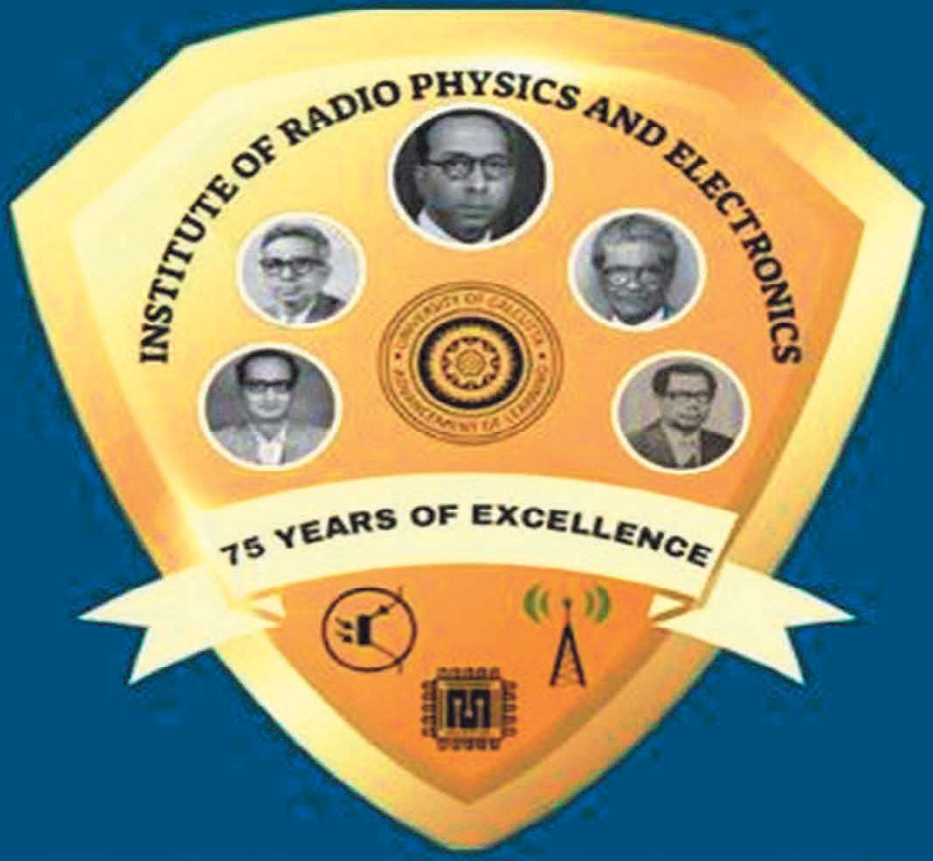
INSTITUTE OF RADIO PHYSICS AND ELECTRONICS



DEPARTMENTAL REPORT

2017-2022

UNIVERSITY OF CALCUTTA

92, Acharya Prafulla Chandra Road,

Kolkata 700 009

Institute of Radio Physics and Electronics: In Retrospect

Genesis and Early Period

The Institute of Radio Physics and Electronics was established as an independent Post Graduate teaching and research Department of the University of Calcutta in the year 1949. Late Professor Sisir Kumar Mitra, D. Sc, F.R.S., Padmabhushan, was the Head of the Institute until his retirement in 1955.

In retrospect, it was in the year 1925 that the University of Calcutta introduced "wireless" as an elective subject for special study in its Post Graduate course in Pure Physics and started a wireless laboratory for teaching and research in the fields of electron tubes and radio wave propagation in the upper atmosphere at the same time. S. K. Mitra and his students were the first to provide experimental evidence of the E-layer of the ionosphere predicted by Heaviside and Kennely. Ionospheric studies conducted from University of Calcutta since early 1930s spearheaded by Late Professor Sisir Kumar Mitra, have made seminal contribution in advancement of the subject. In fact, Prof. Mitra was one of the first in the world to suggest use of HF atmospheric radars with his observations in 1935.
Significant research conducted by Mitra's team and notable accomplishments during 1930s include UV absorption in Ozone layer, first Ionosonde, establishment of Radio Amateur club to augment the broadcasting by AIR, Calcutta, participation in International Polar Year conference by Mitra as the first Asian scientist etc. Professor Mitra assembled one of the first manual Ionospheric Sounding System in Asia and established it at the *Ionospheric Field Station in 1956* thereby putting University of Calcutta in an elite global chain of Ionospheric Sounders. Mitra published his book "The Upper Atmosphere" considered as the bible over the decades to come.
Ever increasing applications of radio waves, especially on the eve of and during the Second World War, and the rapid development of electronics as an important science by itself, created a new situation. Inclusion of these developments was found impossible if the teaching and research activities in these subjects were to be confined within the necessarily limited scope allowed to them as a part of another Post Graduate course as was the scenario in the University. A large-scale expansion and reorganization became imperative. To meet this situation, the University, in 1946, formulated a plan for the creation of a separate Post Graduate Department for Radio Physics and Electronics by pooling the then existing resources of the Wireless section of the Pure Physics Department and the Communication Engineering section of the Applied Physics Department. A Visiting Committee of the All-India Council for Technical Education (A.I.C.T.E) approved this plan in 1947. Grants sanctioned by the Government of India on the recommendation of this Committee enabled the creation of the Institute of Radio Physics and Electronics in 1949 as an independent Post Graduate teaching and research Department of the University of Calcutta.

The foundation stone of the Institute of Radio Physics and Electronics was laid on April 21, 1949, by the then Premier of West Bengal, Dr. Bidhan Chandra Roy. The concluding remark of his address on the occasion of laying the foundation stone of the Institute was the following:

> *"Let me hope that in laying the foundation stone of the Institute of Radio Physics and Electronics today, I have planted a seed which will grow into a mighty tree, spreading its branches much beyond the borders of your present expectation. The Institute will become not only an all-India center of study and research but will also attract earnest seekers after truth from beyond the boundaries of India".*

A look at the subsequent evolution and present standing of the Institute today should convince anybody that the expectations of Dr. Roy are well on the way to fulfillment almost to the word.

Early significant research and development

Prof. Mitra and his able successor, Prof. Jatindra Nath Bhar, selected talented scholars as teachers of the Institute who, besides teaching basic as well as emerging subjects of Radio Science, contributed significantly to research of international standard, while fabricating devices and equipment, for the first time in India. The list of products includes

- loudspeaker developed by Mitra's team
- first Analog Computer by Arun Kumar Choudhury and his team
- first C80 Valve and 3 cm magnetron by H. S. Steyskal, UNESCO Expert and Santosh Kumar Sen
- Solar Cells by Sudhangshu Deb and his team.
- Jnan Saran Chatterjee and Gitindra Saran Sanyal published their work on microwave antenna and other components.
- Mrinal Kumar Das Gupta, a scholar under Prof. Mitra while working in Manchester and reporting the first observation of Radio Double Star, a significant discovery, returned and joined the Institute as a lecturer and initiated his work on Radio Astronomy with Santimay Basu, Dipak Basu and Arun Sen.
- Arun Kumar Choudhury expanded his activities in switching theory and other computational techniques and guided research in control systems with Amar Mahalanabis, Nani Gopal Nath and Ashok Bhattacharyya.
- Biswa Ranjan Nag, after working on non linear oscillators, initiated experimental and theoretical studies on elemental semiconductors, like hot electron effects, microwave characterization and artificial dielectrics.
- Nirmal Baran Chakrabarty, apart from his seminal work on single side band communication, attempted to build He-Ne laser with Amar Nath Chakrabarti.
- The usual work on ionospheric studies continued in the Ionosphere Field Station at Haringhata.

Teaching: Evolution

In the beginning, the Institute started its first session of 2-year M.Sc. course in Radio Physics and Electronics from July 1949. As the main building of the Institute (completed and occupied by the end of 1951) was under construction at that time, classes were held in different places of the Rajabazar Science College campus (Rashbehari Siksha Prangan) — in the seminar rooms of the Departments of Pure Physics and Applied Physics. Practical work was conducted in the Pure Physics and Applied Physics Laboratories and drawing classes were held in the Applied Chemistry building. The infant department had thus to struggle hard during the first two years of its inception. The first examination was held in November, 1951, exactly as scheduled.

Hardly had the Department come into existence when plans for the expansion of the 2-year M.Sc. course to a 3-year course leading to the M.Sc. (Tech.) degree engaged the mind of its founder members. This was necessitated by two factors. First, the latest developments in Radio Physics and Electronics could no longer be given adequate coverage within the curriculum of a 2-year course. Secondly, a 3-year course would be in conformity with the general pattern of technical education recommended by AICTE. The approval for the 3-year M.Sc. (Tech.) course in Radio Physics and

Electronics came from University Grants Commission (U.G.C.) on recommendation of AICTE, in April 1957.

Centre of Advanced Study: Boost for Teaching and infrastructure

Soon after, came a major boost that further brightened the path of progress for the growing Institute. Early in 1962, UGC recommended the establishment of Centers of Advanced Study (CAS) in selected University Departments known for their tradition and promise. The objective of the commission was to encourage the pursuit of excellence and to accelerate the realization of international standards in the field of Post Graduate education and research. In recognition of the tradition built here, ***this Institute was nominated as one of the five Centers of Advanced Study in 1962-63***. This nomination, with the promise of financial assistance to intensify teaching and research activities so as to achieve a high standard of excellence on the international level, motivated the staff of the Institute at all levels. United as a team, the members set to work, each in his own sphere, with redoubled vigor.

In 1969, grants for the third stage of development of the Institute were received from the UGC which recommended drastic changes in the courses to be offered. In short, the approved scheme of development was: i) conversion of the 2-year B.Tech. Course to a 3-year graduate course leading to B.Tech. degree with an annual intake of 30 students, ii) conversion of the 1-year M.Tech. course to a 2-year Post Graduate course leading to the M.Tech. degree with an annual intake of 25 students.

With the financial assistance allotted for the CAS, combined with the grants received for the third development stage, the facilities of the Institute began to improve as desired. A new multi-storied building (known as the CAS building) was constructed at a site adjacent to the Rajabazar Science College campus. Addition of staff, equipment and books paved the way for intensification of teaching, learning and research activities. The provision for Visiting Professors, Seminars and Symposia, Travel and Personnel Exchange facilities substantially accelerated the progress of the Institute.

Meanwhile, on the report of the Assessment Committee appointed by the UGC (in 1973-74) to evaluate the performance of the Center during the first decade of its existence, the UGC classified it as “excellent” and offered to continue grants to the Center under Special Assistance Program (S.A.P) of CAS in selected thrust areas of research.

The Institute celebrated its Silver Jubilee in 1973. In late 1970s, an academic link program ALIS was established between the Institute and a few Universities in the UK. The program encouraged bilateral exchange of scientists. A Liquid Phase Epitaxy (LPE) Reactor was received by the Centre as a gift with which work on growth of semiconductor heterojunction started. A Centre for Research and Training in Radar and Microwaves also started functioning in 1970s.

The University created a separate Department named as the Department of Computer Science and Engineering in 1980. A number of teachers of the Centre were transferred and some of the facilities of the Centre were also made available to this new Department. The activities related to computers in the Centre were somewhat reduced, but the work on Semiconductor and Space Science scaled new heights. In this decade, the Centre received substantial grant from the UGC under the Committee for Strengthening Infrastructure in Science and Technology (COSIST). Equipment related to Microelectronics, millimeter wave technology and characterization of semiconductors were procured out of the fund received. The Centre celebrated the birth centenary of its founder Prof. S. K. Mitra in 1989. Almost concurrently, a new Department of Electronic Science was created by the University. The teachers of the Centre provided initial support to this new Department in all sorts of activities.

In the decade of 1990s, UGC established the Eastern Centre for Radio Astronomy (ECRA) making INRAPHEL as its nodal point and identifying Ionosphere Field Station, Haringhata as the site for observation. Society for Applied Microwave Electronics Engineering Research (SAMEER), an organization funded by the then Department of Electronics, Government of India, opened a branch in Calcutta in this period. Two floors of the CAS building were earmarked for their activities. New projects for fabrication of IMPATT diodes and characterization of millimeter wave devices were awarded to the Centre by different national agencies. The Indian National Committee of URSI (INCURSI) organized a major conference in the Department in 1996 covering almost all branches of research being conducted in the Department.

The Institute started its Golden Jubilee celebration in 1998 by holding an International Conference ***Computers and Devices for Communication (CODEC)***. A two-day Workshop on Nanostructures, Applications and Goals (NAG) was held prior to CODEC to felicitate its illustrious teacher Prof. B. R. Nag. Next year, an Indo-French Workshop Quantum Semiconductor Structures: Modern Developments (QUASEMOD) was also organized by the Institute. With continuation of CAS status, new areas of research, e.g., atmospheric pollution and greenhouse gases, millimeter wave propagation, GPS, satellite communication, photonics, etc. were undertaken.

At the beginning of the current millennium, with funding from the Indian Space Research Organization (ISRO) a Centre named as **S. K. Mitra Centre for Research in Space Environment** was established in the Institute in 2002. It was an inter-departmental entity with the mandate to undertake research in four major areas: (i) Lower Atmospheric Chemistry, (ii) Atmospheric Electricity, (iii) Radio Remote Sensing, and (iv) Space Weather. It was aimed at studying atmospheric phenomena in a comprehensive manner from the lower atmosphere to the upper atmosphere.

The Technical Education Quality Improvement Program (TEQIP): a joint venture of World Bank-MHRD, Govt. of India, was introduced in West Bengal in 2002. The University College of Technology (UCT-CU) was identified as one of the lead Institution. As a Department of UCT-CU, INRAPHEL received some equipment and other support under this program. In parallel, the CAS status was extended to cover the years 2005-2010 on recommendation of a Review Committee.

It was around this time that UGC was entrusted to identify 10 Networking Resource Centres, two each in Physical, Chemical, Biological, Mathematical and Materials Sciences, in the country. In the first phase, CAS in RPE has been given this status with a grant of Rs. 5 crores. The UGC-NRCPS fulfilled its mandate, successfully conducting the mandatory ten summer and winter schools, significant number of specialized workshops and training programmes and conducting five outreach programs in the North Eastern states. Based on the remarkable performance, the tenure of the Centre was extended with a further grant of Rs. 10 crores. With the support of the Government of West Bengal, a Centre for Research and Training in Microwaves and Millimeter waves was created pooling the resources of the Training program in millimeter wave technology. The Centre started its activities in 2008. A new Centre fur Tele InFrastructur: India (CTIF-India) was established in the Institute in 2007 as part of a collaboration with Aalborg University, Denmark.

A major boost to the Space Science activities in the Institute was received when ISRO selected University of Calcutta for financial support under the program of "Strengthening of Space Science Activities at Universities". Under this program, two faculties of the rank of Assistant Professors were recruited by the University and a number of M.Tech. scholarships were provided in addition to a major instrument augmentation fund

Following the directive of the then President, Dr. A. P. J. Abdul Kalam, MHRD/UGC in 2007 decided to create three Centers in the Universities of Calcutta, Bombay and Madras each, on their 150th

Anniversary. The Centre for Research in Nanoscience and Nanotechnology (CRNN) thus came into being in 2007. A few faculties of this Institute took active part in installing MBE and several analytical instruments and conducted research in growth and fabrication in semiconductor nanostructures, and devices.

Research in the Thrust Areas

With the establishment of CAS covering the activities of the whole Institute, a few thrust areas were defined, and the demarcation changed from phase to phase. The following paragraphs will present very brief outline of work and achievements in a few broad areas, after the inception of CAS.

SPACE SCIENCE AND COMMUNICATION

Prof. Sisir Kumar Mitra, the doyen of Radio Science in Asia, had created a rich legacy of experimental Space Science in the Institute which is still being ardently pursued by his successors. Space science activities of the Institute were initiated in the Wireless Laboratory (1925-1949) set up by Prof. Mitra at the Physics Department of the University, immediately after the discovery of the Ionosphere by Appleton and Barnett in 1925. The research work on the ionosphere began at Calcutta for the first time in India, which produced the first experimental evidence of the E-region of the ionosphere in the early 1930s. A series of papers relating to the behavior of ionospheric layers over Calcutta came out within a few years. As Prof. Mitra became more interested in teaching radio science in India, he set up the Institute of Radio Physics and Electronics in 1949. There was an immediate plan to establish an Ionosphere Field Station at Haringhata, 50 km north-east of the city of Calcutta in an area of low radio-frequency interference. This station went operational in 1954 and was made a part of the world-wide network of ionospheric stations providing data to World Data Centres. Ionosonde data for the period 1957-1976 from *Ionosphere Field Station* at Haringhata available at the Space Physics Interactive Data Resources (SPIDR) website under the *National Geophysical Data Center located at Boulder, Colorado,* USA. Using indigenously fabricated equipment, Prof Mitra's group, which included Prof. H. K. Rakshit, Prof. J. N. Bhar and Prof. S. S. Baral, determined from critical frequency and polarization measurements, the properties of the ionospheric layers –the electron density, electron temperature and the magnetic field at Haringhata. This was a remarkable achievement, the data being later verified by rockets and satellites. The lower ionospheric sounding by cross-modulation technique was undertaken by fabricating a 2.2 MHz pulsed transmitter.

In 1966, the Satellite Beacon Group of the Institute of Radio Physics and Electronics was established by Dr. Santimay Basu and tracking of beacons from Low Earth Orbiting satellites for measuring Faraday Rotation and ionospheric scintillations to study Total Electron Content and ionospheric irregularities, namely, Explorer-22 and -27 started at 20, 40 and 41MHz respectively, thus filling a gap in the global morphology of low latitude ionospheric irregularity features of the F-region. During 1972-1973, 136MHz telemetry transmissions from the near-synchronous satellite INTELSAT-2F2 was used with a rotating Yagi antenna for continuous measurement of TEC and scintillations. This was the first geostationary satellite observation in India. Signals from the geostationary satellite ATS-6 were recorded at this station at 140MHz in 1975-1976. The first long-term (1977-1990) satellite measurement from the Ionosphere Field Station, Haringhata started with tracking a VHF Satellite Beacon from the Japanese geostationary satellite ETS-2 by recording the polarization and amplitude of its telemetry signal at 136MHz with an electronically switching polarimeter. Amplitude recordings from VHF beacon of another satellite, FLEETSATCOM-2 at 244MHz were started in 1981.

Meanwhile, research work in other areas, such as ionospheric propagation characteristics at LF, MF and HF broadcast bands was carried out, revealing unusual radio absorptions during major meteor showers, sudden ionospheric disturbances and perturbations due to atmospheric gravity waves. In 1980-1990, major funding from the Department of Electronics (DOE), the Aeronautical Development Agency of the Ministry of Defence, Government of India supported a number of projects on (i) Propagation of Millimetre Waves by radio link measurements and radiometers, (ii) Training Programme in Millimetre Wave Technology, (ii) Millimetre wave scattering. All these supports created major facilities for millimetre wave propagation studies and atmospheric sensing by radiometric techniques.

With the increasing use of space-based navigation and communication systems like the GPS operating in the lower microwave band, it became necessary to observe scintillations with geostationary satellites in this frequency range. Recording of the amplitude of the 1537MHz signal from INMARSAT-2F1 was started in 1990 with a view to studying scintillations on geostationary satellite signals at lower microwave band. A few years later, when the GPS satellite signals were made available to civilians, one of the first two GPS receivers in India, was installed in the Institute in 1994. One of the first results, globally, using GPS signals for studying ionospheric irregularity effects was published in 1997 from the Department. More recently, the research activities have been focused on Space Weather impact on satellite-based communication and navigation links and lower atmospheric characterization using a suite of instruments under the programs like CAWSES, ARFI and Megha Tropiques.

The institute was selected by the National Committee set up by the Science and Engineering Research Board (SERB) of DST, Government of India, as one of the Centers for setting up the Stratospheric and Tropospheric (ST) Radar as a National Facility and a project was sanctioned by the SERB in 2011 with substantial funding. In 2022, the Institute had the unique distinction of implementing the first fully-active phased-array radar in an Indian University operating at 53MHz with financial support from the Science and Engineering Research Board (SERB), Govt. of India. This is the only such facility in the entire eastern and north-eastern India as well as the South-East Asian longitudes. It is developed as a National Facility (https://www.custr.org) open to all academicians and researchers across the country to study the lower to middle atmosphere and ionosphere.

SOLID STATE ELECTRONICS AND CIRCUITS

Significant research in this area has been pursued since 1960's. Experimental studies on hot electron conductivity, mobility and magnetoresistance on Ge and Si and theoretical studies led to concrete picture of different scattering mechanisms. Tunability of Gunn oscillators were studied during this period. Theoretical studies of electronic properties with and without quantizing magnetic field, scattering mechanisms, diffusion, Einstein relation, susceptibility and many other properties in low dimensional semiconductor structures and superlattices made of Si, and compound semiconductors were performed and a few such work was recognized internationally.

In the experimental side, growth and characterization of heterostructures and quantum wells made of compound semiconductors and alloys were undertaken. Cavity perturbation technique was developed to find the conductivity and permittivity of semiconductors. With installation of MBE in CRNN, growth, characterization and fabrication of device structure were intensified.

Substantial research work was also conducted on heterojunction bipolar transistors, FETs using Si, other emerging materials and grapheme. Novel device structures have been proposed and in particular, the behavior of the devices of nanoscale size were predicted by using quantum effects.

MICROWAVE AND LIGHTWAVE TECHNOLOGY

Development of Gunn oscillator circuits and optimization of the performance were the main activities under the Centre for Research and Training in Radar and Microwaves. In addition, theoretical methods were developed to study the performance of microwave components. In later years, exhaustive work on design, fabrication and measurement of characteristics of different types of antennas, like microstrip, dielectric resonator, patch type etc were undertaken and wide bandwidth operation was predicted and verified. Work on microwave tomography was performed. Design, fabrication and testing of IMPATT and other microwave devices were continued along with theoretical studies on their performance and optimization. Work on metamaterials was also initiated. From the 1990s, work on lightwave technology started in the Department. Initially, optical properties of quantum structures including excitonic effects, devices based on multiple quantum wells, photodetectors, semiconductor optical amplifiers and Uni Travelling Carrier photodetectors. Modeling of HEMT/HBT- photodetectors was also undertaken. Under collaboration with CNIT, Italy, experimental work on optical communication was initiated. Theoretical work on performance of optical heterodyning for mm-wave and THz signal generation was done. Photonic generation of microwaves was carried out experimentally. Work on microwave properties of polymers was also carried out. An Indo-Italian bilateral project involving the Institute and CNIT Italy was successfully executed during 2018-2020. Research on visible light communications (VLC) have been undertaken.

SYSTEM SCIENCE

Work on computer science and technology in the areas of switching theory, graph theory and fault tolerant systems continued in full swing in the Institute. A productive area of research was control theory. With the creation of a separate Department in 1980, research in computers and control could not be conducted in full swing. Later, emphasis was given to Biomedical Electronics and Instrumentation. Research on conginitive radio cooperative communication system was established. TVWS (TV white space) backhaul for wireless and PON based access link for rural broadband communications were initiated. A joint collaboration involving the Institute, IIT Delhi and LNMIIT was successfully done during the period 2013 – 2019. Research on speech and audio activity detection have been undertaken. Research in microwave tomography and later application of image processing in mamal cancer diagnostics formed the next line of activity.

Collaborations

The Institute has a long-standing collaboration with the US Air Force Research Laboratory (AFRL) initiated through a Research Project led by Prof. J.N. Bhar, Dr. Santimay Basu and Dr. Ashish DasGupta during 1967-1970. Later, in 2006, the Institute became one of the stations under the global **SCI**ntillation **N**etwork **D**ecision **A**id (SCINDA) program of AFRL, which is still being continued. Collaboration with UK through RPE- British Council program and later under ALIS has already been mentioned. Around 2010s, the Institute became involved in UKIERI program and later in two Erasmus Mundus Program. An informal collaboration between the Institute and Ecole Polytechnique, Paris accepted a few of our students as Ph.D. and Master's students. In 2018, the Institute also became one of the 15 global GNSS ground monitoring stations under the US-Taiwan joint satellite mission COSMIC-2. More recently, collaboration exists between the Institute and the German Aerospace Centre (DLR). In addition, many faculties individually established contacts with institutions in the USA, Canada, UK, EU countries and Taiwan and conducted joint research programmes.

Books, Book Chapters and Patents

Faculties of the Institute published singly or as a coauthor about 10 books from international publishing houses and equal or more number of books from Indian publishers. A few review articles appeared in Reviews of Modern Physics, Semiconductors and Semimetals, Handbooks on Optoelectronic Devices and the like.

Apart from a large number of Indian Patents, faculties got international patents with workers in Bell Lab, USA and Royal Military College, Canada.

Faculty Achievements

The students, researchers and faculties assumed key positions as Director Generals, Directors of National Laboratories, IITs and similar Institutions of National importance, Vice Chancellors of Universities, and top scientific and administrative positions. They served as Professors in many institutions in India and abroad.

Notable achievements by the alumni include FRS, Fellows of Academies in India, FIEEE, Fellow of National Academy of Engineering in USA, Shanti Swarup Bhatnagar award and Jawaharlal Nehru Fellowship and numerous awards.

About Alumni and Their Support

The Institute receives active support from its alumni. A meeting room has been created at the Ionosphere Field Station, Haringhata through generous endowment from Santimay and Sunanda Basu, who also gifted a few computers to the Institute. Under this endowment, M.Tech. students are also encouraged to attend conferences through financial support. Dr. Ashesh Prasad Mitra, illustrious student of Prof. S.K. Mitra and former Director General of the Council of Scientific and Industrial Research (CSIR), donated his book and journals to the Departmental library. A modern class room has been created by the B. Tech. passed out batch of 1979. Generous donation from the batch of 1995 is giving shape of the modern IoT and Sensor laboratory in the Department.

Faculty Profiles

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https://scholar.google.com/citations?user=mF8ulvgAAAAJ&hl=en&oi=ao

Degrees obtained:

- Ph.D. (Tech), Radio Physics and Electronics, 1994
- M.Tech., Radio Physics and Electronics, 1988
- B.Tech., Radio Physics and Electronics, 1986

Classes Taught (2017-2022)

- EC 2.1.2 (B.Tech. Theoretical) - Circuit Theory (till 2020)/
  Circuit and Network Theory (since 2021)
- EC 3.2.2 (B.Tech. Theoretical) - Optoelectronic Principles and Devices (2018-2020)
- ECEL4.1.2.1 (B.Tech. Theoretical) - Optoelectronic Devices and Fiber Optics (since 2021)
- (B.Tech. Practical)- Solid State Devices Measurements (till 2020)
- EC 3.1.8 (B.Tech. Practical) - Electronics Devices Laboratory (since 2021)
- RP 3.2.2 (B.Tech. Theoretical) - High Frequency and Optoelectronic Device (till 2018)
- Paper VIII (M.Sc. Pt II: Electronic Science) - Quantum and Optoelectronics (2019)
- RP 4.2.15 (M.Tech. Theoretical) - Photonic Devices
- RP 4.2.19 (M.Tech. Theoretical) - Nanophotonics
- RP 5.1.6 (M.Tech. Practical) - Measurements and Simulations of Photonic Devices and Systems (till 2018)

Research Interests and Experience

- Semiconductor Photonic Devices and Systems including Nanophotonics
- Semiconductor Nanostructures and Nanoelectronic Devices
- Pre-Doctoral: (1989-1993)
- Post-Doctoral: (1994 - till date)

Administrative Duties / Achievements/ Completed Projects/ Other Details

- DEAN, Faculty of Engineering & Technology, CU (Aug. 2013 – Aug. 2016)
- DIRECTOR, Centre for Research in Nanoscience and Nanotechnology, CU, (Aug.2015-Aug.2017)
- HEAD, Department of Radio Physics and Electronics (RPE), CU, (Dec. 2014 – Nov. 2016)
- Head (acting), University Science Instrumentation Centre (USIC), (Apr. 2014 – July 2022)
- Director, UGC Networking Resource Centre in Physical Sciences, RPE, CU, (Apr. 2013 -)
- Convenor, Ph.D. Research Advisory Committee in RPE, CU- (2017 -2021), (2022- till date)

Projects

International collaboration:

- **Erasmus Mundus LEADERS** (between 20 European and Asian Universities)- July 2014-July 2018
- **UK India Education and Research Initiative** (UKIERI) Thematic partnership with University of Sheffield, UK. - 2012-2015

National:

- **DST** (Department of Science and Technology) **sponsored** project (India) on "Studies on Group IV Semiconductors and Their Alloys for Photonic Device Applications" (P.I.) -Nov. 2011 – Nov. 2014
- **DST** (Department of Science and Technology) **sponsored** project (India) on "Studies on Group IV Semiconductors and Their Alloys for Photonic Device Applications" (Co-P.I.) - 2007-2010

Publications (Books, Journals)

Books and Book Chapters

Book:

- **N. R. Das** and Santu Sarkar, Eds., Computers and Devices for Communication, (Proceedings of CODEC 2019), Lecture Notes in Networks and Systems book series, Vol. 147, (566 pages), Springer, Singapore, 2021, https://doi.org/10.1007/978-981-15-8366-7.

Lecture Notes/Chapters

1. Piyali Mukherjee and **N. R. Das**, "Design of a Microring Resonator Having High Sensitivity for Biosensing Applications", in Advances in Smart Communication Technology and Information Processing: OPTRONIX 2020.
2. Madhusudan Mishra and **N. R. Das**, "Trenched Core Waveguide Structure for Photonic Integrated Circuit" in "Computers and Devices For Communication", N. R. Das and Santu Sarkar (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., vol.147, pp.321-325, 2021.

3. Shampa Guin and **N. R. Das**, “Photon Density Distribution in Quantum Dot-Based Light-Emitting Diode” in "Computers and Devices For Communication", N. R. Das and Santu Sarkar (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.331-335, 2021.

4. Sonali Basak, Santu Sarkar, and **N. R. Das**, “Modes and Coupling in Seven-Core Optical Fiber”, in "Computers and Devices For Communication", N. R. Das and Santu Sarkar (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.344-349, 2021.

5. Santu Sarkar, Pinak Pani Mukherjee and **N. R. Das**, A Comparative Study on Determination of Optimum Detection Threshold for Minimum BER in a WDM Receiver with SRS and FWM Crosstalk, in “Computers and Devices For Communication”, N. R. Das and Santu Sarkar (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.363-368, 2021.

6. A. Ghosh, A. Pal and **N.R. Das**, A Simple Structural Design for Tuning of Bandgap and Window in 1D Photonic Crystal, In: Janyani V., Singh G., Tiwari M., Ismail T. (eds) Optical and Wireless Technologies, Lecture Notes in Electrical Engineering, Springer, Singapore, 648, pp. 127-136, (2020).

7. S. Mukhopadhyay, S. Das and **N.R. Das**, An Approach for Reduction of Cross-Talk in Multi-core Optical Fibers, In: Janyani V., Singh G., Tiwari M., Ismail T. (eds) Optical and Wireless Technologies, Lecture Notes in Electrical Engineering, Springer, Singapore, 648, pp.111-118, (2020).

8. Pinak Pani Mukherjee, **N. R. Das** and S. Sarkar, “Comparison of Power Penalty due to Component, SRS and FWM Crosstalk in a WDM Receiver”, in “Advances in Computer, Communication and Control,” U. Biswas et al. (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.305-309, 2019.

9. M. Mishra, F. Morichetti and **N. R. Das**, “Ferroelectric-Cladded Tunable Silicon Photonic Couple”, in “Advances in Computer, Communication and Control,” U. Biswas et al. (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.401-405. 2019.

10. Shreerupa Biswas, S. Guin and **N.R. Das**, “Photonic Crystal for Gas Sensing Application” in “Advances in Computer, Communication and Control,” U. Biswas et al. (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.449-467. 2019.

11. Piyali Mukherjee and **N. R. Das**, “Tailoring the parameters to increase the efficiency of a microring resonator sensor for biosensing”, in “Advances in Computer, Communication and Control,” U. Biswas et al. (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.477-485. 2019.

12. D. Ghosh, A. Mukherjee, **N. R. Das**, B. N. Biswas, A Study on the Effect of an External Periodic Signal in a Chaotic Optoelectronic Oscillator, In: S. Chattopadhyay, T. Roy, S. Sengupta, C. Berger-Vachon (eds), Modelling and Simulation in Science, Technology and Engineering Mathematics. MS-17 2017, Advances in Intelligent Systems and Computing book series, Springer, Cham, 749, pp.27-36 (2018).

Journal Papers

1. Suman Dey, **N. R. Das** and S. Ghosh, Exploring unconventional features of light dynamics in Harper model based quasi-periodic opticallattices, Optics Communications, 506, Article No. 1 2022.
2. Madhusudan Mishra, **N. R. Das**, Narayan Sahoo and Trinath Sahu, Performance enhancement of armchair graphene nanoribbon resonant tunneling diode using V-shaped potential well, Physica Scripta, 96, Article No. 124076, 23 Dec. 2021.
3. P. P. Mukherjee, S. Sarkar and **N. R. Das**, Spectral efficiency and quantum limit of BPSK transmission in a WDM system in presence of multiple interferers, Photonic Network Communications, 42,134-141, 2021.
4. P. Mukherjee and **N. R. Das**, Approach to Design of Optical Microring Resonator for Biosensing with Enhanced Efficiency, Microsystem Technologies, 2021, 1-9,
5. K. Majumder, P. Rakshit, and **N. R. Das**, Effect of Submicron Structural Parameters on the Performance of a Multi-Diode CMOS Compatible Silicon Avalanche Photodetector, Semiconductors 54, 1032–1038 (2020).
6. A. Banerjee, J. Sarkar, L.A.D. de Britto, G.M. Pacheco, **N.R. Das**, On the Transient Behavior of Single-loop Optoelectronic Oscillators under RF Injection-Locking, IEEE Journal of Quantum Electronics, 56, 5000213(1-13), (2020), doi: 10.1109/JQE.2020.3018378.
7. Shampa Guin and **Nikhil Ranjan Das**, Modeling power and linewidth of quantum dot superluminescent light emitting diode, Journal of Applied Physics, 128, 083102 (1-9), (2020);
8. Paulami Rakshit and **Nikhil R. Das**, Effect of device parameters on improving the quantum efficiency of a lateral Si p–i–n photodetector, Optical and Quantum Electronics 52, 371, (2020).
9. E. Baek, **N.R. Das**, C.V. Cannistraci, et al., Intrinsic plasticity of silicon nanowire neurotransistors for dynamic memory and learning functions, NATURE ELECTRONICS, 3, pp.398-408, (2020). https://doi.org/10.1038/s41928-020-0412-1. (For view only: https://rdcu.be/b4ovR)
10. M Mishra, **N.R. Das**, F Morichetti, Waveguide design optimization for compact silicon photonic ferroelectric phase shifters, Applied Optics, 59, , pp.4385-4391 (2020).

11. J. Sarkar, L. A. D. de Britto, A. Banerjee, **N. R. Das** and G. M. Pacheco, Frequency pulling in optoelectronic oscillator by RF signal injection, Optical and Quantum Electronics, 52, Article No. 214, pp.1-18, (2020), https://doi.org/10.1007/s11082-020-02331-7.
12. J. Sarkar, A. Banerjee and **N. R. Das**, A Theoretical and Experimental Study of the Frequency Pulling Phenomenon in a Single-loop Optoelectronic Microwave Oscillator due to RF Signal Injection, Optik-International Journal for Light and Electron Optics, 207, April, 164427 (2020), https://doi.org/10.1016/j.ijleo.2020.164427.
13. A. Ghosh, A. Pal and **N. R. Das**, An Approach to Design Photonic Crystal Gas Sensor Using Machine Learning, Optik-International Journal for Light and Electron Optics, online 23 Dec. (2019) (https://doi.org/10.1016/j.ijleo.2019.163997).
14. M. Mishra, **N.R. Das**, A. Melloni and F. Morichetti, Modelling domain switching of ferroelectric $BaTiO_3$ integrated in silicon photonic waveguides, Optics Communications, 448, pp.19–25 (2019).
15. S. Guin and **N. R. Das**, Enhancement of optical gain in quantum dot ensemble with electric field, Superlattices and Microstructures, 125, pp.151-158, (2019).
16. D. Ghosh, A. Mukherjee, **N. R. Das**, B. N. Biswas, Control of coexisting periodic oscillations in an Optoelectronic Oscillator, Optical Engineering, 57, 126108 (2018).
17. D. Ghosh, A. Mukherjee, **N. R. Das**, B. N. Biswas, Generation & Control of Chaos in a Single Loop Optoelectronic Oscillator, Optik-International Journal for Light and Electron Optics, 165, pp.275-287, (2018).
18. A. Banerjee, J. Sarkar, **N. R. Das**, B.N. Biswas, Phase-locking dynamics in optoelectronic oscillator, Optics Communications, 414, pp.119-127 (2018).
19. P. Mukherjee, S. Sarkar, **N. R. Das**, An approach for realistic estimation of BER due to signal-component crosstalk in a WDM receiver, Optik-International Journal for Light and Electron Optics 146, pp.1-7 (2017).

Conference Papers

1. Suman Dey, Madhusudan Mishra, Piyali Biswas, **N. R. Das**, and S. Ghosh, A Specialty Multicore Optical Fiber Using Aubry-Andre- Harper Model Based Localization Phase Transition, Frontiers in Optics 2021, Washington, DC United States, 1–4 November 2021, ISBN: 978-1-55752-308-2 (From the session Joint Poster Session I (JTu1A)).
2. M. Mishra, **N. R. Das**, N. Sahoo and T. Sahu, "Effect of Well Width and Barrier Width on I–V Characteristics of Armchair Graphene Nanoribbon based Resonant Tunneling Diode Structure," 2021 Devices for Integrated Circuit (DevIC), 2021, pp. 75-78, doi: 10.1109/DevIC50843.2021.9455884.
3. S. Basak, S. Sarkar and **N. R. Das**, "A New Hole-walled Multi-core Fiber for Space Division Multiplexing for Improved Performance," 2020 IEEE 1st International Conference for Convergence in Engineering (ICCE), Kolkata, India, 2020, pp. 121-123, doi: 10.1109/ICCE50343.2020.9290645.

4. S. Basak, S. Sarkar and **N. R. Das**, "Modes and Coupling in Six-Core hole-walled Optical Fiber," 2020 IEEE Calcutta Conference (CALCON), Kolkata, India, 2020, pp. 478-481, doi: 10.1109/CALCON49167.2020.9106521.

5. Santu Sarkar, Pinakpani Mukherjee and **N.R. Das,** "A comparative study on determination of optimum detection threshold for minimum BER in a WDM receiver with SRS and FWM crosstalk", 7th International Conference on Computers and Devices for Communication (CODEC-2019), 19-20 Dec. 2019, Hotel Vivanta, Kolkata, India.

6. (Awarded Poster) Madhusudan Mishra and **N.R. Das**, "Trenched Core Waveguide Structure for Photonic Integrated Circuit", 7th International Conference on Computers and Devices for Communication (CODEC-2019), 19-20 Dec. 2019, Hotel Vivanta, Kolkata, India.

7. ShampaGuin and **N.R. Das**, "Photon Density Distribution in Quantum Dot based Light Emitting Diode", 7th International Conference on Computers and Devices for Communication (CODEC-2019), 19-20 Dec. 2019, Hotel Vivanta, Kolkata, India.

8. Sonali Basak, Santu Sarkar and **N.R. Das**, "Modes and Coupling in Seven-Core Optical Fiber", 7th International Conference on Computers and Devices for Communication (CODEC-2019), 19-20 Dec. 2019, Hotel Vivanta, Kolkata, India.

9. Alekhya Ghosh, Arghadeep Pal and **N. R. Das**, "A Simple Structural Design for Tuning of Bandgap and Window in 1D Photonic Crystal", 3rdInternational Conference on Optical & Wireless Technologies (OWT 2019), March 16-17, 2019, Jaipur, India.

10. Shroddha Mukhopadhyay, Samanti Das and **N. R. Das**, "An Approach for Reduction of Cross-talk in Multi Core Optical Fibers", 3rdInternational Conference on Optical & Wireless Technologies (OWT 2019), March 16-17, 2019, Jaipur, India.

11. M. Mishra and **N.R. Das**, "Role of Coupling Angle on the Performance of a Ring Resonator-Waveguide Sensor", 3rdInternational Conference on Optical & Wireless Technologies (OWT 2019), March 16-17, 2019, Jaipur, India.

12. Piyali Mukherjee and **N. R. Das**, "Tailoring the parameters to increase the efficiency of a microring resonator sensor for biosensing", 1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.

13. Sonali Basak, S. Guin and **N.R. Das**, "Electrical Tuning of Band Gap in Photonic Crystal",1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.

14. Shreerupa Biswas, S. Guin and **N.R. Das**, "Photonic Crystal for Gas Sensing Application", 1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.

15. M. Mishra, F. Morichetti and **N. R. Das**, "Ferroelectric-Cladded Tunable Silicon Photonic Couple",1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.

16. PinakPani Mukherjee, **N. R. Das** and S. Sarkar, "Comparison of Power Penalty due to Component, SRS and FWM Crosstalk in a WDM Receiver", 1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.
17. K. Majumder, P. Rakshit and **N. R. Das** "Dependence of Bandwidth on the Structural Parameters of Si-CMOS Avalanche Photodiode", 1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.
18. Jayjeet Sarkar, A. Banerjee, **N. R. Das** and B. N. Biswas, "Study the Effect of Delay and Frequency Pulling Phenomenon in an Opto-electronic Oscillator Considering Weak Signal Injection", 1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), 23-24 March, 2018, Asansol Engg. College, India.
19. BN Biswas, A Mukherjee, **N.R. Das**, D Ghosh, "Optoelectronic oscillator: Electron-photon and photon-electron conversion device", 3rd International Conference on Microwave and Photonics (ICMAP), 9-11 Feb. 2018, IIT ISM Dhanbad, India, IEEE Xplore on 07 May 2018, 1-2, DOI: 10.1109/ICMAP.2018.8354495.
20. D Ghosh, **N.R. Das**, A Mukherjee, B.N. Biswas, "Multiple rhythms in an optoelectronic oscillator", 3rd International Conference on Microwave and Photonics (ICMAP), 9-11 Feb. 2018, IIT ISM Dhanbad, India, IEEE Xplore on 07 May 2018, 1-2DOI: 10.1109/ICMAP.2018.8354522.
21. D Ghosh, A Mukherjee, **N.R. Das**, B.N. Biswas, "A Study on the Effect of an External Periodic Signal in a Chaotic Optoelectronic Oscillator", International Conference on Modelling and Simulation, 27-36, 2017, MS-17 2017, 4-5 November, Kolkata, India.
22. S Guin, **N.R. Das**, "Gain and linewidth enhancement in quantum dots with external electric field", International Conference on Numerical Simulation of Optoelectronic Devices (NUSOD), 2017, 24-28 July, Copenhagen, Denmark, published in IEEE Explore on 15Aug, 2017, DOI: 10.1109/ NUSOD.2017.8010022.
23. S Guin, **N.R. Das**, "Electric field aided optical gain in semiconductor quantum dots", International Conference on Circuits, System and Simulation (ICCSS), 2017, pp.24-27, 14-17 July 2017, London, UK, published in IEEE Xplore on 31 Aug., 2017, DOI: 10.1109/CIRSYSSIM. 2017.8023174.
24. S Sarkar, PP Mukherjee, **N.R. Das**, "Realistic estimation of power penalty through a probabilistic framework in a WDM receiver with component crosstalk", International Conference on Circuits, System and Simulation (ICCSS), 2017 14-17 July 2017, pp.171-175, London, UK, published in IEEE Xplore on 31 Aug., 2017, DOI: 10.1109/CIRSYSSIM.2017.8023205.
25. PP Mukherjee, S Sarkar, **N.R. Das**, "A probabilistic framework to estimate minimum Bit Error Rate in a WDM receiver with component crosstalk", IEEE Region 10 Conference (TENCON), 2016, pp. 2004-2007, 22-25 Nov. 2016, Singapore, IEEE Xplore on 09 Feb., 2017, DOI: 10.1109/ TENCON.2016.7848376.

26. S Guin, **N.R. Das**, "Study the effect of inhomogeneous broadening in Quantum Dots for application in medical imaging", IEEE Region 10 Conference (TENCON), 2016, pp.3246-3248, 22-25 Nov. 2016, Singapore, IEEE Xplore on 09 Feb., 2017, DOI:10.1109/TENCON.2016. 7848650.

Invited Lectures

1. "Quantum Dots in Cellular/Sub-cellular Imaging – with design example from SLDs in OCT", **National Webinar** (Online Seminar) on **Recent Advances in Emerging Electronics** organized by P.G. Dept. of Electronic Science & Technology, **Berhampur University,** Odisha, **(under World Bank OHEPEE Project)**, India, February 22-23, 2022.
2. "Photonics For Sensing Applications", **AICTE Training And Learning (ATAL) Faculty Development Programme** (Webinar) organized by **Mizoram University**, Mizoram, India, February 15-19, 2021.
3. "Quantum Dot SLEDs as Broadband Optical Sources for Sub-Cellular OCT", **6th International Conference on Opto-Electronics and Applied Optics (OPTRONIX-2020)**, (Webinar), June 08-10, 2020, University of Engineering and Management (UEM), Kolkata.
4. "Quantum Dot Superluminescent Light Emitting Diode for Optical Coherence Tomography in Sub-Cellular Imaging", **International Seminar cum Research Colloquium on MEMs based Sensors and Smart Nanostructured Devices (MSSND)**, Dec. 27- 28, 2019, Jadavpur University, Kolkata.
5. "Light Emitting Diodes -Advances and Applications", Invited talk at the Technical Event organized by **IEEE Photonics Society** Kolkata Chapter and **IEEE IEM Student Branch**, Nov. 14, 2019, Institute of Engineering and Management (IEM) Saltlake, Kolkata.
6. "Photonics: Enabler of Next Generation Technology", Special Lecture at **Techno International Batanagar**, April 23, 2019.
7. "Photonics in Information Age", **One-day Seminar "Photonics As Future Of Technology (PhotAFOT)'**, an outreach program by **IEEE Photonics Society** Kolkata Chapter, Feb. 02, 2019, ECE Dept, Supreme Knowledge Foundation Group of Institutions, Mankundu, West Bengal, India.
8. "Semiconductor based Optoelectronic Devices", **Faculty Development Programme** organized by **Association of Professional Academic Institution (APAI)**, Kolkata, India, January 15-19, 2019.
9. "Optoelectronic Devices – Basics to Advances", **Faculty Development Programme** organized by **Techno India Group (TIG)**, Kolkata, India, January 14-18, 2019.
10. "Some Theoretical Studies – Possible Resource for Data-Driven Material Science", **Summer School on DCMS Materials 4.0**, at **Technical University Dresden, Germany**, September 10-14, 2018.
11. "Some Theoretical Investigations on Semiconductor Nanostructures", **Seminar**, under **INSA-DFG** Visit, at **Chair of Material Science and Nanotechnology, Technical University Dresden, Germany**, Aug.23, 2018.
12. "Semiconductor Photonic Devices For Optical Communication - Optical Sources", Electronics Techno-Cultural Fest 'VISTAAR 2K18', at **Indira Gandhi Institute of Technology (IGIT)**, mentored program by **TEQIP**, University of Calcutta, at Sarang, Odisha, India, 2018.

13. (**Plenary Lecture**) "Study Engineering and Contribute to Society", in Orientation Programme at **Abacus Institute of Engineering & Management**, Hoogly, India, Aug. 06, 2018.
14. (**Keynote Talk**), "Advances in Semiconductor based Photodetectors", **International Conference on Emerging Trends in Engineering and Science (ETES),** Asansol Engineering College (**AEC**), Asansol, India, March 24, 2018.
15. (**Keynote Talk**), "Advances in Electronics – A brief Account", **UGC-HRDC Special Winter School on Electronics – Science Engineering and Technology (E-SEAT),** University of Calcutta, Kolkata, India, Feb. 26, 2018.
16. "Semiconductor Optoelectronics", **UGC-HRDC Refresher Course** on "Advances in Engineering & Technology", **Guru Ghasidas Vishwavidyalaya**, Bilaspur, Chhattisgarh, India, June 5-24, 2017.

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide**
Monideepa Dutta (Enrolled)	On Organic Semiconductor Devices	Ongoing	--
Rabindranath Sasmal (Registered)	On Semiconductor Nanostructures	Ongoing	---
Suman Dey (Registered)	On Quasi-Photonic Crystals	Ongoing	Dr. Somnath Ghosh
Moubani Bandyopadhyay (Registered)	On Nitride-based Optoelectronics	Ongoing	--
Jayjeet Sarkar (Registered)	On Optoelectronic Oscillators	Ongoing	Dr. Abhijit Banerjee
Pinak Pani Mukherjee (Guided as joint Supervisor)	"Analysis of WDM receiver performance for detection of amplitude and phase modulated signals in presence of component crosstalk"	Presented Pre-Doctoral Seminar	Dr Santu Sarkar
Shampa Guin	"Analysis for Power and Linewidth of Superluminescent Light Emitting Diode with Ensemble of Self-Assembled Quantum Dots"	Submitted (2022)	--
Madhusudan Mishra	"Design and Analysis of BTO-clad Silicon Waveguide Components for Compact Photonic Integrated Circuits"	Submitted (2022)	--
Dia Ghosh	"On Generation and Control of Dynamics of Optoelectronic Oscillator	Awarded (2022)	Prof. B. N. Biswas
Arindum Mukherjee (Guided as joint Supervisor)	"Theoretical Studies on Single Loop Optoelectronic Oscillator"	Awarded (2022)	Prof. B. N. Biswas
Paulami Rakshit	"Performance Analysis and Design of Lateral Silicon Photodetector"	Awarded (2020)	--
Kanishka Mazumder	"Study of Gain and Bandwidth of Avalanche Photodiodes with Very Thin Multiplication Layer"	Awarded (2019)	--

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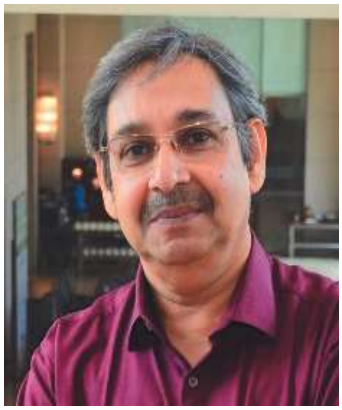

Degrees obtained:

- Ph.D. (Tech), Radio Physics and Electronics, University of Calcutta, 1994
- M.Tech., Radio Physics and Electronics, University of Calcutta, 1989
- B.Tech., Radio Physics and Electronics, University of Calcutta, 1987
- Bachelor of Science (Hons.), Physics Department, Raiganj University College, 1984

Classes Taught (2017-2022)

- Course Code: EC 2.1.1- Electromagnetic Fields and Waves
- Course Code: RP 4.2.2- Microwave and Wireless Antenna
- Course Code: EC HN 2.2.5- Antennas and Radio Wave

Research Interests and Experience

***Areas of interest*:** Meta surface/meta element induced antenna designs; Solutions to cross polarization issues of printed antenna and arrays; Dielectric Resonator Antenna and hybrid subarray, AI based advanced Defected Ground Structure-integration techniques; Fabry-Perot and open resonant cavity antennas: theory, pattern synthesis, and advanced feed design.

- A new class of metal-dielectric hybrid subarray has been introduced with the aim of achieving maximum advantage out of minimum feed and element requirements [IEEE TAP, 69 (7), 3778 - 3787, 2021]. • A novel concept of 'open cavity resonant antenna' along with an AI-based theory has been introduced as an improved variant of the traditional Fabry-Perot cavity [IEEE AWPL, 20 (5) 678-682, 2021]. This design is under progress at ISRO for realizing a unique feed in satellite-borne reflectors.
- The first-time solution to the long-standing issue of high cross-polar fields across the skewed radiation planes of any microstrip antenna [*IEEE TAP*, 68 (6), 4950 - 4954, 2020], [*IEEE AWPL*, 19 (1), 99-103, 2020]. This indeed solves the major shortcoming in SAR antennas and is already in process for the practical applications.

- Reported the glue-free mount for Dielectric Resonator Antennas [*IEEE AWPL*, 16, 2440-2443, 2017] for the first time. This is going to solve the major weakness of using this antenna on highly vibrating platforms like air-borne and space-borne systems.
- Introduced a new radiating mode ($HEM_{12\delta}$) in cylindrical shaped Dielectric Resonator Antenna (DRA) and successfully resolved the challenges of its excitation by innovating a series of novel feeds [*IEEE TAP*, 60 (1), 71-77, 2012]. This overall approach enables cylindrical DRA qualified for on-chip implementation.
- Conceived and introduced Defected Ground Structure (DGS) integration techniques to planar antennas for mitigating cross-polarized radiations and mutual coupling in array elements [*IEEE AWPL*, 4, 455-458, 2005]. This has been eventually established it as an attractive and industry-qualified technique.

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Head, Institute of Radio Physics & Electronics, CU (Dec. 2016 - Nov. 2018)
- Director, Centre for Research in Nanoscience and Nanotechnology, CU (Sept. 2017- Sept. 2019)

Current Projects

Funding agency	Topic and details	Funding and Duration
INAE-SERB DST, Govt. of India	Development of Metasurface Enabled Multifunction Antennas for Medical and 5G Applications, under Abdul Kalam Technology National Innovation Fellowship	Funding: 95 lacs, Duration: 5years

Publications (Books, Journals)

Book:

2022: *Wiley-IEEE Press*
Defected Ground Structure (DGS) Based Antennas, authored by:D. Guha, C. Kumar, and S. Biswas

Journal Papers

1. Sk. Rafidul, P. Mishra, R. Bose, and **D. Guha**, "Uniformly Improved Cross-polar Discrimination in a Dielectric Resonator Antenna by Conduction Current Control," *IEEE Trans. Antennas and Propagat*., (in press).
2. Sk. Rafidul, **D. Guha**, and C. Kumar, "Sources of Cross-polarized Radiations in Microstrip Patches: Multi-Parametric Identification and Insights for Advanced Engineering," *IEEE Antennas and Propag. Mag.,* (in press).
3. R. K. Chakraborty and **D. Guha** "DRA Induced Conduction Current on the Metallic Ground Plane: Interesting Observations on its Impact and Usefulness," *IEEE Antennas and Propag. Mag*., vol. 65, no. 1, pp. 49-59, Feb. 2023,
4. C. Kumar, C. Sarkar, and **D. Guha**, "Radiating Mode Induced Cross-Polar Source in Microstrip Patch: Identification *IEEE Antennas and Wireless Propag. Lett.*, Vol. 21, No. 10, pp. 2080-2084, Oct. 2022.

5. D. Dutta, **D. Guha**, and C. Kumar, “Microstrip patch with grounded spikes: a new technique to discriminate orthogonal mode for reducing cross-polarized radiations,” *IEEE Trans. Antennas and Propag.*, Vol. 70, No. 3, pp. 2295 - 2300, March 2022.
6. C. Sarkar, **D. Guha**, and C. Kumar, "Source of Cross-Polar Fields in a Triangular Patch: Insight and Experimental Proof," *IEEE Antennas and Wireless Propag. Lett.* Vol. 20, No. 12, pp. 2437 - 2441, Dec. 2021.
7. P. Gupta, **D. Guha**, and C. Kumar, “Dual-Mode Cylindrical DRA: Simplified Design with Improved Radiation and Bandwidth,” *IEEE Antennas and Wireless Propagation Lett.*, Vol. 20, No. 12, pp. 2359 - 2362, Dec. 2021.
8. C. Sarkar, **D. Guha**, and C. Kumar, “Hybrid Subarray Using a New Concept of Feed for Advanced Antenna and Array Designs,” *IEEE Trans. Antennas Propag*., vol. 69, no. 7, pp. 3778 - 3787, July 2021.
9. D. Dutta, **D. Guha**, and C. Kumar, “Mitigating Unwanted Mode in a Microstrip Patch by a Simpler Technique to Reduce Cross-Polarized Fields over the Orthogonal Plane,” *IEEE Antennas and Wireless Propag. Lett.*, Vol. 20, No. 5, pp. 678 - 682, May 2021.
10. K. Dutta, P. Mishra, S. Manna, A. Pal, and **D. Guha**, “Geometrical Optics Based Advanced Design of an Open Cavity Resonant Antenna,” *IEEE Antennas and Wireless Propag. Lett.*, Vol. 20, No. 3, pp. 322-326, March 2021.
11. C. Kumar, and **D. Guha**, “Higher Mode Discrimination in a Rectangular Patch: New Insight Leading to Improved Design with Consistently Low Cross-Polar Radiations,” *IEEE Trans. Antennas Propag*., vol. 69, no. 2, pp. 708 - 714, Feb. 2021.
12. C. Kumar and **D. Guha**, “Mitigating Backside Radiation Issues of Defected Ground Structure Integrated Microstrip Patches,” *IEEE Antennas and Wireless Propagation Lett.*, Vol. 20, No. 12, pp. 2502 - 2506, Dec. 2020.
13. I. Pasha, C. Kumar, and **D. Guha**, “Mitigating High Cross-Polarized Radiation Issues over the Diagonal Planes of Microstrip Patches,” *IEEE Trans. Antennas Propagat*., vol. 68, no. 6, pp. 4950-4054, June 2020.
14. S. Choudhury, A. Mohan, P. K. Mishra, and **D. Guha**, “Reconfigurable Dual-Fed Horn with Pattern Switchability Realized by SIW Technology,” *IEEE Trans. Antennas Propagat*., Vol. 68, No. 5, pp. 4072-4076, May 2020.
15. B. P. Kumar, **D. Guha**, and C. Kumar, “Reduction of Beam Squinting and Cross-Polarized Fields in a Wideband CP Element,” *IEEE Antennas and Wireless Propagation Lett.*, Vol. 19, No. 3, pp. 418-422, March 2020.
16. P. Gupta, **D. Guha**, and C. Kumar, “Higher Mode Based Wideband Antenna Design Using an Engineered Cylindrical Dielectric Resonator,” *IET Microwaves, Antennas and Propagations*, Vol. 14, No. 4, pp. 241-246, March 2020.
17. D. Ganguly, **D. Guha**, and Y. Antar, “Cross-Finned UWB Monopole for Wireless Applications: Design Insight and Characterization,” *AEÜ-Int. J. Electronics and Communications*, Vol. 116, March 2020.
18. C. Kumar and **D. Guha**, “Asymmetric and Compact DGS Configuration for Circular Patch with Improved Radiations,” *IEEE Antennas and Wireless Propagation Lett.*, Vol. 19, No. 2, pp. 355-357, Feb. 2020.
19. D. Dutta, Sk Rafidul, **D. Guha**, and C. Kumar, “Suppression of Cross-Polarized Fields of Microstrip Patch across All Skewed and Orthogonal Radiation Planes,” *IEEE Antennas and Wireless Propagation Lett.*, Vol. 19, No. 1, pp. 99-103, Jan. 2020.

20. C. Sarkar, C. Kumar, and **D. Guha**, "A User Friendly Glueless Solution for Dielectric Resonator Antenna using Probe Feeding Technique," *IEEE Antennas Propagat. Mag.* Vol. 61, No. 4, pp. 70-74, Aug. 2019.
21. S. Choudhury, A. Mohan, P. Mishra, and **D. Guha**, "Wideband Pyramidal Ridged Horn Design by SIW Technology," ***IEEE Antennas and Wireless Propagation Lett.***, Vol. 18, No. 7, pp. 1517-1521, June 2019 .
22. I. Pasha, C. Kumar, and **D. Guha**, "Application-Friendly Improved Designs of Single-Fed Circularly Polarized Microstrip Antenna," *IEEE Antennas Propagat. Mag.* Vol. 61, No. 3, pp. 80-89, June 2019.
23. I. Pasha, C. Kumar, and **D. Guha**, "Simultaneous Compensation of Microstrip Feed and Patch by Defected Ground Structure for Reduced Cross- Polarized Radiation," *IEEE Trans. Antennas Propagat*., vol. 66, no. 12, pp.7348-7352, Dec. 2018.
24. C. Sarkar, **D. Guha**, C. Kumar, and Y. Antar, "New Insight and Design Strategy to Optimize Cross-Polarized Radiations of Microstrip Patch over Full Bandwidth by Probe Current Control," *IEEE Trans. Antennas Propagat*., Vol. 66, No. 8, pp. 3902-3909, Aug. 2018.
25. S. Choudhury, A. Mohan, and **D. Guha**, "Wideband Quasi Omnidirectional Planar Inverted F-Antenna for Compact Wireless Systems," *IEEE Antennas and Wireless Propagation Lett.*, Vol. 17, no. 7, pp. 1305-1308, July 2018.
26. S. Choudhury, A. Mohan, and **D. Guha**, "SIW-Induced DualmodeDualband Loop Antenna: A New Design Insight and Guideline," *Microwave and Optical Technol. Lett.*, Vol. 60, no. 1, pp. 50-56, Jan. 2018.
27. C. Sarkar, **D. Guha**, and C. Kumar, "Glueless Compound Ground Technique for Dielectric Resonator Antenna and Arrays," *IEEE Antennas Wireless Propagation Lett*., Vol. 16, pp. 2440-2443, 2017.
28. K. Dutta, **D. Guha,** and C. Kumar, "Theory of Controlled Aperture Field for Advanced Superstrate Design of a Resonance Cavity Antenna with Improved Radiations Properties," *IEEE Trans. Antennas Propagat*., Vol. 65, no. 3, pp. 1399-1403, March 2017.
29. **D. Guha**, D.Ganguly, S. George, C. Kumar, M. T.Sebastian, and Y. Antar, "New Design Approach for Hybrid Monopole to Achieve Increased Ultra-Wide Bandwidth," *IEEE Antennas Propagat. Mag.* pp. 139-144, Feb. 2017.

Conference Papers

1. S. Rafidul, **D. Guha**, "Reduction in Cross-Polar Fields in a DRA: Higher Mode vs. Conduction Current Control Techniques," IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Portland, Oregon, USA, July 23–28, 2023 (*submitted*).
2. S. Rafidul and **D. Guha**, "Does a Dielectric Resonator follow the Same Trend as in a Microstrip Patch in Interpreting the Sources of Cross-Polarized Radiation!," 2022 Microwave, Antennas, and Propagation Conference (MAPCON 2022), Bangalore, India, Dec. 2022.

3. C. Sarkar, **D. Guha**, and C. Kumar, “Simple Way of Controlling Cross-Polarized Radiations from Dielectric Resonator Antennas Without Affecting Other Salient Features Glue-free Technology for Hybrid Dielectric Resonator Antenna (DRA) and Array Designs,” 2022 Microwave, Antennas, and Propagation Conference (MAPCON 2022), Bangalore, India, Dec. 2022.
4. D. Dutta, S. Sinha, S. Ghosh, and **D. Guha**, “Rectangular Patch Coupled with Novel Perturbing Structures for Improved Radiations: Physical Insight for Choosing the Appropriate Shape,” Microwave, Antennas, and Propagation Conference (MAPCON 2022), Bangalore, India, Dec. 2022.
5. **D. Guha**, “Hybrid Dielectric Resonator Antenna: Innovations Over the Decades and State-of-the-Art Techniques,” 2022 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Denver, Jul. 2022.
6. C. Sarkar, C. Kumar, **D. Guha** and R. Mittra, “Glue-free Technology for Hybrid Dielectric Resonator Antenna (DRA) and Array Designs,” 2022 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Denver, Jul. 2022.
7. S. Rafidul, **D. Guha**, and C. Kumar, “Comprehensive Investigation into all Possible Reasons Causing Cross-polarized Radiations in Microstrip Antennas and Predictable Solutions,” 2022 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Denver, Jul. 2022.
8. D. Dutta and **D. Guha**, “Advanced Feature of a Circular Patch Realized as a Mode Specific Metaelement and Further Improvement by Ground Plane Engineering,” 2022 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Denver,Jul. 2022.
9. D. Dutta, **D. Guha**, and C. Kumar, “Rectangular Patch Coupled with Novel Perturbing Structures for Improved Radiations: Physical Insight for Choosing the Appropriate Shape,” 2021 IEEE Indian Conference on Antennas and Propagation (InCAP), Jaipur, India, pp. 762-765, Dec. 2021.
10. C. Sarkar, **D. Guha**, and C. Kumar, Millimeter Wave Subarray Based on an Innovative Design to Attain Improved Characteristics Uniformly Across All Radiation Planes; 2021 IEEE Indian Conference on Antennas and Propagation (InCAP), Jaipur, India, pp. 299-300, Dec. 2021.
11. H. P. G. Rao, Sk Rafidul, and **D. Guha**, “Aperture Coupled Microstrip Radiator: 3D Radiation Characteristics as a Function of Feed Mechanisms and Structural Variations,” 2021 IEEE Indian Conference on Antennas and Propagation (InCAP), Jaipur, India, pp. 801-803, Dec. 2021.
12. C. Sarkar, **D. Guha**, and C. Kumar “Revisiting Ground Plane Current for Improved Diagonal Plane Cross-Polarized Characteristics: An Innovative Design Applicable to a Wide Range of Microstrip Antennas," 2021 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Singapore, Dec. 2021.
13. . D. Dutta, **D. Guha**, and C. Kumar, “Improvement of Rectangular Microstrip Antenna by Mode Specific Meta Element Concept,” 2021 IEEE International Symposium on Antennas

and Propagation & USNC/URSI National Radio Science Meeting, Singapore, pp. 1577-1578, Dec. 2021.

14. **D. Guha**, D. Dutta, and C. Kumar, "Microstrip Patch as Mode-Specific Meta-element: New Concept for Advanced Antenna & Array Design' China Microwave Week-International Conference on Microwave and Millimeter Wave Technology (ICMMT 2021), Nanjing, China, pp. 1-3, May, 2021.
15. **D. Guha**, "Microstrip Antenna Cross-Polarized Radiations, Kai Fong Lee, and Recent Insightful Observations," 2020 Asia Pacific Microwave Conf., Hong Kong, Dec. 2020, pp. 375-376.
16. C. Sarkar and **D. Guha**, "Hybrid subarray configuration of microstrip patches and dielectric resonators: new possibility of realizing wideband array antennas,"33rd URSI General Assembly and Scientific Symposium, Rome, Italy, Aug. 2020.
17. D. Dutta and **D. Guha**, Interesting behavior of rectangular microstrip patch with specific perturbations on the ground plane," 2020 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Montreal, Canada, Jul. 2020.
18. D. Dutta and **D. Guha**, "Metal-depleted Microstrip Ground with Reduced 3D Cross-polarized Radiations," Proc.2020 URSI Regional Conference on Radio Science (URSI-RCRS 2020), Feb. 2020, Varanasi, India, Feb. 2020.
19. S. Rafidul and **D. Guha**, "Symmetric Defected Ground Structure (DGS) for Dual-Polarized Patch Antenna with Suppressed Cross-polarized fields," Proc.2020 URSI Regional Conference on Radio Science (URSI-RCRS 2020), Varanasi, India, Feb. 2020.
20. C. Sarkar and **D. Guha**, "Integrated circuit compatible design of cylindrical dielectric resonator antenna," Proc.2020 URSI Regional Conference on Radio Science (URSI-RCRS 2020), Varanasi, India, Feb. 2020.
21. D. Choudhuri, P. A. Ajeesh, S. Choudhury, and **D. Guha**, "Planar W-band beam steerable antenna array using slotted SIW technology," 2019 IEEE Indian Conference on Antennas and Propagation (InCAP), Gujarat, India, Dec. 2019.
22. S. Choudhury, A. Mohan and **D. Guha**, "A novel methodology to design substrate integrated waveguide based H-plane horns with improved radiations using air perforations," 2019 IEEE Indian Conference on Antennas and Propagation (InCAP), Gujarat, India, Dec. 2019.
23. C. Sarkar and **D. Guha**, "Microstrip vs. Dielectric Resonator: Unaddressed Radiation Anomaly and New Insight into Efficient Design," 2019 IEEE Indian Conference on Antennas and Propagation (InCAP), Gujarat, India, Dec. 2019.
24. D. Dutta, and **D. Guha**, "Composite shorted patch designed for improved radiation patterns," IEEE Indian Conference on Antennas and Propagation (InCAP), Gujrat, India, Dec. 2019.

25. C. Sarkar and **D. Guha**, "Mechanically stable no adhesive approach for rectangular dielectric resonator antenna: A Commercially Viable Design for Practical Applications," 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, 2019, pp. 1-4.

26. K. Dutta and **D. Guha**, "Fabry-Perot resonant cavity antenna: new theory and design opportunity," 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, 2019, pp. 1-1.

27. M. I. Pasha, C. Kumar and **D. Guha**, "New technique for inset-fed microstrip patch with reduced cross polarized radiations," 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, 2019, pp. 1-3.

28. K. Dutta, A. Chatterjee, and **D. Guha**, "Wideband Design of Dielectric Resonator Antenna using Defected Ground Structure," 2018 International Conference on Applied Electromagnetics, Signal Processing and Communication (AESPC), Bhubaneswar, India, 2018, pp. 1-3.

29. 29. M. I. Pasha, C. Kumar, and **D. Guha**, "DGS-integrated Microstrip Patch Designed for Improved Cross-Polar Isolation over Skew Radiation Planes," Proc. of IEEE InCAP-2018, Hyderabad, Dec.2018.

30. S. Rafidul, **D. Guha**, and C. Kumar, "Innovative design concept: defected ground structure for improved planar array," 2018 IEEE Indian Conference on Antennas and Propogation (InCAP), Hyderabad, India, 2018, pp. 1-3, doi: 10.1109/INCAP.2018.8770755.

31. B. P. Kumar, C. Kumar, and **D. Guha**, "A new design approach to improve the circular polarization characteristics of a microstrip antenna," 2018 IEEE Indian Conference on Antennas and Propagation (InCAP), Hyderabad, India, 2018, pp. 1-2, doi: 10.1109/INCAP.2018.8770932.

32. S. Choudhury, A. Mohan, and **D. Guha**, "A new printed log periodic antenna using SIW concept," 2018 IEEE Indian Conference on Antennas and Propogation (InCAP), Hyderabad, India,
2018, pp. 1-3, doi: 10.1109/INCAP.2018.8770745.

33. P. Gupta, **D. Guha**, and C. Kumar, "New aperture coupling technique for dielectric resonator antenna to reduce cross-polarized fields," 2018 IEEE Indian Conference on Antennas and Propagation (InCAP), Hyderabad, India, 2018, pp. 1-2, doi: 10.1109/INCAP.2018.8770703.

34. C. Kumar and **D. Guha**, "Unwanted effects of defects used in microstrip antenna designs and possible solutions," 2018 IEEE Indian Conference on Antennas and Propogation (InCAP), Hyderabad, India,

35. K. Dutta, A. Chatterjee, S. Chakrabarti, and **D. Guha**, "A new Fabry-Perot cavity antenna with wideband characteristics," 2018 IEEE Indian Conference on Antennas and Propogation (InCAP), Hyderabad, India, 2018, pp. 1-2, doi: 10.1109/INCAP.2018.8770730.

36. C. Sarkar, **D. Guha** and Y. M. M. Antar, "New Insight into the Cross-Polarized Radiations: Symmetric vs Asymmetric Microstrip Patch Geometries, " 2018 IEEE Indian

Conference on Antennas and Propagation (InCAP), Hyderabad, India, 2018, pp. 1-2, doi: 10.1109/INCAP.2018.8770820.

37. K. Dutta, S. Manna, A. Pal, P. K. Mishra, and **D. Guha**, "Wideband design of a fabry-perot cavity antenna with improved features," 2018 IEEE Indian Conference on Antennas and Propagation (InCAP), Hyderabad, India, 2018, pp. 1-2, doi: 10.1109/INCAP.2018.8770958.
38. D. Dutta, **D. Guha** and C. Kumar, "Specially designed microstrip array with patterned ground plane for improved characteristics," 2018 IEEE Indian Conference on Antennas and Propagation (InCAP), Hyderabad, India, 2018, pp. 1-3, doi: 10.1109/INCAP.2018.8770748.
39. C. Sarkar, **D. Guha** and Y. M. M. Antar, "New Approach of TE/TM Mode Based Rectangular Microstrip Patch Design for Pattern Diversity," 2018 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Boston, MA, 2018, pp. 1605-1606, doi: 10.1109/APUSNCURSINRSM.2018.8609201.
40. C. Sarkar and **D. Guha**, "HEM12δ mode based advanced cylindrical DRA using a new feeding with non-metallic base," 2018 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Boston, MA, 2018, pp. 2193-2194.
41. P. Gupta, **D. Guha**, C. Kumar and Y. M. M. Antar, "Multi-frequency cylindrical dra with identical radiations using HEM11δ/HEM12δ /HEM111modes," 2018 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Boston, MA, 2018, pp. 2093-2094, doi: 10.1109/APUSNCURSINRSM.2018.8609243.
42. S. Choudhury, A. Mohan and **D. Guha**, "SIW structure explored as a low-profile wideband antenna bearing user-friendly characteristics for wireless transceivers," 2018 IEEE International Symposium on Antennas and Propagation & USNC/URSI National Radio Science Meeting, Boston, MA, 2018, pp. 1941-1942.
43. M. I. Pasha, C. Kumar, and **D. Guha**, "Improvement in circularly polarized square patch design by double-layered ground structure," 2017 IEEE International Conference on Antenna Innovations & Modern Technologies for Ground, Aircraft and Satellite Applications (iAIM), Bangalore, 2017, pp. 1-4, doi: 10.1109/IAIM.2017.8402539.
44. C. Sarkar, **D. Guha**, and C. Kumar, "Compound ground plane designed for probe-fed dielectric resonator antennas," 2017 IEEE International Conference on Antenna Innovations & Modern Technologies for Ground, Aircraft and Satellite Applications (iAIM), Bangalore, 2017, pp. 1-4, doi: 10.1109/IAIM.2017.8402633.
45. C. Kumar and **D. Guha**, "Asymmetric defected ground structure: A new approach of suppressing cross-polarized radiations from probe fed circular patches," 2017 IEEE International Conference on Antenna Innovations & Modern Technologies for Ground, Aircraft and Satellite Applications (iAIM), Bangalore, 2017, pp. 1-4, doi: 10.1109/IAIM.2017.8402520.
46. C Sarkar, and **D Guha**, "Higher order mode based cylindrical DRA designed using a new simplified feed," Proc. IEEE Applied Electromagnetic Conf. (AEMC), Aurangabad, India, Dec. 2017.

47. K. Dutta, A. DattaSinha, **D. Guha**, and C. Kumar, "New idea of antenna-based modulation technique demonstrated as polarization shift keying," 2017 IEEE Applied Electromagnetics Conference (AEMC), Aurangabad, 2017, pp. 1-2, doi: 10.1109/AEMC.2017.8325750.

48. C Sarkar, **D Guha**, C Kumar, and Y. M. M. Antar, "New physical insight into understanding and controlling cross-polar radiations of a probe-fed microstrip patch," Proc. 32nd Intl. Union of Radio Science General Assembly & Scientific Symp., URSI GASS, Aug. 2017, Montreal, Canada.

49. **D. Guha** and C. Sarkar "Dielectric Resonator Antenna: A Solution for its Mount on Metallic Body", IEEE Antennas and Propagations Symp., San Diego, USA. July. 9-14, 2017.

50. **D. Guha**, P. Gupta, C. Kumar, and Y. Antar, "Inverted stair case/hat-shaped dielectric resonator antenna: high gain design with higher order mode ", IEEE Antennas and Propagations Symp., San

51. **D. Guha**, D. Ganguly, S. George, and Y. Antar, "Monopole of decade bandwidth realize from a new metal-dielectric hybrid structure", IEEE Antennas and Propagations Symp., San Diego, USA. July.9-14, 2017.

Patent Details:

Novel dielectric resonator antenna and array structures to avoid adhesive or glue

by **D. Guha,** C. Sarkar, C. Kumar, and S. Biswas

Patent application No. **201731000973 (India),** Published

Microstrip Patch with Reduced Cross Polarized Radiations over Entire Skewed Radiation Planes

By **D. Guha,** M. Pasha, C. Kumar

Patent application No. **KOL / 201931008444 (India),** Published

Invited Lectures/ Distinguished Lecture (DL)

1. 'Power of EM Simulation Tools: my little experience', **Department of Electronics Engineering, Indian Institute of Technology**, **BHU, Varanasi,** Date: Jan. 6, 2023.

2. **IEEE Distinguished Lecture**
   'Mysteries in Dielectric Resonator Modes and Some Techniques for Advanced Antenna Designs, **'Università La Sapienza, Rome,** Nov. 28, 2022

3. **IEEE Distinguished Lecture**
   'Is Antenna made of mathematics?', **Università di Pisa, Italy,** 25 November 25, 2022

4. CSIR Foundation Day Lecture, **CSIR-Central Scientific Instruments Organization (CSIR-CSIO**), **Chandigarh**, October 7, 2022.

5. **IEEE Distinguished Lecture**
   'ELECTRODYNAMICS Revisited from a Different Perspective', **Satyabhama Institute of Technology,** Sept 27, 2022

6. **IEEE Distinguished Lecture**
   'Advances in Antenna Engineering and New Insights', **Pondicherry University**, Sept 26, 2022.
7. **IEEE Distinguished Lecture**
   'Science to Engineering and Engineering to Science: Journey as an Antenna Engineer', **Trivandrum,** Sept 24, 2022
8. 'Have you ever thought?', **IIT Kanpur**, September 17, 2022.
9. **IEEE Distinguished Lecture**
   'Mysteries in Dielectric Resonator Modes and some Techniques for Advanced antenna Designs', **IEEE AP-S Montreal Section Chapter**
10. 'Sources of Cross-Polarized Radiations of a microstrip patch: are all of them known to us?', **IEEE Workshop on Advancement in Antennas and Microwave Technologies**, 16 March, 2022, SAC, **Ahmedabad, India**.
11. 'Some challenges in Antenna Design more insight and experience', **Mizoram University, Aizawl, India**. 23 February 2022
12. 'Power and Beauty of Simulation Tools: My Experience in Engineering Research', **IEEE Intl. Conf. Applied Electromagnetics, Signal Processing and Communication (AESPC-2021),** 26 – 28 Nov. 2021, **Bhubaneswar, India.**
13. "Engineering Research in Academia: How to Address the Challenges', **S. L. N. College of Engineering, Raichur**, 2 September 2021.
14. 'Research- an art of addressing challenges' NIT Mizoram Lecture Series (online)', **NIT Mizoram**, June 28, 2021
15. 'Science to engineering and engineering to science: a journey over the last 25 years', **Fellow Inaugural talk at Indian Academy of Sciences, Bangalore,** June 18, 2021
16. 'Microstrip Patch as Mode-Specific Meta-element: New Concept for Advanced Antenna & Array Design' (online), **China Microwave Week- International Conference on Microwave and Millimeter Wave Technology (ICMMT2021), Nanjing, China**, 23-26, 2021
17. Modern Antennas for Present and Futuristic Wireless Communication Technology, **NIT, Sikkim**
18. Electronic Systems, **Jadavpur University, Kolkata**. Feb. 27, 2021
19. National Science Day Lecture 'Innovative Mind', **CMSDS, DRDO,** Kolkata. Feb. 25, 2021
20. 'The Art of Writing Technical Papers', **Knowledge Sharing Webinars Series, CESC, Kolkata.**
21. 'Microstrip antenna cross-polarization radiations: Kai Fong Lee and Recent insightful observations', 2020 **Asia-Pacific Microwave Conference (APMC 2020), Hong Kong**, Dec.10, 2020
22. Award Receiving Lecture: 'Innovations in Young Minds', **Kolkata, Pulmocon 2020**

23. ‘Art and Challenges of Writing Papers for IEEE Transactions’, **IEEE Bangalore Section, India**
24. ‘New Generation Wireless Techniques’, INAE National Workshop on Recent Advances in Engineering Science and Technology, 1-5 March 2020, **National Institute of Technology, Sikkim, India**
25. ‘Wireless- in the eye of an antenna engineer’, **2020 URSI Regional Conference on Radio Science (URSI-RCRS 2020)**, Feb. 2020, **Varanasi, India.**
26. ‘Scientific Research: Challenges and Successes’, **Malaviya National Institute of Technology, Jaipur**, 15 Oct. 2019, **Jaipur**.
27. ‘Wireless- in the eye of an antenna engineer’, **International Conference on Wireless communication, D. J. Sanghvi College of Engineering Mumbai**, 11 October, 2019
28. ‘Planar antenna design using DGS-integration technique’, **Advanced School of Antennas 2019**, June, **Bhubaneswar**
29. ‘Antenna Designs: Power & Beauty of Simulation Tools’, **Altair Technology Conference**, 11-12 June 2019, **Bangalore**
30. IEEE AP-S Rajasthan Chapter Inaugural Talk**, Malaviya National Institute of Technology, Jaipur,** 4 April, 2019.
31. Inaugural Talk: IEEE AP-S SBC, National **Institute of Technology, Silchar**, 12 Jan. 2019
32. ‘Art of Electrodynamics’, Recent Advances in wireless and space antennas’, **IISST, DOS, Trivandram**, 21 Dec. 2018.
33. ‘Planar Antennas: In Search of Cross-Polarized Radiations and Scope for Future Research’, **Indian Conf. on Antennas and Propagation (InCAP),** Dec. 2018, **Hyderabad**.
34. ‘Scientific Innovations for the Antennas, by the Antennas’**, Intl. Conf. on Innovations in Science, Engineering and Technology**, Oct. 27-28, 2018, **Chittagong, Bangladesh**.
35. ‘Transformation of Communication Technology: Signals through Electromagnetics,’ **Intl. Conf. Applied Electromagnetics, Signal Processing and Communication**, Oct. 22-24, 2018, **KIIT Bhubaneswar**
36. ‘Radiation and Antenna Theory,’ **IEEE Advanced School of Antennas**, 22-26 June, 2018 **Bhubaneswar**
37. ‘Antenna Design: Challenges and Innovations,’ **K.J. Somaiya College of Engineering**, 18 June 2018, **Mumbai**.
38. ‘DRA Technology - New Insights, Innovations, and Applications,’ **IEEE iAIM 2017**, 24-26 November 2017, **Bangalore**
39. ‘Is it Antenna? A Story of Antenna Research & Future Scopes,’ **IEEE Workshop on Advanced Antennas for Space and Ground Applications**, 28th November 2017, **Vizag**
40. ‘A Story of Challenges in Research Career of an Engineer,’ **Indian Statistical Institute, Kolkata**, September 15, 2017.

41. S. N. Bose Memorial Lecture: "Microwave Research: J. C. Bose to contemporary India," **BANGIYA BIGJNAN PARISHAD, Kolkata**, Jan. 25, 2017

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide**
Debi Dutta 00148/Ph.D.(Tech)Proceed/2019 dated on 18-12-2019	Microwave Antenna	Ongoing (Registered)	Nil
Name and Registration information	**Topic**	**Status**	**Co-guide**
Sk Rafidul 00012/Ph.D.(Tech.)Proceed/2019, dated on 18-12-2019	Microwave Antenna	Ongoing (Registered)	Nil
Puneet Kumar Mishra 04145/Ph.D(Tech)Proceed/2019, dated on 19-06-2019	Microwave Antenna	Ongoing (Registered)	Nil
Debojyoti Choudhuri 10231/Ph.D(Tech)Proceed/2022, dated on 28-12-2022	Microwave Antenna	Ongoing (Registered)	Nil
B Pavan Kumar 3362/Ph.D.(Tech.)Proceed/2015	Microwave Antenna	Completed August, 2021	Dr. Chandrakanta Kumar
MahammadIntiyas Pasha 03360/Ph.D.(Tech.)Proceed/2015	Microwave Antenna	Completed February, 2020	Dr. Chandrakanta Kumar
Debarati Ganguly 0307/Ph.D(Tech.)Proceed/2015	Microwave Antenna	Completed January, 2020	Nil
Poulomi Gupta 3924 Ph.D.(Tech.) Proceed/ 13	Microwave Antenna	Completed December, 2019	Nil
Chandreyee Sarkar 6241/Ph.D.(Tech.)/Proceed/2016 dated Sep 1, 2016	Microwave Antenna	Completed November, 2019	Nil
Satyajit Chakrabarti 5342/Ph.D.(Tech.)Proceed/2014	Microwave Antenna	Completed January, 2018	Nil

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Degrees obtained:

- B. Tech.,
- M. Tech.
- Ph. D. (Tech.)

Classes Taught

- Course Code: ECHN2.1.5- B. Tech. Course Name: Materials and Physical Electronics
- Course Code: EC 2.2.2- B. Tech. Course Name: Electronic Devices
- Course Code: EC 2. 2.6- B. Tech. Course Name: Analog Circuits Laboratory
- Course Code: RP 4.1.5- M. Tech. Course Name: Advanced Semiconductor Physics and Devices
- Course Code: RP 4.2.13 - M. Tech. Course Name: Nanoelectronic Devices
- Course Code: RP 4.2.22 - M. Tech. Course Name: CAD Techniques (TCAD & IC Design)

Research Interests and Experience

- Semiconductor Physics, Electronic and Optoelectronic Devices and Circuits, Optical Communications and Photovoltaics.
- My research interests include modeling, and simulation of electronic and optoelectronic devices, in particular emerging devices and circuits built using them. At present I am much more interested in photovoltaic and photo emissive devices, and optical communications.

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Worked as Head of the Department from December 2020-December 2022
- Acting as a member of Ph.D. RAC in the Department of Radio Physics & Electronics, CU since 2017.
- Acting as a member of the Purchase Committee in the Department of Radio Physics & Electronics, CU
- Acted as a Deputy Coordinator of CAS scheme during 2017-2022

Current Personal Projects		
Funding agency	**Topic and details**	**Funding and Duration**
SERB	Investigations on high mobility III-V, Ge and GeSnnano CMOS devices including radiation effects for analog/RF and logic applications	Total Budget Rs. 36.30 Lakh; Duration (2018-2021)

Publications (Books, Journals)

Book

A. Biswas, R. S. Saxena and D. De, "Microelectronics, Circuits and Systems Select Proceedings of 7 th International Conference on Micro2020" in LNEE Springer, 2021. ISBN: 978-981-16-1569-6

Journal Paper

Total Number of SCI Journals: 80;
For details, please visit to https://www.caluniv.ac.in/academic/rpe.html

1. K. Banerjee and **A. Biswas**, "Enhanced analog/RF performance of hybrid charge plasma based junctionless C-FinFET amplifiers at 10 nm technology node," Microelectronics Journal, 2022. https:// DOI: 10.1016/j.mejo.2022.105662.
2. P. Chakraborti, **A. Biswas** and A. Mallik, "High Sensitivity Ge-source L-shaped Tunnel BioFETs for Detection of High-K Biomolecules," Microsystem Technologies, 2022.
3. A. Roy, S. Dey, A. Laha, **A. Biswas** and S. N. Ghosh, "Exceptional Point induced asymmetric mode conversion in a dual-core optical fiber segment," Optics Letts, Vol. 47, pp. 2546-2549, 2022
4. D. Roy, D. P. Samajdar and **A. Biswas**, "Design of hybrid solar cell with GaAs1−xBix (x = 0.01) nanowire core and conformally coated P3HT/ITO shell," Solar Energy, Vol. 238, pp.1-8, 2022. https://doi.org/10.1016/j.solener.2022.04.019
5. H. Karan and **A. Biswas**, "Improving performance of light-emitting diodes using InGaN/GaN MQWs with varying trapezoidal bottom well width", Optik, Vol. 247, p. 167888, 2021.
6. D. Roy, D. P. Samajdar and **A. Biswas**, "Photovoltaic Performance Improvement of $GaAs_{1-x}Bi_x$Nanowire Solar Cells in Terms of Light Trapping Capability and Efficiency," Solar Energy, Vol. 221, pp. 468-475, 2021.
7. D. Roy and **A. Biswas**, "Design and Analysis of Ultra-Thin Dielectric Film Embedded Nanoscale Double-Gate MOSFETs for Boosting Logic Performance," AEUE - International Journal of Electronics and Communications, Vol. 131, pp. 153614, 2021.
8. S. Ghosh, S. Tewari, **A. Biswas**, and A. Chakrabarti, "High performance pH sensors using ion sensitive InGaAs-channel MOSFETs at sub-100 nm technology node," J. of Electronic Materials, Vol.50, pp.1292-1300, 2021.

9. K. Banerjee and **A. Biswas**, "Improved Digital Performance of Charge Plasma Based Junctionless C-FinFETs at 10 nm Technology Node and Beyond," AEUE - International Journal of Electronics and Communications, Vol. 124, pp. 153350, Sept. 2020.
10. P. Nath, **A. Biswas** and V. Nath, "Performance optimization of solar cells using non-polar, semi-polar and polar InGaN/GaN multiple quantum wells alongside AlGaN blocking layers," Microsystem Technologies, Vol. 27, pp. 301–306, 2021.
11. A. Laha, S. Dey, D. Beniwal, **A. Biswas** and S. N. Ghosh, "Third-order exceptional point and successive switching among three states in an optical microcavity," Physical Review A, Vol. 101(6), p-063829, 2020.
12. A. Laha, S. Dey, H. K. Gandhi, **A. Biswas** and S. N. Ghosh, "Exceptional Point and Toward Mode Selective Optical Isolation," ACS Photonics, Vol. 7, No. 4, pp. 967-974, 2020.
13. J. Paul, C. Mondal and **A Biswas**, "Suppression of buried oxide induced variability on digital performance of GeOI pMOSFETs using substrate bias scheme," Microsystem Technologies, 26, pp.1605–1611, 2020.
14. S. Bhattacherjee and **A. Biswas**, "Investigation on noise performance of $InAs_xSb_{1-x}$ MOSFETs with compositional variations," Microsystem Technologies, 26, pp.1133–1140, 2020.
15. S. Dasgupta, C. Mondal and **A Biswas**, "Effects of temperature and channel thickness on digital and analog performance of InAs quantum well nMOSFETs," Microsystem Technologies, 26, pp.1265–1271, 2020.
16. S. De, S. Tewari, and **A. Biswas**, "Negative bias temperature instability (NBTI) effects on p-Si/n-InGaAs hybrid CMOSFETs for digital applications," Microsystem Technologies, Vol. 26, pp.1173–1178, 2020.
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18. S. De, S. Tewari, **A. Biswas** and A. Mallik, "Improved digital performance of hybrid CMOS inverter with Si p-MOSFET and InGaAs n-MOSFET in the nanometer regime," Microelectronic Engineering, Vol. 211, pp. 18-25, 2019.
19. D. Roy and **A. Biswas,** "Effects of asymmetric underlap spacers on nanoscale JLTs and design of optimized CMOS amplifiers," IET Circuits, Devices and Systems, Vol. 13, pp. 510 – 518, 2019.
20. J. Paul, C. Mondal and **A Biswas**, "Subthreshold modeling of nanoscale germanium-tin (GeSn)-on-insulator MOSFETs including quantum effects," Materials Science in Semiconductor Processing, Vol. 94, pp. 128-135, 2019.
21. A. Laha, **A. Biswas** and S. N. Ghosh, "Minimally asymmetric state conversion around exceptional singularities in a specialty optical microcavity," J. of Optics, Vol. 21, 025201, 2019.

22. H. Karan, M. Saha, **A. Biswas** and D. Biswas, "Analysis of luminescence spectra of rectangular and trapezoidal InGaN/GaN multiple quantum wells under varying bias conditions," Optical Materials, Vol. 86, pp. 247-255, 2018.
23. N. Mondal, S. Tewari and **A. Biswas,** "Enhancement of pH-sensitivity using $In_{0.53}Ga_{0.47}As$ channel ion-sensitive-field-effect-transistors," Microsystem Technologies, 2018.
24. A. Laha, **A. Biswas** and S. N. Ghosh, "Non-adiabatic Modal Dynamics around Exceptional Points in an All-Lossy Dual-Mode Optical Waveguide: Towards Chirality Driven Asymmetric Mode-Conversion," Physical Review Applied, 2018.
25. S. Bhattacherjee and **A. Biswas**, "Effects of sidewall spacer layers on thermal and low frequency noise performance of SOI UTB MOSFETs," Microsystem Technologies, 2018. DOI:10.1007/s00542-018-4141-6
26. M. Saha and **A. Biswas**, "High Performance GaN/InGaN Multiple Quantum Well LEDs through Electron Blocking Layer Engineering," Microsystem Technologies, 2018. DOI:10.1007/s00542-018-4091-z
27. J. Paul, C. Mondal and **A Biswas**, "Enhancing digital performance of nanoscale GeOI MOSFETs through optimization of buried oxide properties and channel thickness," Microsystem Technologies, 2018. DOI: 10.1007/s00542-018-4113-x
28. J. Paul, C. Mondal and **A Biswas**, "Studies of buried oxide properties on nanoscale GeOI pMOSFETs for design of a high-performance common source amplifier," Materials Science in Semiconductor Processing, Vol. 80, pp. 85-92, 2018.
29. M. Saha, **A. Biswas** and H. Karan, "Monolithic high performance InGaN/GaN white LEDs with a tunnel junction cascaded yellow and blue light-emitting structures," Optical Materials, Vol. 77, pp. 104-110, 2018.
30. D. Roy and **A. Biswas,** "Analytical model of nanoscale junctionless transistors towards controlling of short channel effects through source/drain underlap and channel thickness engineering," Superlattices and Microstructures, Vol.113, pp. 71-81, 2018.
31. S. Bhattacherjee, **A. Biswas** and S. N. Ghosh, "Less-dispersive specialty optical fiber with an enhanced operational bandgap for applications in the mid infrared region," J. Opt. Soc. Am. B, Vol. 35, pp. 73-80, 2018.
32. S. Tewari, S. De, **A. Biswas** and A. Mallik, "Impact of sidewall spacer on n-InGaAs devices and hybrid InGaAs/Si CMOS amplifiers in deca-nanometer regime," Microsystem Technologies, 2017.
33. K. Banerjee, S.Tewari, and **A. Biswas**, "Impact of aspect ratio of nanoscale hybrid p-Ge/n-Si complementary FinFETs on the logic performance," Microsystem Technologies, 2017.
34. A. Roy, **A. Biswas**, R. K. Varshney and S. N. Ghosh, "Highly sensitive refractive index sensor based on degeneracy in specialty optical fibers: a new approach," Microsystem Technologies, 2017. https://doi.org/10.1007/s00542-017-3622-3
35. H. Karan, M. Saha and **A. Biswas**, "Step multiple quantum well enabled performance enhancement in InGaN/GaN based light-emitting diodes," Microsystem Technologies, 2017. DOI: 10.1007/s00542-017-3567-6

36. D. Roy and **A. Biswas,** "Asymmetric underlap spacer layer enabled nanoscale double gate MOSFETs for design of ultra-wideband cascode amplifiers," Superlattices and Microstructures, Vol. 110, pp. 114-125, 2017.

37. P. Biswas, B. Pal, **A. Biswas** and S. N. Ghosh, "Towards self-similar propagation of optical pulses in a dispersion tailored, nonlinear and segmented Bragg fiber at 2.8 µm," IEEE Photonics Journal, Vol. 9, No. 4, 7104412-1-13, 2017.

38. A. Laha, **A. Biswas** and S. N. Ghosh, "Next nearest neighbor resonance coupling and exceptional singularities in degenerate optical microcavities," Journal of the Optical Society of America B, vol. 34, No.10, pp. 2050-2058, August 2017

39. H. Karan, **A. Biswas** and M. Saha, "Improved performance of InGaN/GaN MQW LEDs with trapezoidal wells and gradually thinned barrier layers towards anode," Optics Communications, Vol. 400, pp. 89-95, 2017.

40. S. De, S. Tewari, **A. Biswas** and A. Mallik, "Impact of channel thickness and spacer length on logic performance of p-Ge/n-Si hybrid CMOSFETs for ULSI applications," Superlattices and Microstructures, Vol. 109, pp. 316-323, September 2017.

41. S. Bhattacherjee and **A. Biswas**, "Development of noise model for InAsSb MOSFETs and their application in low noise amplifiers," Microsystem Technologies, 2017. https://doi.org/10.1007/s00542-017-3466-x

42. C. Mondal and **A Biswas**, "Performance analysis of nanoscale GeSn MOSFETs for mixed-mode circuit applications," Materials Science in Semiconductor Processing, Vol. 66, pp. 109-116, 2017.

43. D. Roy and **A. Biswas,** "Sidewall spacer layer engineering for improvement of analog/RF performance of nanoscale double-gate junctionless transistors," Microsystem Technologies, Vol. 23, pp. 2847–2857, 2017.

44. P. S. Das and **A. Biswas,** "Effect of Ge interface control layer on the interfacial and electrical properties of $TaYO_x$ thin films on GaAs substrates," Microsystem Technologies, Vol. 23, pp. 2055-2063, 2017

Conference papers

- **Total Number 89**
- For details, please visit to https://www.caluniv.ac.in/academic/rpe.html

1. P. Nath and **A. Biswas**, "Performance augmentation of radiation-resilient III-nitride based multi-junction solar cells with varying composition and thickness of the cap layer," IEEE Silchar Subsection Conference (SILCON), 2022, November 4-6, 2022, NIT Silchar, Assam.

2. A. Roy, S. Dey, A. Laha, **A. Biswas**, and S. Ghosh, "Selective mode conversions in a dual core optical fiber hosting multiple exceptional points," Frontiers in Optics and Laser Sciences (FiO+LS-2022), October 17-20, 2022, paper JW5B.40, Rochester, New York, (Hybrid meeting), USA.

3. A. Roy, S. Dey, A. Laha, **A. Biswas**, and S. Ghosh, "Hosting an exceptional point in a gain-loss assisted dual-core optical fiber segment," Frontiers in Optics and Laser Sciences (FiO+LS-2021), November 1-4, 2021, Technical Digest Series (Optica); paper JW7A.50, Washington DC (Hybrid meeting), USA.

4. P. Nath and **A. Biswas**, "Radiation-resilient GaN/$In_xGa_{1-x}N$ multi-junction solar cells with varying in contents," in the 3th International Conference ICCDC 2021, organised by Haldia Institute of Engineering, 16th -18th August, 2021.

5. M. Saha and **A. Biswas**, "Improvement of Efficiency and Uniformity of Dual Wavelength Emission for GaN/InGaN Multiple Quantum Well LEDs Through Triangular Electron Blocking Layer," 3rd International Conference on Communication, Devices and Computing (ICCDC 2021), August 16-18, 2021 at Haldia Institute of Technology, Haldia, West Bengal, India.

6. P. Chakraborti, **A. Biswas** and A. Mallik, "Detection of High-K Biomolecules Using Ge-source L-shaped Tunnel BioFETs," in Proc. 8th International Conference on Microelectronics, Circuits and Systems, Micro2021, Kolkata, India, 8-9 May. 2021.

7. P. Chakraborti, **A. Biswas** and A. Mallik, "Sensing of High-K Biomolecules using L-Shaped Tunnel FET," in Proc. 7th International Conference on Microelectronics, Circuits and Systems, Micro2020, Delhi, India, 25-26 Jul. 2020., pp. 25-33.

8. S. Sadhukhan, A. Laha, **A. Biswas**, and S. Ghosh, "Photonic crystal based ultra-sensitive interferometric nanometer displacement sensor," OSA Frontiers in Optics + Laser Science APS/DLS (FIO + LS), September 14-17, 2020, OSA Technical Digest (online); paper JTu1A.3, Virtual Web Conference, USA.

9. A. Laha, **A. Biswas**, and S. Ghosh, "Nonlinearity controlled asymmetric mode-conversion in an optical waveguide hosting an exceptional point," The JSAP-OSA Joint Symposia (80th Autumn Meeting of the Japan Society of Applied Physics), September 18-21, 2019, OSA Technical Digest (online); paper 20p_E215_4, Hokkaido University (Sapporo Campus), Japan.

10. A. Laha, S. Dey, H. K. Gandhi, **A. Biswas**, and S. Ghosh, "Mode selective optical isolation in an optical waveguide hosting an exceptional point," International Conference on Optics and Electro-optics (ICOL: XLIII Symposium of the Optical Society of India), October 19-22, 2019, Instruments Research and Development Establishment (IRDE), Dehradun, India.

11. A. Laha, S. Dey, **A. Biswas**, and S. Ghosh, "Topological control of state-flipping in a specialty optical microcavity," Workshop on Optics & Photonics: Theory & Computational Techniques (OPTCT), March 23-24, 2019, Indian Institute of Technology Delhi, India.

12. A. Laha, **A. Biswas**, S. Bhattacherjee and S. N. Ghosh, "Exceptional Points in a Specialty Microcavity: Interplay between State-Conversion and Cavity Control Parameters," in the 13th Pacific Rim Conference on Lasers and Electro-Optics (CLEO Pacific Rim, CLEO-PR 2018), Hong Kong, Jul. 29-Aug. 3, 2018.

13. A. Laha, **A. Biswas**, and S. N. Ghosh, "All-Lossy Quasi-Guided Dual-Mode Optical Waveguide Exhibiting Exceptional Singularities," in the Advanced Photonics Congress, Zurich, Switzerland, Jul 2-5, 2018.

14. S. Bhattacherjee and **A. Biswas**, "Impact of substrate bias and dielectric spacer layers on the noise performance of UTB SOI MOSFETs," 5th International Conference on Microelectronics, Circuits and Systems (MICRO 2018), May 19-20, 2018.

15. J. Paul, C. Mondal and **A. Biswas**, "Impact of buried oxide properties on improving digital performance of ultra-thin body GeOI MOSFETs in deca-nanometer regime," 5th International Conference on Microelectronics, Circuits and Systems (MICRO 2018), May 19-20, 2018.

16. N. Mondal, S. Munshi, S. Tewari and **A. Biswas**, "Analysis of high sensitivity pH-Sensor using $In_{0.53}Ga_{0.47}As$ Channel Ion-Sensitive-Field-Effect-Transistors," 5th International Conference on Microelectronics, Circuits and Systems (MICRO 2018), May 19-20, 2018.

17. M. Saha and **A. Biswas**, "Enhancing the Quantum Efficiency of GaN/InGaN Multiple Quantum Well LEDs by Electron Blocking Layer Engineering," 5th International Conference on Microelectronics, Circuits and Systems (MICRO 2018), May 19-20, 2018.

18. A. Laha, **A. Biswas** and S. N. Ghosh, "Adiabatic Optical State Conversion around Exceptional Singularities in an Optical Microcavity of Varying Width," in the International Conference on Advanced Optics and Photonics: ICAOP-2017 (XLI Conference of Optical Society of India) Haryana, India, November 23-26, 2017.

19. H. Karan and **A. Biswas**, "Performance improvement of light-emitting diodes with W-shape InGaN/GaN multiple quantum wells," International Conference on Communication, Devices and Computing (ICCDC), Haldia, India, November 2-3, 2017.

20. M. Saha and **A. Biswas**, "Enhanced Performance of GaN/InGaN Multiple Quantum Well LEDs by Shallow First Well and Stepped Electron Blocking Layer," International Conference on Communication, Devices and Computing (ICCDC), Haldia, India, November 2-3, 2017.

21. P. Biswas, S. N. Ghosh, R. K. Varshney, **A. Biswas**, and B. P. Pal, "*Stable Propagation of Self Similar Pulses Through A Chirped-clad All-solid Bragg Fiber in the Mid-IR," 5th Workshop on Speciality Optical Fibers and Their Applications (WSOF), Limassol, Cyprus, October 11-13, 2017.*

22. P. Biswas, S. N. Ghosh, R. K. Varshney, **A. Biswas**, and B. P. Pal, "Parametric dependence of self-similar propagation of parabolic pulses in a dispersion oscillating fiber," in The 24th Congress of the International Commission for Optics, August 21 – 25, 2017, Tokyo, Japan.

23. D. Roy and **A. Biswas**, "Improved Analog Performance with Asymmetric Underlap Spacers in Double Gate MOSFETs," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

24. A. Laha, **A. Biswas** and S. N. Ghosh, "Cascaded state-flipping around exceptional points in an unconventional optical microcavity with balanced gain-loss," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

25. H. Karan, M. Saha and **A. Biswas**, "Improved Performance of InGaN/GaN Based Light-Emitting Diodes With Step Multiple Quantum Well Structures," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

26. J. Pal, C. Mondal and **A. Biswas**, "Buried Oxide Design Considerations for Improving Analog Performance of Ultra-Thin Body GeOI MOSFETs," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

27. K. Banerjee, S. Tewari and **A. Biswas**, "Analysis of logic performance of nanoscale hybrid p-Ge/n-Si complementary FinFETs," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

28. S. Tewari, S. De, **A. Biswas** and A. Mallik , "Effect of sidewall spacers on the analog performance of InGaAs nMOSFETs in deca-nanometer regime," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

29. A. Roy, **A. Biswas** and S. N. Ghosh, "Inter-modal interactions and towards sensing in speciality optical fibers," 4th Int. Conf. on Microelectronics, Circuits & Systems (MICRO-2017), Darjeeling, India, June 3-4, 2017.

30. S. Bhattacherjee, **A. Biswas** and S.N. Ghosh, "Towards Ultra-large bandwidth in band-gap engineered specialty optical fibers: design and performance study," Proc. in Optics & Photonics Theory & Computational Techniques" (OPTCT), IIT Delhi, India, March 4-5, 2017.

31. A. Laha, **A. Biswas** and S. N. Ghosh, "Exceptional singularities in unconventional gain-loss optical microcavities", Workshop on Optics & Photonics: Theory & Computational Techniques (OPTCT-2017), Indian Institute of Technology Delhi, India, March 4-5, 2017.

Invited Lectures

- Keynote Talk, ***IEEE Silchar Subsection Conference (SILCON), 2022*, NIT Silchar, Assam** during November 4-6, 2022.Title of Talk: III-Nitride Based Quantum Well LEDs
- Invited Talk, **International Conference on Microelectronics, Computing &Communication Systems (MCCS) at Ranchi** during November 9-10, 2019.Title of Talk: High Mobility Nano CMOS Era

Doctoral Students

Name and Registration information	Status	Co-guide
Pramita Nath	Registered	---
Swagata Bankura	Registered	---
Prarthana Chakraborti	Registered	Prof. Abhijit Mallik
Debamita Roy	Registered	Dr. Dip Prakash Samajdar
Arpan Roy	Registered	Dr. Somnath Ghosh

PROF. ASHIK PAUL

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Degrees obtained:

- Ph.D. (Tech.), Institute of Radio Physics and Electronics, University of Calcutta, 2008
- M.Tech. in Radio Physics and Electronics, University of Calcutta, 1997
- B.Tech. in Radio Physics and Electronics, University of Calcutta, 1995

Classes Taught

- ECHN2.2.5- Antennas and Radiowave Propagation (B.Tech.)
- ECEL3.1.4.1- Satellite Communications (B.Tech.)
- ECP4.1.9 and 4.2.2 - Compulsory Project Work (B.Tech.)
- RP4.2.8- Radio Astronomy Techniques (M.Tech.)
- RP4.2.9- GNSS Aids and Applications (M.Tech.)
- RP5.1.1 and 5.2.1- Compulsory Project Work (M.Tech.)
- RP5.1.5- Measurements on Remote Sensing, Communication and GPS based Instrumentation (M.Tech.)

Research Interests and Experience

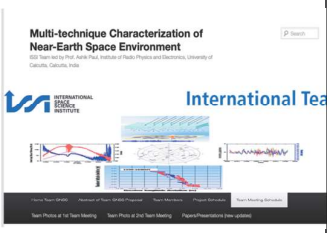
- Ionospheric Space Weather effects and Space Situational Awareness on satellite-based communication and navigation system using VHF Radar,
- Satellite Beacon,
- GNSS,
- IRNSS,
- CRABEX and small-form GNSS modules

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Head of the Department - December 2022-
- Life Member of European Geosciences Union
- Life Member of American Geophysical Union
- Individual Member of the International Union of Radio Science (URSI)

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Resource person for "Ionospheric and Magnetospheric Impacts" discipline of the upcoming Aditya-L1 mission of the Indian Space Research Organization (ISRO)
- Study of the characteristics of ionospheric irregularities at high and low latitudes through coordinated observations of EISCAT and VHF Radar at Haringhata, India
- Plasmasphere Ionosphere Thermosphere Integrated Research Environment and Access services: a Network of Research Facilities (PITHIA-NRF), European Union- April-September 2022
- Multi-frequency characterization of equatorial ionospheric Space Weather effects for developing signal outage predictive capability
- Asian Office of Aerospace Research and Development (AOARD), AFRL, USA, $US44888, 2018-2021
- Multi-technique characterization of near-Earth space environment, International Space Science Institute (ISSI), Switzerland, 2017-2019
- SCINDA Phase IV, Asian Office of Aerospace Research and Development (AOARD), AFRL, USA, $US13490, 2015-2017
- Impact of Equatorial Ionospheric Characteristics on Distributed GNSS Accuracies
- Science and Engineering Research Board (SERB), DST, GoI, Rs.56.8 lakhs, 2015-2018



https://www.issibern.ch/teams/mtconese/

Current Research Projects

Funding agency	Topic and details	Funding and Duration
Science and Engineering Research Board (SERB), DST, GoI	ST Radar Project	Rs.26.99 crores, 2015-2022
Institute for Solar Terrestrial Physics, German Aerospace Centre (DLR/SO)	Coordinated Research on Equatorial Spatial and Temporal anomaly (CREST)	2021-2023

Publications (Books, Journals)

Books and Book Chapters

1. Summer Night-Time E-Layer Echoes observed using University of Calcutta ST Radar, T. Das, P. Nandakumar, G. Singh, D. Jana, J. Y. Siddiqui , S. Majumder and **A. Paul**, Springer Lect. Notes in Networks and Syst., Vol. 147, Chapter 26, ISBN 978-981-15-8365-0), https://doi.org/10.1007/978-981-15-8366-7_26, 2021
2. Lower Atmospheric Wind Profile Studies and Validation Using VHF Doppler Radar of University of Calcutta, T. Das, P. Nandakumar, G. Singh, D. Jana, A. Mitra, A. Ghosh, S. Datta, J. Y. Siddiqui

, S. Majumder and **A. Paul**, Springer Lect. Notes in Networks and Syst., Vol. 147, Chapter 25, ISBN 978-981-15-8365-0), https://doi.org/10.1007/978-981-15-8366-7_25, 2021

Journal Papers

1. Study of the effect of March 17-18, 2015 geomagnetic storm on the Indian longitudes using GPS and C/NOFS, Sarbani Ray, Bidyut Roy, Krishnendu Sekhar Paul, Samiddha Goswami, Christina Oikonomou, HarisHaralambous, Babita Chandel and **Ashik Paul**, J. Geophys. Res., doi:10.1002/2016JA023127, 2017.
2. Impact of multi-constellation satellite signal reception on performance of satellite-based navigation under adverse ionospheric conditions, **A. Paul**, K.S. Paul and A. Das, Radio Sci., 10.1002/2016RS006076, 2017.
3. Relation of decorrelated transionospheric GPS signal fluctuations from two stations in the northern anomaly crest region with equatorial ionospheric dynamics, K.S. Paul and **A. Paul**, Radio Sci., doi:10.1002/2016RS005964, 2017.
4. Response of data-driven artificial neural network-based TEC models to neutral wind for different locations, seasons, and solar activity levels from the Indian longitude sector, D. Sur, S. Haldar, S. Ray and **A. Paul**, J. Geophys. Res., doi: 10.1002/2016JA023678, 2017
5. Assessment of GPS multi-frequency signal characteristics during periods of ionospheric scintillations from an anomaly crest location, S. Goswami, K.S. Paul and **A. Paul**, Radio Sci., doi: 10.1002/2017RS006295, 2017.
6. Latitudinal features of Total Electron Content over the African and European longitude sector following the St. Patrick's day storm of 2015, **A. Paul**,A. Kascheyev, M. Rodriguez-Bouza, K. Pathak, A. Amaral, D. Shetti and J. N.Yao, Adv. Space Res., https://doi.org/10.1016/j.asr.2017.09.012, 2017.
7. Multi-station investigation of spread F over Europe during low tohigh solar activity, K.S. Paul, H. Haralambous, C. Oikonomou, **A. Paul**, A. Belehaki, T. Ionna, D. Kouba and D. Buresova, J. Space Weather Space Clim., 2018.
8. Study of Relative Performance of Different NavigationalSatellite Constellations Under AdverseIonospheric Conditions, S. Goswami, **A. Paul** and S. Halder, Space Weather, 16. https://doi.org/10.1029/2017SW001762, 2018.
9. Inter-frequency performance characterizations of GPS during signal outages from an anomaly crest location, T. Biswas, S. Ghosh, **A. Paul**, S. Sarkar, Space Weather, 17, https://doi.org/10.1029/2018SW002105, 2019.
10. Long-term aspects of nighttime spread F over a low mid-latitude European station, K.S. Paul, H. Haralambous, C. Oikonomou and **A. Paul**, Adv. Space Res., doi: 10.1016/j.asr.2019.06.020, 2019.
11. Effects of CME and CIR induced geomagnetic storms on low-latitude ionization over Indian longitudes in terms of neutral dynamics, S. Chakraborty, S. Ray, D. Sur, A. Datta and **A. Paul**, Adv. Space Res., 65,198-213, 2020.

12. Multi-wavelength coordinated observations of ionospheric irregularity structures from an anomaly crest location during unusual solar minimum of the 24th cycle, **A. Paul**, D. Sur and H. Haralambous, Adv. Space Res., 65, 1402-1413, 2020.
13. Performance of NavIC for studying the ionosphere at an EIA region in India, D. Ayyagari, S. Chakraborty, S. Das, A. Shukla, **A. Paul**, A. Datta, Adv. Space Res., 65, 1544-1558, 2020.
14. Comparative studies of Ionospheric models with GNSS and NavIC over the Indian Longitudinal sector during geomagnetic activities, S. Chakraborty, A. Datta, S. Ray, D. Ayyagari, **A. Paul**, Adv. Space Res., 2020.
15. Characteristics of electron content between GPS and IRNSS altitudes studied around the northern anomaly crest location over Indian longitude sector, K.S. Paul and **A. Paul**, Radio Sci., 2020.
16. Ionospheric response to Strong Geomagnetic Storms during 2000-2005: An IMF clock angle perspective, S. Chakrabaorty, S. Ray, A. Datta and **A. Paul**, Radio Sci., https://doi.org/10.1029/2020RS007061**,** 2020
17. Degradation of satellite-based navigation performance observed from an anomaly crest location in the Indian longitude sector, S. Goswami, S. Ray and **A. Paul**, Radio Sci., 2020.
18. Signal-in-space performance under multi-constellation environment from an Indian low latitude station, T. Biswas and **A. Paul**, Radio Sci., 10.1029/2020RS007119, 2020.
19. Investigation of Satellite Trace (ST) and Multi-reflected Echo (MRE) ionogram signatures and its possible correlation to nighttime spread F development from Cyprus over the solar mini-max (2009-2016), K. S. Paul, H. Haralambous, C. Oikonomou and **A. Paul**, Adv. Space Res., https://doi.org/10.1016/j.asr.2020.12.040, 2020.
20. Ionospheric disturbances over the Indian sector during 8 September 2017 geomagnetic storm: plasma structuring and propagation, L. Alfonsi, C. Cesaroni, L. Spogli, M. Regi, **A. Paul**, S. Ray, S. Lepidi, D. Di Mauro, H. Haralambous, C. Oikonomou, P.R. Shreedevi, A.K. Sinha, Space Weather, 19, e2020SW002607. https://doi.org/10.1029/2020SW002607, 2021.
21. Impact of CME and HSSW driven geomagnetic storms on thermosphere and ionosphere as observed from mid-latitudes, Dibyendu Sur, Sarbani Ray and **Ashik Paul**, Adv. Space Res., 68(3), pp. 1441-1460, 2021.
22. First results on E region irregularities from a 53 MHz radar experiment from Haringhata, India, **A. Paul,** P. Pavan Chaitanya, A.K. Patra, P. Nandakumar, Tanmay Das, Radio Sci. 10.1029/2021RS007289, 2021.
23. Validation of Wind Measurements From a 53 MHz ST Radar Pilot Array Located at University of Calcutta With Collocated Radiosonde Launches, P. Nandakumar, D. Jana, S. V. Sunilkumar, P. R. Satheesh Chandran, R. Vishnu, T. Das, Maria Emmanuel, G. Singh, S. Majumder, J. Y. Siddiqui, **A. Paul,** Radio Sci., https://doi.org/10.1029/2020RS007246, 2022.
24. Impact of low latitude ionospheric effects on precise position determination, T. Biswas, P. Banerjee, **A. Paul**, Radio Sci., https://doi.org/10.1029/2021RS007322, 2022.

25. Ionospheric reconstruction using GNSS signals around an anomaly crest location in Indian longitude sector, Samiddha Goswami, Antara Chaudhuri and **Ashik Paul,** Radio Sci., https://doi.org/10.1029/2021RS007391, 2022.

26. High and mid-latitude and near subsolar point ionospheric and thermospheric responses to the solar flares and geomagnetic storms during low solar activity periods of 2017 and 2020, Dibyendu Sur, Sarbani Ray and **Ashik Paul,** Adv. Space Res., 70, 157-178, https://doi.org/10.1016/j.asr.2022.04.024, 2022.

27. Multi-frequency observations of post-midnight ionospheric irregularities from an anomaly crest location, Samiddha Goswami, Sayani Ghosh and **Ashik Paul**, Radio Sci., https://doi.org/10.1029/2022RS007437, 2022.

28. Investigation of the negative ionospheric response of the 8 September 2017 geomagnetic storm over the European sector, C. Oikonomou, H. Haralambous, **A. Paul,** S. Ray, L. Alfonsi, C. Cesaroni, D. Sur, Adv. Space Res., doi: https://doi.org/10.1016/j.asr.2022.05.035, 2022.

Conference Papers

1. Study of the effects of adverse ionospheric condition on relative performances of different navigational satellite constellations, Samiddha Goswami, **Ashik Paul,** Krishnendu Sekhar Paul, URSI - RCRS 2017 (3rd Regional Conference on Radio Science), National Atmospheric Research laboratory (NARL), Tirupati, India, March 1 - 4, 2017.

2. Post midnight to early morning observation of ionization density depletions from LEO CRABEX measurements from Calcutta, Sayani Ghosh, Krishnendu Sekhar Paul, **Ashik Paul,** URSI - RCRS 2017 (3rd Regional Conference on Radio Science), National Atmospheric Research laboratory (NARL), Tirupati, India, March 1 - 4, 2017.

3. Study of relative signal characteristics of NavIC and GNSS from a anomaly crest location, P. Banerjee, S. Goswami, A. Sinha, S. Saha, A**. Paul,** URSI – RCRS 2017 (3rd Regional Conference on Radio Science), National Atmospheric Research laboratory (NARL), Tirupati, India, March 1 – 4, 2017.

4. Studies on relative performance of different satellite-based navigation systems during adverse ionospheric conditions from equatorial ionization anomaly crest location, **Ashik Paul** and Samiddha Goswami, 32nd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS 2017), Montreal, Canada, August 19-26, 2017.

5. Comparison of equatorial ionization anomaly gradients from multistation GPS TEC and Artificial Neural Network for scintillation prediction in the Indian longitudes, Dibyendu Sur and **Ashik Paul**, 32nd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS 2017), Montreal, Canada, August 19-26, 2017.

6. Impact of adverse ionospheric events on transionospheric satellite signals, Bidyut Roy, Sarbani Ray and **Ashik Paul,** 32nd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS 2017), Montreal, Canada, August 19-26, 2017.

7. Study of relative signal characteristics of NavIC and GNSS from a anomaly crest location, P. Banerjee, S. Goswami and **A. Paul**, 32nd General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS 2017), Montreal, Canada, August 19-26, 2017.

8. Testing the conformity of GPS and IRNSS in terms of ionospheric delay and position errors, Trisani Biswas, Parameswar Banerjee and **Ashik Paul,** 5th International conference on Signal Processing and Integrated Networks (SPIN), Amity University, Delhi-NCR, February 22-23, 2018.
9. Assessment of multi-frequency GNSS signal outages observed from northern Equatorial Ionization Anomaly (EIA) crest locations, **Ashik Paul**, 14th Solar Terrestrial Physics Symposium (STP-14), York University, Toronto, Canada, July 9-13, 2018.
10. Decorrelation of multi-frequency GNSS signals observed from northern equatorial ionization anomaly (EIA) crest locations, **Ashik Paul**, Samiddha Goswami and Krishnendu Sekhar Paul, 42nd COSPAR Scientific Assembly, Pasadena, USA, July 14-22, 2018.
11. Relative robustness of triple frequency GPS signals observed from anomaly crest locations during periods of ionospheric scintillations, Trisani Biswas, Somrita Sarkar, **Ashik Paul,** 42nd COSPAR Scientific Assembly, Pasadena, USA, July 14-22, 2018.
12. Development and validation of a neural network based model to observe the impact of geomagnetic storm on TEC at Lucknow during 2015-2016, Dibyendu Sur, **Ashik Paul**, 42nd COSPAR Scientific Assembly, Pasadena, USA, July 14-22, 2018.
13. Multi-frequency satellite signal outages observed from a low latitude station, **Ashik Paul**, Krishnendu Sekhar Paul, Samiddha Goswami, Trisani Biswas and Somrita Sarkar, 4th Australian and New Zealand Workshop on Space Situational Awareness, University of New South Wales, Canberra, Australia, July 25-27, 2018.
14. Relative performance of IRNSS and GPS from an anomaly crest location, Trisani Biswas and **Ashik Paul**, 15th International Symposium on Equatorial Aeronomy, Physical Research Laboratory, Ahmedabad, India, October 22-26, 2018.
15. Atmospheric dynamics as observed using 53MHz ST Radar at Calcutta (CU-STR), Tanmay Das, P. Nandakumar, Gopal Singh and **Ashik Paul**, 15th International Symposium on Equatorial Aeronomy, Physical Research Laboratory, Ahmedabad, India, October 22-26, 2018.
16. Study of the impact of St. Patrick's 2013 and 2015 events on the midlatitude ionosphere over Europe, Lucilla Alfonsi, Haris Haralambous, **Ashik Paul**, Lucilla Alfonsi, Claudio Cesaroni, Christina Oikonomou, Sarbani Ray, 15th European Space Weather Week, Leuven, Belgium, November 5-9, 2018.
17. Initial observations on Atmospheric Dynamics and Ionospheric irregularities from the 53MHz ST Radar at Calcutta, IEEE International Symposium on Antennas and Propagation (APSYM), Tanmay Das, P. NandaKumar, Gopal Singh, Debyendu Jana and **Ashik Paul**, Cochin University of Science and Technology (CUSAT), Kochi, December 3-5, 2018.
18. RESOURCE: an International Initiative for Radio Sciences Research on Antarctic Atmosphere, N. Bergeot, L. Alfonsi,J. V. Bageston, A. Burrell, M. Cliverd, E. Correia, P. J. Cilliers, G. De Franceschi, A.M. Gulisano, M. Hernández-Pajares, G. Heygster, P. Høeg, G. Jee, A. Krankowski, C. Lee, M. Lester, J. Lichtenberger, S. Lyatsky, M.F. Marcucci, D. Di Mauro, C. Mitchell, J. Morton, T. Nakamura, M. Negusini, **A. Paul**, M. Pozoga, P. Prikryl, V. Romano, P.T. Jayachandran, A.K. Tiwari, A. Weatherwax, A. Zalizovski and S. Zou, L. Benoit, C. Brescani, J.-M. Chevalier, D. Lombardi, R.

Van Malderen, F.J. Meyer, E. Pottiaux, D. Roma-Dollase and L. Spogli, AGU Fall Meeting, Washington D.C. December 10-14, 2018.
19. Initial results observed using 53MHz ST Radar at Calcutta during pre-monsoon, monsoon and post-monsoon seasons, Tanmay Das, Debyendu Jana and **Ashik Paul**, 3rd Conference on India Radar Meteorology (iRad 2019), Indian Institute of Tropical Meteorology (IITM), Pune, January 9-12, 2019.
20. Assessment of GLONASS and GALILEO signal characteristics during periods of ionospheric scintillations from an anomaly crest location, Samiddha Goswami and **Ashik Paul,** 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
21. Impact of VHF irregularity dynamics on multi-frequency GNSS signal fading characteristics, Samiddha Goswami, Sayani Ghosh, Keith Groves and **Ashik Paul,** 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
22. Ionospheric Characterization And Reconstruction Using GPS Satellite Signals Around The Anomaly Crest Region, Samiddha Goswami, Tarun Kumar Pant, **Ashik Paul**, 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
23. Lower atmospheric characteristics and Ionospheric backscatter observed using Calcutta University ST Radar (CU-STR), Tanmay Das, P. Nanda Kumar, Gopal Singh, Debyendu Jana and **Ashik Paul**, 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
24. Spatial distribution of TID signatures on GPS TEC observed in the Eastern Mediterranean longitude sector, K.S.Paul, H. Haralambous, and **A. Paul**, 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
25. Signatures of TIDs and vertical drift of ionization spread F observed over Cyprus during high solar activity period, K.S. Paul, H. Haralambous, C. Oikonomou and **A. Paul**, 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
26. Coordinated Observations of Ionospheric Irregularity Structures at Optical and Radio Wavelengths from an Anomaly Crest Location during the Unusual Solar Minimum Period 2008-2010, Dibyendu Sur, Haris Haralambous and **Ashik Paul**, 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
27. Observations of Storm-Time Thermospheric O/N_2 Ratio and TEC in the Northern Hemisphere during Intense Geomagnetic Storms of 2015-2017, Dibyendu Sur, Sarbani Ray, **Ashik Paul**, 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
28. Interconnection of transitional low to mid latitude ionization density characteristics with spread F from Eastern Mediterranean Longitude sector, K.S. Paul, H. Haralambous and **A. Paul,** 2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India, March 9-15, 2019.
29. Multi-technique characterization of ionospheric Space Weather effects, **Ashik Paul,** International Space Weather Initiative Workshop, International Centre for Theoretical Physics, Italy, May 20-24, 2019.

30. 30. Characteristics of GNSS signal outages observed from the Arctic and Antarctic regions, Dibyendu Sur, Claudio Cesaroni, Lucilla Alfonsi and **Ashik Paul,** International Beacon Satellite Symposium (BSS 2019), Olsztyn, Poland, August 19-23, 2019.
31. Relation of multi-frequency GNSS signal scattering with equatorial ionospheric irregularity dynamics at VHF, **Ashik Paul** and Samiddha Goswami, International Beacon Satellite Symposium (BSS 2019), Olsztyn, Poland, August 19-23, 2019.
32. Signal outages during geomagnetic storms from the northern crest of the equatorial anomaly in the Indian longitude sector, B. Roy, S. Ray and **A. Paul**, International Beacon Satellite Symposium (BSS 2019), Olsztyn, Poland, August 19-23, 2019.
33. Degradation of satellite-based navigation system performance observed from an anomaly crest location, Samiddha Goswami, Sarbani Ray and **Ashik Paul,** International Beacon Satellite Symposium (BSS 2019), Olsztyn, Poland, August 19-23, 2019.
34. Signal-in-Space performance of Satellite Based Navigation system in the equatorial and low latitudes, **Ashik Paul,** AGU Fall Meeting, San Francisco, USA, December 9-13, 2019.
35. The results of the magnetosphere-ionosphere coupling on plasma irregularities over India during the September 2017 storm, Alfonsi L., C. Cesaroni, L. Spogli, **A. Paul**, S. Ray, H. Haralambous, C. Oikonomou, M. Regi, S. Lepidi, D. Di Mauro, AGU Fall Meeting, San Francisco, USA, December 9-13, 2019.
36. Application of Precise Point Positioning Techniques under Adverse Ionospheric Conditions, Trisani Biswas, Parameswar Banerjee and **Ashik Paul**, URSI RCRS 2020, IIT-BHU, February 12-14, 2020.
37. Application of GNSS based Ionospheric Reconstruction for understanding day-to-day variabilities of irregularity dynamics, Antara Chaudhuri, Samiddha Goswami and **Ashik Paul**, URSI RCRS 2020, IIT-BHU, February 12-14, 2020.
38. Ionospheric plasma structuring and propagation over India during 8 September, L. Alfonsi, C. Cesaroni, L. Spogli, M. Regi, **A. Paul,** S. Ray, S. Lepidi, D. Di Mauro, H. Haralambous, C. Oikonomou, P.R. Shreedevi, A.K. Sinha, AGU Fall Meeting (online), December 1-17, 2020.
39. Impact of equatorial and low latitude ionospheric irregularities observed across a broad spectrum of frequencies, **A. Paul,** T. Das and S. Goswami, URSI GASS 2021, Italy, August 28-September 4, 2021.
40. The results of the magnetosphere-ionosphere coupling on plasma irregularities over India during the September 2017 storm, L. Alfonsi, C. Cesaroni, L. Spogli, **A. Paul**, S. Ray, H. Haralambous, C. Oikonomou, M. Regi M., S. Lepidi, D. Di Mauro, URSI GASS 2021, Italy, August 28-September 4, 2021.
41. Characterizing the occurrence of ionospheric irregularities using the SCINDA receiver at Calcutta, Anamika Das, Trisani Biswas and **Ashik Paul**, 21st National Space Science Symposium (NSSS-2022), IISER, Kolkata, January 31-February 4, 2022.

42. Observations of Summer Night-Time FAI Using University ofCalcutta ST Radar, Tanmay Das, Arkadeb Kundu and **Ashik Paul**,21st National Space Science Symposium (NSSS-2022), IISER, Kolkata, January 31-February 4, 2022.

43. Observations of ionospheric depletions using 150 and 400 MHz beacon from CRABEX near the anomaly crest, DyutisGarai, Tanmay Das and **Ashik Paul,** 21st National Space Science Symposium (NSSS-2022), IISER, Kolkata, January 31-February 4, 2022.

44. Characteristics of IRNSS signals as received at Shimla beyond the northern crest of EIA, Babita Chandel, Trisani Biswas and **Ashik Paul**, 21st National Space Science Symposium (NSSS-2022), IISER, Kolkata, January 31-February 4, 2022.

45. Use of 53MHz VHF Radar of Calcutta University to Quantify the Lower Atmospheric Wind Characteristics during Monsoon, 2021, Debyendu Jana, P. Nandakumar, Tanmay Das, Gopal Singh and **Ashik Paul**,21st National Space Science Symposium (NSSS-2022), IISER, Kolkata, January 31-February 4, 2022.

46. Role of relative dynamics of satellite and irregularity structure on GPS signal perturbations, Trisani Biswas and **Ashik Paul**, 15th Quadrennial Solar-Terrestrial Physics Symposium (STP-15), Indian Institute of Geomagnetism (IIG), 21-25 February, 2022.

47. Studies on Ionization Depletions of Equatorial Plasma Structures on Transionospheric Satellite Signals using GPS, Tanmay Das and **A. Paul**, 15th Quadrennial Solar-Terrestrial Physics Symposium (STP-15), Indian Institute of Geomagnetism (IIG), 21-25 February, 2022.

48. Three Components of Wind and Lower Atmospheric Turbulence Measurements Using VHF Doppler Radar Of University Of Calcutta To Characterize Lower Atmospheric Dynamics, Debyendu Jana, P. Nandakumar, Tanmay Das, Gopal Singh and **Ashik Paul**, 15th Quadrennial Solar-Terrestrial Physics Symposium (STP-15), Indian Institute of Geomagnetism (IIG), 21-25 February, 2022.

49. Atmospheric circulation during Indian summer monsoon 2021: A study using 53 MHz VHF radar at Haringhata (22.93□N, 88.50□E), Debyendu Jana, P. Nandakumar and **Ashik Paul,** Annual Monsoon Workshop and National Symp. Changing Climate and Extreme Events: Impacts, Mitigation and Role of Oceans, February 21-23, 2022.

50. Design and Characterization of Phased Array Antennas for ST Radar Operating at 53MHz, J.Y. Siddiqui, P. Nandakumar, K.P. Ray, **Ashik Paul**, IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Denver, USA, July 10-15, 2022.

51. Studies of low-latitude Field-Aligned Ionospheric Irregularities observed using University of Calcutta VHF Radar, **Ashik Paul,** Tanmay Das and P. Nandakumar, 21st International Beacon Satellite Symposium (BSS-22), Boston College, USA, August 1-5, 2022.

52. Observations of multi-scale size ionospheric irregularities at L- and S-band from an anomaly crest location, **Ashik Paul** and Trisani Biswas, International Workshop on GNSS Ionosphere (IWGI-22), German Aerospace Centre, Neistrelitz, Germany, September 26-28, 2022.

53. Beam Formation of 53 MHz Active Phased Pilot Array ST Radar at University of Calcutta using Radar Controller Software, P. Nandakumar, J.Y. Siddiqui, **A. Paul,** URSI-RCRS 2022, IIT Indore, December 1-4, 2022.

54. Atmospheric Boundary Layer Observations over Haringhata using VHF Active Phased Pilot Array Radar of Calcutta University: Preliminary Results, D. Jana and **A. Paul**, URSI-RCRS 2022, IIT Indore, December 1-4, 2022.

Invited Lectures

1. Multi-frequency GNSS amplitude and phase scintillation observations from the anomaly crest region, **3rd URSI Regional Conference on Radio Science (RCRS-2017), National Atmospheric Research Laboratory (NARL), Tirupati**, March 1, 2017
2. Characterization of near-Earth Space Environment using ST Radar and ionospheric instrumentation from University of Calcutta, **ARIES, Nainital**, October 5, 2017
3. Workshop on Space Weather Effects on GNSS operations at Low Latitudes, Multi-frequency GNSS Satellite Signal Outages from an Anomaly Crest Location in India, **International Centre for Theoretical Physics (ICTP), Trieste, Italy**, May 3, 2018
4. Multi-system characterization of near-Earth Space Environment and ionospheric instrumentation at University of Calcutta, **Space Physics Laboratory (SPL), Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram**, June 26, 2018
5. Space Situational Awareness and Space Weather Effects, 4th International Conference on Electrical Engineering and Information and Communication Technology (iCEEiCT2018), **Military Institute of Science and Technology (MIST), Dhaka, Bangladesh**, September 15, 2018
6. Inter-frequency performance of GNSS signals during periods of scintillations near the EIA crest, **15th International Symposium on Equatorial Aeronomy (ISEA-15**), October 25, 2018
7. Leveraging the research opportunities from a fully-active VHF phased array, **IEEE International Microwave and RF Conference (IMARC 2018), Kolkata,** November 29, 2018
8. Space Science Initiatives at University of Calcutta, **Brainstorming Meeting at National Atmospheric Research Laboratory (NARL)**, December 18, 2018
9. Decorrelation of GNSS signals during periods of scintillations near the EIA crest, **2019 URSI Asia Pacific Radio Science Conference (URSI APRASC 2019), New Delhi, India**, March 13, 2019
10. Applications of VHF ST Radar at University of Calcutta for understanding Atmospheric Dynamics in the Geophysically sensitive Tropical to Sub-tropical transition region, **Workshop on Antennas for Modern Wireless and Remote Sensing Applications, IIT Palakkad and IEEE APS Kerala Chapter**, March 23, 2019
11. Scintillation and irregularity characterization using GNSS, **Workshop on Ionospheric Forecasting for GNSS Operations in Developing Countries: Findings and Challenges, International Centre for Theoretical Physics, Italy**, May 27-31, 2019

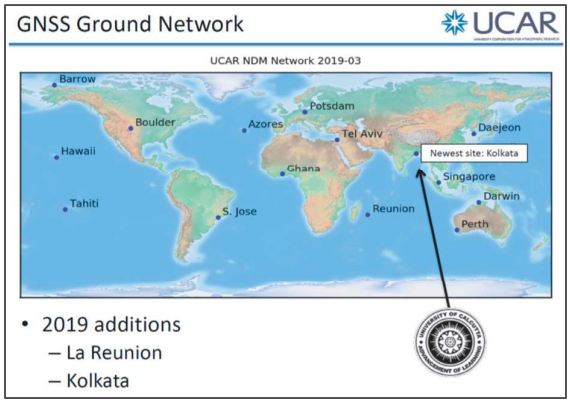
12. Characterization of near-Earth Space Environment using ST Radar, Satellite Beacon and GNSS, **IIT Delhi**, July 31, 2019
13. Ionosphere-Thermosphere-Magnetosphere Science Issues, **Brainstorming Meeting, Space Physics Laboratory, Trivandrum**, August 13, 2019
14. Characterization of Neutral and Ionized Atmospheric Features using an Active Phased Array Radar at University of Calcutta, **IEEE Recent Advances in Geoscience and Remote Sensing: Technologies Standards and Applications (TENGARSS 2019), Kochi, Kerala, India,** October 17-20, 2019
15. Multi-technique aspect sensitive observations of equatorial ionospheric irregularities, **Recent Advances in Space Science, IIT Indore,** November 10, 2019
16. Effects of Propagation Geometry on Ionospheric Irregularity Observations using University of Calcutta ST Radar and GNSS, **URSI RCRS 2020, IIT-BHU**, February 12-14, 2020
17. Lower atmospheric turbulence measurements from University of Calcutta ST Radar, **URSI RCRS 2020, IIT-BHU**, February 12-14, 2020
18. Effects of ionospheric irregularities on GNSS and HF radars, **International Colloquium on Equatorial and Low-Latitude Ionosphere (ICELLI 2020), Centre for Atmospheric Research, National Space Research and Development Agency, Nigeria**, September 16, 2020
19. Space Weather studies from an Indian low latitude station using GNSS and VHF radar, **Webinar on Space Weather: Ionospheric and Technological impact, Doon University**, October 6, 2020
20. Impact of low-latitude aeronomy on satellite-based precise point positioning, **Workshop on Remotely Sensed Data Analysis, IEEE GRSS Kolkata Chapter**, March 13, 2021
21. Multi-scale size ionospheric irregularities impacting signal-in-space performance of satellite-based communication and navigation links, **Space Physics Seminar, Space and Atmospheric Science Division, Physical Research Laboratory**, April 19, 2021
22. Application of remote sensing techniques to understand lower atmospheric and ionospheric features at different frequencies, **Dept. of Astronomy, Astrophysics and Space Engineering, IIT Indore**, November 10, 2021
23. Features of lower atmospheric winds and ionospheric Field-Aligned Irregularities observed using University of Calcutta ST Radar, **21st National Space Science Symposium (NSSS-2022), IISER Kolkata**, January 31, 2022
24. Studies of low-latitude Ionospheric Irregularities observed using University of Calcutta VHF Radar and other systems, **International Colloquium on Equatorial and Low-Latitude Ionosphere, Centre for Atmospheric Research, National Space Research and Development Agency, Anyigba, Nigeria**, September 19-23, 2022

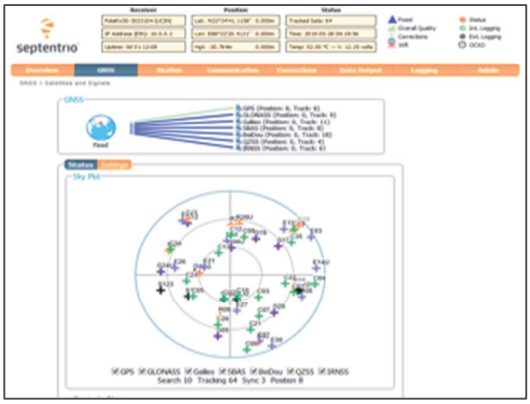
Doctoral Students			
Name and Registration information	**Topic**	**Status**	**Co-guide**
Dibyendu Sur	Study of the impact of Equatorial Ionization Anomaly and neutral dynamics on the TEC models at diverse longitudes in the equatorial region	Awarded in 2021	---
Krishnendu Sekhar Paul	Characteristics of ionospheric Total Electron Content and irregularities in the low to mid-latitude transition region	Awarded in 2021	---
Sumanjit Chakraborty (IIT Indore)	Study of the effects of Space Weather on low-latitude ionosphere during declining phase of solar cycles	Awarded in 2021	Prof. Abhirup Datta, IIT Indore
Samiddha Goswami	Ionospheric characterization and reconstruction using multi-frequency and multi-constellation satellite signals around the anomaly crest region	Registered	---
Trisani Biswas	Characterization of equatorial ionospheric irregularities in terms of its dynamics and effects on satellite-based navigation and communication system	Registered	---
Debyendu Jana	Atmospheric dynamics in the geophysically sensitive tropical to sub-tropical transition region using ST Radar and other ground-based and satellite data	Registered	---
Dyutis Garai	---	Enrolled	---
Anamika Das	---	Enrolled	---
Amit Kumar Chakraborty	---	Enrolled	---

Major Achievement in Current Year

The **DST-SERB National ST Radar Facility** at Ionosphere Field Station, Haringhata of University of Calcutta has been successfully implemented in 2022. This radar operates at 53MHz and is the first active phased-array radar around 50MHz in an Indian University and the third such in the country. This is a unique facility in the entire eastern and north-eastern India as well as the South-East Asian longitude sector.

Institute of Radio Physics and Electronics is one of the **ground monitoring GNSS stations of the US-Taiwan joint satellite mission COSMIC-2** funded by University Corporation for Atmospheric Research (UCAR), Boulder, USA.





PROF. ABHIRUP DAS BARMAN

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Degrees obtained:

- Ph. D(Tech), Radio Physics and Electronics
- M.Tech, IIT Kanpur, Electrical Engineering
- B. Tech, Institute of Radio Physics and Electronics, 1990

Classes Taught

- EC3.2.3- Digital Signal Processing (B. Tech)
- EC3.2.7 – Digital Signal Processing Laboratory (B. Tech)
- ECHN 4.1.4- Mobile Communication and Networks (B. Tech)
- RP3.1.7- Optical Communication (B. Tech)
- RP4.1.4 - Advanced Communication (M. Tech)
- RP4.2.16- Guided Wave Photonics (M. Tech)
- Audio Video Engineering (B. Tech, 2006)
- Analog Electronics (B. Tech, Applied Optics and Photonics Dept.)

Research Interests and Experience

- Signal Processing in Communications
- Wireless Communication
- Optical Communication
- Microwave Photonics

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Serve IES Govt of India, Dy. Director, 1994- 2003
- Core Committee in 150 Years celebration of CU, 2005
- Set up DSP Lab for BTech, 6th Semester, 2004
- Coordinator, three weeks Winter School DSPA++ at IRPE, 2009
- M.Tech, Specialization implementation in RPE, 2010
- Set up a new course in Advanced Communication, M. Tech, 2011
- M.Tech Course Coordinator, 2004-2014
- Convener of CODEC, Intl Conference, 2012
- CODEC Chairperson, 2019
- Convener B. Tech ECE Syllabus Revision of RPE, 2019
- Univ RUSA Campus Coordinator: 2022

International Fellowship

- Invited Researcher, Photonic Research National Laboratory (CNIT), Pisa, Italy, 2007
- Erasmus Mundus Post-doctoral scholarship, Aalborg University, Denmark, 2010-11
- Erasmus Mundus European Union scholarship, Limerick University, Ireland, 2015

Projects

- PI, Mobile Broadband Service Support over Cognitive Radio Networks Funding Agency: ITRA, MeITe, Amount: Rs 137.56 lakhs, 2013-2019
- PI, Joint Indo Italy bilateral Project DST Govt. of India, Rs 26.56 Lakhs, 2017-2020

Publications (Last five years)

Books and Book Chapters

A. Das Barman, Arnav Mukhopadhyay, A. Bogoni (2019) "Energy Efficient Frequency Octupling using Mach-Zehnder Optical Modulator", Computer and Devices for Communication.

Journal Papers

1. Ipsita Sengupta, Shounak Dasgupta, **Abhirup Das Barman,** "Index and mode modulated orthogonal frequency division multiplexing with enhanced spectral efficiency" Wiley Transaction on Emerging Telecommunications Technologies, 10-Jan 2023, Online ISSN:2161-3915, Article DOI: 10.1002/ett.4735
2. Avirup Das, Nabanita Das, **Abhirup Das Barman**, "Multi-hop D2D Communication in Cellular Networks to Minimize EMR", IEEE Transactions on Green Communications and Networking, 6(2), pp.713-722, Dec, 2021
3. Sujoy Mondal and **Abhirup Das Barman**, "Human auditory model based real-time smart home acoustic event monitoring", Multimedia Tools and Applications, Springer, 81.1 pp. 887-906, 2022, Electronic ISSN -2945-5715
4. Chaudhuri, R.B., **Barman, A.D**. and Bogoni, A., "Photonic 60 GHz sub-bands generation with 24-tupled frequency multiplication using cascaded dual parallel polarization modulators", Optical Fiber Technology, Elsevier 58, pp. 1-10, Sept. 2020
5. Sujoy Mondal and **Abhirup Das Barman**, "Speech Activity Detection using Time-Frequency Auditory Spectral Pattern", Applied Acoustics, Elsevier, 167, pp-1-6, May 2020
6. Avirup Das, Nabanita Das, Sasthi C. Ghosh and **Abhirup Das Barman**," Cooperative Spectrum Mobility in Heterogeneous Opportunistic Networks for IoT" Wireless Personal Communications Springer, 10, pp. 2065-2085, 2020
7. Chaudhuri, R.B., **Barman, A.D**., A. Mukhopadhyay and Bogoni. A., "Design and analysis of all optical RF transceiver using polarization modulators", Journal of Optical and Quantum Electronics, Springer, Vol. 52, Issue 235, pp 1-16, March 2020

8. Avirup Das, Nabanita Das, **Abhirup Das Barman** and Subhankar Dhar, “Energy Incentive for Packet Relay Using Cognitive Radio in IoT Networks," IEEE Communications Letters, 23(9) page(s): 1-3, June 2019**.**

9. **Chaudhuri, R.B**., **Barman, A.D**., and Bogoni. A,” Advanced Design System based Modelling of Tunable Multi-band Microwave and Millimeter wave Generation using Cascaded Mach–Zehnder Intensity Modulator”, Journal for Light and Electron Optics, Elsevier, 182, pp.571-579, April 2019

10. **Chaudhuri, R.B**. and **Barman, A.D**., “Generation of an optical frequency comb based on two cascaded dual-parallel polarization modulators”. Applied Optics, OSA, 57(30), pp.9164-9171, 2018

11. S. Karar, **A. Das Barman**, “Two-Stage Rate Allocation Game in Wireless Access Networks With PON Backhaul”, IEEE Communications Letters”, 22(9), PP:1814 – 1817, July 2018

12. S. Melo, S. Maresca, S. Pinna, F. Scotti, M. Khosravanian, Arismar Cerqueira S. Jr., F. Giannetti, **A. Das Barman**, and A. Bogoni,“ Photonics-Based Dual-Band Radar for Landslides Monitoring in Presence of Multiple Scatterers”, IEEE Journal of Lightwave Technology, Volume: 36, Issue:12, Pg. 2237-2343, 2018

13. S. Ghosh, S. Karar, **A. Das Barman, “**A Pricing based Rate Allocation Game in TVWS Backhaul and Access Link for Rural Broadband”, IEEE Systems Journal**,** 13(1), PP. 511-518, March 2019

14. S. Karar, **A. Das Barman**, “Proactive Caching with Content based Pricing for Cooperative Femtocells in Two-tier Heterogeneous Networks" , Journal of Communication Systems, Wiley**,** DOI: 10.1002/dac.3529, Volume31, Issue8, pp. 1-22, May 2018

15. Senjuti Khanra, Ipsita Sengupta and **A. Das Barman**, “Small and Large Signal Analysis using Circuit Model of InGaAs/InP based Uni-Travel Carrier Photodiode", J. Opt. Quantum Electronics, Springer, Vol. 49, Issue. 374. PP. 1-24, Oct., 2017.

16. Karar, S. and Barman, A.D., “Improving data rate of indoor users through time sharing access of femtocell service in underlay heterogeneous network”, Electronics Letters, 54(2), pp.103-105, 2017.

17. Karar, S. and **Barman, A.D,** “Opportunistic spectrum access for cooperative unlicensed femtocells in two-tier heterogeneous networks utilizing HARQ feedback”, Computer Networks, Elsevier, Vol. 123, pp.64-76, May 2017.

18. Alak Halder and **A. Das Barman**, "Adaptive Pre-Compensation of LEDs for Improved Decoding of N-CSK in Visible Light Communication**",** Journal of Optical and Quantum Electronics, Springer, vol. 49, Issue 92, pp.1-15, Jan 2017

19. S. Karar, S. Ghosh, **A. Das Barman,** “Promoting femtocell cooperation through incentive for improving data rate of indoor users in underlay heterogeneous network", IET Communications, 10(17), pp. 2407 – 2415, Jan 2017.

Conference Papers

1. **Abhirup Das Barman**, Senjuti Khanra, and Suman Ghosh, “Alamouti Coded Asymmetrically Clipped Optical OFDM for Improved Performance of Multi-Mode Fiber”, RCRS, IIT Indore, Dec-2, 2022
2. Sujoy Mondal, **Abhirup Das Barman**, “Improved speech activity detection using cochleagram spectral basis by non-negative matrix factorization” , International Conference on Industrial Instrumentation & Control (ici2c-2021), RCC Institute of Information Technology, Kolkata, 20-22 August, 2021 (best paper awarded in this track)
3. Avirup Das, N. Das and **A. D. Barman**, "Cooperative Cognitive Radio for Wireless Opportunistic Networks," 11th International Conference on COMmunication Systems And NETworkS, **IEEE** COMSNETS 2019
4. Ipsita Sengupta, and **Abhirup Das Barman**, “Analysis of Bias Current Modulation Performance in RSOA with its Electrical Equivalent Circuit Model”, International Conference on Emerging Technologies for Sustainable Development (ICETSD '19), Government College of Engg. and Leather Technology, pp.370-373, 5-6 March, 20
5. Rangana Banerjee Chaudhuri, Arnav Mukhopadhyay, Antonella Bogoni and **Abhirup Das Barman**,” Software Defined Optically Generated Pre-coded QPSK Modulated Microwave Signal” Paper ID_1570495941, IEEE international conference IMARC 2018,28-30 Nov. Kolkata, 2018
6. Rangana Banerjee Chaudhuri, Arnav Mukhopadhyay and **A. Das Barman**, “Linearity Analysis of a Frequency Tripled Optically Generated Radio Frequency Signal”, IEEE 3rd International Conference on Microwave & Photonics (ICMAP), ISM Dhanbad, 9-11Feb. 2018.
7. Melo, S., Maresca, S., Pinna, S.,S., Khosravanian M., Cerqueira A., Giannetti F., **Das Barman, A.**, Bogoni, A. “High precision displacement measurements in presence of multiple scatterers using a photonics-based dual-band radar”, IET International Conference on Radar Systems 2017, (CP728), Belfast, Ireland 2017. (The article placed third in the ranking for the “Best Student Paper Award).
8. A. Das, S. C. Ghosh, N. Das and **A. Das Barman**, "Q-Learning Based Co-operative Spectrum Mobility in Cognitive Radio Networks", has been accepted at 42nd Annual IEEE Conference on Local Computer Networks (LCN), October 9-12, 2017, Singapore
9. **Abhirup Das Barman** and Alak Halder, “Indoor visible light communication with smart lighting technology", Proc. SPIE 10107, Smart Photonic and Optoelectronic Integrated Circuits XIX, 101070W, Sanfrancisco California, Proc. of SPIE Vol. 10107 101070W-8 doi:10.1117/12.2256663, February 20,2017;
10. S. Karar, **A. Das Barman**, “Iterative approach to Stackelberg power control game for densely deployed co-channel femtocells”, WISPNET 2017, Chennai, 22-24 March 2017

Invited Lectures
1. "Wireless Visible Light Communication 5G Enabling Technology", Recent Trends in Electromagnetics and Optics (RiTEOp), IIEST, Electronics and Telecommunication Engineering Dept, Shibpur, 18th Jan, 2023
2. "Visible light communication- its challenges and solutions", at NIT Delhi, October20, 2021
3. "Visible Light Communication through Indoor lighting", 2nd International Conference on Ubiquitous & Emerging Concepts on Sensors & Transducers – UEMCOS 2020, 16-18 Oct, at the University of Engineering and Management, Kolkata, October 16, 2020
4. "DFT- an Useful Tool in Signal Processing", *DMBSP-2019* at NSHM Knowledge Campus, Durgapur, in association with IEI on 9th April, 2019.
5. 'Network Densification and Interference Management in Femto-Cells,' National Conf on 5G and IoT- The New Internet Perspective LNMIIT, Jaipur, 8th December, 2018
6. Keynote address: 'Multi Access Optical Network, Indira Gandhi Institute of Technology,' Sarang, Odissa, 26th Feb,2018
7. 'Indoor visible light communication with smart lighting technology,' SPIE, Photonics West (OPTO) 2017, San Francisco, California, USA, Jan 28-Feb 2, 2017
8. 'Key Challenges and Solutions to Present and Next Generation Cellular Systems,' IEEE Society Chapter, Kalyani Government Engineering College, 21st August, 2017.
9. 'Next generation optical access technologies, research towards unlimited bandwidth access' IIEST, Shibpur, 26th Sept 2017
10. 'Future Challenges in Mobile Communication,' Workshop at NERIST, Arunachal Pradesh, 8th May 2017

Doctoral Students

Name and Registration information	Topic	Status	Co-guide
Sujoy Mondal (Ph.D. Reg. No. 3713/Ph.D.(Tech.)Proceed/2017)	Speech and Audio Activity Detection by Gammatone Filter Bank based Human Auditory Model	Presented Pre-Doctoral Seminar May 2022	nil
Avirup Das, (Ph.D. Reg. No. 1003/Ph.D. (Tech.) Proceed/2017)	Cooperative Spectrum Mobility In Heterogeneous Opportunistic Network Using Cognitive Radio	Awarded in 2022	Prof. Nabanita Das, ISI Kolkata
Rangana Banerjee Chowdhuri, Ph.D registration number: 6247/Ph.D. (Tech.)Proceed/2016	Photonic generation of RF signals and optical comb using external optical modulation	Awarded 2021	nil

Sandip Karar **(**Ph.D registration number: 5558/Ph.D.(Tech)Proceed/2015,	Resource allocation and cooperative communication for femtocells in next generation, heterogeneous networks,	Awarded 2019	nil
Senjuti Khanra **(**Ph.D registration No. 7579/Ph.D.(Tech.) Proceed/2014	Modeling of uni-traveling carrier photodiode for wireless photonic transmitter,	Awarded 2018	nil
Ipsita Sengupta **(**Ph.D. registration No**.:**533 Ph. D. (Tech) Proceed/2009	Circuit modeling of semiconductor optical amplifiers for optical links and network	Awarded 2015	nil

Major Achievement in Current Year

Description:

1. Completed Indo Italian bilateral Project DST Govt. of India
2. Best paper award ML track: “Improved speech activity detection using cochleagram spectral basis by non-negative matrix factorization” ici2c-2021, August, 2021

DR. JAWAD YASEEN SIDDIQUI

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Google Scholar:

https://scholar.google.ca/citations?user=SqCugrIAAAAJ&hl=en

Degrees obtained:

- Ph.D., Institute of Radio Physics and Electronics, University of Calcutta, 2005
- M.Tech., University of Calcutta, 1999

Classes Taught

- EC2.1.1- Electromagnetic Fields and Waves
- ECHN2.2.8 - Antenna Laboratory
- RP 4.1.3- Applied Electromagnetics
- RP 4.2.2- Microwave & Wireless Antennas

Research Interests and Experience

- **Jawad Yaseen Siddiqui** is an Associate Professor in the Institute of Radio Physics and Electronics, University of Calcutta, India. He is an Adjunct Faculty at Queen's University, Kingston, Canada. He was a Visiting Professor, Dept. of ECE, University of Alberta, Edmonton, Canada in 2021. He received his Doctor of Philosophy degree in Radio Physics and Electronics, University of Calcutta in 2005. He worked as a Post Doctoral Fellow at the Royal Military College of Canada and Visiting Researcher at Queen's University, Canada at different periods during 2008-2021. He has more than 150 publications in peer reviewed journals and conferences. His research areas include printed circuits and antennas, radar and nano-photonics. He is a Co-Principal Investigator of Stratosphere Troposphere (ST) Radar Project at the University of Calcutta. He is the recipient of 2022 Institution of Electronics and Telecommunication Engineers (IETE)-S.N. Mitra Memorial Award for contribution and leadership role in radio broadcast science and technology. He received the IEEE SIGHT Volunteer of the Year Award for 2022.

- He is a Senior Member of the IEEE and is currently the IEEE AP-S Committee Chair for AP-S SIGHT Committee. He is a Member of the APS COPE Committee. He is also a Member of IEEE Humanitarian Activities Committee and Member Management Council, IEEE Smart Village. He is a Member, MTT-S Meetings and Symposia Committee. He served as Chair for the AP-S and MTT-S Jt. Chapter in IEEE Kolkata Section and SIGHT Chapter, IEEE Kolkata Section. He is Vice Chair of the IEEE Antennas and Propagation Chapter Activities Committee.

Current Personal Projects	
Funding agency	**Topic and details**
SERB	Co-Principal Investigator of 53 MHz Stratosphere Troposphere (ST) Radar Project at the University of Calcutta
IEEE Antennas and Propagation Society	Remote Diagnosis for cardiac patients in rural India

Publications

Journal Papers

1. Nandan Bhattacharya, **Jawad Y. Siddiqui**, Y.M.M. Antar, "Object Identification With Minimal Precomputed Library Using Physical Aspect Of Singularity Expansion Method", IEEE Antennas and Wireless Propagation Letters,2023(doi: 10.1109/LAWP.2022.3227261)
2. Nandan Bhattacharya, **Jawad Y. Siddiqui**, Ajay Poddar, Ulrich L. Rohde, "UWB Disc Monopole Antenna: Time-Domain Characteristics during Transmission and Reception", IETE Journal of Research, 2023 (doi: 10.1080/03772063.2023.2176371)
3. S. Chakrabarti, G. Sadhukhan, A. Chakraborty, **J.Y. Siddiqui**, "Lower profile high-power dual-polarized wide beam tracking antenna at S-band band", Wiley-Microwave and Opt. Technol. Lett, Vol. 64, pp 1448-1453, May 2022
4. A. Nella, S.K.Vattiprolu, C. Saha and **Jawad Y. Siddiqui**, "A reconfigurable integrated 4-port UWB and NB antenna system for cognitive radio application", Int. Journal of RF and Microwave Computer Aided Engineering, Vol. 32, No. 3, March 2022
5. P. Nandakumar, D. Jana, S. V. Sunilkumar, P. R. Satheesh Chandran, R. Vishnu, T. Das, Maria Emmanuel, G. Singh, S. Majumder, **J. Y. Siddiqui**, A. Paul, "Validation of Wind Measurements From a 53 MHz ST Radar Pilot Array Located at University of Calcutta With Collocated Radiosonde Launches" RadioScience, Vol. 57, Issue3, March 2022 (https://doi.org/10.1029/2020RS007246)
6. K. Sathish, C. Saha, D. Sarkar, **J.Y.Siddiqui,** Y. Antar, "Varactor-Controlled SRR-Integrated Frequency-Reconfigurable Multifunctional Vivaldi Antenna", IEEE Antennas and Propagation Magazine, ,September 2021
7. C. Saha, **J. Y. Siddiqui**, A. P. Freundorfer, L.A. Shaik and Y.M.M. Antar, "Active Reconfigurable Ultra-Wideband Antenna with Complementary Frequency Notched and Narrowband Response" IEEE Access, Vol. 8, pp. 100802-100809, June 2020.
8. C. Sarkar, C. Saha., Shaik, L. A**., J.Y. Siddiqui**, and Y.M.M. Antar "Spur line integrated single-/dual-/triple-notched ultra-wideband monopole antenna", International Journal of RF and Microwave Computer-Aided Engineering, Vol. 29, issue 12, October, 2019.
9. S. Dutta, C. Saha, and **J.Y. Siddiqui,** Y. M.M. Antar, "Frequency Tunable Differentially Fed Inverted Microstrip Patch Antenna with Low Cross Polarized Radiation", INAE Letters, Vol. 4, issue 2, pp. -77-82, 2019.

10. C.Sarkar, C. Saha, L. Ahmed, **J.Y. Siddiqui**, and Y.M.M. Antar "Frequency Notched Balanced Antipodal Tapered Slot Antenna With Very Low Cross-Polarized Radiation" IET Microwaves, Antennas and Propagation, vol. 12, no. 11, pp. 1859-1863, Aug. 2018
11. C. Saha, L. Ahmed, R. Muntha, Y. M.M. Antar and **J.Y. Siddiqui**, "A dual Reconfigurable Printed Antenna: Design Concepts and Experimental Realization" IEEE Antennas and Propagation Magazine ,Vol. 60, issue 3, pp- 66-74, June 2018.
12. C. Saha, **J.Y. Siddiqui**, C. Sarkar, L.Ahmed and Y.M.M. Antar, "Ultra-Wideband Antipodal Tapered Slot Antenna With Integrated Frequency Notch Characteristics" IEEE Transactions on Antennas and Propagation, vol. 66, No. 3,pp. 1534-1539, March 2018.
13. L.Ahmed, C. Saha, Y.M.M. Antar and **J.Y. Siddiqui**, "An antenna advance for Cognitive Radio: Introducing Multilayered Split Ring Resonator Loaded Printed Ultra-Wideband Antenna with Multi-Functional Characteristics" IEEE Antennas and Propagation Magazine, Vol. 60, issue. 2, pp 20-33, March 2018.
14. S. Bagchi and **J.Y. Siddiqui**, "Selection strategies of narrowband channels in wideband licensed spectrum", International Journal of Electronics Letters (Taylor and Francis), Vol. 6, no. 3, pp. 315-328, 2018
15. S. Bagchi and **J.Y. Siddiqui**, "Throughput Optimization Using Availability Analysis Based Spectrum Sensing for a Cognitive Radio", AEU-International Journal in Electronics and Communications (Elsevier), Vol. 85, pp. 12-22, Feb. 2018
16. L. Ahmed, C. Saha, S. Arora, S. Das, **J.Y. Siddiqui**, and AK Iyer "Bandwidth Control of Cylindrical Ring Dielectric Resonator Antennas using Metallic Cap and Sleeve Loading" IET Microwaves, Antennas and Propagation, Volume: 11, Issue 12, Sep. 2017.
17. S. Bagchi and **J.Y. Siddiqui**, "Exploiting HOCS to tackle mutual coupling in a multi-antenna basedCognitive Radio receiver", International Journal of Electronics Letters, (Taylor and Francis),Vol. 5, no. 3, pp. 358-374, 2017
18. C. Saha, P.Natani, L.Ahmed, Y.M.M. Antar and **J.Y. Siddiqui**, "Square / Hexagonal Split Ring Resonator Loaded Exponentially Tapered Slot Ultra Wideband (UWB) Antenna with Frequency Notch Characteristics" Microwave Opt. Technology Lett. , Vol. 59,issue 6,pp.1241-1245'June 2017.

Conference Papers

1. **Jawad Y. Siddiqui**, Braden P. Smyth, Ashwin K. Iyer,"Printed UWB Monopole Antenna Loaded with MTM-EBG Based Bandstop Filter" in Proc. IEEE Antennas and Propagation Symposium and North America Radio Science Meeting, Denver, USA July 09-15, 2022.
2. **Jawad Y. Siddiqui**, P. Nandakumar, K.P. Ray, A. Paul,"Design and Characterization of Phased Array Antennas for ST Radar Operating at 53MHz" in Proc. IEEE Antennas and Propagation Symposium and North America Radio Science Meeting, Denver, USA July 09-15, 2022.
3. D. Ganguly, D. Sarkar, S. Das, C. Saha, **J.Y. Siddiqui**, Y. Antar,"Design of a Compact Reactive Loaded Miniaturized Catheter Antenna for Microwave Ablation in Deep Tissue Environment"in Proc. IEEE Antennas and Propagation Symposium and North America Radio Science Meeting, Denver, USA July 09-15, 2022.

4. P. Ganguly, A. Dey, D. Ganguly, C. Saha, **J.Y. Siddiqui**, "WBAN Channel Modeling on Electromagnetic Interaction in Biological Tissues for Estimating Path Loss Characteristics" Proc. 14th European Conference on Antennas and Propagation (EuCAP), March 2020, Copenhagen, Denmark
5. D.Sarkar, C. Saha, D. Ganguly, **J.Y. Siddiqui**, Y.M.M. Antar, "Impact of Parasitic Patches for Controlling Mutual Coupling and Spatial Correlation in Closely Spaced UWB MIMO Antennas" Indian Conference on Antennas and Propagation, Ahmedabad, Dec. 2019
6. S. Bhattacharyya, C. Saha and **J.Y. Siddiqui**, "High Frequency Applications of Metamaterials and Metasurfaces", 2019 IEEE Recent Advances in Geoscience and Remote Sensing: Technologies, Standards and Applications (TENGARSS), Cochin, India, October 2019.
7. N. Bhattacharyya, **J.Y. Siddiqui**, Y.M.M. Antar, "Study On The Physical Aspect Of Singularity Expansion Method" 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, March 2019
8. C. Saha, **J.Y. Siddiqui**, Y.M.M. Antar, "Multifunctional Antennas for Cognitive Radio Applications", 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, March 2019
9. S. Keerthipriya, C. Saha**, J.Y. Siddiqui**, Y.M.M. Antar, "Dual Tunable Multifunctional Reconfigurable Vivaldi Antenna for Cognitive/Multi-Standard Radio Applications" 2019 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, Atlanta, US, July 2019
10. S. Keerthipriya, C. Saha, **J.Y. Siddiqui** and Y.M.M. Antar, "Dual Tunable Multifunctional Reconfigurable Vivaldi Antenna for Cognitive/Multi-Standard Radio Applications ", in Proc. IEEE Antennas and Propagation Symposium, Atlanta ,USA , July 07-12, 2019
11. C. Saha, **J.Y. Siddiqui**, and MM Yahia Antar. "Multifunctional Antennas for Cognitive Radio Applications" in Proc. 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC), pp. 1-4. IEEE,, Delhi, India, March, 2019.
12. Divya Rao, Chittajit Sarkar, Chinmoy Saha and **J.Y. Siddiqui**, "Spur Line Loaded UWB Inserted DRA With Frequency Notched Characteristics" in Proc. IIWE 2018, Trivandrum, India Dec 6-8, 2018.
13. Chittajit Sarkar, Chinmoy Saha and **J.Y. Siddiqui**, "Ultra-wideband MIMO monopole antenna with WLAN band rejection" in Proc. IIWE 2018, Trivandrum, India Dec 6-8, 2018.
14. C.Sarkar, C. Saha, L. Ahmed, **J.Y. Siddiqui** and Yahia M.M. Antar "Balanced Antipodal Tapered Slot Antenna with Low Cross-Polarized Radiation" in Proc. IEEE Antennas and Propagation Symposium, San Diego, USA July 09-14, 2017.
15. Utkarsha Deva, C. Saha and **J.Y. Siddiqui** "Reflector Backed High Gain Photoconductive THz Antenna Using Conical GaAs Horn and Si Lens" in Proc. IEEE Antennas and Propagation Symposium, San Diego, USA July 9-14, 2017.

16. B. Pramanick, S. Martinez, M. Madou and C. Saha, L. Ahmed and **J.Y.Siddiqui** "SU-8 Derived Novel Ultra Compact Carbon Antenna Using C-MEMS Technology" in Proc. IEEE Antennas and Propagation Symposium, San Diego ,USA July 09-14, 2017.

Invited Lectures

1. Design And Characterization Of Phased Array Antennas For ST Radar Operating At 53Mhz, **IEEE Antennas And Propagation Symposium And North America Radio Science Meeting, Denver, USA**, July 09-15, 2022.
2. Multifunctional Antennas, **35th Annual Symposium, IEEE North Jersey,** October 7,2021
3. Multifunctional Filtering Antennas, **2021 IEEE CAMA Conference, 15-17 November 2021, Antibes Juan-Les-Pins, France**
4. Recent Trends in Multifunctional Antennas, **Mediterranean Microwave Symposium**, 31 October -2 November 2019, **Hammamet- Tunisia**

Doctoral Students

Name and Registration information	Status	Co-guide
Sayantani Datta	Awarded 2020	
Chittajit Sarkar	Awarded 2019	
Srijibendu Bagchi	Awarded 2018	
Nandan Bhattacharyya	Pre doc Seminar	
P. Nanda Kumar	On going	
Ashirwad Dutta	On going	
Anisur Rahaman	On going	
Gautam Sadhukhan	On going	
Sonia Bhattacharya		Himadri Bhattacharyya

Major Achievement in Current Year

Recipient of the 2023 IEEE SIGHT Volunteer of the Year

DR. SOMA BARMAN (MANDAL)

Office: Sisir Mitra Bhavan

J.N. Bhar Bhavan, Room Number: 31

Email Address (Primary): sbrpe@caluniv.ac.in

Email Address (Secondary): barmanmandal@gmail.com

Phone Number: 9432906252

Google Scholar:
https://scholar.google.com/citations?hl=en&user=of2_-JsAAAAJ

Degrees obtained:

- Ph.D. (Engineering), J.U., 2001
- M.Tech., RPE, CU, 1996
- B. Tech, RPE, CU., 1994

Classes Taught

- Course Code: EC 3.1.3 - Course Name: Digital Communication
- Course Code: EC 3.1.7 - Course Name: Digital Communication Laboratory
- Course Code: RP 4.1.4 - Course Name: Advanced Communication

Research Interests and Experience

- **Cytomorphic Circuit Modeling of Biological Pathways**

For studying the cellular behavior of biological system, mimicking Gene Regulatory network (where large no. of biochemical reactions involved) into Electronics domain. Such synthetic models help in therapeutic approaches, drug dosage control, prediction of genetic disease, etc.

- **Embedded signal processing and IoT for healthcare applications**

Design and implementation of Intelligent, low power and high-performance sensing and signal processing units to process various biomedical signals.

Upon integration of cloud storage and communication via IoT framework, these processed signals will help in health care related applications like remote health monitoring, disease diagnosis and prediction, telemedicine etc.

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Acting as General coordinator for MTECH course since 2020
- Coordinating MTECH (RPE) admission process since 2020

Personal Projects		
Funding agency	**Topic and details**	**Funding and Duration**
1. Centre for Research for Nano-science & Nano-technology (CRNN), CU,	"Electrical Circuit Model of DNA/RNA string and their simulation in a SPICE framework "	Funding: 2 lakhs +1 SRF Duration: 2012- 2013
• SERB, DST, Govt. of India	Electrical Network Modelling of Biological System & its applications in Genetic Disease Diagnosis	Funding: 31 Lakhs +1 SRF Duration: 2013-2017
• West Bengal Higher Education, Science & Technology and Biotechnology (Sci& Tech.), Govt. of West Bengal	Cytomorphic CMOS Circuit Modeling and Ultra -Low Power Design of P53 Protein Pathway for Synthetic Biology Applications	Funding: 13.26 Lakhs +1 SRF Duration: 2018-2021
• UGC UPE II, Calcutta University. UPE II	Modern Biology and Signal Processing Group, 'Development of Low Cost, Prototype Electronic System for Health Monitoring'	Funding: 6 lakhs

Publications

Books and Book Chapters

1. "IoT-Based Real-Time Remote ECG Monitoring System," Samik Basu, Anwesha Sengupta, Anindita Das, Mahasweta Ghosh, and **Soma Barman (Mandal),** Lecture Notes in Networks and Systems book series (LNNS, volume 147), DOI: https://doi.org/10.1007/978-981-15-8366-7_4,ISBN: 978-981-15-8365-0; 04 February 2021, Springer, Singapore, pp 23-28.
2. "Identification of Satellite DNA in Different Species," Rachita Ghoshhajra, Sanghamitra Chatterjee and **Soma Barman (Mandal**), Lecture Notes in Networks and Systems book series (LNNS, volume 147), DOI: https://doi.org/10.1007/978-981-15-8366-7_4,ISBN : 978-981-15-8365-0; 04 February 2021, Springer, Singapore,, pp 58-64.
3. "Modeling and Simulation of p53-Mdm2 Protein Pathway in Normal Cells," Trisha Patra, Sanghamitra Chatterjee, Soumya Pandit, and **Soma Barman (Mandal)**; Lecture Notes in Networks and Systems book series (LNNS, volume 147), DOI: https://doi.org/10.1007/978-981-15-8366-7_4,ISBN : 978-981-15-8365-0; 04 February 2021, Springer, Singapore, pp 65-71.
4. "An Approach to Reduce Power Consumption and Delay of SingleError Correction Codes in WSNs for IoT Applications" ; Jhilam Jana, SayanTripathi, JagannathSamanta, JaydebBhaumik and **Soma Barman (Mandal)**, Lecture Notes in Networks and Systems book series (LNNS, volume 147), DOI: https://doi.org/10.1007/978-981-15-8366-7_4,ISBN : 978-981-15-8365-0; 04 February 2021, Springer, Singapore, pp 196-203.

5. “Identification of Some Transposable Elements of DNA Using “BP Suche” Algorithm “;RachitaGhoshhajra, SanghamitraChatterjee and **Soma Barman (Mandal),** Computational Intelligence in Pattern Recognition. Advances in Intelligent Systems and Computing, vol 999. Springer, Singapore. https://doi.org/10.1007/978-981-13-9042-5_6, 2020, pp 57-68

6. “Smart Health Monitoring System for Temperature, Blood Oxygen Saturation, and Heart Rate Sensing with Embedded Processing and Transmission Using IoT Platform.”, Samik Basu, Sinjoy Saha, Soumya Pandit and **Soma Barman (Mandal),** Computational Intelligence in Pattern Recognition. Advances in Intelligent Systems and Computing, vol 999. Springer, Singapore. https://doi.org/10.1007/978-981-13-9042-5_6, 2020, pp 81-91

7. “Design of a Health Monitoring System for Heart Rate and Body Temperature Sensing Including Embedded Processing Using ARM Cortex M3” Mahasweta Ghosh, Samik Basu, Soumya Pandit, **Soma Barman (Mandal),** Computational Intelligence in Pattern Recognition. Advances in Intelligent Systems and Computing, vol 999. Springer, Singapore. https://doi.org/10.1007/978-981-13-9042-5_6, 2020, pp 93-103

8. “Behavioral Modeling of Differential Inductive Seismic Sensor and Implementation of Its Readout Circuit" Abhishek Kumar Gond, Rajni Gupta, Samik Basu, Soumya Pandit and **Soma Barman,** Springer Nature Singapore Pte Ltd. 2017, Communication, Devices, and Computing, Lecture Notes in Electrical Engineering 470, https://doi.org/10.1007/978-981-10-8585-7_24,pp 253-262, 8th April,2018.

9. "RS (255, 249) Codec Based on All Primitive Polynomials Over GF(2^8)" Jagannath Samanta, Jaydeb Bhaumik, **Soma Barman**, Sk. G. S. Hossain, Mandira Sahu and Subrata Dutta**,** Springer Nature Singapore Pte Ltd. 2017, Communication, Devices, and Computing, Lecture Notes in Electrical Engineering 470, https://doi.org/10.1007/978-981-10-8585-7_14,8th April,2018, pp-151-161

10. " Binary Error Correcting Code for DNA Databank" Jagannath Samanta, Jaydeb Bhaumik, **Soma Barman** and Raj Kumar Maity, Springer Nature Singapore Pte Ltd. 2017, Communication, Devices, and Computing, Lecture Notes in Electrical Engineering 470, https://doi.org/10.1007/978-981-10-8585-7_1,8th April,2018, pp 1-12

11. "Electrical Equivalent Model for Gene Regulatory System”, M. Dutta and **S. Barman,** Lecture Notes in Electrical Engineering, vol 453. Springer, Singapore, doi.org/10.1007/978-981-10-5565-2_14,Print ISBN 978-981-10-5564-5 , Online ISBN 978-981-10-5565-2. (2018) , pp-151-169.

12. “Design of a Low-Cost Heart Rate Monitoring System” , S. Nandy and **S Barman**, Lecture Notes in Electrical Engineering, vol 453. Springer, Singapore, DOI https://doi.org/10.1007/978-981-10-5565-2_19 , Print ISBN 978-981-10-5564-5 , Online ISBN 978-981-10-5565-2 , 20168, pp 207-219.

Journal Papers

1. RP3MES: A Key to Minimize Infection Spreading.", Mahasweta Ghosh and Soma Barman Mandal, Transactions of the Indian National Academy of Engineering., DOI: 10.1007/s41403-022-00328-0, 16th March, 2022
2. "Classification of Homo sapiens gene behavior using linear discriminant analysis fused with minimum entropy mapping"; Joyshri Das & Soma Barman (Mandal), Medical & Biological Engineering & Computing (2021) Vol,59: pp 673–691, 17 February 2021, IF :2.6,ISSN : 0140-0118
3. Identification of Homo sapiens cancer classes based on fusion of hidden gene features", Joyshri Das and **Soma Barman (Mandal)**, Journal of Biomedical Informatics, Vol 110,October 2020, DOI : https://doi.org/10.1016/j.jbi.2020.103555, IF 6.3
4. "Intelligent Remote Health Monitoring System", Samik Basu, Mahasweta Ghosh, **Soma Barman(Mandal)**, International Journal of Information Technology, Communication and Convergence, Inderscience, DOI: 10.1504/IJITCC.2020.112453, 2020 Vol.3 No.4-, May,2020- UGC approved.
5. Jagannath Samanta, Jaydeb Bhaumik and **Soma Barman**, "Compact and Power Efficient SEC-DED Codec for Computer Memory", Microsystems Technologies (Springer)(SCI,.IF 2.27, ISSN 0946-7076, Feb,2019
6. " A non-invasive cancer gene detection technique using FLANN based adaptive filter", Saikat Singha Roy and **Soma Barman**", Springer Microsystem Technologies, https://doi.org/10.1007/s00542-018-4036-6, ISSN 0946-7076, July 2018, IF= 2.27
7. "FPGA and ASIC Implementation of RS (47, 41) Codec for Intelligent Home Networking System", J. Samanta, J. Bhaumik and **S. Barman**, Journal of Active & Passive Electronic Devices (Emerging SCI) 2017, ISSN: 1555-0281, pp 1-19.
8. Compact CA-based single byte error correcting codec", J. Samanta, J. Bhaumik and **S. Barman**, IEEE Transactions on Computers, DOI: 10.1109/TC.2017.2739726 , ISSN :0018-9340, IF= 2.916, Vol. PP, Issue: 99. August,2017
9. Prediction of Homo sapiens cancer cells by electrical network modeling of amino acid sequence" T. Roy**, S. Barman**, International Journal of Bioinformatics Research and Applications, ISSN: 1744-5485, 9th Feb ,2017, DOI 10.1504/IJBRA.2017.082057

Conference Papers

1. "Noise Suppressing Cascaded IIR Elliptic Filter Design for ECG Signals"; Suman Saha and **Soma Barman (Mandal),** 3rd International Conference on Communication, Devices and Computing (ICCDC) 2021, August 16-18, 2021.
2. "Fast Response - A Smart Ambulatory System for Monitoring Accident/Disaster Victims along with Live Tracking Facility"; Mahasweta Ghosh and **Soma Barman (Mandal)**, 3rd International Conference on Communication, Devices and Computing (ICCDC) 2021, August 16-18, 2021

3. “Modeling of Apoptotic p53 Protein Pathway for Damaged DNA”; Trisha Patra, Sanghamitra Chatterjee and **Soma Barman (Mandal),** 3rd International Conference on Communication, Devices and Computing (ICCDC) 2021, August 16-18, 2021.

4. “Modeling of p53 protein pathway using Markov chain based Probabilistic Boolean Network”, Mala Sau Giri, Sanghamitra Chatterjee and **Soma Barman (Mandal),** 3rd International Conference on Communication, Devices and Computing (ICCDC) 2021, August 16-18, 2021.

5. “FPGA implementation of different biochemical reactions involved in a cell”; **Soma Barman Mandal**, Moumita Acharya, Samik Basu, Amlan Chakraborty, 25th International Symposium on VLSI Design and Test (VDAT),16-18 Sept. 2021, **DOI:** 10.1109/VDAT53777.2021.9601094

6. "Identification of some Transposable Elements of DNA using ‘BP Suche’ Algorithm", Rachita Ghoshhajra, Sanghamitra Chaterjee, **Soma Barman Mandal**, International Conference on Computational Intelligence in Pattern Recognition (CIPR 2019), Indian Institute of Engineering Science and Technology, Shibpur, 19th-20th January 2019

7. "Smart Health Monitoring System for Temperature, Blood Oxygen Saturation and Heart Rate Sensing with Embedded Processing and Transmission using IoT platform", Samik Basu, Sinjoy Saha, Soumya Pandit, **Soma Barman (Mandal),** International Conference on Computational Intelligence in Pattern Recognition (CIPR 2019), Indian Institute of Engineering Science and Technology, Shibpur, 19th-20th January 2019

8. " Design of a Health Monitoring System for Heart Rate and Body Temperature Sensing Including Embedded Processing using ARM Cortex M3", Mahasweta Ghosh, Samik Basu, Soumya Pandit, **Soma Barman (Mandal)**, International Conference on Computational Intelligence in Pattern Recognition (CIPR 2019-20th January 2019.

9. " Raspberry PI 3B+ Based Smart Remote Health Monitoring System using IoT Platform", Samik Basu, Mahasweta Ghosh, **Soma Barman (Mandal)**, 2nd International Conference on Communication, Devices and Computing (ICCDC 2019), HIT, Haldia, March 14-15, 2019-accepted.

10. "Peltier Module Based Water Generation and Waste Heat Management System" Trisha Patra, Samik Basu, **Soma Barman (Mandal),** 2nd International Conference on Communication, Devices and Computing (ICCDC 2019), HIT, Haldia, March 14-15, 2019-accepted.

11. " Study of Evolution by Searching Alu Pattern from Primate Transposon" Rachita Ghoshhajra, Sanghamita Chatterjee, **Soma Barman Mandal**, 2nd International Conference on Communication, Devices and Computing (ICCDC 2019), HIT, Haldia, March 14-15, 2019

12. " Modeling of Gene Regulatory Network using Boolean Network" Sau Giri M, Chatterjee. S and **Barman. S**, Proc. Of 6th International Conference on " Computing, Communication and Sensor Networks", 30-31 Dec, CCSN2017, Vol II

13. "Design and Analysis of a CMOS Analog Multiplier as part of Read Out Circuit for a differential Inductive Seismic Sensor", Abhishek Kumar Gond, Samik Basu, **Soma Barman**, Soumya Pandit, Proceeding of 6th International Conference on " Computing, Communication and Sensor Networks",30, 31 Dec CCSN2017, Vol 1, pp 3-8, ISBN: 81-85824-46-0

14. " FLANN based Adaptive Filter for Cancer Gene Identification System", Saikat Singha Roy and **Soma Barman**, Proceeding of 6th International Conference on " Computing, Communication and Sensor Networks",30, 31 Dec CCSN2017, Vol 1, pp 30-35, ISBN: 81-85824-46-0

Invited Lectures

Cytomorphic Engineering: A Bridge between Biological and Electronics System**, International Conference UEMCOS, 2021,** 30th to 2nd October,2021

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide**
Saikat Singha Roy, Re-registration on 18/10/2022	Digital Filtering Approach in Genomics	Completed 5000 pre-Phd seminar on January 04, 2023	NA
Mala SahooGiri, Registration on 18/12/2019	Study of GRN using Boolean network	-	Dr. Sanghamitra Chatterjee
Trisha Patra Registration on 9/2/2021	Cytomorphic circuit modeling of p53 protein pathway	-	Dr. Sanghamitra Chatterjee
Mahasweta Ghosh Registration on 21/7/2022	Machine Learning Application in Health Care	-	NA
Suman Saha Enrolled on 8/9/2021	Digital Filtering approach in Prediction of CVD	-	NA
Moumita Acharya Enrolled on 8/9/2021	Cytomorphic hardware implementation of different stochastic biochemical reactions involved in a cell	-	Prof. Amlan Chakrabarti

Major achievement in Current Year

- Best paper award for paper presented in International conference on ICCDC, 2021, 16-18 August, 2021, Haldia, WB, Paper titled " Noise suppressing Cascaded Elliptic IIR Filter Design for ECG Signals," Suman Saha and Soma Barman (Mandal)

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Degrees obtained

- Ph.D, Calcutta University, RPE, 2016
- M.Tech., Calcutta University, RPE, 2001
- B.Tech. Calcutta University, RPE, 1999

Classes Taught

- EC 2.1.3 - Signals and Systems
- ECEL3.2.4.1 - Microwave and Navigational Electronics
- ECEL3.2.8 - Microwave Laboratory
- RP 4.1.3 - Applied Electromagnetics
- RP 4.2.5 - Electromagnetic Interference and Compatibility

Research Interests and Experience

- Microwave Antennas, Microwave Circuits, RF Energy Harvesting, Bio Electromagnetics

Publications

Journal Papers

1. D. Chatterjee and **A. Kundu**," Comparative Analysis of Non-Contacting Feed Mechanism in Square Micro Strip Patch Antenna", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 6, Issue 7, July 2017

2. D. Chatterjee and **A. Kundu**," Ultra-Wide Band Microstrip Patch Antenna In Medical Applications", i-manager's Journal on Wireless Communication Networks, Vol. 6 l No. 1 l April - June 2017

3. D. Chatterjee and **A. Kundu**," Parametric Study of Micro Strip Patch Antenna Using Different Feeding Techniques for Wireless and Medical Applications", Advances in Science, Technology and Engineering Systems Journal Vol. 3, No. 1, 310-316 (2018)

4. D. Chatterjee and **A. Kundu**," High Gain Metamaterial Antenna Using Linear Displacement of SRR Elements ", Texas Journal of Multidisciplinary Studies, Vol.2, Pages 77-82, November 2021

Conference papers

1. D. Chatterjee and **A. Kundu**," Performance Analysis and Comparative Study of Microstrip Patch Antenna using Aperture Coupled and Proximity Coupled Feeding Methodology ", IEEE International Conference on Computer, Communication, and Signal Processing (ICCCSP-2017), January 2017
2. D. Chatterjee and **A. Kundu**," A Novel Design of Aperture Coupled Patch Antenna for Wireless and Medical Applications ", 4th International Conference on 'Microelectronics, Circuits and Systems', Micro2017, June 2017
3. D. Chatterjee and **A. Kundu**," A Small Broadband Micro Strip Patch Antenna with Ground Plane Optimization", Indian Conference on Antennas and Propagation (InCAP 2018), December 2018
4. D. Chatterjee and **A. Kundu**," Study of Miniaturized Patch Microstrip Antenna with Circular Slot and SRR Optimization", URSI Asia-Pacific Radio Science Conference, March 2019
5. D. Chatterjee and **A. Kundu**," Design Of Symmetrical Trident Monopole Antenna For 2.4/2.5/5.2GHz WLAN/WiMAX Applications", 2021 IEEE Region 10 Symposium (TENSYMP), August 2021

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide**
Debajyoti Chatterjee 06264/PhD.(Tech.)Proceed/2017 Dated 08.09.2017	UWB Antenna	Pursuing	no
Sumit Varshney 00004/PhD.(Tech.)Proceed/2019 Dated 18/12/2019	RF Energy Harvesting	Pursuing	no

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Google Scholar:
https://scholar.google.com/citations?user=yNl9ny8AAAAJ&hl=en&citsig=AMD79oraDCCMLTPKKPUS4J9O-kCEuHSuZA

Degrees obtained:

- PhD (Engg), Jadavpur University, ETCE Department, Year:2009
- M.E. Tel.E, Jadavpur University, ETCE Department, Year:2004
- B. Tech (ECE), Kalyani University, Year:2002

Classes Taught

- Course Code: EC2.2.3 - Course Name: Control Theory and Systems
- Course Code: EC 3.2.2- Course Name: Microprocessor and Microcontroller
- Course Code: EC3.2.6 - Course Name: Microprocessor and Microcontroller Laboratory
- Course Code: ECHN4.1.7- Course Name: Microelectronics and VLSI Laboratory
- Course Code: RP4.2.23- Course Name: Design Entry and Simulation laboratory
- Course Code: RP4.1.9- Course Name: Processor organization and architecture

Research Interests and Experience

- Machine learning
- Artificial Intelligence
- Bio-inspired computing
- Bio-medical signal processing
- FPGA based prototyping
- Embedded System Design

Administrative Duties / Achievements/ Completed Projects/ Other Details

- General Coordinator of BTech ECE course
- Winter school Coordinator: Appointed as Coordinator of the winter school (equivalent to Refresher course) in Physics and Engineering. Held in UGC-HRDC, University of Calcutta during 26/2/2018 – 20/3/2018
- Swadeshi Microprocessor Challenge, Ministry of Electronics & Information Technology, Government of India, started from 18.08.2020, Duration: 1year, Acted as Team leader.
- Acted as **Treasurer**, IEEE-WIE, Kolkata, Year: 2017, 2020

Current Personal Projects	
Funding agency	**Topic and details**
Regional Geriatric Centre, Medical College Kolkata	Affordable Wearable Cardiac Monitor for Early Detection, Monitoring and Prevention of Arrhythmia for elderly citizens, R&D project by Regional Geriatric Centre, Medical College Kolkata, Duration: 1 Year

Publications (Books, Journals)

Book Chapter

1. Nabanita Banerjee and Sumitra Mukhopadhyay. "Modified Multi-Grey Wolf Pack for Vital Sign-Based Disease Identification." *Soft Computing Methods for System Dependability*. IGI Global, 2020. 45-94, ISBN13: 9781799817185.
2. Prativa Agarwalla and Sumitra Mukhopadhyay. "Wolf-Swarm Colony for Signature Gene Selection Using Weighted Objective Method." *Nature-Inspired Algorithms for Big Data Frameworks*. IGI Global, 2019. 170-195, ISBN13: 9781522558521.
3. Sumitra Mukhopadhyay and Soumyadip Das. "Application of Nature-Inspired Algorithms for Sensing Error Optimisation in Dynamic Environment." *Nature-Inspired Algorithms for Big Data Frameworks*. IGI Global, 2019. 124-169, ISBN13: 9781522558521.
4. Prativa Agarwalla and Sumitra Mukhopadhyay. "Feature selection using multi-objective optimization technique for supervised cancer classification." *Multi-objective optimization*. Springer, Singapore, 2018. 195-213, ISBN 978-981-13-1471-1.
5. Agarwalla, Prativa, and Sumitra Mukhopadhyay. "Selection of Pathway Markers for Cancer Using Collaborative Binary Multi-Swarm Optimization." Applying Big Data Analytics in Bioinformatics and Medicine. IGI Global, 2018. 337-363.

Journal Papers

1. Debasmita Pal, **Sumitra Mukhopadhyay**, and Rajarshi Gupta, "Two-stage Classifier for Resource Constrained On-board Cardiac Arrhythmia Detection." IEEE Transactions on Instrumentation and Measurement (2022) IF: 5.332, (10.1109/TIM.2022.3224535).
2. Nabanita Banerjee, and **Sumitra Mukhopadhyay**, "AP-TLB-IGWO: Adult-pup teaching-learning based interactive grey wolf optimizer for numerical optimization." *Applied Soft Computing* (2022): 109000, ISSN 1568-4946, IF: 8.263 (https://doi.org/10.1016/j.asoc.2022.109000).
3. Prativa Agarwalla, **Sumitra Mukhopadhyay**, "GENEmops: Supervised feature selection from high dimensional biomedical dataset,", Applied Soft Computing, 2022, 108963, ISSN 1568-4946, IF: 8.263, (https://doi.org/10.1016/j.asoc.2022.108963).
4. Nilava Mukherjee, **Sumitra Mukhopadhyay**, and Rajarshi Gupta. "Real-time mental stress detection technique using neural networks towards a wearable health monitor." Measurement Science and Technology 33.4 (2022): 044003, IF: 2.046.

5. Pratyush Prasun, **Sumitra Mukhopadhyay**, and Rajarshi Gupta. "Real-time multi-class signal quality assessment of photoplethysmography using machine learning technique." Measurement Science and Technology 33.1 (2021): 015701, IF: 2.046.

6. P. Agarwalla, and **S. Mukhopadhyay**, Hybrid advanced player selection strategy-based population search for global, Expert Systems with Applications, 139, 112825, (2020). IF:8.665 (https://doi.org/10.1016/j.eswa.2019.112825).

7. S. Das and **S. Mukhopadhyay**, FIL-DGA based hardware optimization system. Applied Soft Computing, 72, 235-260, (2018). IF: 8.263 (https://doi.org/10.1016/j.asoc.2018.07.037).

8. Prativa Agarwalla, and **Sumitra Mukhopadhyay,** "Bi-stage hierarchical selection of pathway genes for cancer progression using a swarm based computational approach." Applied Soft Computing 62 (2018): 230-250, IF: 8.263 (https://doi.org/10.1016/j.asoc.2017.10.024)

9. Prativa Agarwalla and **Sumitra Mukhopadhyay**, "Efficient player selection strategy based diversified particle swarm optimization algorithm for global optimization." Information Sciences 397 (2017): 69-90, IF:8.233(https://doi.org/10.1016/j.ins.2017.02.027)

Conference Papers

1. Debasmita Pal, **Sumitra Mukhopdhyay** and Rajarshi Gupta. "A Machine Learning-based Lightweight and Real-time Cardiac Arrhythmia Detection using Optimum Samples and Features." 2022 IEEE 9th Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON). IEEE, 2022. (**DOI:** 10.1109/UPCON56432.2022.9986397 (**Best paper award received in a track**)

2. Priya Sardar, Rajarshi Gupta, and **Sumitra Mukhopadhyay**, "Multiclass Signal Quality Assessment of Electrocardiogram using Entropy-based Features and Machine Learning Technique", IEEE Silchar Sub-section Conference (SILCON-2022) Nov 4-6 2022, Silchar, India, DOI: 10.1109/SILCON55242.2022.10028787.

3. Souvik Ghosh, **Sumitra Mukhopadhyay**, and Rajarshi Gupta. "A New Physiology-based Objective Mental Stress Detection Technique with Reduced Feature Set and Class Imbalanced Dataset Management." 2021 IEEE International Conference on Technology, Research, and Innovation for Betterment of Society (TRIBES). IEEE, 2021, (DOI: 10.1109/TRIBES52498.2021.9751622)

4. Prativa Agarwalla and **Sumitra Mukhopadhyay**, "Comparative Analysis of Multi-objective Algorithms for Imbalanced Biomedical Data Classification with Tuned Classifier." 2021 5th International Conference on Information Systems and Computer Networks (ISCON). IEEE, 2021, **DOI:** 10.1109/ISCON52037.2021.9702397

5. Nabanita Banerjee and **S. Mukhopadhyay**, "HC-PSOGWO: hybrid crossover oriented PSO and GWO based co-evolution for global optimization." 2019 IEEE region 10 symposium (TENSYMP). IEEE, 2019.

6. Agarwalla, Prativa, and **Sumitra Mukhopadhyay**, "Efficient coordinator guided particle swarm optimization for real-parameter optimization." 2017 7th International Conference on Cloud Computing, Data Science & Engineering-Confluence. IEEE, 2017.

Invited Lectures

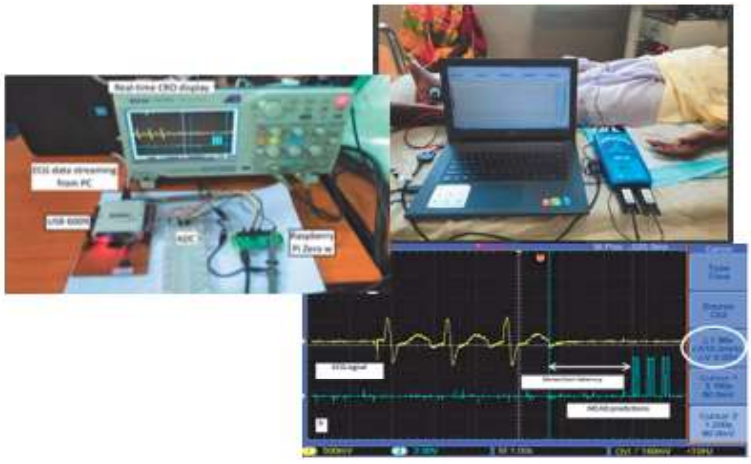
1. 3 Days Workshop on "Reconfigurable Technology Foundation and Prospect" Organized by **TMSL-IET on-campus student chapter in joint collaboration with IET(UK) Kolkata Local Network,** 04.03.2023.
2. Faculty Development Program on "Artificial Intelligence and Machine Learning" during 22nd to 24th November, 2021 by **Department of Electronics & Communication Engineering, Heritage Institute of Technology, Kolkata.**
3. Webinar related to "Application of machine learning in instrumentation engineering," on 30th September' 2021, Organized by **TMSL-IET on-campus student chapter in joint collaboration with IET(UK) Kolkata Local Network.**

Doctoral Students

Name and Registration information	Topic	Status	Co-guide
Prativa Agarwalla Registered	Bio-inspired swarm computing procedure for cancer classification	Thesis submitted	NA
Soumyadip Das Registered	Application of bio-inspired optimization on big-data handling and related FPGA prototyping	Ongoing	NA
Nabanita Banerjee Registered	Automated mental stress detection using bio-inspired computing procedure and related hardware implementation	Ongoing	NA

Major Achievement in Current Year

Design of IoT enabled affordable Wearable Cardiac Monitor for Early Detection, Monitoring and Prevention of Arrhythmia for elderly citizens (In collaboration with Applied Physics Department, CU and Geriatric Department, Medical College, Kolkata)



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Google Scholar:
https://scholar.google.com/citations?user=DEVI424AAAAJ&hl=en

Degrees obtained:

- Ph.D (Tech) in Radio Physics and Electronics, University of Calcutta, Year: 2006
- M.Tech in Radio Physics and Electronics, University of Calcutta, Year: 1999
- B. Tech, Institute of Radio Physics and Electronics, University of Calcutta, 1997

Classes Taught

- EC 2.2.2 - Electronic Devices, B.Tech 4th Semester, Radio Physics and Electronics
- RP 4.2.12- Quantum Theory of Solids, M.Tech 2nd Semester, Radio Physics and Electronics
- RP 4.2.23 - Design Entry and Simulation laboratory, M.Tech 2nd Semester, VLSI Design
- RP 4.1.5 - Advanced Semiconductor Physics and Devices, M.Tech 1st Semester, Radio Physics and Electronics and VLSI Design
- RP 4.1.2 - Computational Methods using Matlab, M.Tech 1st Semester, Radio Physics and Electronics
- EC 3.1.6 - Digital System Design Laboratory, B.Tech 5th Semester, Radio Physics and Electronics
- EC 3.1.2 - Computer Organization and Architecture, B.Tech 5th Semester, Radio Physics and Electronics

Research Interests and Experience

- Semiconductor Physics and Devices, Photonics, Low Dimensional Structures, Transport Phenomenon in Electronic Devices, Optoelectronics and Plasmonics
- Biosensing Applications

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Course Coordinator of M.Tech in VLSI Design till 15.10.2020
- Coordinator of 4th Semester in ECE from December, 2020 to till date.

Current Personal Projects		
Funding agency	**Topic and details**	**Funding and Duration**
DST, Government of India	High-responsivity GeSn short-wave infrared phototransistors	Three years 04.01.2016-03.01.2019 Rs. 33,73,500/-

Publications (Books, Journals)

Books

Prasanta Kumar Basu, **Bratati Mukhopadhyay** and Rikmantra Basu, *Semiconductor Nanophotonics*, UK: Oxford University Press, 2022

Journal Papers

1. Vedatrayee Chakraborty, Swagata Dey, Rikmantra Basu, **Bratati Mukhopadhyay** and P. K. Basu" Current gain and external quantum efficiency modeling of GeSn based direct bandgap multiple quantum well heterojunction phototransistor", *Opt Quant Electron*, vol. 49, pp. 125(13pp), March 2017.
2. **Bratati Mukhopadhyay**, Gopa Sen, P. K. Basu, Rikmantra Basu, Shyamal Mukhopadhyay, "Prediction of Large Enhancement of Electron Mobility in Direct Gap $Ge_{1-x}Sn_x$ Alloy", *Phys. Stat. Sol. B*., vol 254, pp. 1700244 (7pp), August 2017.
3. Swagata Dey, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Type II band alignment in $Ge_{1-x-y}Si_xSn_y/Ge_{1-\alpha-\beta}Si_\alpha Sn_\beta$ heterojunctions", *Solid State Communications*, vol 270, pp.155-159, December 2017.
4. Neetesh Kumar**, Bratati Mukhopadhyay** and Rikmantra Basu, "Tunnel injection transistor laser for optical interconnects", *Opt Quant Electron*, vol. 50, pp. 160(12pp), March 2018.
5. **Bratati Mukhopadhyay**, Gopa Sen, Souradeep De, Rikmantra Basu, Vedatrayee Chakraborty, and Prasanta K. Basu, "Calculated Characteristics of a Transistor Laser Using Alloys of Gr-IV Elements", *Phys. Stat. sol. B*., vol 255, pp. 1800117 (6pp), July 2018.
6. Swagata Dey, Vedatrayee Chakraborty, **Bratati Mukhopadhyay** and Gopa Sen, "Modeling of tunneling current density of GeC based double barrier multiple quantum well resonant tunneling diode", *Journal of Semiconductors*, vol 39, pp. 1-5, August 2018.
7. Soumava Ghosh, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Study of Si-Ge-Sn based Heterobipolar Phototransistor (HPT) exploiting Quantum Confined Stark Effect and Franz Keldysh effect with and without resonant cavity", *Physica E*, vol 106, pp. 62-67, October 2018.
8. Swagata Dey, Gopa Sen, Vedatrayee Chakraborty, **Bratati Mukhopadhyay** "Performance prediction of a quantum well Infrared photo detector (QWIP) using GeSn/SiGeSn quantum well structure" *Journal of Communications Technology and Electronics*, vol. 64, no.11, pp. 1298–1306, July 2019.

9. Soumava Ghosh, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Performance analysis of GeSn/SiGeSn quantum well infrared photodetector in terahertz wavelength region", *Physica E*, vol 115, pp.113692 (9pg), August 2019.

10. Soumava Ghosh, **Bratati Mukhopadhyay**, Gopa Sen, "Performance Enhancement of GeSn Transistor Laser with Symmetric and Asymmetric Multiple Quantum Well in the Base", *Semiconductors*, vol. 54, pp. 77–84, August 2019.

11. Namrata Shaw, Gopa Sen and **Bratati Mukhopadhyay**, "An analytical approach of elimination of ambipolarity of DPDG-TFET using strained type II staggered SiGeSn heterostructures", *Superlattices and Microstructures*, vol 141, pp. 106488, March 2020.

12. Namrata Shaw, **Bratati Mukhopadhyay** and Gopa Sen, "Study of electrical parameters of a dual material double gate TFET using a strained type II staggered $Ge_{1-x-y}Si_xSn_y/Ge_{1-a-b}Si_aSn_b$ heterojunction", *J Comput Electron*, vol. pp. 19, 1433, June 2020.

13. Soumava Ghosh, **Bratati Mukhopadhyay** and Guo-En Chang, "Design and Analysis of GeSn-Based Resonant-Cavity-Enhanced Photodetectors for Optical Communication Applications," *IEEE Sensors J*., vol. pp. 20, 7801-7809, July 2020.

14. Soumava Ghosh, Kuan-Chih Lin, Cheng-Hsun Tsai, Harshvardhan Kumar, Qimiao Chen, Lin Zhang, Bongkwon Son, Chuan Seng Tan, Munho Kim, **Bratati Mukhopadhyay**, and Guo-En Chang, "Metal-Semiconductor-Metal GeSn Photodetectors on Silicon for short-wave infrared applications," *Micromachines*, vol.11, pp. 795, August 2020.

15. Soumava Ghosh, Kuan-Chih Lin, Chen-Hsun Tsai, Kwang Hong Lee, Qimiao Chen, Bongkwon Son, **Bratati Mukhopadhyay**, Chuan Seng Tan and Guo-En Chang, "Resonant-cavity-enhanced responsivity in germanium-on-insulator photodetectors," *Optics Express*, vol. 28, pp. 23739-23747, August 2020.

16. Shyamal Mukhopadhyay, **Bratati Mukhopadhyay**, Gopa Sen and P.K. Basu, "Maximum theoretical electron mobility in n-type Ge1-xSnx due to minimum doping requirement set by intrinsic carrier density" *J Comput Electrons*, vol. 20, pp. 274–279, January 2021.

17. Soumava Ghosh, Harshvardhan Kumar, **Bratati Mukhopadhyay** and Guo-En Chang, "Design and Modeling of High-Performance DBR-Based Resonant-Cavity-Enhanced GeSn Photodetector for Fiber-Optic Telecommunication Networks" *IEEE Sensors J*., vol. 21, pp. 9900-9908, April 2021

18. Soumava Ghosh, Anirban Bhattacharyya, Gopa Sen and **Bratati Mukhopadhyay**, "Optimization of diferent structural parameters of GeSn/SiGeSn Quantum Well Infrared Photodetectors (QWIPs) for low dark current and high responsivity" , *J Comput Electrons*, vol. 20, pp. 1224-1233, March 2021.

19. **Bratati Mukhopadhyay**, Shyamal Mukhopadhyay, and Prasanta Kumar Basu, "Limitations of Drude model in determining plasma properties for multivalley semiconductors: a case study with Ge1-xSnx alloy", *Journal of Nanophotonics*, vol.16, pp. 026004, May 2022.

20. Namrata Shaw and **Bratati Mukhopadhyay**, "Ge and $Ge_{1-z}Sn_z$ Based Gate-Underlap Dual Material Double Gate Tunnel Field Effect Transistor: Modeling, Optimization and its Application to Biosensors",*Physica Status Solidi (A)*, December 2022 https://doi.org/10.1002/pssa.202200587.

21. Namrata Shaw and **Bratati Mukhopadhyay**, "Modeling and Performance Analysis of a Split-Gate T-Shape Channel DM DPDG-TFET Label-Free Biosensor", *IEEE Sensor J.* vol. 23, no. 2, pp. 1206-1213, January 2023.

Conference Papers

1. Vedatrayee Chakraborty, Swagata Dey, , "A Comparative study on Front Illuminated Ge-GeSn-GeSn Hetero-Phototransistors on Si Substrate at 1.55 µm by Silvaco-TCAD Simulator", Proceedings of Information, Photonics & Communication (IPC '17), Kolkata, India, 15th-17th-May, 2017, pp. 105-112.

2. Soumava Ghosh, Swagata Dey, **Bratati Mukhopadhyay**, Gopa Sen "Study of High frequency performance in GeSn based QWIP", Proceedings in International Conference, CODEC 2019, Kolkata, India, 19th -20th December, 2019, pp. 448-452.

3. Shyamal Mukhopadhyay, **Bratati Mukhopadhyay**, Gopa Sen and P.K.Basu, " Calculation of Intrinsic Carrier Density of De1-xSnx Alloy, Its Temperature Dependence Around Room Temperature and Its Effect on Maximum Electron Mobility", Proceedings in International Conference, CODEC 2019, Kolkata, India, 19th -20th December, 2019, pp. 551-556.

4. Soumava Ghosh, **Bratati Mukhopadhyay**, gopa Sen and P.K.Basu, "Analysis of some important parameters of Si-Ge-Sn RCE-HPT exploiting QCSE and FKE", Published in 2020 URSI Regional Conference on Radio Science (URSI-RCRS), Varanasi, India, 12th-14th February, 2020

5. Shyamal Mukhopadhyay, **Bratati Mukhopadhyay**and P. K. Basu, "Change in Absorption Threshold in Heavily Doped Direct Band Gap $Ge1{-}xSnx$ due to Band Gap Narrowing and Burstein Moss Shift." XIV Annual Symposium, Optical Society of India: Frontiers in Optics and Photonics (FOP21), IIT Delhi, Sept 24-27, 2021.

6. Namrata Shaw and **Bratati Mukhopadhyay**, "Performance Assessment of a Dielectrically Modulated SiGe-Pocket DG TFET-based Biosensor," IEEE EDKCON, Kolkata, 978-1-6654-7205-0/22/$31.00 ©2022 IEEE, November 26-27, 2022.

7. Namrata Shaw and **Bratati Mukhopadhyay**, "Design and Performance Analysis of Step Channel Stack Oxide DG-TFET for Dielectrically Modulated Bio-sensing Applications," IEEE Kolkata Conference CALCON, Jadavpur University, Kolkata, December 10-11, 2022.

Invited Lectures			
Modelling GeSn Laser, **Indo Taiwan workshop on Group IV Photonics**			
Doctoral Students			
Name and Registration information	**Topic**	**Status**	**Co-guide**
Swagata Dey	Studies On Physical Processes Of Some Photonic Devices Based On Group IV Semiconductor Heterojunctions	Degree Awarded on 23.06.2022	Prof. P.K. Basu (Joint Supervisor)
Soumava Ghosh	To Study the Performance of Some Optoelectronic Devices Based on Group IV Semiconductor Materials and Alloys	Degree Awarded on 19.12.2022	NA
Namrata Shaw Registered on 16.12.2020	Modeling of TFET as biosensor	Documents submitted for Pre-Ph.D Seminar	NA
Shyamal Kumar Mukhopadhyay Registered on 22.03.2021	Study of Electronic Properties of Gr IV Group IV Alloy Semiconductor Structures and Devices	Pre-Ph.D Seminar completed	Supervisor: Prof. (Retired) P.K.Basu Jt. Supervisor: Dr. Bratati Mukhopadhyay
Jayabrata Goswami Registered on 07.08.2022	Modeling of TFET	Pursuing	NA
Major Achievement in Current Year			
Elected to the Grade of IEEE Senior Member from February 19, 2022.			

DR. ARPITA DAS

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Google Scholar:
Arpita Das - Google Scholar https://scholar.google.com › citations

Degrees obtained

- Ph. D., University of Calcutta, Dept. of Radio Physics and Electronics, 2012
- M.Tech. University of Calcutta, Dept. of Radio Physics and Electronics, 2006
- B.Tech., University of Calcutta, Dept. of Radio Physics and Electronics, 2004

Classes Taught

- EC 2.2.1 - Analog Electronics
- RP 4.1.6 - Graph Theory and Combinatorics
- RP5.1.10 - FPGA Laboratory
- ECHN4.1.7 - Microelectronics and VLSI Laboratory

Research Interests and Experience

- Biomedical Image and Signal Processing Techniques, Multimodal Data Analysis, Machine Learning Algorithms, Identification & Classification of Diseases, Design of Computer Aided Diagnosis Systems.
- FPGA based Hardware Prototyping for Digital Circuits and Systems, Embedded System Design for analyzing Biomedical Data.

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Member of Data Collection and Verification Committee and NAC
- Member of Board of Studies (BOS), Board of Post Graduate Studies (BPGS)
- Member of Ph.D. Admission Committee
- Member of M.Tech. Admission Committee
- Maintain AICTE Portal for Approval of Engineering Courses.

Publications (Books, Journals)

Books and Book Chapters

1. S. Banerjee, S. Roy, **A. Das** (2021), "Fusion-Based Multimodal Brain Tumor Detection Using Convolution Neural Network", Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering, Chapter-19, pp. 183-194, Springer, Singapore. [https://doi.org/10.1007/978-981-33-6915-3_19].

2. N. Sinha, **A. Das** (2021), "Robust Detection of Atrial Arrhythmias Using Sub-modules of Different Feature Predictors", Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering, Chapter-3, pp 17-28, Springer, Singapore. [https://doi.org/10.1007/978-981-33-6915-3_3].
3. D. Mukherjee, **A. Das** (2021), "Gabor Filter Based Automated Enhancement of Brain Tumors", Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering, Chapter-8, pp. 71-80, Springer, Singapore. [https://doi.org/10.1007/978-981-33-6915-3_8].
4. K. Das, **A. Das** (2021), "Segmentation of Brain Tumor Using Cluster Validity Index-Based Fuzzy C-Means Algorithm", Advances in Medical Physics and Healthcare Engineering. Lecture Notes in Bioengineering. Chapter-6, pp. 45-56, Springer, Singapore. [https://doi.org/10.1007/978-981-33-6915-3_6].
5. S. Mukherjee, **A. Das** (2021), "Relative Global Optimum-Based Measure for Fusion Technique in Shearlet Transform Domain for Prognosis of Alzheimer's Disease", In: Deshpande A., Estrela V.V., Razmjooy N. (eds) Computational Intelligence Methods for Super-Resolution in Image Processing Applications. Springer, Cham. Chapter-15, pp 279-291. [https://doi.org/10.1007/978-3-030-67921-7_15].
6. P. Das, **A.Das** (2021), "Automatic Detection and Classification of Enhanced Brain Tumor Using Machine Learning Algorithm", Computers and Devices for Communication, Lecture Notes in Network and Systems, Springer Nature Singapore, Chapter 6, Vol. 147, 2021. [doi: 10.1007/978-981-15-8366-7_6].
7. S. Mukherjee, **A. Das** (2021), "An Artificially Intelligent Fusion Approach for Prognosis of Alzheimer's Disease", Computers and Devices for Communication, Lecture Notes in Network and Systems, Springer Nature Singapore, Chapter 7, Vol. 147, 2021. [doi: 10.1007/978-981-15-8366-7_7].
8. S. Mukherjee, **A. Das** (2020)**,** "Effective Fusion Technique using FCM based Segmentation Approach to Analyze Alzheimer's Disease ", Smart Healthcare Analytics in IoT Enabled Environment, Intelligent Systems Reference Library, Chapter-6, Vol. 178, Springer Nature Switzerland AG, 2020. [ISBN 978-3-030-37550-8;E-ISBN: 978-3-030-37551-5; DOI: 10.1007/978-3-030-37551-5]
9. P. Das, R. Rajak, **A. Das** (2020), "Application of AI for Computer Aided Diagnosis System to Detect Brain Tumor", Chapter- 10, Handbook of Research on Disease Prediction Through Data Analytics and Machine Learning, IGI Global, pp. 185-204, October 2020. [ISBN13: 9781799827429; ISBN10: 1799827429 ; E-ISBN13: 9781799827436 ; DOI: 10.4018/978-1-7998-2742-9.ch010]
10. A. Chattaraj and **A. Das** (2018), "A Novel Kernel Based Fuzzy Clustering Approach to Identify Masses in Mammograms" Chapter-3, Expert System Techniques in Biomedical Science Practice, IGI Global, pp. 46-69, 2018. [ISBN13: 9781522551492 (print), E-ISBN13: 9781522551508]

Journal Papers

1. Mayukhmala Jana and **Arpita Das**, "Multimodal Medical Image Fusion using Two-Stage Decomposition Technique to Combine the Significant Features of Spatial Fuzzy Plane and Transformed Frequency Plane", *IEEE Transactions on Instrumentation and Measurement,* vol. 72, pp. 1-10, *2023*, Art no. 5005910[doi: 10.1109/TIM.2023.3240222]. (IF: 5.332)

2. Nabanita Sinha, Rajesh K. Tripathy and Arpita Das, “ECG beat Classification based on Discriminative Multilevel Feature Analysis and Deep Learning Approach”, *Biomedical Signal Processing and Control, Elsevier*, vol. 78, 103943, pp. 1-11, Sept. 2022. [https://doi.org/10.1016/j.bspc.2022.103943]. (IF: 5.076)

3. Nabanita Sinha and **Arpita Das**, “Detection of Obstructive Sleep Apnea using Non-Negative Matrix Factorization based Feature Extraction Approach in Eigen Spectrum Domain”, *IEEE Transactions on Instrumentation and Measurement,* vol. 71, pp. 1-9, 2022, Art no. 4002809 [doi: 10.1109/TIM.2022.3151167]. (IF: 5.332)

4. Nabanita Sinha and **Arpita Das**, “Identification and Localization of Myocardial Infarction based on Analysis of ECG Signal in Cross Spectral Domain using Boosted SVM classifier,” *IEEE Transactions on Instrumentation and Measurement,* vol. 70, pp. 1-9, 2021, Art no. 4007409[doi: 10.1109/TIM.2021.3117663]. (IF: 5.332)

5. Nabanita Sinha and **Arpita Das**, "Discrimination of Life-Threatening Arrhythmias using Singular Value, Harmonic Phase Distribution, and Dynamic Time Warping of ECG Signals," *IEEE Transactions on Instrumentation and Measurement*, vol. 70, pp. 1-8, 2021, Art no. 2504508, [doi: 10.1109/TIM.2020.3045190]. (IF: 5.332)

6. Nabanita Sinha and **Arpita Das**, “Automatic Diagnosis of Cardiac Arrhythmias based on Three Stage Feature Fusion and Classification Model using DWT”, *Biomedical Signal Processing and Control, Elsevier*, Vol. 62, 102066, 2020[https://doi.org/10.1016/j.bspc.2020.102066]. (IF: 5.076)

7. Suranjana Mukherjee and **Arpita Das**, “Vague Set Theory based Segmented Image Fusion Technique for Analysis of Anatomical and Functional Images”, *Expert Systems with Applications, Elsevier*, Vol. 159, 113592, 2020.
[https://doi.org/10.1016/j.eswa.2020.113592]. (IF: 8.665)

8. Poulomi Das and **Arpita Das**, “Shift Invariant Extrema based Feature Analysis Scheme to Discriminate the Spiculation Nature of Mammograms”, *ISA Transactions, Elsevier*, Vol. 103, pp. 156-165, 2020. [https://doi.org/10.1016/j.isatra.2020.03.018]. (IF: 5.911)

9. Poulomi Das and **Arpita Das**, “A Fast and Automated Segmentation Method for Detection of Masses using Folded Kernel based Fuzzy C-means Clustering Algorithm”, *Applied Soft Computing, Elsevier*, Vol. 85, 105775,2019[https://doi.org/10.1016/j.asoc.2019.105775]. (IF: 8.263)

10. **Arpita Das** and M. Bhattacharya, “Study on neurodegeneration at different stages using MR images: computational approach to registration process with optimisation techniques”, *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization*, Taylor & Francis, Vol. 5, No. 3, pp. 165-182, 2017.
[https://doi.org/10.1080/21681163.2015.1036308].

Conference papers

1. P. Das and **A. Das, “**Interlayer Textural Variabilities to Study the Benignancy/Malignancy of Brain Tumors using MR Modalities Images**”,** *2022 IEEE Kolkata Section (CALCON),* 10-11 Dec. 2022, pp. 1-6.

2. M. Jana, S. Basu and **A. Das**, "Fusion of Multimodal Images using Parametrically Optimized PCNN and DCT based Fourier Analysis," *2022 IEEE Delhi Section Conference (DELCON)*, 11-13 Feb. 2022, pp. 1-7, [doi: 10.1109/DELCON54057.2022.9753411].

3. M. Jana, S. Basu and **A. Das**, "NSCT-DCT based Fourier Analysis for Fusion of Multimodal Images," *2021 IEEE 8th Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON)*, 11-13 Nov. 2021, pp. 1-6. [doi: 10.1109/UPCON52273.2021.9667618].

4. N. Sinha and **A. Das**, "Analysis of ECG Signal based on Feature Fusion and Two-Fold Classification Approach," *IEEE2021 International Conference on Advances in Electrical, Computing, Communication and Sustainable Technologies (ICAECT)*, Bhilai, India, 19th-20th Feb. 2021, pp. 1-5. [doi: 10.1109/ICAECT49130.2021.9392515].

5. S. Mukherjee and **A. Das**, "Parametrically Optimized Pulse Coupled Neural Network for Analysis of Multimodal Medical Images," *IEEE 2021 International Conference on Advances in Electrical, Computing, Communication and Sustainable Technologies (ICAECT)*, Bhilai, India, 2021, pp. 1-6. [doi: 10.1109/ICAECT49130.2021.9392491].

6. P. Das and **A. Das**, "Adaptive Gabor Filtering using Grey Wolf Optimization for Enhancement of Brain MRI," *2020 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE)*, 26th-27th Dec. 2020, Bhubaneswar, India, pp. 356-359. [doi: 10.1109/WIECON-ECE52138.2020.9397926].

7. Chattaraj A, **Das A**, Bhattacharya M, "Mammographic Image Segmentation by Marker Controlled Watershed Algorithm", *IEEE Int. Conf. on Bioinformatics and Biomedicine (BIBM),* Kansas City, MO, USA, Nov.-13-16, 2017, IEEE Xplore, pp. 1000-1003. (doi: 10.1109/BIBM.2017.8217793)

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide**
Nabanita Sinha 01121/Ph.D.(Tech.)Proceed/2021 Dated 9th Feb., 2021	Detection of Cardiovascular Diseases using Machine Learning Algorithms	Pursuing	No
Poulomi Das 05486/Ph.D.(Tech.)Proceed/2020 Dated 16th December, 2020	Detection and Classification of Tumors using Machine Learning Algorithms	Pursuing	No
Suranjana Mukherhee 05475/Ph.D.(Tech.)/Proceed/2020 Dated 16th December, 2020	Fusion of Multimodal Images for Analysis of Diseases	Pursuing	No

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Professional Webpage: https://drsoumyapandit.in

Google Scholar/Any other: https://in.linkedin.com/in/spirpe

Degrees obtained:

- Ph.D. IIT Kharagpur, School of IT, 2009
- M.Tech, University of Calcutta, Radio Physics and Electronics, 2002
- M.Sc., University of Calcutta, Electronic Science, 2000

Classes Taught

- EC2.1.6 - Circuit and Network Laboratory
- EC2.2.1 - Analog Circuits
- EC2.2.6 - Analog Circuits Laboratory
- ECHN3.1.5 - Probability and Stochastic Process
- RP4.1.1 - Advanced Engineering Mathematics (Stochastics portion)
- RP4.1.7 - Algorithms for VLSI Design
- RP4.2.21 - Testing and Verification of VLSI Circuits
- RP4.2.22 -CAD Techniques Laboratory (IC Design)

Research Interests and Experience

- Intelligent Analog Circuit Design.
- Ultra-Low Power Design of Analog VLSI Circuits
- Statistical Modeling and Design for Manufacturability of ICs.
- Compact Modeling of Advanced Semiconductor Devices for VLSI Applications
- Data Analytics and Stochastics

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Co-ordinator 2 years Full time M.Tech VLSI Design and 3 years Part time M.Tech VLSI Design program of the University of Calcutta.
- Teacher –In Charge of IC Design Laboratory, a research and post-graduate level teaching laboratory. Duration: 10 years

- Teacher-In Charge (jointly) of Electronic Circuits Laboratory and Analog Circuits Simulation, under graduate level teaching laboratories. Duration: 8 years
- Joint teacher-incharge, VLSI Design Laboratory, Dept. of Radio Physics and Electronics, Duration; 4 months.
- Member of the Syllabus sub-committee responsible for up gradation of B.Tech syllabus in Electronics and Communication Engineering at the Institute of Radio Physics and Electronics, Duration 1 year
- Member of the Syllabus sub-committee responsible for upgradation of M.Tech VLSI Design syllabus. Duration 1 year
- Member of the Board of Studies in Electronics and Communication Engineering and Board of Post Graduate Studies in VLSI Design, Duration 13 years
- Coordinator of the 3rd Semester B.Tech course in Electronics and Communication Engineering. Duration: 5 years
- Member of Admission and Selection Committee for M. Tech students' admission.
- Member of the Board of Studies in Electronics and Communication Engineering, National Institute of Science and Technology, Berhampur, Autonomous College under Biju Pattanaik University of Technology, Odhisa.
- Session Chair, 5th International Conference on Opto-Electronics and Applied Optics (OPTRONIX-2019)
- Session Chair, Modeling and Simulation Track, 4th IEEE International Conference on Emerging Electronics (ICEE), 16-19 Dec, 2018
- Member of the Technical Program Committee, 31st International Conference on VLSI Design, 2018
- Member of the Technical Program Committee, 21st International Symposium on VLSI Design and Test, 2017, IIT Roorkee
- Member of the Technical Program Committee, 7th International Symposium on Embedded Computing and System Design, 2017, NIT Durgapur
- Ph.D. Forum Chair, 29th International Conference on VLSI Design, 2016
- Session Chair, International Conference, Microelectronics, Circuits and Systems (Micro-2014), International Conference, Microelectronics, Circuits and Systems (Micro-2014)
- Founded the IEEE ED Student Branch University of Calcutta (SBC28561A) in the capacity of chapter advisor
- Treasurer, IEEE EDS Calcutta Chapter 2012-2013
- Chair, IEEE EDS Calcutta Chapter, 2014-2015
- Members of the Regions and Chapter Committee, IEEE Electron Devices Society, USA, 2016-2017
- Vice Chair, SRC, Region-10, IEEE Electron Devices Society, USA, 2018- 2021
- Regional Editor, R-10 IEEE EDS Newsletter, 2021 onwards

Current Personal Projects		
Funding agency	**Topic and details**	**Funding and Duration**
Ministry of Electronics and Information Technology, Govt. of India	Special Manpower Development Program in VLSI Design, Chips to System Design. Project 1: Special Manpower Development Program, Chips to System Design, Project Titles: 1. FPGA Design of Digital Signal Processing for Seismic Applications (linked with the C2SD project of IIT Kharagpur), Project 2. Design and SPICE Simulation of Low Power Analog Front End (AFE), RF Low Noise Amplifier and Mixer Focusing on Seismic Applications towards ASIC Design	INR 88,98,449/- from 2015-2021

Publications (Books, Journals)

Books and Book Chapters

Last 5 years only, For details see https://drsoumyapandit.in

1. **S.Pandit**, Design Methodology for Ultra-Low-Power CMOS Analog Circuits for ELF-SLF ApplicationsIn: Dhiman, R., Chandel, R. (eds) Nanoscale VLSI. Energy Systems in Electrical Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-15-7937-0_204 October 2020
2. **S.Pandit**, Characterization of Stochastic Process Variability Effects on Nano-Scale Analog Circuits, Dhiman, R. (Ed.). (2022). Nanoelectronics for Next-Generation Integrated Circuits (1st ed.). CRC Press. https://doi.org/10.1201/9781003155751
3. S.K.Maity and **S.Pandit**, 'UTB III-V-OI-Si MOS Transistor: the future transistor for VLSI Design', VLSI and Post-CMOS Electronics. Volume 2: Devices, circuits and interconnects,2019 Edited by Rohit Dhiman, Rajeevan Chandel, IET, UK
4. S.Das, D.Das and **S.Pandit**, 'Reliability Aware Global Routing of Graphene Nanoribbon Based Interconnect', Proceedings of 26th International Symposium on VLSI Design and Test , Part of the Communications in Computer and Information Science book series (CCIS,volume 1687)
5. S. Upadhyay, T. Sau, S. Mitra, A. Bhowmik, S. Sarkhel and **S. Pandit**, "Statistical Analysis of a Low Power Analog Current Source," 2022 IEEE VLSI Device Circuit and System (VLSI DCS), Kolkata, India, 2022, pp. 160-164, https://doi/10.1109/VLSIDCS53788.2022.9811473 .

Journal Papers (Last 5 years)

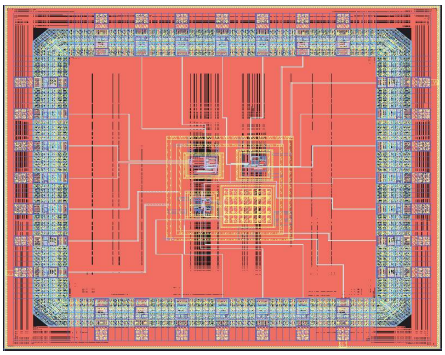
1. S. K. Maity, P. Dutta and **S. Pandit**, Compact drain current modeling of planar InGaAs quantum well MOSFET, Micro and Nanostructures, Volume 169, 2022, 207361, pages 1-14, ISSN 2773-0123, https://doi.org/10.1016/j.micrna.2022.207361. Impact Factor = 3.22
2. S.K.Maity and **S.Pandit**, 'Device-circuit analysis of ultra-thin body In1−xGaxAs on insulator MOS transistor with varying indium mole fraction and channel thickness', Engineering Research Express, IoP Science 4 (2022) 025024 https://doi.org/10.1088/2631-8695/ac6ecc Impact Factor = 1.205
3. Koyel Mukherjee, Trisha Sau, Sneha Upadhyay, Susmita Mitra, Arpita Bhowmik, Saheli Sarkhel, **Soumya Pandit**, Rajat Kumar Pal, A 588 nW, 1 nA current reference circuit with extremely low (0.002%/V) line sensitivity over a wide supply voltage range and low temperature coefficient, International Journal of Numerical Modeling: Electronic Networks, Devices and Field, John Willey and Sons, Volume 35, Issue 4 July/August 2022 e2999, https://doi.org/10.1002/jnm.2999, Impact Factor = 1.054
4. Subir Kumar Maity, **Soumya Pandit**, A SPICE compatible physics-based intrinsic charge and capacitance model of InAs-OI-Si MOS transistor, Superlattices and Microstructures, Volume 156, 2021, 106975, ISSN 0749-6036, https://doi.org/10.1016/j.spmi.2021.106975. Impact Factor = 2.658
5. S. Sengupta, **S. Pandit**, A Unified Model of Drain Current Local Variability due to Channel Length Fluctuation for an n-channel EδDC MOS Transistor. Springer, Silicon 14, 4979–4989 (2022). https://doi.org/10.1007/s12633-021-01218-w. Impact Factor = 2.941
6. S. K. Maity, A. Haque and **S. Pandit**, "Charge-Based Compact Drain Current Modeling of InAs-OI-Si MOSFET Including Subband Energies and Band Nonparabolicity," in IEEE Transactions on Electron Devices, vol. 67, no. 6, pp. 2282-2289, June 2020, https://doi.org/10.1109/TED.2020.2984578. Impact Factor = 3.222
7. S.K.Maity, **S. Pandit**, 'Performance Assessment of CMOS circuits using III-V on Insulator MOS Transistors'. Springer, Silicon 13, 1939–1949 (2021). https://doi.org/10.1007/s12633-020-00582-3, Impact Factor = 2.941
8. S.Das, D.Das and **S.Pandit**, 'A Global Routing Method for Graphene Nanoribbons Based Circuits and Interconnects', ACM Journal on Emerging Technologies in Computing Systems Volume 16 Issue 3 Article No.: 31, July 2020 pp 1–28 https://doi.org/10.1145/3384214. Impact Factor = 1.420
9. S.K.Maity and **S.Pandit**. 'Analysis of scaling of thickness of the buffer layer on analog/RF and circuit performance of InAs-OI-Si MOSFET using NQS model', International Journal of Numerical Modeling: Electronic Networks, Devices and Field, John Willey and Sons, Volume33, Issue1 January/February 2020, e2664, 31 July 2019 https://doi.org/10.1002/jnm.2664, Impact Factor = 1.054

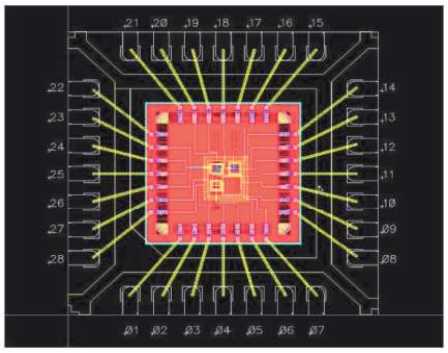
Doctoral Students			
Name and Registration information	**Topic**	**Status**	**Co-guide**
Koyel Mukherjee	Low Voltage Analog IC Design	Enrolled	Nil
Subrata Das	Studies on Physical Design of VLSI Circuits based on Graphene Nanoribbon	Registered	Prof. Debesh Kumar Das
Subir Kumar Maity	Studies of Device and Circuit Performance Of III-V-OI-Si MOS Transistors	Thesis Submitted	Nil
Sarmista Sengupta	Study Of Process Variability Effects On EδDC MOs Transistor For Low Power VLSI Applications.	Awarded	Nil

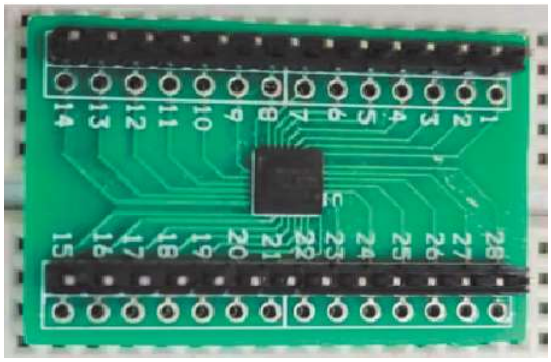
Major Achievement in Current Year

Description

Under the SMDP-C2SD Project, the researchers have designed and taped out an ASIC EDU095 using 180nm CMOS Technology of SCL. This chip is the interface electronics for Differential Inductive Seismic Sensor.







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Google Scholar:
https://scholar.google.com/citations?user=AvkQ3HUAAAAJ

Degrees obtained:

- Ph. D. in Electrical Engineering, Boston University (USA)
- M. Tech. in Materials Science, IIT Kanpur
- M. Sc. In Electronic Science, Calcutta University

Classes Taught

- ECHN 2.1.5 - Materials and Physical Electronics (shared)
- ECEL 4.1.1.2 - Microelectromechanical Systems
- ECEL 4.1.5.3/RP 5.1.9 - MEMS laboratory
- EST 103 - Physics of Electronic Materials (Electronic Science)
- RP 4.2.14 - Nanostructures and Nanomaterials
- RP 5.1.8 - Microelectronics Laboratory

Research Interests and Experience

- Semiconductor Materials Growth by Molecular Beam Epitaxy
- Opto-electronic Device Development
- Oxide Semiconductors, Nanomaterials, Microelectromechanical Systems, Microfluidics, System Development

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Associate Faculty, Center for Research in Nanoscience and Nanotechnology (CRNN), University of Calcutta
- Member, Ph D. committee, CRNN-CU
- PI, Project funded by DIT, GOI

Current Personal Projects

Funding agency	Topic	Funding and Duration
West Bengal Department of Science, Technology and Biotechnology (WB-DSTBT),	Water purification based on Ultraviolet Light Emitting Diodes monitored in real time using microfluidic components and an IOT cloud-based monitoring	2019 till date, Allocation 17,00,000 INR

Funding agency	Topic	Funding and Duration
Office of the Principal Scientific Advisor to the Govt. of India	Development of III-Nitride White and Ultraviolet LED Technology For Green Energy & Societal impact	2017 to 2020. Allocation: 3,00,00,000 INR
Department of Science and Technology under the BRICS Program.	New principles and fabrication technologies of extreme 2D and 0D AlGaInN nanoheterostructures for high efficiency mid- and deep-ultraviolet spontaneous and laser emitters	40,00,000 INR
Science and Engineering Research Board	Development of Ultraviolet PIN photodetectors by Molecular Beam Epitaxy for Solar Blind Focal Plane Arrays	63,91,763 INR

Publications (Books, Journals)

Journal Papers

1. Deep-UV wavelength-selective photo-detectors based on lateral transport in AlGaN/AlN quantum well and dot-in-well structures", Pallabi Pramanik, Sayantani Sen, Chirantan Singha, **A. Bhattacharyya**, Lin Zhou and David J. Smith, AIP Advances, 11, 085109 (2021)
2. "Compositional Inhomogeneity in AlGaN Multiple Quantum Wells Grown by Molecular Beam Epitaxy: Effect on Ultraviolet Light-Emitting Diodes", Sayantani Sen, Pushan Guha Roy, Chirantan Singha, Anirban Saha, Alakananda Das, Pallabi Pramanik, Susanta Sen, **Anirban Bhattacharyya**, Journal of Electronic Materials, 50, 3447, (2021)
3. "Determining the Composition of 100 Nano-Liter Fuel Mixture in a Silicon Micro-Cuvette Using Ultraviolet Absorption Spectroscopy," A. Das, S. K. Mitra and **A. Bhattacharyya** Journal of Microelectromechanical Systems, 30, 315, (2021)
4. "GaN/AlN Multiple Quantum Wells grown by Molecular Beam Epitaxy: Effect of growth kinetics on radiative recombination efficiency", Chirantan Singha, Sayantani Sen, Alakananda Das, Anirban Saha, Pallabi Pramanik, Sudipta Bera, Rupa Mukhopadhyay, **Anirban Bhattacharyya**, Thin Solid Films, 701, 138216 (2020)
5. "Design and implementation of water purification system based on deep ultraviolet light emitting diodes and a multi-pass geometry reactor", Pallabi Pramanik; Shaswati Das; Arghya Adhikary; Chirasree Roy Chaudhuri; **Anirban Bhattacharyya**, Journal of Water and Health, 18, 306 (2020)
6. "Monitoring the growth of III-nitride materials by plasma assisted molecular beam epitaxy employing diffuse scattering of RHEED", S. Sen, S. Paul, C. Singha, A. Saha, A. Das, P. Guha Roy, P. Pramanik, **A. Bhattacharyya**, Journal of Vacuum Science and Technology (B), 38, 014007 (2019)
7. "AlGaN multiple quantum wells by PA-MBE for deep UV emission: Effect of growth interruptions", S Sen, C Singha, A Saha, A Das, PG Roy, P Pramanik, **A Bhattacharyya**, Journal of Crystal Growth, 523, 125159 (2019)

8. "Long-range Solid-state Electron Transport through Ferritin Multilayers", Sudipta Bera, Jayeeta Kolay, Pallabi Pramanik, **Anirban Bhattacharyya** and Rupa Mukhopadhyay, Journal of Materials Chemistry C,7, 2019, 9038
9. "Development of silicon microneedle arrays with spontaneously generated micro-cavity ring for transdermal drug delivery", Alakananda Das, Chirantan Singha and **Anirban Bhattacharyya**, Microelectronics Engineering, 210, 14 (2019).
10. "A simple method to overcome the limitation of hybrid monochromator in the identification of peaks in the HRXRD pattern of $Al_{0.4}Ga_{0.6}N$ /$Al_{0.6}Ga_{0.4}N$ multi quantum wells", T. K. Sharma, R Kumar, AK Sinha, Pallabi Pramanik, Sayantani Sen, **A Bhattacharyya**, Materials Science and Engineering: B, Vol 240, 92-96 (2019)
11. "Determining the polarity of droplet epitaxy grown AlGaN nanorods using piezoresponse force microscopy", S Parida, G Mangamma, C Singha, **A Bhattacharyya**, S Dhara, Nano-Structures & Nano-Objects 20, 100398, (2019)
12. "Mg and Al doped ZnO thin film: Photo-induced "oxygen breathing" under UV illumination", Arpita Das, Pushan Guha Roy, Sayantani Sen, **Anirban Bhattacharyya**, Thin Solid Films, Vol 662, 54-59, (2018
13. "Bioelectronics at graphene–biofilm interface: Schottky junction formation and capacitive transitions", Sanhita Ray, Sayantani Sen, Alakananda Das, Anirban Bose, **Anirban Bhattacharyya**, Avishek Das, Sanatan Chattopadhyay, Shib Shankar Singha, Achintya Singha, Hirak K Patra, Anjan Kr Dasgupta, Medical Devices & Sensors, Volume 1, Issue 3 (2018)
14. "Growth of AlGaN alloys under excess group III conditions: Formation of vertical nanorods" Chirantan Singha Sayantani Sen, Pallabi Pramanik, Mainak Palit, Alakananda Das, Abhra Shankar Roy, Susanta Sen, **Anirban Bhattacharyya**, J. Crystal Growth, 281, 40-47, (2018)
15. 'Selective deposition of ZnO nanowires on silicon micro-pyramidal arrays', A Das, PG Roy, C Singha, **A Bhattacharyya**, Materials Science in Semiconductor Processing 71, 352-356 (2017)
16. "Surface optical phonon modes in hexagonal shaped Al0. 97Ga0. 03N nanostructures" AK Sivadasan, Chirantan Singha, KG Raghavendra, S Amirthapandian, **A Bhattacharyya**, Arup Dasgupta, Sandip Dhara, Applied Physics (A), 123, 527 (2017)
17. "Compositional inhomogeneities in AlGaN thin films grown by molecular beam epitaxy: Effect on MSM UV photodetectors", Pallabi Pramanik, Sayantani Sen, Chirantan Singha, Abhra Shankar Roy, Alakananda Das, Susanta Sen and **A. Bhattacharyya**, J. Appl. Phys. 120, 144502 (2016), Impact Factor 2.06, ISSN 0021-8979
18. "Mg and Al co-doping of ZnO thin films: Effect on ultraviolet photoconductivity" Arpita Das, Pushan Guha Roy, Amartya Dutta, Sayantani Sen, Pallabi Pramanik, Diptasikha Das, Aritra Banerjee, **Anirban Bhattacharyya**, Materials Science in Semiconductor Processing, 54, 36 (2016), Impact Factor 2.35, ISSN 1369-8001
19. "Correlation between defect and magnetism of low energy Ar+ 9 implanted and un-implanted Zn 0.95 Mn 0.05 O thin films suitable for electronic application", SK Neogi, N Midya, P Pramanik, A Banerjee, **A Bhattacharyya**, GS Taki, JBM Krishna, S Bandyopadhyay, Journal of Magnetism and Magnetic Materials, 408, 217 (2016). Impact factor 2.60

20. "Wavelength-Specific Ultraviolet Photo-detectors based on AlGaN Multiple Quantum Wells" Pallabi Pramanik, Sayantani Sen, Chirantan Singha, Abhra Shankar Roy, Alakananda Das, Susanta Sen, D. V. Sridhara Rao, **Anirban Bhattacharyya**, IEEE Journal of Quantum Electronics 53(3), 1-6, (2016), Impact factor 1.88

21. "Controlling the compositional inhomogeneities in $Al_xGa_{1-x}N/Al_yGa_{1-y}N$ MQWs grown by PA-MBE: Effect on luminescence properties", Pallabi Pramanik, Sayantani Sen, Chirantan Singha, Abhra Shankar Roy, Alakananda Das, Susanta Sen, Deepak Kumar, D. V. Sridhara Rao, **Anirban Bhattacharyya**, Journal of Crystal Growth 439, 60–65, (2016), Impact factor 1.75, ISSN 0022-0248

22. "Anomalous red emission with competition and coexistence of defect and band edge emission in photo-electrochemically active (Zn 0.97 Ga 0.03) (O 0.95 N 0.05) solid solution", Sumithra Sivadas Menon, Sayantani Sen, Pallabi Pramanik, **Anirban Bhattacharyya**, Bhavana Gupta, Brajesh Tiwari, K Baskar, Shubra Singh, RSC Advances, 6 (103081-103087), 2016

23. "Interface phonon modes in the [AlN/GaN]20 and $[Al_{0.35}Ga_{0.65}N/Al_{0.55}Ga_{0.45}N]20$ 2D multi quantum well structure", A. K. Sivadasan, Chirantan Singha, Anirban **Bhattacharyya** and Sandip Dhara Phys. Chem. Chem. Phys., 18, 29864 (2016),

Invited Lectures

1. "Controlling alloy phenomenon in AlGaN grown by Molecular Beam Epitaxy: Effect on ultraviolet light-emitting diodes" **IWPSD (International Workshop on Physics of Semiconductor Devices)** 14th December 2021, **Organized by SSPL/IITD**

2. "Alloy Fluctuations in AlGaN alloys: Causes and Effects", **32nd ANNUAL GENERAL MEETING OF MRSI & 3rd INDIAN MATERIALS CONCLAVE,** 20-23 December, 2021, **organized by the Indian Institute of Technology (IIT) Madras**

3. "Ultraviolet Light Emitting Diodes: Our Path towards Pure Water for All", **International Conference on Current Trends in Materials Science and Engineering 2019 (CTMSE 2019) organized by IEM Kolkata/ S. N. Bose Center for Basic Sciences**

4. "Ultraviolet emitters and detectors grown by Molecular Beam Epitaxy", Recent trends in Condensed Matter Physics" **RTCMP (2020), organized by Indian Association for the cultivation of science (IACS), Jadavpur, Kolkata**

5. "Deep UV emission from AlGaN MQWs grown by MBE: Effect of growth kinetics", **Intl' Conf. On Emerging Electronics (ICEE) December, 17-19, 2018 in Bangalore, organized by IISc and IEEE EDS.**

6. "AlGaN MQWs grown by Plasma Assisted Molecular Beam Epitaxy for Deep UV Emission", **International Workshop on Crystalline Materials and Applications (IWCMA-2019)" Crystal Growth Centre, Anna University, Chennai.** 03rd - 05th January 2019.

7. "Growth of III-Nitride materials on to A-plane Sapphire", **International Workshop on Physics of Semiconductor Devices, (IWPSD 2017)**

8. Tutorial talk on Gallium Nitride, **3rd International Conference on Emerging Electronics (ICEE), at IIT Bombay, Mumbai,** 2016

9. "AlGaN Alloys by plasma assisted molecular beam epitaxy: A new growth model", **Materials Research Society of India (MRSI) Symposium "Advanced Materials For Sustainable Applications" & 27thAnnual General Meeting of MRSI- held at CSIR North East Institute of Science & Technology, Jorhat,** 18-21 February, 2016 **(MRSI Medal Lecture)**

10. "Ultraviolet Photodetectors based on AlGaN alloys grown by Molecular Beam Epitaxy", **National Conference on Semiconductor Materials and Devices, IIT Jodhpur**, 2016

Doctoral Students

Name	Topic	Status	Co-guide
Pallabi Pramanik	Ultraviolet Detectors	Awarded	
Sayantani Sen	Ultraviolet Emitters	Awarded	
Chirantan Singha	III-Nitride Nanostructures	Awarded	
Alakananda Das	MEMS and Microfluidics	Awarded	Susanta Mitra (York Univ, Canada)
Arpita Das	Oxide Semiconductors	Submitted	
Anirban Saha	III-Nitride materials	Ongoing	
Pushan Guha Roy	III-Nitride Devices	Ongoing	
Suchismita Pal	MEMS and Microfluidics	Ongoing	

Major Achievement in Current Year

- Development of Ultraviolet Light Emitting Diodes
- Development of Ultraviolet Wavelength-selective photodetectors
- Development of III-Nitride Vertical Nanorod cluster structures with embedded quantum wells and dots
- Development of silicon microneedles for drug delivery
- Development of water purification systems based on UV-LEDs

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Degrees obtained

- Ph. D, Jadavpur University, 2013
- ME, Jadavpur University, 2009
- B.Tech., Haldia Institute of Technology, 2007

Classes Taught

- EC3.2.1 - Computer Networking
- EC3.2.7 - Digital Signal Processing Laboratory
- ECOE2.1.4.3 - Artificial Intelligence and machine Learning
- ECOE 3.1.9.1 - Advanced Programming Language Laboratory
- RP 4.1.1 - Advanced Engineering Mathematics
- RP3.1.20 - Artificial Intelligence and Robotics
- RP2.1.12 - Computer Network Experiments
- RP2.1.17 - Computer Networking

Research Interests and Experience

- **Brain- Computer Interface (BCI), Application of Machine Learning in Medical field.**

  My recent work on Brain- Computer Interface is focused on stress/load recognition of human brain using EEG signal, measurement of addiction level of smokers using their EEG signals and other bio-potential signals, development of EEG and EMG induced Robotic Physiotherapy system for knee rehabilitation, EEG sensor driven assistive device for elbow and finger rehabilitation using Deep learning, IQ level assessment technique using EEG topographic maps.

- **Bio- Medical Engineering, Medical image processing.**

Administrative Duties / Achievements/ Completed Projects/ Other Details

1. **Completed Project:** "Providing limbic support to a partially paralytic person by generating movement to his/her paralytic hand by imitating the gesture of the other healthy hand and also develop "Sensation of touch" to it" of **3226000 (Thirty-two Lacs twenty-six thousands),** funded by **Science and Engineering Research Board (**SERB), Government of India in the duration of 31st March 2018 to 30th March 2021
2. **Administrative Duties:**
    - Member of AICTE Portal Management committee in University of Calcutta.
    - Serving as a Data Verification Team Member in RPE Department.
    - Coordinator of 7th and 8th Semester.

Publications

Book Chapters

1. "Detecting Different Emotional States of Human Brain Using Bio-potential Signals," by Prithwijit Mukherjee and **Anisha Halder Roy**, in CODEC- Springer, Kolkata, India, pp. 94-101,2019.
2. "A Novel Handoff Algorithm for 5G," by Prithwijit Mukherjee, **Anisha Halder Roy**, and Sanchita Ghosh in CODEC- Springer, Kolkata, India, pp. 169-175,2019.

Journal Papers

1. SayanSaha Roy, Shraban Roy, Prithwijit Mukherjee and **Anisha Halder Roy**, "An Automated Liver Tumour Segmentation and Classification Model by Deep Learning Based Approaches" in Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization, Taylor and Francis, https://doi.org/10.1080/21681163.2022.2099300, 2022.
2. Saurav Mandal, **Anisha Halder Roy**, Pulak Mondal, "Automated detection of fibrillations and flutters based on fused feature set and ANFIS classifier", in Biomed. Signal Process. Control, Elsevier, Vol. 69, no.102834, 2021
3. Saurav Mandal, Pulak Mondal, **Anisha Halder Roy**, "Detection of Ventricular Arrhythmia by using Heart rate variability signal and ECG beat image", in Biomed. Signal Process. Control, Elsevier, Vol. 68, no. 102692, 2021.

Conference Papers

1. "Detection of Cardiac Arrhythmia based on feature fusion and Machine Learning algorithms," by Saurav Mandal, **Anisha Halder Roy**, and Pulak Mondal, in CONIT-IEEE, Karnataka, India, June,2021.

2. "Design of a Computationally Economical Image Classifier using Generic Features," by Rohan Basu Roy, **Anisha Halder Roy**, Amit Konar and Atulya K. Nagar, in CEC-IEEE, New Zealand, June,2019.

3. "Detection of Stress in Human Brain," by Prithwijit Mukherjee, and **Anisha Halder Roy**, in ICACCP-IEEE, Sikkim, February, 2019.

Doctoral Students

Name	**Topic**	**Status**	**Co-guide**
Prithwijit Mukherjee	Analysing Different Bio-potential Signals and Applying Them in Human-Machine interaction (HMI)	Registered	No
Sudipta Paul	Gesture driven Human-Computer Interaction using Kinect Sensor	Registered	No
Saurav Mandal	VLSI implementation of machine learning based diagnosis system	Registered	Dr. Pulak Mondal

DR. SUCHISMITA TEWARI

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Degrees obtained:

- Ph.D. (Tech.), Institute of Radio Physics and Electronics, 2017
- M.Tech. Institute of Radio Physics and Electronics, University of Calcutta; 2011
- B.Tech. Institute of Radio Physics and Electronics, University of Calcutta;2008
- B.Sc. (Physics Honours), University of Calcutta; 2005

Classes Taught

- RP 4.2.13 - Nanoelectronics Devices (M.Tech.)
- RP 4.2.11 - Microelectronics Technology (M.Tech.)
- RP 4.2.22 - CAD Techniques (TCAD and IC Design) (M.Tech.)
- RP5.2.1 - Compulsory Project Work (M.Tech.)
- EC3.1.1 - Digital System Design (B.Tech.)
- ECHN4.1.3 - Microelectronics and VLSI (B.Tech.)
- EC3.1.6 - Digital System Design Laboratory (B.Tech.)
- RP4.2.2 - Project Work & Dissertation (B.Tech.)

Research Interests and Experience

- Semiconductor Physics;
- Semiconductor devices (both classical and novel)

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Co-ordinator of M.Tech. RPE 2nd. semester
- Member of Data collection, verification and compilation committee
- Served as one of themembers of the board of moderators for M.Tech. 2nd. Semester (RPE) examination
- Performed examination duties (question paper setting, evaluation of answer scripts, invigilation duties)
- Served as joint Secretary in CODEC 2019
- Selected as one of the members of the registration committee for CODEC 2023

Publications (Books, Journals)			
Books and Book Chapters			
Gayen S., **Tewari S**., Chattopadhyay A. (2021) Impact of Channel Epilayer Induced Corner-Effect on the Sensing Performance of a Unique PTFET-Based Biosensor (Epi-PTFET-Biosensor). In: Biswas A., Saxena R., De D. (eds) Microelectronics, Circuits and Systems. Lecture Notes in Electrical Engineering, vol 755. Springer, Singapore. https://doi.org/10.1007/978-981-16-1570-2_8, **Print ISBN**978-981-16-1569-6, **Online ISBN**978-981-16-1570-2			
Journal Papers			
1. S. Ghosh, **Suchismita Tewari**, Abhijit Biswas, Amlan Chakrabarty, "*High-Performance pH Sensors Using Ion Sensitive InGaAs-Channel MOSFETs at Sub-100 nm Technology Node,*" Journal of Electronic Materials, online 2021, DOI 10.1007/s11664-020-08630-9ISSN: 0361-5235			
2. S. Gayen, **S. Tewari**, and A, Chattopadhyay, "Role of Corner-Effect and Channel Epilayer Thickness on the Performance of a Unique pTFET-Based Biosensor (epiCOR-pTFET-Biosensor) Device in Sub-100-nm Gate Length," IEEE Transactions on Nanotechnology vol. 20, pp. 678-686, 2021, Print ISSN: 1536-125X, Electronic ISSN: 1941-0085			
Doctoral Students			
Name and Registration information	**Topic**	**Status**	**Co-guide**
Suman Das [Registration no: 00117/Ph.D.(Tech.Proceed/2019)]	TFET for LP Applications	Pursuing	Joint-supervisor
Sanu Gayen [Registration no: 07067/Ph.D.(Tech.Proceed/2021)]	Bio-sensor	Pursuing	Supervisor

MRS. SHAMPA GUIN

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Email Address (Secondary): sgrpe@caluniv.ac.in
Phone Number: 9477144319
Google Scholar:
https://scholar.google.com/citations?user=hUhCU_QAAAAJ&hl=en

Degrees obtained:

- M.Tech in Radio Physics and Electronics (specialization: Photonics), Institute of Radio Physics and Electronics, University of Calcutta, 2013
- B.Tech in Radio Physics and Electronics, Institute of Radio Physics and Electronics, University of Calcutta, 2011
- B.Sc (Physics Hons), Visva Bharati University, 2008

Classes Taught

- EC2.1.2 - Circuit and Network Theory (2019-till date)
- ECEL4.1.2.1- Optoelectronic Devices and Fiber Optics (2020-till date)
- ECEL4 1.1.1 - Instrumentation and Power Electronics (2017-till date)
- EC3.1.8 - Electronic Devices Laboratory (2016-till date)
- ECEL4.1.6.1 - Optoelectronic Devices and Fiber Optics Laboratory (2018-till date)
- ECP4.2.2 - B.Tech project (group of two students)(since 2017)
- RP 4.2.15 - Photonic Devices (2017-till date)
- RP 4.2.16 - Guided Wave Photonics (2017-till date)
- RP 5.1.6 - Measurements and Simulations of Photonic Devices and Systems(2017-till date)
- M.Tech project (one student)

Research Interests and Experience

- Topic: Photonic Device with nanostructure
  Visiting Researcher in the Department of Electronic and Electrical Engineering at the University of Sheffield (UK) under the UK-India Education and Research Initiative (UKIERI) sponsored by the British Council during 1st June 2014- 8th August 2014 and 13th February 2015- 8th March 2015. Visited the *Semiconductor Materials and Devices Group* of Prof. R. A. Hogg and received extensive training on the fabrication of certain types of opto-electronic device in the clean rooms such as photolithography, etching, vapour deposition, passivation etc. and also instructed in opto-electronic test measurements such as gold wire bonding, electroluminescence, and temperature measurement and has gained proficiency in both.
- Topic: Si Photonics, Photonic Integrated Circuit

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Course Coordinator of 3rd semester ECE, Institute of Radio Physics and Electronics
- Chairman, IEEE Photonics Society Kolkata Chapter (2022-present)

- Member of data collection and verification committee, Institute of Radio Physics and Electronics
- Secretary, IEEE Photonics Society Kolkata Chapter (2019-2021)
- Treasurer, IEEE Photonics Society Kolkata Chapter (2017-2018)

Publications (Books, Journals)

Books and Book Chapters

1. Shreerupa Biswas, S. Guin and N.R. Das, " Photonic Crystal for Gas Sensing Application" U. Biswas et al. (Eds.), Lecture Notes in Networks and Systems, Springer Nature Singapore Pte. Ltd., pp.449-467, 2019.
2. Shampa Guin and Nikhil Ranjan Das, "Photon Density Distribution in Quantum Dot based Light Emitting", N. R. Das et al. (Eds.) DOI 10.1007/978-981-15-8366-7, 2367-3370, Lecture Notes in Networks and Systems Springer Nature Singapore Pvt., 2021.

Journal Papers

1. Shampa Guin, Nikhil Ranjan Das, "Modeling power and linewidth of quantum dot superluminescent light emitting diode", Journal of Applied Physics, 128, 083102, 2020.
2. Shampa Guin, Nikhil Ranjan Das, "Enhancement of optical gain in quantum dot ensemble with electric field", Superlattices and Microstructures 125, pp 151–158, 2019.

Conference Papers

1. Shampa Guin, N. R. Das, 'Gain and Linewidth Enhancement in Quantum Dots with External Electric Field", NUSOD 2017, Denmark Technical University, Copenhagen.
2. Shampa Guin, N. R. Das, "Electric Field Aided Optical Gain in Semiconductor Quantum Dots, ICCSS 2017,University of Greenwich, London, United Kingdom.
3. Sonali Basak, S. Guin and N.R. Das, "Electrical Tuning of Band Gap in Photonic Crystal", 1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), Asansol Engg. College, India.
4. Shreerupa Biswas, S. Guin and N.R. Das, " Photonic Crystal for Gas Sensing Application",1st International Conference on Emerging Trends in Engineering and Science (ETES-2018), Asansol Engg. College, India.

Invited Lectures

1. "Superluminescent Light Emitting Diode: Prospect for sub-cellular imaging", invited by Supreme Knowledge Foundation group of Institution, Mankundu, Hoogly, India and IEEE Photonics Society Kolkata Chapter in Workshop on "Photonics as Future of Technology 2019".
2. "Optical source for sub-cellular Imaging" invited by IEEE Photonics Society Kolkata Chapter in Workshop on "Women in Photonics 2018", at Institute of Radio Physics and Electronics, University of Calcutta, Kolkata, India.

Major Achievement in Current Year

1. "Topper" in NPTEL examination on Fiber Optics by IIT Roorkie and Swayam, 2020.
2. IEEE Photonics Society Kolkata Chapter received "Most Improved Chapter Award", 2020.

MR. SOUVIK MAJUMDER

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Degrees obtained

- M.Tech in RPE, CU, 2013
- B.Tech in RPE, CU, 2011
- B.Sc, Hons. In Physics, CU, 2008

Classes Taught

- ECEL2.2.4.1 - Communication Principles &Techniques
- ECEL2.2.7.1 - Analog Communication Laboratory
- ECEL3.2.4.1 - Microwave and Navigational Electronics
- ECOE2.1.4.3 - Numerical Analysis
- EC2.1.8 - Electronics Workshop
- RP 4.2.6 - Space-borne &Terrestrial Remote Sensing
- RP5.1.5 - Measurements on Remote sensing Communication and GPS based Instrumentation

Research Interests and Experience

- Atmospheric Physics, Weather, Precipitation
- GPS and Navigation, GPS Meteorology.

Publications

Journal Papers

1. **Souvik Majumder**, Saurabh Das and Animesh Maitra, "Study of tropospheric delay over Indian region from MODIS, NCEP/NCAR data and ground based water vapor measurements at Kolkata", Advances in Space Research, 56(6), 1115–1124, 2015.
2. Saurabh Das, **Souvik Majumder**, Rohit Chakraborty and Animesh Maitra,"A Simplistic Approach for Water Vapor Sensing Using a Stand Alone GPS Receiver", IET Radar, Sonar & Navigation, 8 (8), 845-852, 2014. (SCI Impact Factor: 2.51)

Conference Papers

1. **Souvik Majumder**, Pallabi Saha, Animesh Maitra, "Water Vapor Sensing using Ground-Based Dual Frequency GPS Measurement Over a Tropical Location", 7th International Conference on Computers and Devices for Communication (CODEC) 2019, at Kolkata.

2. Pallabi Saha, **Souvik Majumder** and Animesh Maitra, “Rain Drop Size Distribution at a Tropical Location near Land - Sea Boundary”, URSI AP-RASC 2019, New Delhi, India, 09 - 15 March 2019.
3. Gopal Mondal, Devarpita Kundu , **Souvik Majumder** and Animesh Maitra, “Seasonal Variation of Rain and Cloud Microstructure at a Tropical Location”, URSI AP-RASC 2019, New Delhi, India, 09 - 15 March 2019
4. **Souvik Majumder**, AnimeshMaitra, Saurabh Das, “Water Vapor Sensing using Ground-Based Dual Frequency GPS Measurement Over a Tropical Location”, URSI RCRS 2017 at Tirupati
5. **Souvik Majumder,** ArpitaAdhikar, AnimeshMaitra, “Rain microphysical features as observed from ground based radar and disdrometer at a tropical location”, 6th International Conference on Computers and Devices for Communication (CODEC) 2015, at Kolkata.

DR. SANTU SARKAR

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Degrees obtained:

- Ph.D.: CU, IRPE, 2011
- M.Tech.: CU, IRPE, 2000
- B.Tech.: CU, IRPE, 1998

Classes Taught

- EC 3.1.3 - Digital Communication
- EC3.2.2 - Microprocessor and Microcontroller
- EC3.2.6 - Microprocessor and Microcontroller Laboratory
- RP:4.1.4 - Advanced Communications
- ECEL4.1.6.1 - Optoelectronic Devices and Fiber Optics Laboratory
- EC 4.1.8 - Mobile &Satellite Comm
- EC 4.1.7 – Optical Communication

Research Interests and Experience

- Wavelength Division Multiplexing (WDM) crosstalk
- Multi core Fiber (MCF)
- Photonic Crystal and Photonic crystal Fiber

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Erasmus Mundus Leaders Project: Funded by European Union and coordinated by City University London, Duration: 21/8/2017 to 15/11/2017
- Winter school Coordinator: Appointed as Coordinator of the winter school (equivalent to Refresher course) in Physics and Engineering. Held in UGC-HRDC, University of Calcutta during 26/2/2018 – 20/3/2018
- Ph.D. admission committee coordinator, IRPE

Publications

Books and Book Chapters

1. P. P. Mukherjee, Santu Sarkar and Nikhil R. Das , “Comparison of Power Penalty Due to Component, SRS, and FWM Crosstalk in a WDM Receiver”, Advances in Computer, Communication and Control, Springer Singapore, 2019, [eBook ISBN: 978-981-13-3122-0; Hardcover ISBN: 978-981-13-3121-3; Series ISSN: 2367-3370; DOI: 10.1007/978-981-13-3122-0]

2. Basak S., Sarkar S., Das N.R. (2021) Modes and Coupling in Seven-Core Optical Fiber. In: Das N.R., Sarkar S. (eds) Computers and Devices for Communication. CODEC 2019. Lecture Notes in Networks and Systems, vol 147. Springer, Singapore. https://doi.org/10.1007/978-981-15-8366-7_50

3. Sarkar S., Mukherjee P., Das N.R. (2021) A Comparative Study on Determination of Optimum Detection Threshold for Minimum BER in a WDM Receiver with SRS and FWM Crosstalk. In: Das N.R., Sarkar S. (eds) Computers and Devices for Communication. CODEC 2019. Lecture Notes in Networks and Systems, vol 147. Springer, Singapore. https://doi.org/10.1007/978-981-15-8366-7_53

4. De A., Nandi T., Sarkar S., Haldar S. (2021) An Overview of Reactivity for Various Nano Zero Valent Iron Particles Towards Fenton's Oxidation. In: Das N.R., Sarkar S. (eds) Computers and Devices for Communication. CODEC 2019. Lecture Notes in Networks and Systems, vol 147. Springer, Singapore. https://doi.org/10.1007/978-981-15-8366-7_80

Journal Papers

1. T. Nandi, A. De, S. Sarkar, S. Haldar, "Optimizing the degradation of dichlorvos in aqueous solution using nZVI DTPAþH2O2 and its detection using ac conductivity measurement with the help of response surface methodology" Journal of the Indian Chemical Society, Elsevier, Vol. 99, 2021.

2. Mukherjee, P., Sarkar, S. & Das, N.R., "Spectral efficiency and quantum limit of BPSK transmission in a WDM system in presence of multiple interferers," Photonic Network Communications,42, 134–141 (2021). https://doi.org/10.1007/s11107-021-00945-9 INDEXING: SCI IF: 2.028 (2020)

3. T. Nandi, A. De, S. Sarkar, S. Haldar, "A study of nZVI DTPA induced degradation of selective organic pollutants by the help of ac conductivity measurement," Environmental Nanotechnology, Monitoring & Management, Elsevier, Vol. 14, 2020.

4. P. P. Mukherjee, S. Sarkar and N. R. Das, "An approach for realistic estimation of BER due to signal-component crosstalk in a WDM receiver," Optik - International Journal for Light and Electron Optics, Elsevier, Vol. 146, pp. 1-7, October 2017.

Conference Papers

1. S. Basak, A. Mukhopadhyay, **S. Sarkar**, N. R Das, "Investigation of couplings in presence of air hole in 12-core double layer hexagonal shape Fiber design", 2022 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC 2022), December 15-17, 2022, GIET University, Gunupur, India.

2. S. Mukherjee, S. Malakar, **S. Sarkar** and N. R Das, "Study of near and mid-infrared Photonic crystal waveguide suitable for biosensing application", 2022 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC 2022), December 15-17, 2022, GIET University, Gunupur, India.

3. S. Mitra, **S. Sarkar**, “Location sensing of wheel based movable object with low cost sensors in GPS denied environment”, 2020 IEEE Calcutta Conference (CALCON), pp 482-485, 2020

4. S. Basak, **S. Sarkar**, N. R Das, "Modes and Coupling in Six-Core hole-walled Optical Fiber",2020 IEEE Calcutta Conference (CALCON), pp 478-481, 2020.

5. S. Basak, **S. Sarkar**, N. R Das, “A New Hole-walled Multi-core Fiber for Space Division Multiplexing for Improved Performance”, ICCE 2020, 1st IEEE International Conference for Convergence in Engineering, 2020.

6. P. P. Mukherjee, **S. Sarkar** and N. R. Das, “Realistic Estimation of Power Penalty through a Probabilistic Framework in a WDM Receiver with Component Crosstalk,” ICCSS 2017, July 14-17, UK, London.

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide if any**
PinakPani Mukherjee Reg. No.: 05048/Ph.D. (Tech.) Proceed/2021 Date: 24/9/2021	On the analysis of crosstalk performance evaluation and optimum design of wavelength division multiplexed receiver system	Submitted	Prof. N. R. Das
Tanima Nandi Reg. No.: 00122/Ph.D. (Tech.) Proceed/2019 Date: 18/12/2019	Synthesis and characterization of iron based nano materials and its application to degrade and detect pollutants		Dr. Sandip Haldar
Sonali Basak Reg. No.: 01117/Ph.D. (Tech.) Proceed/2021 Date: 9/2/2021	Design of high-capacity multicore fibers for space division multiplexing to support next generation wireless communication		

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Degrees obtained

- Ph.D. (Tech), DETS, University of Kalyani, 2014
- M.Tech, RPE, CU, 2006
- B.Tech, RPE, CU, 2004

Classes Taught

- ECEL3.2.4.1 - Microwave and Navigational Electronics
- EC 2.1.1 - Electromagnetic Fields and Waves
- ECEL3.2.8.1 - Microwave Laboratory
- EC 2.1.8 - Electronics Workshop
- RP 4.1.3 - Applied Electromagnetic
- RP 4.2.3 - Microwave Devices, Circuits & Materials
- RP 4.2.2 - Microwave & Wireless Antennas

Research Interests and Experience

My areas of interest include the design of high-gain wideband compact microstrip patch antennas, multi-band antennas for wireless devices, circularly polarized antennas, SIW integrated microstrip antennas, MIMO antennas for sub-6 GHz applications, and performance enhancement of microstrip antennas using frequency selective surface (FSS) and metamaterial, wireless power transfer system design.

Administrative Duties / Achievements/ Completed Projects/ Other Details

Administrative Duties

- Coordinator of 6th Semester ECE
- Ph.D. Coursework coordinator

Professional Body Membership

- Senior Member IEEE,
- Life member InRaSS.
- Secretary, IEEE AP-MTT Chapter, Kolkata Section
- Advisor, IEEE MTT-S Student Branch Chapter, University of Calcutta

Current Personal Projects		
Funding agency	**Topic and details (if required)**	**Funding and Duration**
SERB, Govt. of India	Design of Highly Efficient Wireless Power Transfer System Utilizing Metasurface Integrated Planar Antenna for IoT Applications	45.32 L; 3 years

Patent Details

Juin Acharjee, Mihir Kumbhakar, **Kaushik Mandal**, and Sujit Kumar Mandal, "A System and Method for Designing a Compact Multiband Antenna," **Australian Innovation Patent**, Patent number: 2021103584; Term of Patent: Eight years from 3rd July 2021.

Publications (Books, Journals)

Book Chapters

1. Ayan Pal, Arunabho Panja, Amibrata Samadder, Saswata Banerjee, Juin Acharjee, **Kaushik Mandal**, "Extended Microstrip Line-Fed Circularly Polarized Dielectric Resonator Antenna for WiMAX and 5G Applications," *In book: Trends in Wireless Communication and Information Security*, (Lecture Notes in Electrical Engineering book series (LNEE) vol. 740, pp. 27-36, Proceedings of EWCIS 2020. April 2021. [DOI: 10.1007/978-981-33-6393-9_4] ISBN: 978-981-33-6392-2 (Print); 978-981-33-6393-9 (Online) (Best paper award winning).
2. Susamay Samanta, Sagnik Chakrabarti, Aniket Jana, P Soni Reddy, and **Kaushik Mandal**, "Miniaturized Flexible Monopole Antenna for Wearable Biomedical Applications," *In book: Advances in Medical Physics and Healthcare Engineering*, (Lecture Notes in Bioengineering) , pp. 415-421, December 2021, Springer Singapore. [DOI: 10.1007/978-981-33-6915-3_41] ISSN: 21952728 2195271X, ISBN: 978-981-33-6914-6.
3. Priyanka Das, and **Kaushik Mandal**, "A novel design of FSS-based absorber integrated microstrip antenna," In Book: Innovations in Electrical and Electronic Engineering (LNEE), pp. 505-512, vol. 756, Springer Singapore; *International Conference on Electrical and Electronics Engineering (ICEEE 2021)*, Delhi NCR, India, 2-3 January, 2021. [DOI: 10.1007/978-981-16-0749-3_38] ISSN: 18761119 18761100, ISBN: 978-981-16-0748-6.
4. Juin Acharjee, Mihir Kumbhakar, **Kaushik Mandal**, and Sujit Kumar Mandal, "A Compact Multiband Antenna for Mobile Handset Application," In book: Computers and Devices for Communication, LNNS, vol. 147, pp. 116-123, February 2021, CODEC, December 19-20, 2019 [10.1007/978-981-15-8366-7_16] ISBN: 978-981-15-8365-0 (Print); 978-981-15-8366-7 (Online) (Best poster award).
5. Priyanka Das, and **Kaushik Mandal**, "Design and Modelling of a FSS based Wideband Absorber," ," In book: Computers and Devices for Communication, LNNS, vol. 147, pp. 207-214, February 2021, *2019 7th International Conference on Computers and Devices for Communication (CODEC),* December 19-20, 2019, [DOI: 10.1007/978-981-15-8366-7_28] Institute of Radio Physics & Electronics, University of Calcutta. ISBN: 978-981-15-8365-0 (Print); 978-981-15-8366-7 (Online)

6. Gouri Shankar Paul, and **Kaushik Mandal**, "Miniaturized Multi-stopband Frequency Selective Surface for WLAN and X–Band Applications," Proceedings of 2nd International Conference on Communication, Devices and Computing, Lecture Notes in Electrical Engineering (LNEE), vol. 602, pp. 131-137, December 2019. [DOI: 10.1007/978-981-15-0829-5_13] [Springer Nature Singapore Pte Ltd. 2020]. ISSN: 1876-1119 (Online); 1876-1100 (Print).

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1. Priyanka Das, Amit Kumar Singh, and **Kaushik Mandal**, "Beam-steering of millimeter wave antenna using linear phase gradient metalens for 5G applications," *International Journal of RF and Microwave Computer Aided Engineering,* vol. 32, pp. e23459, October 2022. [DOI: 10.1002/mmce.23459] [I.F-1.694, Indexing: SCI; Publisher: WILEY].
2. Juin Acharjee, Shreya Chatterjee, Nipun Kumar Mishra, Gouri Shankar Paul, and **Kaushik Mandal**, "Synthesizing Radiation Properties of Dual-band Dual-mode High Gain Dielectric Resonator Antenna for Wireless Applications," *Progress In Electromagnetics Research- C*, vol. 122, pp. 153-164, August 2022. [DOI: 10.2528/PIERC22053102] [I.F: 1.02; Indexing: Clarivate Analytics' Emerging Source Citation Index and Elsevier's SCOPUS and Compendex].
3. Priyanka Das, and **Kaushik Mandal**, "Polarization Converter Surface Integrated MIMO Antenna for Simultaneous Reduction of RCS and Mutual Coupling," *IEEE Antennas and Wireless Propagation Letters*, vol. 21, pp. 1782-1786, June 2022. [DOI: 10.1109/LAWP.2022.3179708] [I.F-3.834, Indexing: SCI; Publisher: IEEE Xplore].
4. Priyanka Das, and **Kaushik Mandal**, "Design of graphene-constituted Frequency Selective Surface-based perfect absorbers in THz regime—A circuit analysis approach," *International Journal of Numerical Modelling Electronic Networks Devices and Fields,* vol. 36, pp. e3027, May 2022. [DOI: 10.1002/jnm.3027] [I.F-1.296, Indexing: SCI; Publisher: WILEY].
5. Priyanka Das, and **Kaushik Mandal**, "Transmissive Type Dual Band Polarization Converter Integrated Microstrip Patch Antenna in THz regime," Optik - International Journal for Light and Electron Optics, vol. 261, pp. 169157, April 2022, [DOI: 10.1016/j.ijleo.2022.169157] [I.F-2.443, Indexing: SCI, Publisher: ELSEVIER].
6. Priyanka Das, and **Kaushik Mandal**, "A tunable circularly polarized antenna in THz regime," Micro and Nanostructures (Superlattices and Microstructures), vol. 66, pp. 207232, April 2022, [DOI: 10.1016/j.micrna.2022.207232] [I.F-2.658, Indexing: SCI, Publisher: ELSEVIER].
7. Priyanka Das, Amit Kumar Singh, and **Kaushik Mandal**, "Metamaterial loaded highly isolated tunable polarisation diversity MIMO antennas for THz applications," Optical and Quantum Electronics, vol. 54, pp. 250, March 2022, [DOI: 10.1007/s11082-022-03641-8] [I.F-2.084, Indexing: SCI, Publisher: Springer].
8. Juin Acharjee, **Kaushik Mandal**, and Sujit Kr. Mandal, "Slotted patch and ground for reducing side lobe level of planar antenna operating under higher order mode," *Annals of Telecommunications,* March 2022. [DOI: 10.1007/s12243-022-00911-0] [I.F-1.444, Indexing: SCOPUS, Publisher: Springer].

9. Priyanka Das**, Kaushik Mandal**, and Ali Lalbakhsh "Beam-Steering of Microstrip Antenna using Single-layer Passive FSS based Phase Shifting Surface," *International Journal of RF and Microwave Computer Aided Engineering,* vol. 33, pp. e23033, March 2022. [DOI: 10.1002/mmce.23033] [I.F-1.694, Indexing: SCI; Publisher: WILEY].

10. Priyanka Das, and **Kaushik Mandal**, "Passive FSS based polarization converter integrated microstrip antenna," *International Journal of RF and Microwave Computer-Aided Engineering,* vol. 32, pp. e22982, February 2022. [DOI: 10.1002/mmce.22982] [I.F-1.694, Indexing: SCI; Publisher: WILEY].

11. Ali Lalbakhsh, Andrew Pitcairn, **Kaushik Mandal**, Mohammad Alibakhshikenari, Karu P. Esselle, and Sam Reisenfeld, "Darkening Low-Earth Orbit Satellite Constellations: A Review," *IEEE Access*, vol. 10, pp. 24383-24394, January 2022. [DOI: 10.1109/ACCESS.2022.3155193] [I.F-3.745, Indexing: SCIE, Publisher: IEEE Xplore].

12. **Kaushik Mandal**, Susamay Samanta, Juin Acharjee, and Chinmoy Saha, "Slot Loaded Folded Half-Mode Substrate Integrated Waveguide Antenna for Wideband Applications," *AEÜ - International Journal of Electronics and Communications*, vol. 144, pp. 154057, December 2021. [DOI: 10.1016/j.aeue.2021.154057] [I.F-3.183, Indexing: SCI; Publisher: ELSEVIER].

13. Priyanka Kumari, **Kaushik Mandal**, Juin Acharjee, and Sunandan Bhunia, "Cross-Polarization Pattern Diversity of Patch Antenna using Recessed Dielectric Layer" *AEÜ - International Journal of Electronics and Communications*, vol. 137, pp. 153806, May 2021. [DOI: 10.1016/j.aeue.2021.153806] [I.F-3.183, Indexing: SCI; Publisher: ELSEVIER].

14. Ali Lalbakhsh, Muhammad U. Afzal, Touseef Hayat, Karu P. Esselle, and **Kaushik Mandal**, "All-metal wideband metasurface for near-field transformation of medium-to-high gain electromagnetic sources," *Scientific Reports*, vol. 11, pp. 9421, May 2021. [DOI: 10.1038/s41598-021-88547-3] [I.F-3.998, Indexing: SCOPUS, Publisher: Nature].

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18. Susamay Samanta, P Soni Reddy, and **Kaushik Mandal**, "Field Asymmetry Ratio: A New Quantitative Approach for Identification of Appropriate Microstrip Patch Antenna Geometries Offering Enhanced Cross-Polarization Discrimination," *AEÜ - International Journal of Electronics and Communications*, vol. 128, pp. 153519, January 2021 [DOI:10.1016/j.aeue.2020.153519] [I.F-3.183, Indexing: SCI; Publisher: ELSEVIER].

19. Mrityunjoy Kumar Ray, **Kaushik Mandal**, Nasimuddin Nasimuddin, Ali Lalbakhsh, Raad Raad, and Faisel E. M. M. Tubbal, "Two-Pair Slots Inserted CP Patch Antenna for Wide Axial Ratio Beamwidth," *IEEE Access*, vol. 8, pp. 223316-223324, December 2020. [DOI:10.1109/ACCESS.2020.3043406] [I.F-3.745, Indexing: SCIE, Publisher: IEEE Xplore].

20. Priyanka Das, and **Kaushik Mandal**, "RCS Reduction of Microstrip Antenna using Split Square Loop Thin Absorber," *IET Microwaves Antennas & Propagation*, vol. 14, pp. 1771-1778, November 2020. [DOI: 10.1049/iet-map.2020.0347] [I.F-2.036, Indexing: SCI; Publisher: IET].

21. Ali Lalbakhsh, Seyed Morteza Alizadeh, Amirhossein Ghaderi, Alireza Golestanifar, Bahare Mohamadzade, Mohammad (Behdad) Jamshidi, Kaushik Mandal, and Wahab Mohyuddin, "A Design of a Dual-Band Bandpass Filter Based on Modal Analysis for Modern Communication Systems," *Electronics* 2020, 9, 1770, October 2020 [DOI:10.3390/electronics9111770] [I.F-2.690, Indexing: SCIE, Publisher: MDPI].

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23. Juin Acharjee, **Kaushik Mandal**, and Sujit Kr. Mandal, "Optically controlled superwideband to Multiband Reconfigurable Antenna for wireless application," *Micro and Nanosystems,* vol. 13, pp. 204-210, June 2020. [DOI: 10.2174/1876402912999200613230909] [I.F-0.52, Indexing: SCOPUS].

24. Robert Mark, Harsh Verdhan Singh, **Kaushik Mandal**, and Soma Das, "Mutual coupling reduction using near zero ϵ and μ metamaterial based superstrate for MIMO application," *IET Microwaves Antennas & Propagation*, vol. 14, pp. 479-484, February 2020. [DOI: 10.1049/iet-map.2019.0382] [I.F-2.036, Indexing: SCI; Publisher: IET].

25. Juin Acharjee, Ram Lakhan Kumar, **Kaushik Mandal**, and Sujit Kr. Mandal, "A Compact Multiband Multimode Antenna Employing Defected Ground Structure," *Radio Engineering*, vol. 28, pp. 663-670, December 2019. **[**DOI: 10.13164/re.2019.0663] [I.F-1.076, Indexing: SCI Expanded].

26. Mrityunjoy Kumar Ray, **Kaushik Mandal**, and Nasimuddin, "Low Profile Circularly Polarized Patch Antenna with Wide 3-dB Beamwidth," *IEEE Antennas and Wireless Propagation Letters*, vol. 18, pp. 2473-2477, December 2019. [DOI: 10.1109/LAWP.2019.2940703] [I.F-3.834, Indexing: SCI; Publisher: IEEE Xplore].

27. Robert Mark, Neha Rajak, **Kaushik Mandal**, and Soma Das, "Isolation and Gain Enhancement Using Metamaterial based Superstrate for MIMO applications," *Radio Engineering*, vol. 28, pp. 689-695, December 2019. [DOI: 10.13164/re.2019.0689] [I.F-1.076, Indexing: SCI Expanded].

28. Priyanka Das, **Kaushik Mandal**, and Ali Lalbakhsh, "Single-Layer Polarization Insensitive Frequency Selective Surface for Beam Reconfigurability of Monopole Antennas," *Journal of Electromagnetic Waves and Applications,* vol. 34, pp. 86-102, November 2019. [DOI: 10.1080/09205071.2019.1688693] [I.F: 1.373; Indexing: SCI; Publisher: Taylor & Francis].

29. Mrityunjoy Kumar Ray and **Kaushik Mandal**, "Pair of Diagonal Slots Loaded Low-Profile Circularly-Polarized Patch Antenna with Wide 3-dB Axial Ratio Beamwidth," *IET Microwaves Antennas & Propagation*, vol. 13, pp. 2433 – 2438, November 2019. [DOI: 10.1049/iet-map.2019.0392] [I.F-2.036, Indexing: SCI; Publisher: IET].

30. Gouri Shankar Paul, and **Kaushik Mandal**, "Polarization-Insensitive and Angularly Stable Compact Ultra-wide Stop-band Frequency Selective Surface," *IEEE Antennas and Wireless Propagation Letters*, vol. 18, pp. 1917-1921, September 2019. [DOI: 10.1109/LAWP.2019.2933545] [I.F-3.834, Indexing: SCI; Publisher: IEEE Xplore].

31. Amartya Das, Juin Acharjee, and **Kaushik Mandal**, "Compact UWB printed slot antenna with three extra bands and WiMAX rejection functionality," *Radio Engineering*, vol. 28, pp. 544-551 September 2019. [DOI: 10.13164/re.2019.0544] [I.F-1.076, Indexing: SCI Expanded].

32. Robert Mark, Harsh Singh, **Kaushik Mandal**, and Soma Das, "Reduced edge-to-edge spaced MIMO antenna using parallel coupled line resonator for WLAN applications," *Microwave and Optical Technology Letters*, vol. 61, pp. 2374–2380, July 2019 [DOI: 10.1002/mop.31911] [I.F: 1.392; Indexing: SCI Extended; Publisher: WILEY].

33. Gouri Shankar Paul, **Kaushik Mandal**, Juin Acharjee, and Partha Pratim Sarkar, "Reduction of Mobile Phone Radiation Exposure Using Multi-stopband Frequency Selective Surface," *Progress In Electromagnetics Research- M*, vol. 83, pp. 9-18, July 2019. [DOI: 10.2528/PIERM19041401] [I.F: 1.02; Indexing: SCOPUS].

34. Anik Ghosh, and **Kaushik Mandal**, "High Gain and Wideband Substrate Integrated Waveguide Based H-plane Horn Antenna," *AEÜ - International Journal of Electronics and Communications*, vol. 105, pp. 85-91, June 2019 [DOI: 10.1016/j.aeue.2019.04.005] [I.F-3.183, Indexing: SCI; Publisher: ELSEVIER]

35. S. Samanta, **K. Mandal,** P. S. Reddy, and P. P. Sarkar, "Near-Field Approach toward Enhanced Suppression of Cross-Polarized Radiation across Different Elevation Planes using Novel Epsilon-Shaped Clusters of Shorting Pins" *IET Microwaves Antennas & Propagation*, vol. 13, pp. 966-975, June- 2019. [DOI: 10.1049/iet-map.2018.5769] [I.F-2.036, Indexing: SCI; Publisher: IET].

36. Juin Acharjee, Amit Kumar Singh, **Kaushik Mandal**, and Sujit Kr. Mandal, "Defected Ground Structure toward Cross Polarization Reduction of Microstrip Patch Antenna with Improved Impedance Matching," *Radio Engineering*, vol. 28, no. 1. pp. 33-38, April 2019. [DOI:10.13164/re.2019.0033] [I.F-1.076, Indexing: SCI Expanded].

37. Robert Mark, Nipun Mishra, **Kaushik Mandal**, Partha Pratim Sarkar, and Soma Das, "Hexagonal Nested Loop Fractal Antenna for Quad Band Wireless Applications," *Frequenz-Journal of RF-Engineering and Telecommunications*, vol. 73, no. 3-4. pp. 99-108, February 2019. [DOI: 10.1515/freq-2018-0115] [I.F-0.543, Indexing: SCImago (SJR) & SCOPUS].

38. Priyanka Das, and **Kaushik Mandal**, "Modeling of ultra-wide stop-band frequency selective surface to enhance the gain of a UWB antenna," *IET Microwaves Antennas & Propagation*, vol. 13, pp. 269-277, February- 2019. [DOI: 10.1049/iet-map.2018.5426] [I.F-2.036, Indexing: SCI; Publisher: IET].

39. Robert Mark, Neha Rajak, **Kaushik Mandal**, and Soma Das, "Metamaterial Based Superstrate towards the Isolation and Gain Enhancement of MIMO Antenna for WLAN application," *AEÜ - International Journal of Electronics and Communications*, vol. 100, pp. 144-152, January- 2019. [DOI: 10.1016/j.aeue.2019.01.011] [I.F-2.924, Indexing: SCI; Publisher: ELSEVIER].

40. Juin Acharjee, **Kaushik Mandal**, and Sujit Kr. Mandal, "Reduction of Mutual Coupling and Cross-Polarization of a MIMO/Diversity Antenna using a String of H-Shaped DGS," *AEU-International Journal of Electronics and Communications*, vol. 97, pp. 110-119, December- 2018. [DOI: 10.1016/j.aeue.2018.09.037] [I.F-2.924, Indexing: SCI; Publisher: ELSEVIER].

41. Robert Mark, Nipun Mishra, **Kaushik Mandal**, Partha Pratim Sarkar, and Soma Das, "Hexagonal ring fractal antenna with dumb bell shaped defected ground structure for multiband wireless applications," *AEÜ - International Journal of Electronics and Communications*, vol. 94, pp. 42-50, June- 2018. [DOI: 10.1016/j.aeue.2018.06.039] [I.F: 2.924; Indexing: SCI; Publisher: ELSEIVER].

42. Susamay Samanta, P Soni Reddy, and **Kaushik Mandal**, "Cross-Polarization Suppression in Probe-Fed Circular Patch Antenna Using Two Circular Clusters of Shorting Pins," *IEEE Transactions on Antennas and Propagation*, vol. 66, pp. 3177-3182, June- 2018.[DOI: 10.1109/TAP.2018.2819895]
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43. Santanu Mondal, **Kaushik Mandal** and Partha Prtim Sarkar, "Design of MIMO Antenna for Ultra-wideband Applications," *IETE Journal of Research,* vol. 64, pp. 497-502, May- 2018. [DOI: 10.1080/03772063.2016.1176540] [I.F: 0.185; Indexing: SCI Extended; Publisher: Taylor & Francis].

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Conference Papers

1. Priyanka Das, and **Kaushik Mandal**, "Dual-band Absorption using a Phase Transition Metal," 2022 *IEEE Wireless Antenna and Microwave Symposium (WAMS)*, June 2022, [DOI: 10.1109/WAMS54719.2022.9847787]

2. Priyanka Das, Chinmoy Saha, and **Kaushik Mandal**, "Mutual Coupling and RCS Reduction of MIMO Antenna using a hybrid technique," 2022 *IEEE Wireless Antenna and Microwave Symposium (WAMS)*, June 2022, [DOI: 10.1109/WAMS54719.2022.9848128]

3. Juin Acharjee, Gouri Shankar Paul, **Kaushik Mandal**, and Ali Lalbaksh, "Design and Analysis of Shorting Pin Loaded Triple Band Microstrip Patch Antenna with Enhanced Gain for Wireless Applications," 2021 *Photonics & Electromagnetics Research Symposium (PIERS)*, November 2021, [DOI: 10.1109/PIERS53385.2021.9694717]

4. Priyanka Das, and **Kaushik Mandal**, "An All-Dielectric FSS Inspired Reconfigurable Band-stop Filter," Proceedings of *IEEE International Conference on Advent Trends in Multidisciplinary Research and Innovation, ICATMRI 2020*, Buldana, Maharashtra, 30th December, 2020.. [DOI: 10.1109/ICATMRI51801.2020.9398489]

5. Priyanka Das, and **Kaushik Mandal**, "An Illustration of a novel All Dielectric 3D FSS based Band-Pass Filter," Proceedings of 2020 IEEE 5th *International Conference on Computing Communication and Automation, ICCCA*, December 2020. [DOI: 10.1109/ICCCA49541.2020.9250756]

6. Priyanka Das, and **Kaushik Mandal**, "Multiband Reflection and Transmission mode Linear to Circular Polarizer integrated Microstrip Patch Antenna," Proceedings of 2020 *International Symposium on Antennas and Propagation, APSYM 2020*, Cochin, 14-16 December 2020. [DOI: 10.1109/APSYM50265.2020.9350727]

7. Priyanka Das, and **Kaushik Mandal**, "Reconfigurable All Dielectric 3D FSS Filter," Proceedings of 2020 International Symposium on Antennas and Propagation, APSYM 2020, December 2020. [DOI: 10.1109/APSYM50265.2020.9350734]

8. Susamay Samanta, **Kaushik Mandal**, P. Soni Reddy, and N. Nasimuddin, "Circularly Polarized Metallic Post Integrated Patch Antenna for Road Transport and Traffic Telematics Application at 5.8 GHz DSRC Band," *URSI Regional Conference on Radio Science (URSI-RCRS*), IIT-BHU, February 2020. [DOI: 10.23919/URSIRCRS49211.2020.9113638].

9. Mrityunjoy Kumar Ray, and **Kaushik Mandal**, "Wide Beamwidth Circularly Polarized Slot Loaded Microstrip Patch Antenna," *2019 IEEE Indian Conference on Antennas and Propagation (InCAP)*, December 19-22, 2019. [DOI: 10.1109/INCAP.2018.8770851].

10. Susamay Samanta, **Kaushik Mandal**, P. Soni Reddy, and Partha Pratim Sarkar, "Investigation on Novel Quarter-Arc Shaped Clusters of Shorting Pins for Improvement in Cross-Polarization Discrimination of Diamond-Shaped Microstrip Patch Antenna," *2018 IEEE Indian Conference on Antennas and Propagation (InCAP)*, December 16-19, 2018. [DOI: 10.1109/INCAP.2018.8770913].

11. Mrityunjoy Kumar Ray, and **Kaushik Mandal**, "Shorting Pin and Slot Loaded Dual Band Microstrip Antenna for MICS and GPS Applications," *2018 IEEE Indian Conference on Antennas and Propagation (InCAP)*, December 16-19, 2018. [DOI: 10.1109/INCAP.2018.8770851].

12. Juin Acharjee, **Kaushik Mandal**, and Sujit Kumar Mandal, "A Tri-Band Meander-Shaped Patch Antenna for WLAN and Radio Navigation Applications," *2018 IEEE Indian Conference on Antennas and Propagation (InCAP)*, December 16-19, 2018. [DOI: 10.1109/INCAP.2018.8770794].

13. Susamay Samanta, P Soni Reddy, and **Kaushik Mandal**, "New Dimension in Cross-Polarization Reduction of a Hexagonal Microstrip Antenna Using Two Circular Substrate Integrated Cavities," *Proc. of the 2017 IEEE Region 10 Conference (TENCON),* Malaysia, pp. 1358-1363, November 5-8, 2017. (Best paper award winning) [DOI: 10.1109/TENCON.2017.8228069].

Invited Lectures

Frequency Selective Surface (FSS) Based Mobile Phone Radiation Protector, ***AMECC-2020,*** **GITA Bhubaneswar**, on 29th February 2020

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide**
Juin Acharjee NITD/PhD/EC/2016/00825 3rd Oct 2016	Characterization of Some Defected Ground Structures and their Applications to Planar Antenna Design.	Awarded on 3rd July 2020	Sujit Kr. Mandal (NIT Durgapur)
Priyanka Das 00804/Ph.D.(Tech.)Proceed/2019, 19th February 2019	Radiation Performance Improvement of Some Antennas using Frequency Selective Surfaces	Awarded on 2nd September 2022	No
Name and Registration information	**Topic**	**Status**	**Co-guide**
Susamay Samanta 06115/Ph.D(Tech.)Proceed/ 2018 Dt: 17th Aug 2018	Novel Arrangement of Metal Posts to Enhance the Radiation Characteristics of Microstrip Patch Antenna.	Awarded on 30th January 2023	No
Mrityunjoy Kumar Ray 03151/Ph.D.(Tech.)Proceed/2018 24th April 2018	Design and Characterization of Circularly Polarized Microstrip Antenna for Improved Axial Ratio Beamwidth	Thesis submitted on 6th December 2022	No
Gourishankar Paul 00092/Ph.D.(Tech.)Proceed/2019 18th December 2019	Polarization-Insensitive and Angularly Stable Compact Frequency Selective Surfaces for Ultrawide and Multiple Stop-Band	Thesis will be submitted in February 2023	No

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Phone Number: 9433564748

Degree Obtained:

Ph.D.: University of Calcutta, Radio Physics and Electronics, 2013

Classes Taught

- EC 3.1.1 - Digital Electronics
- EC 2.1.4 - Signals and Systems
- EC 4.1.1 - Microelectronics and VLSI
- RP 4.1.8 - VLSI Circuits and Systems
- RP 4.2.11 - Microelectronics Technology
- RP 4.2.24 - Low Power Design

Research Interests and Experience

Theoretical studies [modeling and simulation] on,

- Semiconductor Devices (both classical and novel)
- FET-based Biosensors
- Image Processing

Administrative Duties / Achievements/ Completed Projects/ Other Details

- Course/Programme coordinator of B. Tech 5th Sem. in ECE
- Member of Different Departmental subcommittee like NBA, NAAC etc.
- Member of Syllabus committees for B.Tech. and M.Tech.
- Member of Ph.D. Coursework committee

Publications

Books and Book Chapters

1. S. Sinha Roy, A. Basu, **A. Chattopadhyay**, "Intelligent Copyright Protection for Images," CRC Book Series on Computational Intelligence and Application, *Taylor and Francis*, ISBN: 9780429513152, April, 2019
2. S. Sinha Roy, A. Basu, and **A. Chattopadhyay**, "Hardware Implementation of a Visual Image Watermarking Scheme using Qubit / Quantum Computation through Reversible Methodology," Quantum-Inspired Intelligent Systems for Multimedia Data Analysis, *IGI Global*, SBN:9781522552192, Ch. 4, pp. 95-140, 2018

3. S. Sinha Roy, A. Basu, and **A. Chattopadhyay**, "Intelligent Image Watermarking for Copyright Protection", Intelligent Multi-Modal Data Processing, *Wiley Publishing*, Ch. 4, pp. 69-96, 2021

Journal Papers

1. Y. Mori , S. Sato , Y. Omura, **A. Chattopadhyay**, A. Mallik, "On the definition of threshold voltage for tunnel FETs," *Superlattices and Microstructures*, vol. 107, pp. 17-27, July 2017
2. E. Datta, **A. Chattopadhyay**, A. Mallik, and Y. Omura, "Temperature Dependence of ACnalog Performance, Linearity, and Harmonic Distortion for a Ge-Source Tunnel FET*," IEEE Trans. on Electron Devices, vol. 67, no. 3, pp. 810-815, Mar. 2020*
3. S. Ghosh, **A. Chattopadhyay**, and S. Tewar, "Optimization of Hetero-Gate-Dielectric Tunnel FET for Label-Free Detection and Identification of Biomolecules," ***IEEE Trans. on Electron Devices,*** vol. 67, no. 5, pp. 2157-2164, May 2020
4. S. Sinha Roy, A. Basu, and **A. Chattopadhyay**, "On the Implementation of a Copyright Protection Scheme using Digital Watermarking," *Multimedia Tools and Applications, Springer*, vol.79,pp.13125-13138, 2020
5. **A. Chattopadhyay**, S. Tewari, and P. S. Gupta, "Dual-Metal Double-Gate with Low-k/High-k Oxide Stack Junctionless MOSFET for a Wide Range of Protein Detection: a Fully Electrostatic Based Numerical Approach," *Silicon*, vol. 13, pp. 441–450, 2021
6. S. Sinha Roy, A. Basu, **A. Chattopadhyay**, and T. S. Das, "Implementation of Image Copyright Protection Tool using Hardware-Software Co-simulation," *Multimedia Tools and Applications, Springer*, vol. 80(3), pp. 4263-4277, 2021
7. E. Datta, **A. Chattopadhyay**, and A. Mallik, "A Comparison of Analog Performance, Linearity, and Distortion Characteristics Between Symmetric InGaAs and Asymmetric InGaAs/InP MOSFETs," *IEEE Trans. on Electron Devices***,** vol. 68, no. 4, pp. 1570-1576, April 2021
8. S. Gayen, S. Tewari, and **A. Chattopadhyay**, "Role of Corner-Effect and Channel Epilayer Thickness on the Performance of a Unique pTFET-Based Biosensor (epiCOR-pTFET-Biosensor) Device in Sub-100-nm Gate Length," *IEEE Transactions on Nanotechnology*, vol. 20, pp. 678–686, 2021
9. S. Das, **A. Chattopadhyay**, and S. Tewari, "Asymmetric-elevated-source-drain TFET: A fairly scalable and reliable device architecture for sub-400-mV low-stand-by-power digital applications," *IETE Technical Review*, vol. 39, no. 2, pp. 316–327, 2022
10. S. Das, **A. Chattopadhyay**, and S. Tewari, "Architecture- and gate-oxide-level optimization of a Si-based asymmetric U-TFET for low power operation: A real-time gate/drain electrostatic based leakage perspective," ***Silicon***, vol. 14, pp. 10719–10727, 2022
11. S. Das, **A. Chattopadhyay**, and S. Tewari, "Asymmetric U-shaped-gated TFET for low-power Ana–digi applications at sub-7-nm technology node: A simulation-based optimization study," *IEEE Transactions on Electron Devices*, vol. 69, no. 11, pp. 6430–6437, 2022

Conference Papers

1. A. Basu, S. Sinha Roy, **A. Chattopadhyay**, "Implementation of a Spatial Domain Salient Region Based Digital Image Watermarking Scheme," 2nd International Conference on Research Computational Intelligence and Communication Networks (ICRCICN), IEEE, 23-25 September, 2016, Kolkata, India

2. A. Basu, S. Sinha Roy, **A. Chattopadhyay**, "Relative Study on Some Saliency Map Models: Leads to Improve Data Protection in Network Surroundings," National Conference on Recent Trends in Renewable Energy and Smart Grid (RRESG), 24-25 February, 2017, Rajasthan, India.

3. E. Datta, **A. Chattopadhyay**, and A. Mallik, **"**Effect of Gate Dielectric Material on the Analog Performance of a Ge-Source Tunnel FET," International Workshop on the Physics of Semiconductor Devices (IWPSD-2017), December 12-15,2017, Delhi, India

4. S. Sinha Roy, M. Das, A. Basu, and **A. Chattopadhyay**, "FPGA Implementation of an Adaptive LSB Replacement Based Digital Watermarking Scheme," International Symposium on Devices Circuits and Systems (ISDCS), IEEE, 29-31 March, 2018, Kolkata, India

5. S. Das, **A. Chattopadhyay**, and S. Tewari, "nTunnel FET (nTFET) reliability study against positive bias temperature instability (PBTI) for different device architectures," 4th International Conference on Microelectronics, Computing & Communication Systems (MCCS-2019), May 11-12,2019, Ranchi, India

6. S. Das, S. Sinha Roy, A. Basu, and **A. Chattopadhyay**, "Implementation of Dual Image Watermarking for Copyright Protection," Proc. 2nd International Conference on Emerging Trends and Advances in Electrical Engineering and Renewable Energy(ETAEERE), Springer, 5-6 March, 2020, Odisha, India.

7. S. Sinha Roy, A. Basu, and **A. Chattopadhyay**, "FPGA Implementation of an Image Watermarking Scheme based on Intensity Level Matching," 4th International Conference on Devices or Integrated Circuit (DevIC), IEEE, 19-20 May, 2021, Kalyani, India.

8. S. Das, **A. Chattopadhyay**, and S. Tewari, "Effect of Channel Epilayer Thickness on Low Power Analog Operation of Asymmetric U-Shaped pTFET." XXIst International Workshop on the Physics of Semiconductor Devices (IWPSD 2021), December 14-17, 2021, Delhi, India

Doctoral Students

Name and Registration information	**Topic**	**Status**	**Co-guide if any**
Anirban Saha [Registered]	Image Processing	Ongoing	Dr. Abhishek Basu [ECE Dept., RCCIIT, Kolkata]
Subhrajit Sinha Roy [Registered]	Image Processing	Ongoing	Dr. Abhishek Basu [ECE Dept., RCCIIT, Kolkata]
Suman Das [Registered]	Novel Semiconductor Device	Ongoing	Dr. Suchismita Tewari [RPE Dept., CU, Kolkata]

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Phone Number: 8583984175

Degrees obtained

- Ph.D., IIT Kharagpur, 2015
- M.Tech, IIT Kharagpur, E&ECE, 2011

Classes Taught

- EC2.1.6 - Circuit and Network Lab
- ECHN4.1.3- Microelectronics and VLSI
- RP4.1.8 - VLSI Circuit and Systems
- EC3.1.1 - Digital System Design
- RP4.2.20 - Analog and Mixed-signal Design
- RP 4.2.24 - Low Power Design
- ECHN 3.2.5 - High-Speed Electronics

Research Interests and Experience

- Reconfigurable Chip Design for Neuromorphic Computation
- Portable Low-Cost Biomedical System Design Using Embedded Systems

Publications

Journal Papers

1. M. Ghosh**, P. Mondal**, S. S. Borah and S. Kumar, ”Resistorless Memristor Emulators: Floating, Grounded using OTA and VDBA for high frequency applications,” in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems,2022, doi: 10.1109/TCAD.2022.3189837
2. **Pulak Mondal,** FPGA-accelerated adaptive cartesian to polar conversion and efficient MI computation for image registration. J. Real Time Image Process.19(3): 529-537 (2022)
3. **Pulak Mondal,** Swapna Banerjee, A Reconfigurable Memory-Based Fast VLSI Architecture for Computation of the Histogram, IEEE Trans. Consumer Electron.65(2): 128-133 (2019)
4. **Pulak Mondal**, Swapna Banerjee, FPGA-accelerated adaptive projection-based image registration. J. Real Time Image Process. 18(1): 113-125 (2021)
5. Subhasish Banerjee, Mourina Ghosh, **Pulak Mondal** and Bal Chand Nagar, New Multi-function Third-Order Inverse Filter using OTRAs, J. Inst. Eng. India Ser B, October 2021, vol. 103, pp. 913928, DOI: https://doi.org/10.1007/s40031-021-00687-2

6. Subhasish Banerjee, Mourina Ghosh, **Pulak Mondal**, Ashish Ranjan, Third order Inverse multi function filter employing MOS resistors and capacitors, Int. J. Numer. Model. March 2022; 35(5): e3002. doi:10.1002/jnm.3002

7. Subhasish Banerjee, **PulakMondal**, Mourina Ghosh, Realization of a reconfigurable Butterworth and Bessel filter using single operational transresistance amplifier and study of their performance, Int. J. Numer. Model. January 2022; 35 (4): e2987.doi: https://doi.org/10.1002/jnm.2987

8. Saurav Mandal, **Pulak Mondal**, Anisha Halder Roy, Detection of Ventricular Arrhythmia by using Heart rate variability signal and ECG beat image. Biomed. Signal Process. Control. 68: 102692 (2021)

9. Saurav Mandal, Anisha Halder Roy, **PulakMondal,** Automated detection of fibrillationsand flutters based on fused feature set and ANFIS classifier. Biomed. Signal Process. Control. 69: 102834 (2021)

10. N. Bhattacharyya*, S. Singh*, A. Banerjee, R. Ghosh, O. Sinha, N. Das, R. Gayen, S. S Pal, S. Ganguly, T. Dasgupta, T. Dasgupta, **P. Mondal**, A. Adhikari, S. Sarkar, D. Bhattacharyya, A. K. Mallick, O. P. Singh and S. K. Pal (2022). Integration of Electroencephalogram (EEG) and Motion Tracking Sensors for Objective Measure of Attention-deficit Hyperactivity Disorder (MAHD) in Pre-schoolers, Review of Scientific Instruments 93(5):054101. (IF: 1.523) [* These authors contributed equally] DOI: 10.1063/5.0088044.11.

11. N. Bhattacharyya, S. Singh, D. Mukherjee, N. Das, A. Chatterjee, A. Halder, A. Adhikari, S. Mondal, D. Shikha, A. Bajaj**, P. Mondal**, P. Chakrabarti, A. K. Mallick and S. K. Pal (2022). Picosecond-resolved Fluorescence Resonance Energy Transfer (FRET) in Diffuse Reflectance spectroscopy explores biologically relevant hidden molecular contacts in a non-invasive way, Phys. Chem. Chem. Phys 24(2022) 6176 6184. (IF: 3.676) DOI: 10.1039/D1CP05159H.

12. N. Bhattacharyya, S. Singh, R. Ghosh, A. Banerjee, A. Adhikari, A. Halder, M. Goswami, A. Chattopadhyay, **P. Mondal**, S. S. Natto, S. A. Ahmed, A. Mallick, and S. K. Pal (2022). Development of a Smart Active Respirator for Comfortable and Hygienic Breathing, Phys. Fluids 34, 051901. (IF: 3.521) DOI: 10.1063/5.0091456.

13. N. Bhattacharyya, S. Singh, A. Halder, A. Adhikari, R. Ghosh, D. Shikha, S. K. Tripathi, A. K. Mallick, **P. Mondal** and S. K. Pal (2021). An Energy Resolved Optical Non-invasive Device Detects Essential Electrolyte Balance in Humans at Point of Care, Transactions of the Indian National Academy of Engineering 6(2021) 355-364. DOI: 10.1007/s41403-021-00204-3.

14. Bhattacharyya N, Mukherjee D, Singh S, Ghosh R, Karmakar S, Mallick A, Chattopadhyay A, Mondal **P, Mondal** T, Bhattacharyya D, Mallick AK, Nabi G, Pal SK. "Seeing" invisible volatile organic compound (VOC) marker of urinary bladder cancer: A development from bench to bedside prototype spectroscopic device. Biosens Bioelectron. 2022 Dec 15;218:114764. doi: 10.1016/j.bios.2022.114764. Epub 2022 Sep 29. PMID: 36206669.

15. N. Bhattacharyya, S. Singh, A. Halder, A. Adhikari, R. Ghosh, D. Shikha, S. K. Tripathi, A. K. Mallick**, P. Mondal** and S. K. Pal (2021). An Energy Resolved Optical Non-invasive Device Detects Essential Electrolyte Balance in Humans at Point of Care, Transactions of the Indian National Academy of Engineering 6(2021) 355-364. DOI: 10.1007/s41403-021-00204-3.

Conference Papers

1. Subhasish Banerjee, Mourina Ghosh, **Pulak Mondal**, OTRA Based Realization of Second Order Inverse Lowpass Filter and Inverse Bandpass Filter, 8th International Conference on Communication and Signal Processing (ICCSP 19), organized by department of ECE, Adhiparasakhi Engineering College in association with IEEE, held at Tamilnardu, India from 4th to 6th April 2019, pp. 0148-0152, doi:10.1109/ICCSP.2019.8698012.
2. Subhasish Banerjee, **Pulak Mondal**, Mourina Ghosh, Novel Realization of Second Order Inverse Bandreject Filter and Inverse Allpass Filter Using Operational Transresistance Amplifier, IEEE Region 10 Symposium (IEEE TENSYMP 2019), organized by IEEE Kolkata Section, held at Biswa Bangla Convention Centre, Newtown Kolkata, India from 7th to 9th June 2019, pp. 623-627, doi: 10.1109/TENSYMP46218.2
3. Subhasish Banerjee, Shekhar Suman Borah, Mourina Ghosh, **PulakMondal**, Three Novel Configurations of Second Order Inverse Band Reject Filter Using a Single Operational Transresistance Amplifier, IEEE Region 10 Conference (IEEE TENCON2019), organized by IEEE Kerala Section, held at Hotel Grand Hyatt Kochi Bolgatti, Kerala, India from 17th to 20th October 2019, pp. 2173-2178, doi:10.1109/TENCON.2019.8929318.
4. Mourina Ghosh, Subhasish Banerjee, Shekhar Suman Borah and **Pulak Mondal**, Single OTRA Based Implementation of Second Order Band Reject Filter (Three Configurations), Internetional Conference on Modelling, Simulation and Inteligent Computing (MoSICOM 2020), organized by BITS Pilani Dubai Campus, Dubai from 29th to 31st January, 2020. Lecture Notes in Electrical Engineering, vol 659, pp.-319-327, July 2020, Springer, Singapore. https://doi.org/10.1007/978-981-15-4775-134
5. Subhasish Banerjee**, Pulak Mondal**, Mourina Ghosh, Performance Analysis of Single Operational Transresistance Amplifier Based Bandpass Filter and Bandreject Filter, 4th International Conference 2021 Devices for Integrated Circuit (DevIC 2021) organized by IEEE KGEC Student Branch Chapter in association with Department of ECE, KGEC and technically co-sponsored by IEEE EDS Kolkata Chapter held online from 19-20thMay 2021, pp. 586-590, doi: 10.1109/DevIC50843.2021.9455881
6. S. Mandal, A. H. Roy and **P. Mondal**," Detection of Cardiac Arrhythmia based on feature fusion and Machine Learning algorithms," 2021 International Conference on Intelligent Technologies (CONIT), 2021, pp. 1-4, doi: 10.1109/CONIT51480.2021.9498352.

Doctoral Students

Name	Topic	Status
Subhasish Banerjee	Design Of Signal Processing Circuits Using Current Mode Active Blocks	Registered
Saurav Mandal	Machine Learning based Disease detection System	Registered
Neha Bhattacharyya	Spectroscopy of acoustic and electromagnetic radiation for development of devices for biomedical diagnosis and environmental pollution monitoring	Registered

DR. SANTANU MONDAL

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Email Address: santanumondal2008@rediffmail.com

Email Address: santanu.rpe@gmail.com

Phone Number: 8013471833

Degrees obtained

- Ph. D, University of Kalyani, DETS, 2018

Classes Taught

- ECHN 3.2.5 - High Speed Electronics
- ECOE 2.1.7.1 - Algorithms and Advanced Data Structures Laboratory
- ECHN 2.2.8 - Antenna Laboratory
- EC 2.1.8 - Electronics Workshop
- RP 4.2.5 - Electromagnetic Interference and Compatibility
- RP 4.2.3 - Microwave Devices, Circuits and Materials

Research Interests and Experience

- Microwave antennas
- frequency selective surfaces

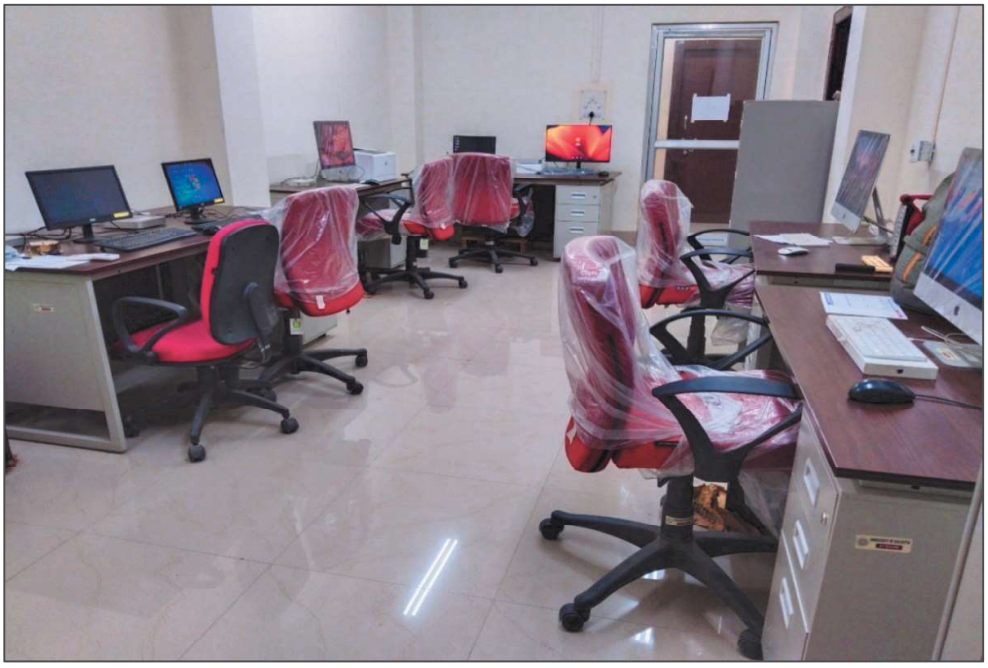
Publications

Journal Papers

1. **S. Mondal**, K. Mondal and P. P. Sarkar, "Design of MIMO Antenna for Ultra-wideband Applications," *IETE Journal of Research*, Vol. 64, No. 4, pp. 497-502, 2018.
2. S. Dey, **S. Mondal**, and P. P. Sarkar, "Single Feed Circularly Polarized Antenna Loaded with Complementary Split Ring Resonator (CSRR)", *Progress In Electromagnetics Research M*, Vol. 78, pp. 175-184, 2019.
3. S. Dey, **S. Mondal**, and P. P. Sarkar, "Reactive Impedance Surface (RIS) based Asymmetric Slit Patch Antenna loaded with Complementary Split Ring Resonator (CSRR) for Circular polarization", *Journal of Electromagnetic Waves and Applications*, Vol. 33, No. 8, pp. 1003-1013, 2019.
4. S. Dey, A. Indu, **S. Mondal**, and P. P. Sarkar, "Diagonally Asymmetric CSRRs Loaded Circularly Polarized Antenna with Frequency Selective Surface", *Progress In Electromagnetics Research M*, Vol. 92, pp. 43-54, 2020.
5. S. Coomar, **S. Mondal**, and R. Sanyal, "Compact, flexible and highly selective wideband complementary FSS with high angular stability", International Journal of Microwave and Wireless Technologies, Vol.14, No.10, pp. 1298-1314, 2021.
6. S. Coomar, **S. Mondal**, and R. Sanyal, "Polarization-insensitive ultrathin fractal shaped frequency selective surface for ultra-wide band shielding", AEU-International Journal of Electronics and Communications, Vol. 147, 147, pp. 1-10, 2022.

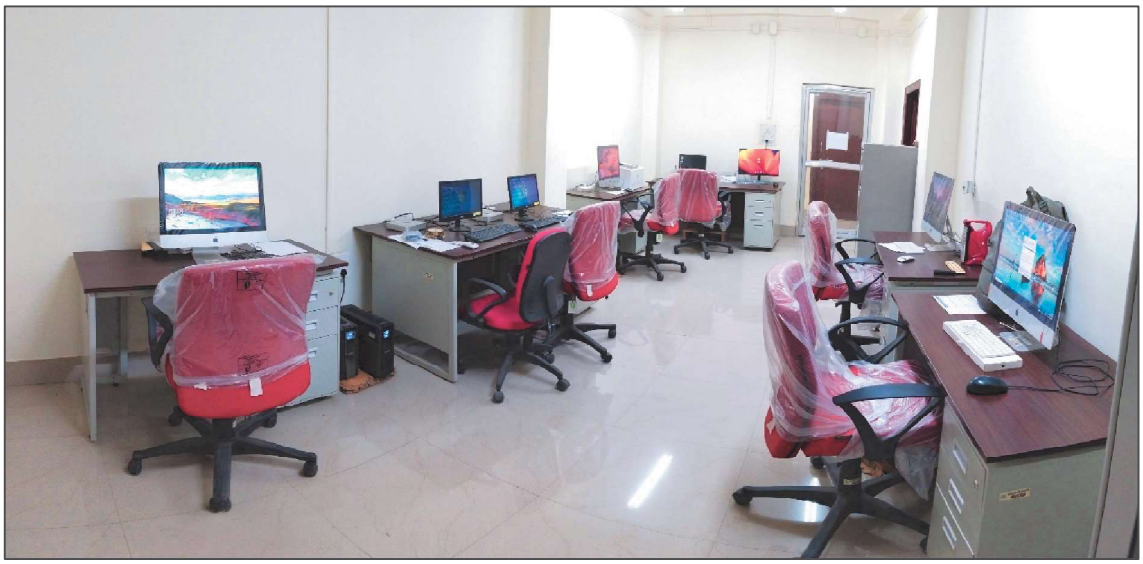
Glimpses of
RPE Laboratory Facilities

ST Radar Array, ST Radar Project at Calcutta University,
Ionosphere Field Station, Haringhata



ST Radar Control Room, ST Radar Project at Calcutta University,
Ionosphere Field Station, Haringhata

Satellite Beacon Laboratory, ST Radar Project at Calcutta University, Ionosphere Field Station, Haringhata



Radar Data Analysis Laboratory, ST Radar Project at Calcutta University, Ionosphere Field Station, Haringhata

Space Application Technology Laboratory, Sisir Mitra Bhavan, RPE

Microwave Engineering Laboratory, Sisir Mitra Bhavan, RPE

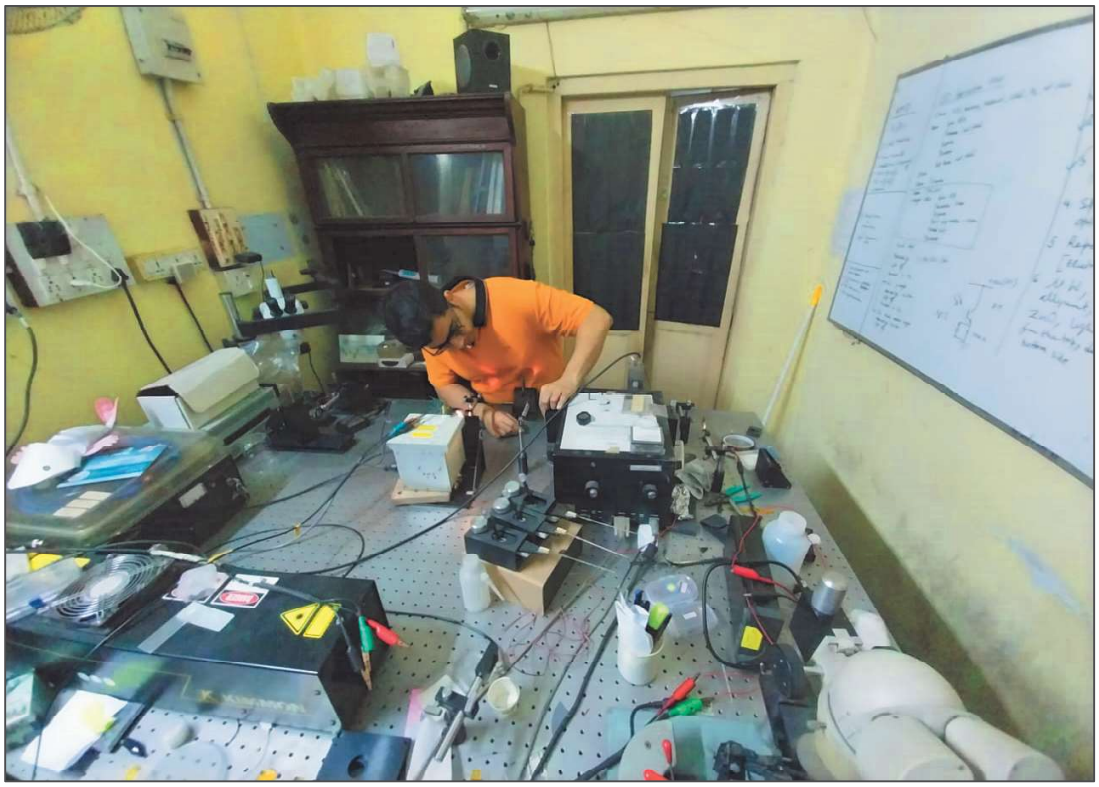
Communication Research Laboratory, Sisir Mitra Bhavan, RPE

TCAD Laboratory, Sisir Mitra Bhavan, RPE

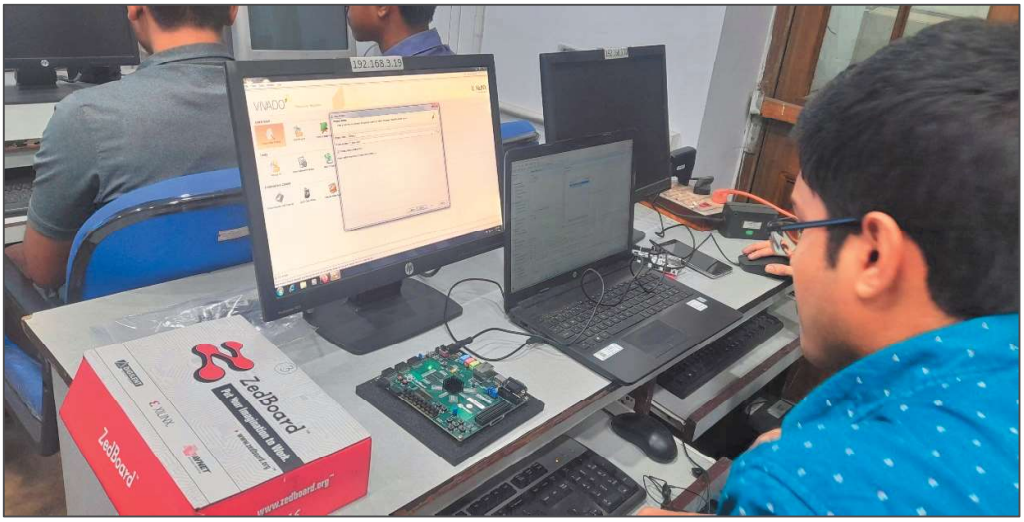
Antenna Research Laboratory, Sisir Mitra Bhavan, RPE

Solid State Electronics Laboratory, Sisir Mitra Bhavan, RPE

Microelectronics Laboratory, Sisir Mitra Bhavan, RPE



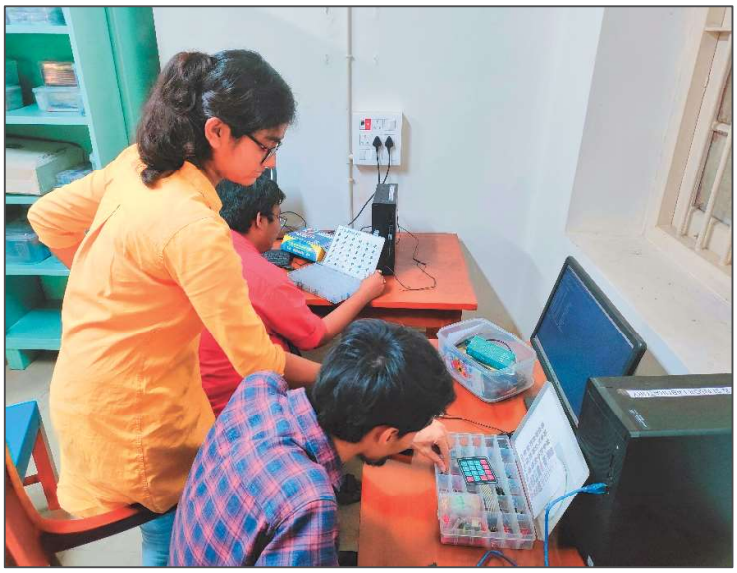
Optical Characterization Laboratory, Sisir Mitra Bhavan, RPE



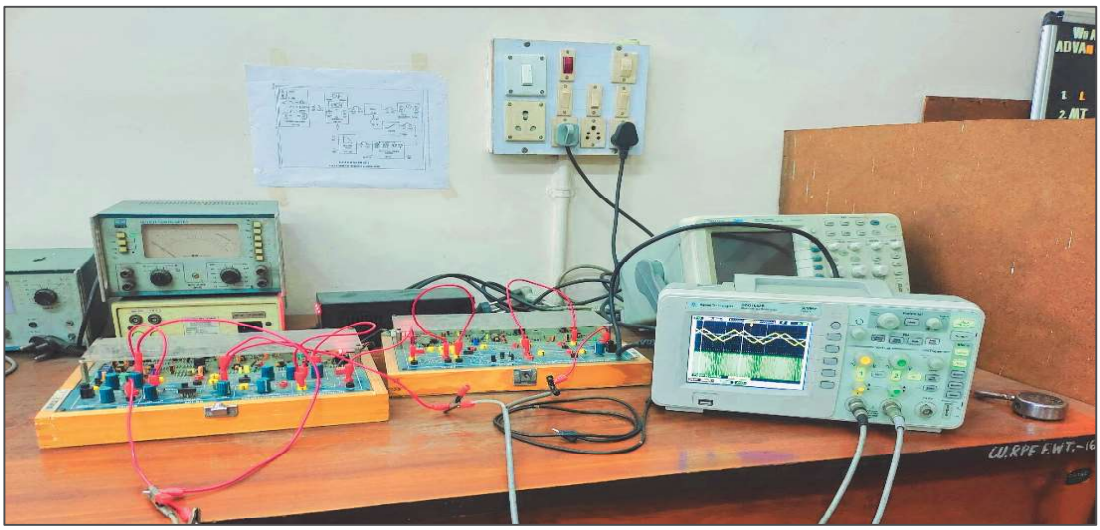
VLSI Laboratory, Sisir Mitra Bhavan, RPE





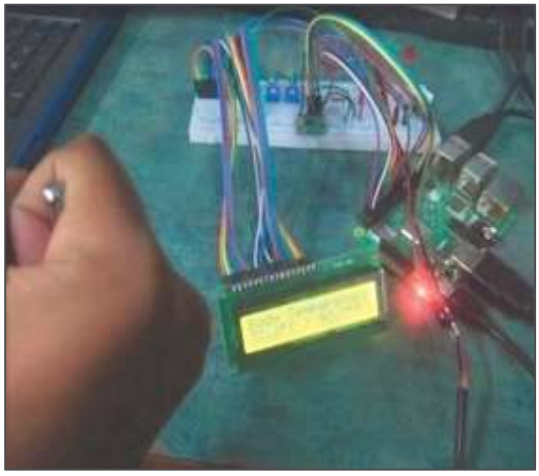


IoT Laboratory, Sisir Mitra Bhavan, RPE



Analog Communication Laboratory, Sisir Mitra Bhavan, RPE

Analog Circuit Simulation Laboratory, J.N. Bhar Bhavan, RPE



Digital Communication System Laboratory, J.N. Bhar Bhavan, RPE