research interests. They offer help both inside the student network and to nearby networks outside academia, such as industries and the government.

ACHIEVEMENTS

The GRSS Kolkata Chapter was quite successful during 2017–2018. We received monetary support of US\$8,200 in 2017 and US\$15,000 in 2018 for our activities. Also, the Sikkim Manipal Institute of Technology Student Chapter claimed the GRSS Student Grand Challenge Award in 2018 with a financial prize of US\$6,000.

In addition, the GRSS Kolkata Chapter was selected as the nodal Chapter for the International Workshop on Advanced Machine Learning Techniques for Climate Informatics (CHAPNET) for both 2018 and 2019. This is an international collaboration among several Chapters from different

countries. The theme of CHAPNET 2018 was Remotely Sensed Big Data Analytics and Mining. The Kolkata Chapter was the leader among others who participated in this event, including the Benelux, Western New York, Bombay, Hyderabad, and Brazil Chapters. CHAPNET 2019 was also led by the Kolkata Chapter and hosted by the Indian Statistical Institute, Kolkata. The other participants were the Benelux, Western New York, Bombay, Hyderabad, and Singapore Chapters.

The biggest achievement for the GRSS Kolkata Chapter was to receive the Chapter Excellence Award and a Regional Leader Award in 2019 (Figures 3 and 4). These special awards given to advance and mark noteworthy success for the growth of a Chapter were presented to Prof. Ghosh during the GRSS International Geoscience and Remote Sensing Symposium (IGARSS) held at Yokohama, Japan, 28 July–2 August 2019 (Figure 5). Prof. Ghosh also received an award for his significant contributions and service toward the advancement of the IEEE and the engineering professions.

CHAPTER ACTIVITIES

The Chapter has conducted numerous outreach programs over different parts of its geographical area to promote the GRSS. We organized seminars and hosted workshops

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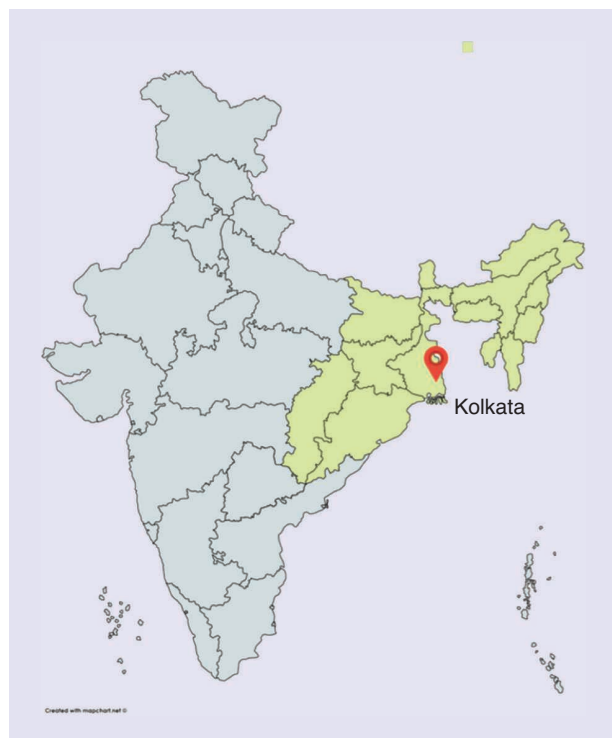


FIGURE 2. The geographical spread of the GRSS Kolkata Chapter.

mainly focusing on the topic of developing big data analytics and deep learning in remote sensing. Young researchers from different parts of India participated in these workshops. This manpower development is helping educate researchers in geoscience in India.

With the help of speakers from developed countries who share their valuable experiences with young Indian researchers and students, we continue to encourage young researchers to become interested in new areas of the GRSS. As previously noted, this fostered the formation of two new student Chapters, showing that the Kolkata Chapter has been successful in attracting students in the field to the GRSS.

This Chapter also recently started a Best Student Paper contest. To attract members, the GRSS Kolkata Chapter offered a one-year subsidized membership for winners of student paper competitions in workshops or conferences in addition to the prize and certificates.



FIGURE 3. The Chapter Excellence Award certificate presented to the GRSS Kolkata Chapter.



FIGURE 4. The Regional Leader Award certificate, presented to Prof. Ghosh.

ACTIVITIES DURING 2017

2017 was a year of multiple activities for this Chapter. The following seminars were conducted:

- 1) Semantically Enhanced Approach for Spatial Interpolation
 - Speaker: Dr. Shrutilipi Bhattacharjee, Technical University of Munich, Germany
 - Date of visit: 20 April 2017
 - Number of attendees: 20
 - Location: Indian Statistical Institute, Kolkata
- 2) NASA-ISRO Synthetic Aperture Radar (NISAR) and the Art of Writing Good Papers
 - Speakers: Prof. Paul Rosen and Prof. William Emery, NASA, Washington, D.C.
 - Date of visit: 10 June 2017
 - Number of attendees: 35
 - Location: Indian Statistical Institute, Kolkata
- 3) SAR and Other Remote Sensing Activities of ISRO
 - Speakers: Dr. Arundhuti Roy Misra and Dr. Debojyoti Dhar, Indian Space Research Organization (ISRO), Bengaluru
 - Date of visit: 27 July 2017
 - Number of attendees: 30
 - Location: Indian Statistical Institute, Kolkata
- 4) Key Challenges and Solutions to Present and Next-Generation Cellular Systems
 - Speaker: Prof. Abhirup Das Barman, Institute of Radio Physics and Electronics, University of Calcutta
 - Date of visit: 21 August 2017
 - Number of attendees: 80
 - Location: Kalyani Government College, Kalyani, India.

Six workshops were also conducted in 2017:

- 1) Workshop on Data Science and Machine Learning
 - Dates: 28–31 March 2017
 - Location: Center for Soft Computing Research, Indian Statistical Institute, Kolkata
 - Number of participants: 64
- 2) Workshop on Neural Networks, Cyber Security, and Wireless Body Area Networks
 - Date: 9 September 2017

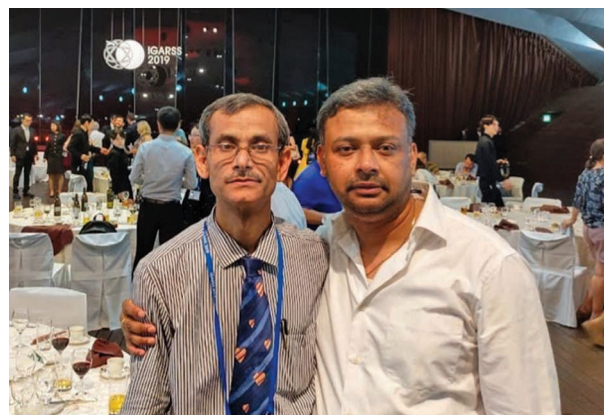


FIGURE 5. Members attending the IGARSS 2019, held in Yokohama, Japan.



FIGURE 6. Attendees at the National Workshop on Machine Learning and Remote Sensing, 2017.

- Location: Meghnad Saha Institute of Technology, Kolkata
 - Number of participants: 80
- 3) National Workshop on Machine Learning and Remote Sensing (Figure 6)

- Date: 14 March 2017
 - Location: Siksha 'O' Anusandhan University, Odisha
 - Number of participants: 150
- 4) Workshop on Disaster Management

- Date: 29 March 2017
 - Location: Panagarh, West Bengal
 - Number of participants: 50
- 5) Workshop on Remote Sensing and Signal Processing

- Dates: 15–16 May 2017
 - Location: Guwahati, Assam
 - Number of participants: 80
- 6) Big Data in Earth Science
- Dates: 15–16 November 2017
 - Location: Kalinga Institute of Industrial Technology, Bhubaneswar
 - Number of participants: 46.

The GRSS Kolkata Chapter also sponsored the International Conference on Communication, Devices, and Networking (ICCDN) on 3–4 June 2017 at the Sikkim Manipal Institute of Technology, Rangpo (Figure 7). There were 100 attendees at the conference.

ACTIVITIES DURING 2018

The year 2018 was an important one in respect to the events organized. Four seminars were conducted:

- 1) Data Science
- Speakers: Dr. Emmett Ientilucci, Rochester Institute of Technology, and Prof. Ashish Ghosh, Indian Statistical Institute, Kolkata



FIGURE 7. A panel at ICCDN 2017.

- Date of visit: 25 January 2018
 - Number of attendees: 60
 - Location: National Institute of Technology, Silchar
- 2) Observational Cosmology at Low Radio Frequencies: Prospects With the Square Kilometre Array
- Speaker: Dr. Abhirup Datta, Indian Institute of Technology, Indore
 - Date of visit: 28 June 2018
 - Number of attendees: 20
 - Location: Center for Soft Computing Research, Indian Statistical Institute, Kolkata
- 3) Fundamentals of Radio Wave Propagation
- Speaker: Prof. Animesh Maitra, Institute of Radio Physics and Electronics, University of Calcutta
 - Date of visit: 24 August 2018
 - Number of attendees: 84
 - Location: Netaji Subhash Engineering College, Kolkata

- 4) IEEE Technical Lecture on Video and Image Processing
 - Speaker: Prof. Ananda Shankar Chowdhury, Department of the Department of Electronics and Telecommunication Engineering, Jadavpur University, Kolkata
 - Date of visit: 9 October 2018
 - Number of attendees: 30
 - Location: Netaji Subhash Engineering College, Kolkata.

In addition, three Distinguished Lecturer Programs were undertaken:

- 1) Statistical Information Theory and Geometry for SAR Image Analysis
 - Speaker: Prof. A.C. Frery, Federal University of Alagoas, Brazil
 - Date: 13 February 2018
 - Number of attendees: 30
 - Location: Center for Soft Computing Research, Indian Statistical Institute, Kolkata
- 2) Statistical Information Theory and Geometry for SAR Image Analysis
 - Speaker: Prof. A.C. Frery, Federal University of Alagoas, Brazil
 - Date: 14 February 2018
 - Number of attendees: 50
 - Location: Netaji Subhash Engineering College, Kolkata
- 3) Overview of the NASA Tropics CubeSat Constellation Mission
 - Speaker: W. Blackwell, MIT Lincoln Lab
 - Date of visit: 30 October 2018
 - Number of attendees: 50
 - Location: Indian Statistical Institute, Kolkata.

The GRSS Kolkata Chapter conducted two workshops during 2018:

- 1) Workshop on Remotely Sensed Big Data Analysis and Mining (Figure 8)
 - Dates: 23–24 January 2018
 - Number of participants: 23
 - Location: Center for Soft Computing Research, Indian Statistical Institute, Kolkata
- 2) Workshop on Digital Geometric Algorithms, Applications, and Prospective Future Directions
 - Dates: 28–30 October 2018
 - Number of participants: 55
 - Location: Indian Institute of Information Technology, Kalyani.

To promote the Society, some education and outreach programs were also organized. The International School on Deep Learning in SAR and Hyperspectral Remote Sensing was conducted 29 October–2 November 2018 at the Indian Statistical Institute, Kolkata. Eminent speakers like Avik Bhattacharya (Indian Institute of Technology, Mumbai), Ashish Ghosh (Indian Statistical Institute, Kolkata), B.S. Dayasagar (Indian Statistical Institute, Bangalore), Saurabh Das (Indian Institute of Technology, Indore), Sonali Agarwal (Indian Institute of Information Technology, Allahabad), and W. Blackwell (MIT Lincoln Lab) shared their valuable knowledge with the 50 attendees who participated in the event. An educational visit to the Doppler Weather Radar Regional Meteorological Centre, Kolkata, was conducted on 1 October 2018 with 15 participants.

The Chapter was formed with a goal to empower students interested in geosciences and remote sensing in India with the knowledge and awareness of technology and practices. The GRSS Kolkata Chapter is trying to help young Indian researchers stay informed about the latest innovations in geosciences



FIGURE 8. A social event at the Workshop on Remotely Sensed Big Data Analysis and Mining, 2018.



FIGURE 9. Attendees gather during the Workshop on Machine Learning and Big Data Analytics: Application to Remote Sensing, 2019.

and remote sensing from around the world and, accordingly, identify the field with the Indian context. Recent trends of research show an increasing interest in the areas of Earth studies, remote sensing, satellite imagery, and so on.

FUTURE ACTIVITIES

The GRSS Kolkata Chapter is striving to move forward with Society activities and has already conducted the Sikkim Manipal outreach activity with a workshop on Machine Learning and Big Data Analytics: Application to Remote Sensing (Figure 9). Future plans of this Chapter include an academic and industry Distinguished Lecturer program. The Chapter is looking forward to hosting CHAPNET 2020 at the Indian Statistical Institute, Kolkata, this year. A national-level conference will be held at C.V. Raman College. There will be a technical visit to the Indian Defense Research and Development Organization's Integrated Test Range at Odisha. Planned outreach activities at the Indian Institute of Technology Patna include a workshop on Remote Sensing Using Data Science and Communication Engineering. A deep learning workshop will be conducted as a part of Guwahati University's outreach activity. Lastly, a national-level conference will be held at the Indian Institute of Information Technology, Kalyani. We hope this will promote healthy interactions among peer researchers and help in the growth of the Chapter.

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