

2024 International Conference on Innovations in Science, Engineering and Technology (ICISET)

Innovative Technologies for Global Solutions



26-27 October 2024

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2024



Organized by: Faculty of Science & Engineering
International Islamic University Chittagong, Bangladesh



“
**Our Humble Respect and Love to Those Who were Martyred,
Maimed and Injured while Protesting Against the Fascist.**
”

Conference Book

ICiset (2016-2024)

International Conference on Innovations in Science, Engineering and Technology



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Faculty of Science and Engineering
International Islamic University Chittagong, Bangladesh



4th International Conference on Innovations in Science, Engineering and Technology 2024 (ICISET-2024)

26-27 October, 2024

Venue

International Islamic University Chittagong
Kumira, Sitakunda, Chittagong, Bangladesh

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International Islamic University Chittagong, Bangladesh

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Conference Book

International Conference on Innovations in Science, Engineering and Technology (ICiset-2024)

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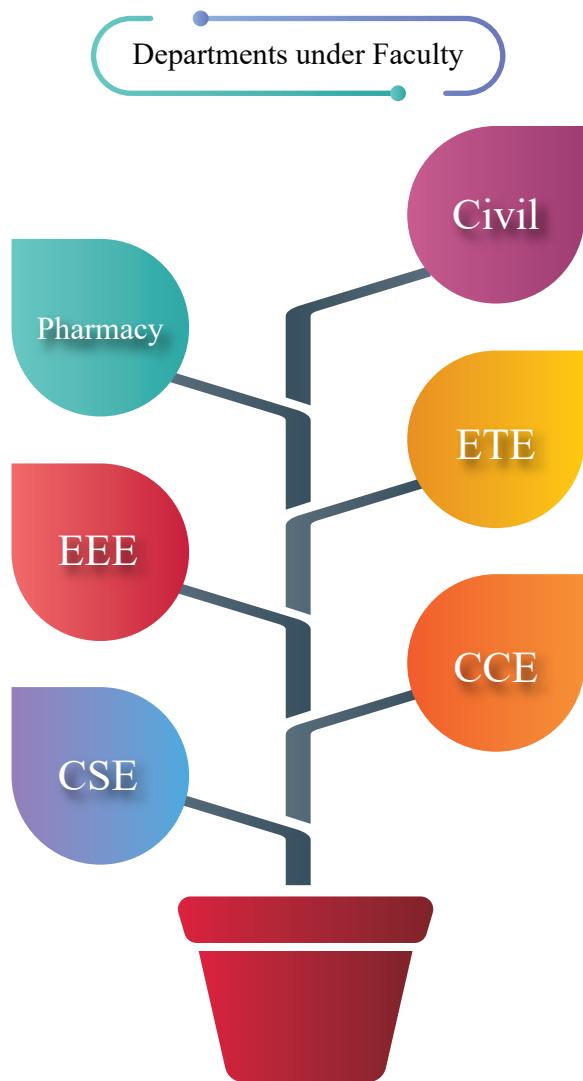
**International Conference on Innovations in
Science, Engineering and Technology 2024
(ICiset-2024)**

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“O Allah, Increase Me in Knowledge.”
Surah Ta-Ha (20:114)



Faculty of Science & Engineering
International Islamic University Chittagong

Editor's Note



At the outset, I am thankful to Almighty Allah for publishing such a publication for the fourth time on the occasion of the International Conference on Innovations in Science, Engineering, and Technology (ICISET-2024), organized by the Faculty of Science and Engineering, International Islamic University Chittagong (IIUC). The first conference book was published in 2016, the second in 2018, and the third in 2022, respectively.

It is really difficult to release an abstract proceeding on the eve of the conference considering the limitations and all other parameters. Collecting proceeding materials such as abstracts of registered articles, messages, pictures, schedule of technical sessions, schedule of programs, indexing of authors, etc. is another challenging task to be done within a certain period of time. Sometimes the task becomes even more daunting when one sees that there are still some things left to collect. Despite all the unexpected obstacles, we have managed to illuminate the monument as a result of our concerted efforts and hard work.

The content of the conference book begins with the messages of the eminent persons, the list of registered papers, the keynote speech, the invited speech, the schedule of the technical session, the abstract of papers, the list of members of the various committees and sub-committees, the authors' index, a brief report on ICISET 2016-2024, a pictorial presentation, etc. Complete paperwork can be found on CDs and pen drives. It would have been better to make an indexing of registered papers according to the session-wise, but it was not possible because of the finalization of the technical session schedule coming to our hands just before the printing of the book.

The papers were submitted to 8 tracks in total; it may be difficult for an author to find his paper's page number. Therefore, indexing has been made considering the paper ID as the primary key. As a result, any author can easily find his paper according to his/her paper ID. All the affairs of CSE, EEE, ETE, Applied Physics, etc. have been categorized in the IEEE Track and the particulars of Genetic Engineering, Biotechnology, Pharmacy, Civil Engineering, etc. have been grouped in the Non-IEEE Track. So any author can easily find his paper as per Track also. Moreover, an author index is available in the last portion of the book.

I would like to express my sincere gratitude and thanks to those who have generously contributed their messages, articles, and other works that have enriched the souvenir. I would also like to express my sincere gratitude to the members of the Sub-Committee on Souvenir and to all those who have kindly assisted and cooperated in the publication of the Conference Book.

Finally, I hope that any mistake, omission, or deficiency on our part would be graciously excused by the respected readers.

May Allah accept our efforts and give us the best rewards here and hereafter.

A handwritten signature in black ink.

Prof. Dr. A.N.M. Rezaul Karim

Dept of Computer Science & Engineering
International Islamic University Chittagong



LIST OF COUNTRIES PARTICIPATING IN THE CONFERENCE



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Norway



South Korea



Thailand



USA

Conference Program Schedule

All times are in BST (GMT +6:00)

Programs at a glance

Day 1, Saturday, 26 October, 2024		
Time	Program	Venue
08:00 – 09:00	Conference Kit Collection	Central Library
09:00 – 10:30	Inaugural Ceremony	IIUC Auditorium
10:30 – 11:00	Refreshment	IIUC Auditorium
11:00 – 13:00	Plenary Session 1	IIUC Auditorium
13:00 – 14:00	Prayer and Lunch Break	Central Mosque Central Cafeteria

Day 1, Saturday, 26 October, 2024		
14:00 – 15:30	TS–1A: Power and Green Energy System – 1	CSE Main Building, SE LAB_C201 Academic Building-6
14:00 – 15:30	TS–1B: Electronics, Materials Science, VLSI and Real Time Systems-1	FSE Building Computer Lab EEE Department, R323
14:00 – 15:30	TS–1C: Artificial Intelligence and Intelligent Computing-1	CSE Main Building AI LAB_C101 , Academic Building-6
14:00 – 15:30	TS–1D: Data Science and Big Data Analytics-1	CSE Main Building PLAB #1_C301 Academic Building-6
14:00 – 15:30	TS–1E: IOT and Signal Processing-1	AI & Machine Learning Lab Dept. of CCE Academic Building -05 Room No.-306
14:00 – 15:30	TS–1F: Communication and Computer Networks-1	FSE Building ETE Department R421
14:00 – 15:30	TS–1G: Pharmacy and Biological Science-1	Seminar Hall Auditorium Building
14:30 – 16:15	Industry University Collaboration Program	IIUC Auditorium
15:30 – 16:15	Prayer and Refreshment	Central Mosque, TS Venues

Conference Program Schedule

All times are in BST (GMT +6:00)

Programs at a glance

16:15 – 17:45	Plenary Session 2	IIUC Auditorium
17:45– 18:15	Prayer and Refreshment	Central Mosque IIUC Auditorium
18:15 – 19:45	TS–2A: Power and Green Energy System– 2	CSE Main Building SE LAB_C201, Academic Building-6
18:15 – 19:45	TS–2AP: Power and Green Energy System– 3	Seminar Hall Auditorium Building
18:15 – 19:45	TS–2B: Electronics, Materials Science, VLSI and Real Time Systems– 2	FSE Building Computer Lab EEE Department R323
18:15 – 19:45	TS–2C: Artificial Intelligence and Intelligent Computing-2	CSE Main Building AI LAB_C101, Academic Building-6
18:15 – 19:45	TS–2D: Data Science and Big Data Analytics-2	CSE Main Building PLAB #1_C301 Academic Building-6
18:15 – 19:45	TS–2E: IOT and Signal Processing-2	AI & Machine Learning Lab Dept. of CCE Academic Building -05 Room No.-306
18:15 – 19:45	TS–2F: Communication and Computer Networks – 2	FSE Building ETE Department R421

Day 2, Sunday, 27 October , 2024

Time	Program	Venue
08:30 – 09:00	Conference Kit Collection	Central Library
09:00 – 11:00	Plenary Session 3	IIUC Auditorium
11:00 – 11:30	Refreshment	IIUC Auditorium
11:30 – 13:00	TS–3A: Power and Green Energy System– 4	CSE Main Building SE LAB_C201 Academic Building-6
11:30 – 13:00	TS–3B: Electronics, Materials Science, VLSI and Real Time Systems – 3	FSE Building Computer Lab EEE Department R323

Conference Program Schedule

All times are in BST (GMT +6:00)

Programs at a glance

11:30 – 13:00	TS–3C: Artificial Intelligence and Intelligent Computing-3	CSE Main Building , AI LAB_C101 Academic Building-6
11:30 – 13:00	TS–3CP: Artificial Intelligence and Intelligent Computing-4	CSE Main Building CN LAB_C401 Academic Building-6
11:30 – 13:00	TS–3D: Data Science and Big Data Analytics-3	CSE Main Building PLAB #1_C301 Academic Building-6
11:30 – 13:00	TS–3E: IOT and Signal Processing-3	AI & Machine Learning Lab Dept. of CCE , Academic Building -05, Room No.-306
11:30 – 13:00	TS-3F: Communication and Computer Networks - 3 (Antennas and Propagation: Special Session by IEEE AP-S MGA, Bangladesh)	FSE Building ETE Department R421
11:30 – 13:00	TS–2G: Pharmacy and Biological Science-2	Seminar Hall Auditorium Building
13:00 – 14:00	Prayer and Lunch	Central Mosque, Central Cafeteria

14:00 – 15:45	Plenary Session 4	IIUC Auditorium
15:45 – 16:15	Prayer and Refreshment	IIUC Auditorium
16:15 – 17:45	TS–4A: Power and Green Energy System– 5	CSE Main Building SE LAB_C201 Academic Building-6
16:15 – 17:45	TS–4B: Electronics, Materials Science, VLSI and Real Time Systems– 4	FSE Building Computer Lab EEE Department R323
16:15 – 17:45	TS–4C: Artificial Intelligence and Intelligent Computing-5	CSE Main Building AI LAB_C101 Academic Building-6
16:15 – 17:45	TS–4CP: Artificial Intelligence and Intelligent Computing-6	CSE Main Building PLAB #1_C301 Academic Building-6
16:15 – 17:45	TS–4E: IOT and Signal Processing-4	AI & Machine Learning Lab, Dept. of CCE Academic Building -05 Room No.-306
16:15 – 17:45	TS–4F: Communication and Computer Networks – 4	FSE Building ETE Department R421
16:15 – 17:45	TS–4S: Special Session	Seminar Hall , Auditorium Building
17:45 – 18:15	Prayer	Central Mosque



Conference Program Schedule

All times are in BST (GMT +6:00)

Programs at a glance

Day 2, Sunday, 27 October, 2024		
Time	Program	Venue
18.30– 20.00	Closing Ceremony	IIUC Auditorium
20.00 – 21.00	Conference Dinner	The Copper Chimney Restaurant, GEC

MESSAGE



Adviser

Ministry of Posts, Telecommunications and IT &
Ministry of Information and Broadcasting
Government of the People's Republic of Bangladesh

It is my privilege to send messages of support and congratulations to the organizers, participants, presenters, and negotiators of the International Conference on Innovation of Science, Engineering, and Technology (ICISET) 2024.

Enthusiasm for life is revived when we learn that we were born with special gifts, using our unique ways to create a peaceful world. In the new millennium, our challenge is to build a new nation on the basis of a new worldview, combining technological skills with the excellent human values.

Today's competitive world is a challenge with the progress of the great transformation of a new civilization. A conference is very effective for this purpose which gives us the opportunity to show and collect knowledge from each other. From the knowledge gained, we can share ideas for evolution and development for the world where we are together. Let us build a better future for you and our children through research, conference and technology.

I would like to thank the organizers for organizing this conference and express my sincere gratitude to the presenters, participants, and negotiators. I also wish the conference success.

Md. Nahid Islam

MESSAGE



Chairman

University Grants Commission of Bangladesh.

I am delighted to know that the Faculty of Science and Engineering of International Islamic University Chittagong (IIUC) is going to organize the 4th International Conference on Innovations in Science, Engineering and Technology 2024 (ICISET 2024) during 26-27 October 2024. IEEE Bangladesh and Centre for Research and Publication (CRP) deserve special appreciation for their assistance to organize the event.

Being the key vehicle to development, science and technology have historically had a mammoth impact on resolving the challenges that come with increased modernity, and consumption. Scientific advancement and innovations have made the impossible possible. They have also made human life safe, secure and comfortable.

I hope the ICISET 2024 will surely turn into a right platform for the experts to present some of the most complex and multidisciplinary topics related to Science, Engineering and Technology. Scientists, engineers, professionals, researchers, and students from home and abroad will be able to exchange their views about the latest development in the areas of Computer Science and Engineering, Electrical Engineering, Electronics, Telecommunication Engineering, Pharmacy, Civil and Environmental Science, and other relevant fields of Science, Engineering and Technology in the conference.

I am confident that the innovative ideas and thoughts to be presented by the scholars in the ICISET 2024 will go a long way in helping the humanity and supporting future generation for further improvement in Science, Engineering and Technology.

On behalf of the University Grants Commission of Bangladesh (UGC), I would like to extend my sincere thanks to the organizing committee for their untiring efforts to make the conference happen.

I wish the ICISET 2024 a grand success.

Professor Dr. S. M. A. Faiz

MESSAGE



Vice Chancellor
Noakhali Science and Technology University (NSTU), Bangladesh
Chief Guest, Opening Ceremony
ICISET 2024

I am delighted to know that an international conference on Innovations in Science, Engineering, and Technology (ICISET 2024) is going to be organized by the Faculty of Science and Engineering (FSE) of International Islamic University Chittagong.

Science has changed how we live and what we believe. By making life easier, science has given people the opportunity to follow social concerns such as ethics, aesthetics, education, and justice; to create culture; and to improve the conditions of human life. Development at any stage is always associated with technology, and technology occurs when science advances.

I believe that this prestigious international conference will become an innovative platform for leading scientists, researchers, academics, and scholars from home and abroad, who will exchange and share their research work and experiences. I hope this conference will enlighten us to understand new developments in science and engineering and will create a new window for sharing knowledge with the scientific community in this field.

I extend my best wishes and congratulations to the organizers for making the conference a success.

A handwritten signature in black ink, appearing to read "M. Ismail".

Professor Dr. Mohammad Ismail

MESSAGE



Professor Emeritus and former Vice-Chancellor,
International Islamic University Chittagong
& Chief Guest
Closing Ceremony, ICISET 2024

It gives me great pleasure that the Faculty of Science and Engineering of International Islamic University Chittagong (IIUC) is going to organize "2024 International Conference on Innovation in Science, Engineering, and Technology" (ICISET 2024). The conference, in association with the Centre for Research and Publication (CRP) at IIUC and scheduled for October 26-27, 2024, on its beautiful campus, is indeed a significant event that deserves special appreciation for all those involved in organizing the event.

I hope ICISET 2024 will be an outstanding platform to congregate a group of highly talented scientists, engineers, technologists, and researchers who will work for the expansion of science and technology so that new windows can be opened for the betterment of humanity.

I strongly believe that the thought-provoking speeches of the keynote speakers will undoubtedly be a source of inspiration for the participants of the conference and motivate them to pursue advancements that benefit humanity.

I express my sincere gratitude to all the authors, speakers, committee members, reviewers, sponsors, advisers, and other members whose sincere efforts are the key factors for the success of this conference.

Wishing ICISET 2024 a grand success.

Professor Dr. A.K.M. Azharul Islam

MESSAGE



Chairman
Board of Trustees
International Islamic University Chittagong

I am immensely pleased to learn that the Faculty of Science of Engineering (FSE) of International Islamic University Chittagong (IIUC), in association with the Center for Research and Publication (CRP) of the University, is going to organize an International Conference on Innovations in Science, Engineering, and Technology.

I am delighted to announce that the Faculty of Science and Engineering (FSE) at the International Islamic University Chittagong (IIUC), in collaboration with the Center for Research and Publication (CRP), is organizing an International Conference on Innovations in Science, Engineering, and Technology.

It is a commendable decision to publish a conference digest, which will include abstracts of the papers and other pertinent information, on the eve of the conference scheduled for October 26-27, 2024.

I am confident that this conference will be an excellent platform for participants to enhance their knowledge and explore the latest science, engineering, and technology innovations. It will also provide a unique opportunity for attendees to engage with leading scientists, researchers, peers, and sponsors.

My best wishes to all participants, hoping the conference will be productive and beneficial for everyone involved.

I extend my heartfelt wishes for the conference's overall success.

A handwritten signature in black ink.

A.N.M. Shamsul Islam

MESSAGE



Vice-Chancellor (In-Charge)
International Islamic University Chittagong

I am really very happy that International Islamic University Chittagong (IIUC) is going to hold its 16th **International Conference on Innovation in Science, Engineering, and Technology** (ICISET2024), organized by the Faculty of Science and Engineering (FSE) of IIUC with the Technical Co-Sponsorship of IEEE Bangladesh Chapter, during October 26-27, 2024.

On behalf of the International Islamic University Chittagong, I am very glad to welcome all distinguished guests and participants of the conference from home and abroad, at the green campus of IIUC, Kumira, Chattogram, adjacent to the Bay of Bengal, Bangladesh, which is filled with immense natural beauty and free from air and sound pollution.

I believe, this conference will encourage the professional fraternity to explore new areas of recent advances in science and technology and will improve the quality of professional skills needed in today's modern, advancing world.

I would like to express my special thanks to all the IIUC personnel, participants, scientists, organizers, sponsors, and co-sponsors of the conference for their immense help and contribution in making the conference a success and for the pre-release of an informative Conference Book (Souvenir) at this great and glorious occasion.

I wish a grand success for the conference.


Prof. Dr. Mohammad Ali Azadi

MESSAGE



Treasurer (In-Charge)
International Islamic University Chittagong

It gives me immense pleasure to provide a short message on the eve of such an august gathering of engineers, scientists, research students, and participants of the International Conference on “Innovations in Science, Engineering, and Technology 2024 (ICISET 2024)”. I congratulate the Faculty of Science and Engineering (FSE) of International Islamic University Chittagong in association with the Center for Research and Publication (CRP) for hosting this event again after the highly successful arrangements of ICISET 2016, 2018, and 2022.

I believe that this prestigious international conference will become an important body of leading scientists, researchers, academics, and scholars from home and abroad, who will exchange and share their research works and experiences. I hope this conference will enlighten us to understand the new developments in the field of science and engineering.

I extend my best wishes and congratulations to the organizers for making the conference a success.


Prof. Dr. Muhammed Mahbubur Rahman

MESSAGE



Chair, Technical Committee, ICISET 2024
Distinguished Professor,
CSE Department, BRAC University, and
Fellow, Bangladesh Academy of Sciences

It is my great pleasure to write a few words on the occasion of holding the International Conference on Innovations in Science and Technology- the second conference of the series, organized by International Islamic University Chittagong (IIUC) in its beautiful scenic campus at Kumira. IIUC has been very passionate about trying to create an environment conducive to the creation and satisfaction of thirst for knowledge. It is also contributing to the development of academic and research activities beyond the walls by organizing international conferences for strengthening collaboration among faculty members and students alike and organizing programming contests to sharpen the programming and problem-solving skills of the students all over the country.

I hope that participants from home and abroad will be exchanging their ideas and thoughts, and will be mutually beneficial. In addition, they will enjoy the beautiful campus of IIUC and hospitality of the organizers. I sincerely believe that the ICISET series will continue to enrich research culture in the country, and collaboration with foreign faculty members and researchers. I take this opportunity to thank members of the Advisory Committee for ensuring smooth holding of the conference, members of the Technical Committee, and IEEE, BDS, for their hard work in selecting the manuscripts for presentation, and the Organizing Committee led by Professor Md. Delawer Hossain for doing all the preparatory work for making the conference a grand success.

A handwritten signature in black ink, appearing to read "Md. Delawer Hossain".

Prof. Dr. Mohammad Kaykobad

MESSAGE



Chair
IEEE Bangladesh Section

I am delighted to announce that the Faculty of Science and Engineering (FSE) of the International Islamic University Chittagong (IIUC) will host the 4th International Conference on International Conference on Innovations in Science, Engineering, and Technology (ICISET 2024) in Chittagong, Bangladesh, from October 26 to 27, 2024. With great pride, the IEEE Bangladesh Section is joining as the technical co-sponsor for this conference, contributing to advancing various fields of science, engineering, and technology in Bangladesh.

The rapid advancements in various disruptive technologies in science and engineering play a pivotal role in shaping the modern world. These technological developments are indispensable for realizing the vision of a smart Bangladesh by the year 2041. The government aspires to evolve from a digital Bangladesh into a smart Bangladesh by fostering science, engineering, and technology innovation. To achieve this vision, it is crucial to launch many innovative initiatives aimed at up skilling our youth, professionals, and researchers to equip them to face the challenges of Industry 4.0 on a global scale. In this context, the 4th ICISET emerges as a timely and vital initiative to serve as a crucial meeting point uniting engineers, scientists, innovators, researchers, and students in the various fields of science and engineering.

IEEE is the world's largest technical professional organization dedicated to advancing technology to benefit humanity, society, and mankind. IEEE and its members inspire a global community through their highly cited publications, conferences, technology standards, and professional and educational activities. The IEEE Bangladesh Section was established in 1993. In recent years, the IEEE Bangladesh Section and its members have acquired several outstanding achievements, including the IEEE MGA Outstanding Large Section Award (which is the highest possible recognition for a section). Currently, the Bangladesh Section has 14 society chapters, 3 affinity groups, and 58 student branches. ICISET aligns with the overarching vision of the IEEE Bangladesh Section, which is dedicated to fostering innovation and nurturing the growth of our young talents. It consistently organizes national and international events, offering our budding talents the chance to engage in the global technological landscape and participate in ongoing advancements. Furthermore, through its diverse societies and chapters, the IEEE Bangladesh Section has

MESSAGE

been actively pioneering research and innovation in various domains such as computing, robotics, signal processing, power and energy, and biomedical engineering. Bangladesh Section appreciates members' dedicated efforts to continue the momentum of the Section and retain its glory by increasing scientific and technological activities to bring more prestige and visibility to the world.

On behalf of the IEEE Bangladesh Section, I want to take a moment to express my heartfelt gratitude to all the guests, authors, speakers, committee members, reviewers, track chairs, session chairs, sponsors, and volunteers. Your incredible efforts and dedication are the driving force behind the success of ICISET 2024. We are deeply appreciative of your contributions and hope that the conference will be an enjoyable, informative, and thought-provoking experience for all participants.

As we look forward to the 4th International Conference on Innovations in Science, Engineering, and Technology 2024 (ICISET 2024), I extend my best wishes for its success. May this conference be a platform for fruitful discussions, innovative ideas, and inspiring collaborations.



Prof. Dr. M. Moshiul Hoque



In the name of Allah, The Most Beneficent, The Most Merciful.

On behalf of the Organizing Committee, I welcome you all to the *International Conference on Innovations in Science, Engineering, and Technology (ICISET 2024)*, which will take place on October 26-27, 2024, in the beautiful campus of IIUC. This conference is organized by the Faculty of Science and Engineering (FSE) of International Islamic University Chittagong (IIUC) in association with the Center for Research and Publication (CRP) of IIUC. IEEE Bangladesh Section is the Technical Co-Sponsor of the conference. Conference ID is 62123.

We have now entered the fourth industrial revolution (4IR). It is driven by the diffusion of technology and evolving at such an exponential rather than linear phase that impact on human capital transformation is inevitable. Therefore, we need to make sure that these technologies are harnessed in the right way, to fulfill their potential to revolutionize our world, transform the lives of people, and unlock new pathways for sustainable development around the world. We hope that this conference can provide useful insights into the successful adoption of 4IR in **the vision of our students in achieving a new Bangladesh**.

The idea of organizing ICISET began in 2016 under the Technical Co-Sponsorship of the IEEE Bangladesh Chapter. The 2024 rendition of ICISET is the 4th instance following in the footsteps of the previously successful ICISET-2016, ICISET-2018 and ICISET-2022. In 2020, we could not arrange it due to the outbreak of the Covid-19 pandemic. This is the 16th International Conference at IIUC.

Here I must add a few words about the preceding conditions that prevailed in Bangladesh for ICISET-2024. During July-August, the world watched with horror and sadness as the country's youth sacrificed their lives fighting for social justice, equity, and a brighter future for all. While that fight was successful in ushering Bangladesh into a more hopeful era, we cannot and will not forget the countless sacrifices of the youth and general public of Bangladesh. As a result, we are now able to organize ICISET-2024 with renewed vigor and optimism. We pray for the departed souls and the speedy recovery of those who were physically harmed.

I am very happy to mention that today ICISET has now become a platform that brings together researchers, scientists, software architects, and industry professionals to exchange innovative ideas on the next generation of information technologies and their application. We have received the largest number of articles (**498**) for ICISET 2024. Each article submission has been subject to a rigorous review process involving *at least three reviewers* (who are experts in the field). About 35.7% of the submitted papers were finally accepted for presentation, which points to the growing stature of ICISET as an international conference.

We have sincerely tried to accommodate the original and quality research work of various universities from home and abroad. In total, there are 30 foreign universities and 62 local universities (25 public and 37 private) represented this year. The foreign universities are from Australia, Canada, China, England, Ethiopia, Fiji, Holland, Hungary, Indonesia, India, Japan, KSA, Malaysia, Nepal, Nigeria, Norway, South Korea, Thailand, and USA.

We express our heartfelt gratitude towards the authors and paper presenters, keynote speakers and invited speakers from home and abroad for their efforts in preparing well-written meaningful papers for the conference. We also express gratitude to reviewers from various countries that reviewed these articles and have given their effective judgments in spite of their busy schedules.

The organizing committee has made every effort to deliver a productive ICISET 2024. We have managed the whole ICISET 2024 conference through a comprehensive online process for abstract, paper submission, reviewer report and notification of acceptance. In addition, 15 keynote speeches, 12 Invited speeches, 4 plenary sessions, and 26 technical sessions have been included.

For the ICISET 2024 conference, I am very pleased to announce an international panel of fifteen very distinguished keynote speakers who have agreed to share their expertise and forward-looking philosophy during the conference. These keynote speakers are not just world leaders in their areas of expertise, they also cover the widest breadth of topics relevant to ICT today. For example, from the University of Queensland (Australia), we have Prof. Dr. Christophe Fumeaux on 75 years of IEEE AP-S Research: Retrospective and Future Prospects for Antenna Technologies and Applications. We have from India Professor Dr. Debatosh Guha from the University of Calcutta on the Role of Antenna in Magical Transformation of Engineering in the light of the 75th Anniversary of the IEEE AP Society, Professor Dr. Sanghamitra Bandyopadhyay, from the Indian Statistical Institute on Applications of Artificial Intelligence Methods in Life Sciences, Professor Dr. Ujjwal Maulik from Jadavpur University on Machine Learning for Healthcare, and Professor Dr. Mohamed-Slim Alouini from King Abdullah University of Science and Technology (KSA) on Towards Connecting the Unconnected. We also have other equally distinguished speakers from Malaysia (Professor Nofri Yenita and Professor Al-Mamun), Japan (Professor Maezono), Fiji (Professor Shawkat Ali), Thailand (Professor Pharkphoom), Nepal (Professor Shakya), and Bangladesh (Professor Islam, Professor Moshiul, Professor Mosaddik and Professor Khan), will cover topics such as Smart Microgrids, Sustainable Drainage, Computational Materials Science, Securing Landownership Through Blockchain, BCG Economy Model, Security Challenges in software, MXene based Nanotech Wonders, Low-resources Languages, Nanomedicine and Solar PV in Bangladesh. IIUC and the ICISET2024 organizing committee are indeed very grateful to this very distinguished panel of keynote speakers who have agreed to grace our conference with their expertise and vision for addressing current societal challenges of the fourth industrial revolution (4IR).

I am very pleased to announce the names of twelve invited speakers who will share their expertise during the conference. These speakers are from Indonesia (Professor Imad Uddin), Malaysia (Professor Imtiaz Khalid, Professor Isa, Dr Zakaria and Prof. Dr. Zuraidah), USA (Dr. Ruhul), Japan (Dr. ICHIBA and Dr. Khan), Australia (Dr. Nahidul), Norway (Dr. Zia) and Nigeria (Dr. Amadi) and Bangladesh (Engr Salim) will cover topics such as Superconducting Materials, Molecular Modelling Studies of Quinazoline, Slots Patch Antenna for Power Transformer, Harnessing AI for Transformative Healthcare, Perspective of Human Resource, Developing Novel Therapies for Cancer Chemoprevention and Treatment, High-pressured Solid Hydrogen over 0.5 TPa, Investigating the Impact of SiC Doping on P-type SnO Thin-Film Transistors, Observation Impact on Numerical Weather Prediction, Trustworthy Machine Learning Applications and Computer as a technological backbone and Safety Engineering. We thank all these learned

taking time and effort to contribute to this conference for the greater benefit of society.

We are grateful to the universities having a MoU with IIUC for their support and participation in the ICISET 2024 Conference. These universities are: Universiti Sains Islam Malaysia (USIM) , Universiti Malaysia Perlis (UniMAP), Universiti Teknologi MARA Malaysia, and Istanbul Sabahattin Zaim University, Turkey (IZU).

IEEE IIUC Student Branch started its journey in 2016, the year when the first ICISET was held. At this moment, there are four IEEE Societies that include the IEEE Power and Energy Society, IEEE Robotics & Automation Society, IEEE Computer Society, and IEEE Communication Society. The student branch along with its chapters has arranged a good number of events. IEEE Bangladesh Section's (IEEEBDS) plans to conduct a session with the active participation of students, graduate members, and faculty members of FSE, IIUC. Many thanks to IEEEBDS for continued support.

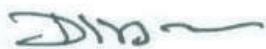
I offer my sincere thanks to my colleagues belonging to the Faculty of Science and Engineering, who have supported me continuously from the very beginning with the planning of this endeavor. ICISET-2024 is the result of sincere efforts and dedication by the members of the organizing committee, sub-committees, the technical program committee, tracks coordinators and tracks chairmen, teachers, volunteers, and students of FS&E, ICT, TMD, and LMD, officers, staff, print and electronic media, and all others who have helped to make this program successful.

My acknowledgement will be incomplete without mentioning the contribution of Prof. Dr. M. Kaykobad, the Technical Chair, and his team for their whole-hearted support to complete the review work successfully. I express my sincere thanks to the Chair, IEEE Bangladesh Section Prof. Dr. M. Moshiul Hoque, and his team for their sincere effort to select original and quality research work for this conference. The editorial board deserves special thanks for their outstanding efforts in preparing the manuscripts for publication. We are grateful to all of them.

Last but not the least, the honorable Chairman, BoT, Mr. Shamsul Islam, and Hon'ble Vice-Chancellor Professor Mohammed Ali Azadi deserve special thanks for the permission to organize this conference. We are thankful to the IIUC authority for providing financial and logistical supports in all respects.

We hope that you will find the ICISET 2024 informative and stimulating. In closing, we remember again the countless sacrifices made by the youth and public of Bangladesh during July-August period that have steered the ICISET 2024 into a new era of hope. We pray for those departed souls and the speedy recovery of those who were physically injured. I believe that the ICISET 2024 will be very successful, which will bring rich dividends to all the attending participants.

May Allah guide us all to the path of success.



Prof. Dr. Md. Delawer Hossain
Chair, Organizing Committee
ICISET 2024
International Islamic University Chittagong

MESSAGE



Co-Chair
Organizing Committee, ICISET 2024
Dean, Faculty of Science & Engineering
Professor, Dept. of CSE
International Islamic University Chittagong

On behalf of the organizing committee, I am honored to welcome all of you to the International Islamic University Chittagong (IIUC) for the 2024 International Conference on Innovations in Science, Engineering, and Technology (ICISET 2024). Faculty of Science and Engineering (FSE) in collaboration with the Center for Research and Publication (CRP) of IIUC organizes this event. This is the fourth edition of ICISET, with the previous three highly successful conferences held in 2016, 2018, and 2022.

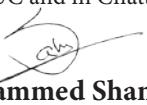
The objective of ICISET 2024 is to create a unique opportunity for scientists, engineers, professionals, researchers, and students to present their latest research findings and experiences in the fields of Computer Science and Engineering, Electrical Engineering, Electronics, Telecommunication Engineering, Pharmacy, Environmental Science, and other relevant areas of science, engineering, and technology. The vision of ICISET is to become a collaborative platform for researchers from both home and abroad, where industry practitioners engage with academic researchers to generate innovative solutions to contemporary challenges.

I am pleased to note that we have received an overwhelming response from authors, reviewers, and experts from various nations. A total of 498 papers were submitted from 20 different countries, and each paper was blind-reviewed by a minimum of three researchers who are experts in the respective fields. The paper acceptance rate for this conference is approximately 36%. All accepted and presented papers are expected to be included in IEEE Xplore. Authors will also have the option to publish their manuscripts or extended versions in reputed indexed journals.

The conference features fifteen outstanding researchers as keynote speakers: Professor Dr. A B M Shawkat Ali, SMIEEE, Vice-Chancellor, Bangladesh University of Business and Technology (BUBT), Bangladesh. Former Professor of Data Science, the Fiji University, Fiji, Dr. A.K.M. Azharul Islam (Professor Emeritus and former Vice-Chancellor, IIUC, Bangladesh), Prof. Dr. Abdullah Al-Mamun (IIUM, Malaysia), Prof. Christophe Fumeaux (The University of Queensland, Australia), Dr. M. Rezwan Khan (Professor Emeritus, United International University, Bangladesh), Prof. Dr. Debabati Guha (University of Calcutta, India), Mohammad Dr. Ashik Mosaddik (East West University, Bangladesh), Dr. M. Moshiul Hoque (CUET, Bangladesh), Prof. Dr. Mohamed-Slim Alouini (King Abdullah University of Science and Technology, KSA), Prof. Ir. Dr. Nofri Yenita Binti Dahlan (Universiti Teknologi MARA, Malaysia), Prof. Dr. Pharkphoom Panichayupakaranant (Prince of Songkla University, Thailand), Prof. Dr. Ryo Maezono (JAIST, Japan), Dr. Sanghamitra Bandyopadhyay (Indian Statistical Institute, India), Prof. Dr. Subarna Shakya (Tribhuvan University, Nepal), and Prof. Dr. Ujjwal Maulik (Jadavpur University, India). In addition, we will have twelve invited talks by renowned speakers from various universities, both local and international. My heartfelt thanks to all our respected speakers for their time and effort.

My sincere appreciation and gratitude go to the organizing committee, various sub-committees, advisory committee, technical program committee, and reviewers for their dedication and support leading up to this day. I also acknowledge the financial support and sponsorship from all the sponsoring organizations, which contributed to the successful completion of this conference.

I encourage your active participation in ICISET 2024 to help make this conference a grand success. Enjoy your stay on the green campus of IIUC and in Chattogram, the Port City of Bangladesh.


Prof. Mohammed Shamsul Alam

MESSAGE



Co-Chair
Organizing Committee, ICISET 2024
Associate Professor, Dept. of EEE
International Islamic University Chittagong

It is my immense pleasure and honor to welcome you all to the 4th International Conference on Innovations in Science, Engineering, and Technology (ICISET) 2024, hosted by the Faculty of Science and Engineering at the International Islamic University Chittagong (IIUC). As an organizing co-chair, I am thrilled to be part of this landmark event and to share in the excitement of exploring the latest advancements and innovations in our fields.

First and foremost, I would like to extend my deepest gratitude to the esteemed authorities of IIUC. The leadership and vision of IIUC's administration have been instrumental in creating an environment that fosters academic excellence and research innovation. A heartfelt thanks is also due to the dedicated faculty members of the Faculty of Science and Engineering at IIUC. Our sincere appreciation extends to the reviewers, whose meticulous evaluations have significantly contributed to the quality and rigor of the conference proceedings. The integrity of the review process enhances the scholarly value of our conference, and for this, we are deeply thankful to them. We also wish to acknowledge and express our gratitude to the IEEE Bangladesh Section (IEEE BDS) for their invaluable support and partnership. The IEEE is a global leader in advancing technology for humanity, and our collaboration with IEEE BDS has greatly enriched the scope and impact of ICISET.

IEEE technical conferences play a pivotal role in bridging the gap between theoretical research and practical applications. They offer a venue for presenting cutting-edge research, discussing emerging trends, and tackling the complex challenges that lie ahead. ICISET 2024, with its focus on innovations across these domains, aims to highlight the transformative potential of new ideas and technologies. This conference serves as a catalyst for discovering novel solutions, exploring interdisciplinary approaches, and fostering collaborations that can lead to significant advancements. Over the course of this conference, participants will have the opportunity to engage with leading experts, attend thought-provoking sessions, and explore a wide range of topics that reflect the diverse and dynamic nature of our fields. I hope, the contributions will be instrumental in making ICISET 2024 a successful and enriching experience for all.

In closing, I extend my best wishes to each of you for a productive, inspiring, and enjoyable conference. May ICISET 2024 be a source of valuable insights, fruitful collaborations, and lasting impact. Again, thanks to everyone who helped make this event a success. Your dedication and support are deeply appreciated, and I look forward to a memorable and impactful conference.

Welcome to ICISET 2024, and let us make this conference a remarkable journey of discovery and advancement. Thank you.

A handwritten signature in black ink, appearing to read "Shaq".

Dr. Md. Shamimul Haque Choudhury

MESSAGE



Member Secretary
Organizing Committee, ICISET 2024
Associate Professor, Department of CSE
International Islamic University Chittagong

It is a great honour and privilege for me to address you all on the occasion of 2024 International Conference on Innovations in Science, Engineering, and Technology (ICISET 2024). This multidisciplinary international conference, now in its fourth edition, is a testament to the continued dedication of the Faculty of Science and Engineering at the International Islamic University Chittagong, in collaboration with the Center for Research and Publication. Since its inception in 2016, ICISET has continued to grow in both scope and impact scope, and we are grateful for the ongoing support of the IEEE Bangladesh Section, as our esteemed Technical Co-sponsor.

ICISET 2024 aims to provide a platform for scientists, engineers, researchers, and students to present their latest findings and share experiences across diverse fields, including Computer Science, Electrical Engineering, Telecommunication, Pharmacy, and other related disciplines. This conference aspires to foster collaboration and meaningful exchanges between academia and industry, driving innovative solutions to contemporary challenges.

I would like to extend my heartfelt thanks to the organizing committee, sub-committees, advisory and technical committees, track chairs, and reviewers, whose tireless efforts have made this event possible. Our deepest appreciation also goes to the IIUC authorities, patrons, sponsors, partners, and IEEE Bangladesh Section for their invaluable contributions.

Finally, my sincere gratitude goes to the authors and participants of ICISET 2024. Your contributions and active participation are what make this conference truly meaningful. As we embark on this journey of knowledge sharing and innovation, I pray that Allah blesses ICISET 2024 with success and makes it a source of goodness and inspiration for all.

Dr. Mohd. Moazzam Hossen

MESSAGE



Technical Member Secretary,
ICISET 2024
& Associate Professor,
Department of Electrical and Electronic Engineering
International Islamic University Chittagong

It is a great honor and privilege for me to write a few words on the occasion of 2024 International Conference on Innovations in Science, Engineering, and Technology (ICISET2024). This is the 4th instance Faculty of Science and Engineering of International Islamic University Chittagong, in association with the Center for Research and Publication, is organizing ICISET. Like the previous instance, IEEE Bangladesh Section has generously agreed to become the technical co-sponsor of this grand event.

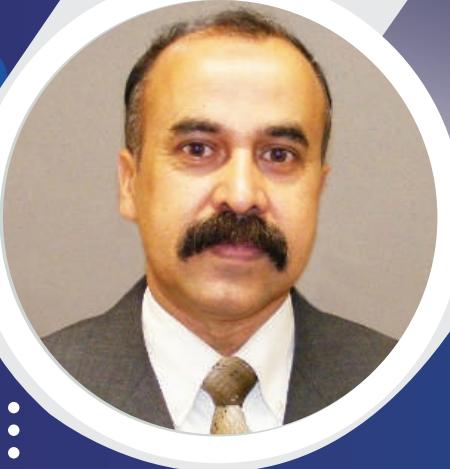
ICISET 2024 attracted researchers from all over Bangladesh as well as from distant corners of the globe. They all together submitted 498 papers in ICISET 2024. Each of the submitted papers has gone through a rigorous review process, and only 180 of them got acceptance for presentation in the conference. Finally, registered papers are going to be presented in about 24 parallel technical sessions of ICISET 2024. In addition to that, we have 15 keynotes and 11 invited talks from distinguished faculty members of several renowned universities.

I would like to seize this opportunity to express my heartfelt thanks to all the people who worked hard behind the scenes, the organizing committee and sub-committee members, advisory and technical committee members, track chairs, and the reviewers. We are thankful to IIUC authorities, our patrons, sponsors, partners and our technical co-sponsor, IEEE Bangladesh Section. Last but not least, my appreciation should go to the authors and participants of ICISET 2024 for whom we have all gathered together.

I wish Allah makes ICISET 2024 a grand success and a source of goodness.

A handwritten signature in black ink, appearing to read "Sunbeam".

Dr. Sikder Sunbeam Islam



Professor Dr. A B M Shawkat Ali, SMIEEE

Vice-Chancellor

Bangladesh University of Business and Technology
(BUBT), Bangladesh.

Former Professor of Data Science, the Fiji University, Fiji
e-mail: shawkata@unifiji.ac.fj,

Securing Landownership Through Blockchain DApp for Fraud Prevention in Real Estate Transactions

Abstract: This project presents the development and implementation of a blockchain-based decentralized application (DApp) for securing land ownership. The proposed system leverages the Ethereum blockchain, smart contracts, and the Inter Planetary File System (IPFS) to create a secure, transparent, and efficient land registration and ownership transfer process. The system addresses key issues in the current land registration process, such as fraud, inefficiency, and lack of transparency, by eliminating intermediaries and automating transactions, the architecture of the DApp, its implementation, and the potential impact on the real estate sector.

Biography: For over 25 years, Professor A B M Shawkat Ali has been working in universities across Asia, Australia, and the South Pacific in the area of Computer Science. He is a professor and Vice Chancellor at Bangladesh University of Business and Technology (BUBT), Dhaka, and a Data Scientist Consultant for the industry. He also worked as a Senate member and Council member (elected) and has chaired the various program evaluation and academic promotion committees. He obtained his PhD from Monash University, Australia, in Machine Learning and has substantial experience as a lecturer, researcher, program coordinator, research coordinator, Head of Department, Dean of School, and Acting Vice-Chancellor. He has published over 150 books, book chapters, journals and conference papers. Under international collaboration, he established two international conferences in Fiji, the first conferences in the South Pacific in Computer Science and Engineering. He has received over 8 million research grants from industry, government, and international communities such as EU, USAID, World Bank, Canadian Grant Authority, and Australian industries. He has been awarded several awards, including the Project of the Year from Thales Australia, the Vice-Chancellor Research Excellence award from The University of Fiji, the Outstanding Leadership Award from IEEE, the Top 10 Course Designers CQ University, the Excellence in Supervision Award CQ University, and the Post-Graduation Publication Award Monash University. He is a senior member of IEEE, the world's largest professional organization.



Dr. A.K.M. Azharul Islam

CPhys, FBAS

Professor Emeritus and former Vice-Chancellor,
International Islamic University Chittagong, Bangladesh
e-mail: azi46@ru.ac.bd

MXene based Nanotech Wonders: 'Science Fiction' or Emerging Reality

Abstract: Nanotechnology, a cutting-edge field of study in the twenty-first century, is the manipulation of matter at the nanoscale level. MXenes, a fascinating class of 2D materials, are thin flakes, often just a few nm thick, composed of transition metal carbides/nitrides/borides. They have drawn the interest of researchers from all around the world. Several techniques can be applied to change the properties of these particles at the nanoscale to acquire new qualities useful in a wide range of innovative applications. Enhanced durability, strength, water-resistance and conductive resistance, engineered nanomaterials have found their way in diverse areas of consumer products like cosmetics, textiles, coatings, medicine etc.

2D nanotech has driven revolutionary innovations in the medical field, particularly concerning improved drug delivery and bioelectronics, biosensors, gas sensors, tissue engineering, and therapeutics. MXenes are being explored for environmental applications, e.g., adsorption of organic pollutants such as dyes, medicines, organic chemicals, and heavy metals.

Among the several disruptive technologies that have developed with the Fourth Industrial Revolution, nanotech is considered one of the major worldwide tech research initiatives of the 21st century.

MXenes hold immense promise in energy storage applications also, particularly as superconductors. However, there is a challenge - during processing, MXenes tend to restack, reducing their accessibility and hindering their performance. A very recent study revolutionizes energy storage and more by showing the road from 2D to 3D. By allowing MXene to seep into a porous ceramic scaffold, 2D MXene nanosheets are ordered into a 3D structure in this creative approach. The process of freeze-casting yields open-pore structures with regulated dimensions and directionality when applied to the creation of the ceramic scaffold. This 3D configuration optimizes the surface area of the nanomaterials for reactions while guaranteeing an adequate volume. This material system exhibits remarkable experimental results and has the potential to be used in various applications such as batteries, fuel cells, decarbonization systems, and catalytic devices. Its electrical conductivity may be precisely adjusted by adjusting the MXene content and the porosity of the backbone. One day, MXene supercapacitors might even run our electric cars.

Thus MXene's role for shaping the future of nanotech, although not apparent to many of us and even once confined to the realms of science fiction, is not science fiction but rather a real world with a tangible reality with immense potential. In summary, MXenes are bridging the gap between imagination and practicality, ushering in a new era of nanotech.

Biography: Prof. Dr. A.K.M. Azharul Islam, Professor Emeritus and former Vice-Chancellor of International Islamic University Chittagong, was born in Bogra, Bangladesh on 2nd November 1946.

Academic Qualifications: Prof. Islam graduated in Physics from the University of Rajshahi. He secured First Class and First position in both B.Sc. Hons. & M.Sc. He has successfully pursued DIC from Imperial College of Sci. & Tech., London in the year 1969. He was awarded Ph. D. in 1972 from London University.

Prof. Islam's field of research areas are: (i) Elementary particle physics during 1967 - 1978, (ii) Condensed Matter Physics with current interest in Superconductivity, defects of solids, electronic structure of materials, MAX phases and 2D MXenes (since 1978).

National and International Awards (= 16):

Prof Islam is an ISESCO Laureate with 3 International and 13 National awards.

Professional Experience: Prof. Islam served Rajshahi University as a Lecturer in Physics from January 1968. He became Professor in early 1984. During his long 45-year teaching career he served as:

Chairman, Department of Physics, Dean, Faculty of Science, Rajshahi University.

Member of Senate, Syndicate, Academic Councils of Rajshahi and other Universities.

Member, Board of Governors, RCMP, Chittagong University.

Editor-in-Chief, Journal of Scientific Research; Member, Editorial Board, J Bang. Acad. Sci., Rajshahi Univ. Studies.

Reviewer of more than thirty International Journals, and few national journals.

Publications and Research Guidance: Professor Islam already guided 125 research students for their M.Sc, M.Phil and Ph.D works – currently guiding 4 research students including 2 MPhil/Ph.D students.

Total number of Publications = 488; Among these are 292 research publications in International research journals. Visit:

<https://www.researchgate.net/profile/A-K-M-Islam> ;

<https://scholar.google.com/citations?hl=en&user=yO2PTYQAAAAJ>

175 general articles published on Science, Education and National & International issues (Malaysia, Indonesia, India, UK); **21 books** (published nationally and in India & New York); He has edited Proceedings of International Workshop (catalogued by US

Library of Congress, ICTP & other libraries of the world, <https://lccn.loc.gov/99938837>).

His book “Bedevilled world” on contemporary socio-political events was published by Global Media Publications (New Delhi, India, 2008, 324 pages), see OCLC WorldCat Bedevilled world.

Co-discoverer of a Perovskite-type oxide Superconductor with Japanese physicists. For more information visit: http://www.spring8.or.jp/en/news_publications/press_release/2014/140303/

Research Gate

<https://www.researchgate.net/profile/A-K-M-Islam>

Prof. Islam carried out research as a Post-doctoral Fellow at Imperial College (London); J. J. Thomson Laboratory (Reading University, UK) on Royal Society Fellowship. He has also worked as visiting scientist at: (i) University of Cambridge (U.K), (ii) Jawaharlal Nehru Centre for Advanced Research, Bangalore (India), and (iii) ICTP (Italy) as a Regular Associate and then as a Senior Associate; (iv) Yamanashi University, Japan, under joint UGC-Japan research project.

Conferences and Seminars: Prof. Islam so far visited 28 countries and attended 54 international conferences; Organized two international workshops in 1996 and 1998 (participants from 14 countries).

Prof Islam is an elected Fellow of (i) The Institute of Physics (London), and (ii) Bangladesh Academy of Sciences. He is also Member/Fellow of different professional bodies such as: (i) The New York Academy of Sciences, (ii) The American Physical Society, (iii) AAAS (USA), (iv) The Asian Physical Society, (v) The Bangladesh Physical Society (Vice-President for two years), (vi) Bangladesh Assoc. for the Adv. of Science. He is also a Life Member of Bangla Academy (Dhaka) and a few other Societies.



Prof. Dr. Abdullah Al-Mamun

C.Eng., P. Eng, FIEB.
Cataclysmic Management and Sustainable Development
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Sustainable Drainage and Stormwater Management for Bangladesh

Abstract: Floods are one of the natural disasters that commonly occur in many parts of the tropical region. Bangladesh is one of the countries affected by floods, whether caused by heavy rainfall or typhoons. However, due to climate change, exceptionally high rainfall events are also occurring more frequently in the arid regions, causing unexpected floods, and affecting lives, the economy, health, etc. Proper management of stormwater in an integrated manner is one of the sustainable ways to reduce the effect of floods and other issues on society and the environment. Stormwater drainage is one of the integral parts of urban and rural infrastructure. Until the 1970s, the focus on stormwater management was conveyance-oriented; mainly to channel the runoff flow safely without causing any flooding. However, extensive studies worldwide revealed that stormwater also carries significant amounts of pollutants, leading to the necessity of controlling non-point source (NPS) or runoff pollution. As such, the modern concept of stormwater management not only involves "quantity control," but also due attention is given to "quality control." This speech is intended to highlight the main features of an integrated stormwater management system, where runoff is not only considered a nuisance but also a potential natural resource. Especial attention is given to the need and prospects of integrated stormwater management systems to reduce the impacts of stormwater-related damages in one of the rapidly developing countries of the world, Bangladesh.

Keywords: Climate Change, Environment, Non-point Source Pollution, Rainfall-runoff, Stormwater, Sustainable Drainage and Urban Flood.

Biography: **Dr. Abdullah Al Mamun** received a Ph.D. degree in Environmental Engineering from the University Putra Malaysia. He received B.Sc. in Civil Engineering and M.Sc. in Environmental Engineering degrees from BUET, Bangladesh, and University Putra Malaysia, respectively. He is currently serving as a Professor of Civil Engineering at International Islamic University Malaysia (IIUM). His research interests include Hydrology, Water Pollution Control, Water and Wastewater Treatment, Urban Stormwater Management, Flood Mitigation and Integrated River Basin Management.

He has 18 years of engineering teaching experience at an international university and 31 years of professional experience in Civil Engineering (water and environment sector). As a practicing engineer, he worked full-time for 12 years in various engineering companies before joining the teaching profession in January 2006. He had great opportunities working with international consultants in the water and environment sectors. He is a life Fellow of the Institution of Engineers Bangladesh (FIEB).

He is active in acquiring research grants (RM 1.64 million), conducting research (25 grants), presenting conference papers (104 papers) and publishing research findings in the referred journal papers (88 papers), writing & editing books and chapters (1 book as author, 3 books as editor, and 16 book chapters as author), product & process development (27 awards, 3 patents granted and 1 more pending) and part-time engineering consultancy (36 various projects).

Dr. Abdullah has already supervised 14 post-graduate students, and 76 undergraduate students; and examined the theses of 20 post-graduate students (8 internal and 12 external examiners). He was invited as a trainer, speaker, and session chair for 16 events on water and environmental engineering topics.



وَمَا أُفْتِنْتُكُمْ عَنِ الْعِلْمِ إِلَّا قَلِيلًا

“You have been given only a little knowledge.”
Surah Al-Isra (17:85)

**Mohammad Dr. Ashik Mosaddik**

Professor of Pharmacy
Pro-Vice Chancellor,
East West University, Bangladesh
e-mail: mamosaddik@ru.ac.bd and pro-vc@ewubd.edu

Nanomedicine: A Revolution in Pharmaceutical Sciences

Abstract: In recent years, there has been a growing interest in applying scientific methodologies to unravel the mysteries of the natural world. Remarkable progress has been achieved in pharmaceutical and medical research, particularly through the incorporation of nanotechnology (NT) in medicine and drug development. This integration holds great promise for improving disease detection, treatment, and prevention. There is a renewed focus on the potential medical applications of nanomaterials (NMs) in biomedicine. NMs have become essential in modern medicine, serving as contrast agents in imaging and as carriers for drug and gene delivery to tumors. Nanoparticles (NPs) have facilitated groundbreaking analyses and treatments that were previously unattainable, but they also pose environmental and societal challenges, especially in terms of their potential toxicity. Therefore, it is essential to comprehensively assess the clinical implications of NPs. A deeper understanding of their impact on diseases could lead to more advanced diagnostics and more effective treatment methods. This overview underscores the vital role of NPs in modern medicine and drug delivery systems, while also examining the potential future impact of NT in medicine and pharmaceuticals.

Biography: Professor Mosaddik currently serves as the Pro-Vice Chancellor of East West University Dhaka. Previously, he was the Pro-Vice Chancellor of Varendra University, Rajshahi. He holds the position of Professor at the Pharmacy Department of Rajshahi University. With his extensive experience and expertise, Professor Mosaddik has significantly contributed to the advancement of pharmaceutical sciences. He also worked as a Research Professor at Damman University on Nanotechnology. During his Postdoctoral research on Plant Metabolomics and Anticancer via Apoptosis at Jeju National University of South Korea, he demonstrated exceptional research skills and a keen interest in exploring novel approaches for treating cancer. Furthermore, his Ph.D. in Phytochemistry and Phytopharmacology from the Centre for Phytochemistry at the University of Southern Cross, NSW, Australia showcases his commitment to deepening his understanding of medicinal plant constituents and their potential therapeutic applications. Professor Mosaddik's academic accomplishments have been recognized both nationally and internationally. He received the Commonwealth Government Fellowship from the Government of Australia and the Vice Chancellor Award for his outstanding results in his B. Pharm and M. Pharm degrees. He has also been awarded the Best Poster Award from RACI Natural Product Group of NSW, Australia, and the Best Poster Award at the International Conference on Nutrition and Physical Activity in Aging, Obesity, and Cancer. His notable achievements include winning the prestigious TWAS and BAS Young Scientist (Junior Group) Award in 2011 in Biological Sciences. Professor Mosaddik is an active contributor to scientific journals and has published approximately 145 research articles in esteemed journals such as Food Chemistry, Journal of Food Science, Phytomedicine, and Phototherapy Research and published 5 book Chapters with esteemed publishers. He has already been listed as the top 2% scientist by Stanford University and Elsevier Science for the last five years from 2020 to 2024. Professor Mosaddik also currently serves as the Chair of the National Expert Committee in Pharmacy Education by Bangladesh Accreditation Council (BAC) from 2023. Moreover, Professor Ashik Mosaddik has mentored several Ph.D. students, provided guidance, and fostered their

research skills. Under his supervision, eight Ph.D. students have completed their studies, and his dedication to developing the next generation of researchers is commendable. He can be reached via email: pro-vc@ewubd.edu .

“
"IF YOU TEACH YOUR CHILDREN THE THREE R's (OF READING, WRITING AND ARITHMETIC)
AND LEAVE THE FOURTH R (OF RELIGION), YOU WILL GET A FIFTH R (OF RASCALITY)".

-STANLEY HALL



Prof. Christophe Fumeaux

FIEEE.

President-Elect of the IEEE Antennas and Propagation Society, <https://ieeaps.org>
School of Electrical Engineering and Computer Science
The University of Queensland
Brisbane QLD 4072 Australia
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75 Years of IEEE AP-S Research: Retrospective and Future Prospects for Antenna Technologies and Applications

Abstract: The IEEE Antennas and Propagation Society (AP-S) is celebrating its 75th anniversary. This jubilee is a perfect occasion to celebrate the rich history of fundamental developments in antenna technologies, which have shaped wireless technologies in the last decades.

The presentation will start with an overview of the status of the IEEE Antennas and Propagation Society, including a description of current directions and activities. It will then review historical research achievements in the fields of electromagnetics, antennas, and propagation. Selected examples of evolutions from classical antennas to state-of-the-art devices will be examined, in conjunction with their applications in wireless communications, remote sensing, and biomedical engineering.

The highlighted research achievements will include examples from mobile to satellite communications and from reflect arrays to the reconfigurable intelligent surfaces that will shape the propagation channels of the future. The presentation will also describe how the understanding of electromagnetic wave interactions with the human body has enabled the field of bio-electromagnetics to evolve: it has progressed from investigations of the damages caused by excessive exposure to harnessing electromagnetic waves for medical monitoring, diagnostics, or even treatment. If the past is a predictor of the future, advances in antennas and propagation will continue to open exciting new possibilities for tomorrow's wireless technologies.

Biography: Christophe Fumeaux received his Ph.D. degree from ETH Zurich, Switzerland, in 1997. From 1998 to 2008, he held various positions at the University of Central Florida, the Swiss Federal Office of Metrology, and ETH Zurich. From 2008 to 2023, he was a Professor with The University of Adelaide, Australia. In 2023, he joined the School of Electrical Engineering and Computer Science at The University of Queensland, Brisbane, as Chair Professor in Optical and Microwave Engineering. His main research interests concern applied electromagnetics, antenna engineering, and the application of RF design principles across the electromagnetic spectrum. Prof. Fumeaux was the recipient of the ETH Medal for his doctoral dissertation. From 2011 to 2015, he was a Future Fellow of the Australian Research Council. He was the recipient of the 2018 Edward E. Altshuler Prize, the 2014 IEEE Sensors Journal and the 2004 ACES Journal best paper awards. He received the University of Adelaide Stephen Cole the Elder Award for Excellence in Higher Degree by Research Supervisory Practice in 2018. He served as an Associate Editor for the IEEE Transactions on Microwave Theory and Techniques, and as Senior Associate Editor and Associate Editor-in-Chief for the IEEE Transactions on Antennas and Propagation. From 2017 to early 2023, he served as the Editor-in-Chief for the IEEE Antennas and Wireless Propagation Letters. He is the 2024 President-Elect of the IEEE Antennas and Propagation Society. He is a Fellow of the IEEE.



Prof . Dr. Debatosh Guha

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Antenna Technology in the Light of 75th Anniversary of IEEE Antennas and Propagation Society

Abstract: Now a days, ‘Antenna’ has been a popular term among the common people, but it was not like that even just 137 years ago. Heinrich Hertz, while trying to experimentally validate Maxwell’s Theory at his workplace in Karlsruhe in 1887, first conceptualized the antenna system. Since then, ANTENNA grew fast and became tremendously relevant, giving birth to the “Working Group on Antennas and Wave Propagation” under IRE in 1949. Over this intermediate time of 62 years (1887-1949), ‘Antenna’ (read ‘antenna engineers’) played massive roles towards the growth and transformation of science and technology in general. This talk intends to highlight this aspect with deeper insight into ‘antenna science and engineering’.

Biography: **Guha** is a Professor in Radio Physics and Electronics, University of Calcutta. He is a Fellow of IEEE, an Abdul Kalam National Fellow, Govt. of India, and also a fellow of all four National Academies for Sciences and Engineering in India. He served IEEE Transactions on Antennas and Propagation and IEEE Antennas and Wireless Propagation Letters as an Associate Editor, and IEEE Antennas and Propagation Magazine as a Section Editor. He has been serving the IEEE AP Society and URSI Commission-B in various capacities. At present, he is the Chair of the IEEE AP-S MGA Committee and also a Distinguished Lecturer of the IEEE AP Society. His research interests include low-profile antenna techniques.

**Dr. M. Moshiul Hoque**

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Multimodal Aggressive Memes Classification in Low-Resources Languages

Abstract: Internet memes have become a powerful means for individuals to express emotions, thoughts, and perspectives on social media. While often considered a source of humor and entertainment, memes can also disseminate hateful content targeting individuals or communities. Most existing research focuses on the negative aspects of memes in high-resource languages, overlooking the distinctive challenges associated with low-resource languages like Bengali (also known as Bangla). Furthermore, while previous work on Bengali memes has focused on detecting hateful memes, there has been no work on detecting their targeted entities. To bridge this gap and facilitate research, we introduce a couple of novel multimodal datasets: BHM (Bengali Hateful Memes) and MIMOSA (MultiIModal aggreSSion dAtaset) in Bengali. The first dataset consists of 7,148 memes with Bengali as well as code-mixed captions, tailored for two tasks: (i) detecting hateful memes and (ii) detecting the social entities they target (i.e., Individual, Organization, Community, and Society). MIMOSA encompasses 4,848 annotated memes across five aggression target categories: Political, Gender, Religious, Others, and non-aggressive.

This talk covers two critical Multimodal Aggressive Memes classification tasks and shares their outcomes based on two developed datasets. The 1st task presents a solution, DORA (Dual cO-attention fRAmework), a multimodal deep neural network that systematically extracts significant modality features from memes. It then evaluates these features with modality-specific features to better understand the context. Our experiments show that DORA is effective on our low-resource hateful meme datasets and outperforms several state-of-the-art rivaling baselines. The 2nd task introduces a model, MAF (Multimodal Attentive Fusion), a simple yet effective approach that uses multimodal context to detect the aggression targets. MAF captures the selective modality-specific features of the input meme and jointly evaluates them with individual modality features. Experiments on MIMOSA exhibit that the proposed method outperforms several state-of-the-art rivaling approaches.

Biography: Dr. M. Moshiul Hoque is a professor in the Dept. of Computer Science & Engineering and Director of Sheikh Kamal IT Business Incubator at Chittagong University of Engineering & Technology (CUET). He was head of the Department of Computer Science & Engineering and Dean of the Faculty of Electrical & Computer Engineering, CUET. Dr. Hoque received a Ph.D. in Information & Computer Sciences from Saitama University (Japan), an M.Sc. Engg. in CSE from BUET, and a B.Sc. Engg. in EEE from CUET, respectively. He is the founding director of the CUET Natural Language Processing (NLP) Lab. Currently, Dr. Hoque is acting as the Chair of the IEEE Bangladesh Section. He has published more than 220 articles in several international journals and conferences. His research works have been awarded to several international conferences, such as HIS 2011, EICT 2013, IEMIS 2018, ICO 2019, ICIoTCT 2020 and CONSTRAINT-AAAI 2021, ICCIT 2022, and IEEE WIECON-ECE 2022.

Dr. Hoque worked in several technical committees of IEEE/IEEE BDS co-sponsored conferences such as Organizing Chair (ECCE 2023, ICCIT 2022/23, IEEE WEICON-ECE 2022/23), TPC

Chair (ACMI 2021, ICREST 2021-23, ECCE 2019, IEEE R10 HTC 2017), TPC Co-chair (IEEE R10 IEEE HTC 17, TENSYMP 2020, ICISET 2018/21, IEEE WIECON-ECE 21) & Publication Chair (IEEE ECE WIECON 2018-19, IEEER10 TENSYMP 2020). His research interests include Human-Robot/Computer Interaction, Machine Learning, and Natural Language Processing. Dr. Hoque is a Senior Member of IEEE, IEEE Computer Society, IEEE Robotics & Automation Society, IEEE Women in Engineering Affinity Group, IEEE Signal Processing Society, USA, and a Fellow of the Institute of Engineers, Bangladesh.

“Are Those Equal, Those Who Know And Those Who Do Not Know? It Is Those Who Are Endued With Understanding That Receive Admonition”

- Sura Az Zumar : 9



Prof. Dr. Mohamed-Slim Alouini

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Towards Connecting the Remaining 3 billion

Abstract: The transformative influence of the Internet and Communication Technology (ICT) has reshaped society, touching every aspect from the economy to healthcare. As the widespread deployment of 5G continues, there is an on-going focus on the inception of the sixth generation (6G) of wireless communication systems (WCSs). Anticipated to shape the future of connectivity in the 2030s, 6G aims to deliver unparalleled communication services to meet the demands of hyper-connectivity.

While densely populated urban areas have traditionally been the primary beneficiaries of WCS advancements, the vision for 6G transcends city limits. Aligned with the United Nations' sustainability goals for 2030, an important aspect of 6G endeavors to democratize the benefits of ICT, fostering global connectivity sustainably. This talk delves into this particular envisioned landscape of 6G, providing insights into the future of wireless communication and guiding research efforts towards sustainable, inclusive, and high-speed connectivity solutions for the future. Central to this discussion are two emerging technologies: Free Space Optics (FSO) and Non-Terrestrial Networks (NTN). These innovative solutions hold the promise of extending high-speed connectivity beyond urban hubs to underserved regions, fostering digital inclusivity, and contributing to the development of remote areas. Through this exploration, we aim to convey the potential of 6G and its role in shaping a connected, sustainable future for all.

Biography: Mohamed-Slim Alouini was born in Tunis, Tunisia. He received the Ph.D. degree in Electrical Engineering from the California Institute of Technology (Caltech) in 1998. He served as a faculty member at the University of Minnesota then at Texas A & M University at Qatar, before joining in 2009 the King Abdullah University of Science and Technology (KAUST) where he is now the Al-Khawarizmi Distinguished Professor of Electrical and Computer Engineering. Prof. Alouini is a Fellow of IEEE and OPTICA (Formerly the Optical Society of America (OSA)). He is currently particularly interested in addressing the technical challenges associated with the uneven distribution, access to, and use of information and communication technologies in far-flung, rural, low-density populations, low-income, and/or hard-to-reach areas.



Prof. Ir. Dr. Nofri Yenita Binti Dahlan

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Empowering Research and Innovations: Revolutionizing Campus Sustainability through Smart Microgrids

Abstract: This keynote explores the transformative potential of smart microgrids in enhancing campus sustainability amidst global trends in renewable energy (RE) technology. By integrating renewable energy sources, energy storage, advanced control systems, and artificial intelligence, smart microgrids offer universities a path towards greater energy independence, efficiency, and resilience. The discussion also encompasses policy frameworks, RE programs, evolving business models, and collaborative partnerships shaping the adoption of smart microgrid solutions.

Biography: Ir. Dr. Nofri Yenita Binti Dahlan is a Professor in the School of Electrical Engineering, Universiti Teknologi MARA (UiTM) Shah Alam, Malaysia. Currently, she serves as the Director of UiTM Solar Research Institute (SRI). She received an Electrical Engineering Degree, a B. Eng (Hons) from Universiti Tenaga National (UNITEN) Malaysia in 2001, an M.Sc. degree from the University of Manchester Institute of Science and Technology (UMIST), UK, in 2003, and a Ph.D. degree from the University of Manchester, UK, in 2011.

Her research interest has focused on power generation investment, energy economics and policy, electricity market, energy modelling, renewable energy, energy savings and efficiency. In recognition for her achievements in the fields, she has been awarded a Certified Measurement and Verification Professional (CMVP) in 2014 from the Efficiency Valuation Organization (EVO) and Association of Energy Engineers (AEE), U.S. She also served as policy consultant for United Nation Industrial Development Organization (UNIDO) Malaysia Energy Efficiency and Solar Thermal Application (MAEESTA) Project. In this exercise, she developed a Policy Brief titled Solar Thermal Deployment Strategy for Malaysian Industries and led the development of three energy efficiency and conservation guidelines for Energy Commission Malaysia. In rural electrification related project, she has partnered with researchers from the United Kingdom to conduct a research project titled “Facilitating a Just, Fair, and Affordable Energy Transition in the Asia-Pacific” for addressing energy justice dimensions of rural electrification, techno-economic analysis of different business models and policy implications of these combined findings through stakeholder workshops. In 2021, she has been featured as a Women Leaders in Energy and Environment by Young Southeast Asia Leaders Initiative (YSEALI) Women’s Leadership Academy Alumni Network and in 2023 as the recipient of the Honorable Mention awards for the 2023 Underwriters Laboratories-ASEAN-US Science Prize for Women. Ir. Dr. Nofri Yenita Dahlan is a Nonresident Fellow at the National Bureau of Asian Research (NBR).



Prof. Dr. Pharkphoom Panichayupakaranant

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Natural Product Innovation Based on the Bio-Circular-Green (BCG) Economy Model

Abstract: In the current domain of natural product innovation, there is a notable shift in global paradigms towards solutions that go beyond mere novelty and commercial feasibility. The emphasis is now on comprehensive approaches that actively address environmental challenges, prioritizing the imperative of the planet's sustainability. With high consumer awareness and heightened regulatory pressures, companies are adopting sustainable practices, following circular economy principles, and incorporating eco-friendly procedures in product development. Since the Asia-Pacific Economic Cooperation (APEC) 2022 meeting in Bangkok, Thailand, the concept of a BCG (Bio/Circular/Green) economy has emerged as a promising strategy. This novel approach envisions a holistic economic system that integrates research-based innovation, emphasizing the value addition of native natural and cultural resources. The BCG economy aims to minimize waste, preserve, and restore ecosystems, ultimately contributing to the establishment of a prosperous and sustainable economic model. This model places a significant emphasis on leveraging science, technology, research, and innovation to transform the inherent strengths in natural enrichment and unique traditional cultures into a competitive advantage. In accordance with the BCG model, a range of healthcare products derived from native plants have been innovated using a green extraction method utilizing alternative eco-friendly solvents. This innovative approach incorporates three key concepts of green extraction. Firstly, it focuses on a short-time and low-energy extraction method that emphasizes efficiency in the extraction process. In contrast to conventional heating extraction methods like reflux and Soxhlet, which can be resource-intensive in terms of time and energy, microwave extraction has gained approval as a green extraction method due to its significantly lower energy and time consumption, coupled with the production of high-quality herbal extracts. Secondly, it employs green and reusable solvents, minimizing the environmental impact and promoting sustainability in the production chain. This approach not only holds the potential to reduce production costs but also addresses safety and regulatory concerns associated with the use of hazardous and volatile organic solvents, such as methanol, acetone, ethyl acetate, chloroform, ether, dichloromethane, petroleum ether, and hexane, in the industrial production of herbal products. Lastly, the emphasis is on producing high-quality extracts, ensuring a high level of active compounds in the final products. Various alternative green solvents, including pharmaceutical excipients in pastilles and agro-solvents derived from agricultural resources such as ethanol, vegetable oils, glycerol, D-limonene, and α -pinene, have been successfully employed in the development of nutraceuticals and functional foods using green microwave extraction. Some recent examples of herbal innovations, including three herbal products made from -mangostin, [6]-gingerol, and chamuangone extracts that have been developed based on the BCG model, are presented.

Keywords: BCG economy; Green extraction; Herbal product; Innovation; Microwave.

Reference: Panichayupakaranant, P. Development of natural product innovation based on the bio-circular-green (BCG) economy model. Journal of Nutraceuticals and Health, 2024; 2(1): 3-5.

Biography: Dr. Pharkphoom Panichayupakaranant is a Professor of the Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Thailand. His research interests involved development of herbal products using a green extraction and standardization method, preparation of active constituent-rich herbal extracts, and medicinal plant tissue cultures.

His achievements include:

1. Research publications: 136 documents indexed in SCOPUS and Web of Science
2. h-index = 31 (SCOPUS), = 26 (Web of Science)
3. 15 patents and 19 petty patents
4. International invention awards for herbal products:
 - 4.1 A Gold Medal Award and a Special Award from the International Trade Fair- Ideas, Inventions, and New Products 2022 (iENA 2022), Germany
 - 4.2 A Gold Medal Award and a Special Award from Seoul International Invention Fair 2019, Korea
 - 4.3 A Gold Medal Award from the 45th International Exhibition of Inventions of Geneva 2017, Switzerland
 - 4.4 A Gold Medal Award from the 13th Taipei International Invention Show & Technomart 2017, Taiwan
 - 4.5 A Gold Medal and two Special Award from the 10th International Warsaw Invention Show 2016, Poland
 - 4.6 A Gold Medal and a Special Award from the International Invention & Innovation Exhibition 2016, Malaysia
 - 4.7 A Gold Medal and a Special Award from Brussels Innova Expo 2015, Belgium
5. Editorial boards
- 5.1 Editors-in-Chief for World Journal of Pharmacology
- 5.2 Associate editor for Frontiers in Nutrition (Food Chemistry)
- 5.3 Editorial board for Journal of Health Science and Medical Research (JHSMR).

"Mothers Should Breastfeed Their Children For Two Full Years – For Those Who Wish To Complete The Full Term Of Nursing, And Clothing And Maintenance Must Be Borne By The Father In A Fair Manner."
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Dr. M. Rezwan Khan

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Solar PV in Bangladesh: A Plan to Convert the Consumers to Prosumers for Clean and Cost-Effective Power Generation

Abstract: With the dwindling supply of natural gas from the existing gas fields, Bangladesh is becoming heavily dependent on fossil fuels for its power generation. Although the Rooppur nuclear power Unit-1 is expected to generate power for the national grid from early 2025, it will generate close to 5% of the installed capacity, and the percentage will go up when the Unit-2 is commissioned. However, by that time it is expected that the total power requirement will also go higher, making the overall nuclear power less than 8% of the generation capacity. So, it is very clear that Bangladesh will have to dominantly depend on fossil fuels in the near future. Considering the sunshine availability in Bangladesh, the prospect of solar PV in Bangladesh power system is quite high even if we consider the land requirement and the system stability.

Rapid growth of solar PV in Bangladesh power system, prompted by low PV cost in the world market, has the main challenge of land availability, as it is feared that agricultural lands will be lost if Bangladesh chooses to generate a high percentage of solar electricity. However, this problem can be mitigated by encouraging rooftop solar in the industries and in commercial and domestic rooftops. A conservative estimate indicates that it is possible to install close to 10,000 MWp from domestic and commercial roof tops in the peri-urban and rural areas. Another 8,000 MWp can be established in the industrial roof tops. So, it seems that within the next 5-10 years Bangladesh may be producing close to 50% of its electrical energy from solar PV, including the large-scale solar farms. The figures look very encouraging from a low carbon point of view, but on the hindside, large percentage of solar PV penetration would require an energy storage system to cater for the intermittent nature of PV generation and power supply in the night hours. As the price of solar PV energy is at least 40% lower than the present cost of electricity generation, it is very important for Bangladesh to make a holistic plan to move forward with solar PV installations.

In this presentation, the possible technical and policy options are discussed to encourage the consumers to become prosumers (producers and consumers) so that the burden of importing of fossil fuels by spending hard earned foreign currency is significantly reduced.

Biography: Prof. M. Rezwan Khan completed his B.Sc. in Electrical and Electronic Engineering from Bangladesh University of Engineering and Technology (BUET), the leading technical university in Bangladesh, in 1980. He then obtained his M.Sc. and Ph.D. from University College London, UK, in 1982 and 1986, respectively. He is presently serving as a Professor Emeritus and the Executive Director of the Institute for Advanced Research (IAR) at the United International University (UIU), Bangladesh. IAR provides funds to the faculty members to conduct collaborative research with other institutions at home and abroad.

Prof. Khan has been working on renewable energy, energy efficiency, and energy harvesting for the last 25 years. He has been serving as the Chairman of the Technical Standard Committee of Infrastructure Development Company Limited (IDCOL), the largest financial organization in Bangladesh in the renewable energy sector. Under his technical guidance, IDCOL has so far financed more than 5 million solar home systems in Bangladesh, the largest solar home system program in the world. IDCOL presently funds solar irrigation systems, roof top solar for industries, and large-scale grid integrated solar PV systems.

So far, as far as renewable energy related R&D is concerned, he has guided a number of national and internationally funded projects like Solar Nanogrid (funded by EPSRC, DFID, UK), development of low-cost technology for energy based applications (funded by EPSRC, DFID, UK), solar ferry boats (IDCOL, Bangladesh), mini solar cold storage for rural applications in Bangladesh (funded by IDCOL, Bangladesh), and analysis on the application of bifacial PV panels for agro-PV applications in the paddy growing fields (funded by UIU, Bangladesh). He also served as the Principal Investigator/country coordinator of a number of projects funded by MECS, UK, like cooking diaries for common Bangladeshi foods while using electric appliances, low-cost inverter-less grid integrated solar PV-based clean cooking technology for household applications, and their field level implementations. He received the Bangladesh Academy of Sciences Gold Medal in 2005 for his outstanding contribution in the field of science and technology in Bangladesh. Prof. Khan is a proponent of DC power system and was selected as the Distinguished Lecturer of IEEE IAS for the year 2017-18.

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Read, ‘O Prophet,’ in the Name of your Lord (Allah) Who created.
Created humans from a clinging clot.
Read, Your lord is Most Generous
Who taught (the use of) by the pen.
Taught humanity what they knew not. (Sura Al Alaq: 1-5)

**Prof. Dr. Ryo Maezono**

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Computational Materials Science in JAIST

Abstract: JAIST is a governmental institute established in 1992, only accommodating post-grad students. More than 50% of students are coming from abroad. There are two research groups majoring in Computational Materials Science located in the School of Information Science, utilizing supercomputers in JAIST. In the talk, I will present several research activities on that field, hybridizing research between Materials and Computer Science.

The properties of a material originate from its atomic geometry. Therefore, the pursuit of novel material properties reduces to the exploration of new geometries, such as crystal structures. Given the structure of a material as input data, one can evaluate its properties through ab initio calculations [2]. Hence, the idea is to vary the trial input structure and search for novel structures that realize novel properties. This began with the initial efforts of randomly altering the input structure [1], but in recent years, techniques to update the input structure using data science methods to enhance search efficiency have been intensively studied. Implementations employing genetic algorithms to update input data have made significant progress. We are applying this technique to predict new crystal structures in ternary hydrides that achieve high Tc superconductors [3-6]. Using the same method, we collaborate with experimental researchers to predict new crystal structures under high pressure [7], and we have succeeded in synthesizing entirely new compounds that were predicted [8]. Parallel to the genetic algorithm, there is the particle swarm algorithm, by which we successfully predicted a new crystal phase with unknown hydrogen crystal structures under high pressure [9].

Keywords: Ab initio, crystal structure, superconductors, genetic algorithm, particle swarm algorithm

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Biography: Dr. Ryo Maezono (PhD/Applied Physics) is a full professor at JAIST (Japan Advanced Institute of Science and Technology), school of Information Science, working on Simulation Science Research area. He got his BSc (1995) and PhD (2000) in Applied Physics at Tokyo University, majoring in condensed matter theory and working on the phase diagrams of magnetic oxides. He was a JSPS fellow (Tokyo University/1999-2000), working on the magnetic properties of oxides. He got a postdoctoral position at Cavendish Laboratory, Cambridge University (EPSRC fellow/2000-2002), and moved to NIMS (National Institute of Materials Science, Japan), as a tenure researcher (2001-2007). In 2007, he moved to JAIST and is now a tenure faculty there. Since his postdoc in Cambridge, he has worked on Diffusion Monte Carlo (DMC) electronic structure calculations using massive parallel computations. He has published several DMC works using world top class huge parallel calculations, exploring the cutting-edge of numerical quantum many-body problems. As an expert of the DMC method, he has given several lectures on many-body problems at Osaka University, Yokohama National University, Kanazawa University, etc., outside of JAIST. As a computer scientist, he has also contributed to the education of simulation science for high school students, whose contents are published in his books (ISBN:978-4627818217, 978-4627170315, 978-9819909186, 978-4627170322). As a researcher of computational materials science, he leads several industrial collaborations with companies (Toyota-Motor/Sumitomo-Mining/Shin-Etsu Chemicals/Asahi glass Inc./Denso Inc./Morita Chemical Inc.), as well as those with an experimental synthesis community in inorganic chemistry.



Albert Einstein said, “Science without Religion is Lame, Religion without Science is Blind.”



Prof. Dr. Subarna Shakya

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Security Challenges in Software as a Service environment

Abstract: Cloud Computing is internet-based computing where all the shared resources, software, and information are provided to the computers and devices on demand. Users can access the information from anywhere and anytime. Software as a service is those services that are provided to the consumers to use the provider's applications running on the cloud. These services can be accessed by clients anywhere, anytime, with the help of various devices, like a thin client interface, as web browser, or a program interface.

Cloud services are helpful to reduce the cost of infrastructure and software. This keynote concentrates on Security Challenges in the SAAS environment. One of the main services provided by cloud computing has the feature of multi-tenancy that virtually provides the services on a one-by-one basis, but physically all users utilize the services at the same time. This keynote mainly addresses an analysis of the cloud computing security issues and challenges, focusing on software as a service of cloud computing. The major issue on cloud is security, which decreases the growth of cloud and increases complications with data privacy and data protection. At the ends of this keynote, focus on the different security challenges in the SAAS environment and some recommendations to address the issues and challenges in the SAAS environment.

Keywords: cloud services, security, SaaS, multi tenancy, data privacy, data protection

Biography: Prof. Dr. Subarna Shakya holds a Ph.D. in Computer Engineering from Lviv Polytechnic National University, Ukraine. He is Professor of Computer Engineering at the Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University, and also served as a Visiting Professor at Brown University, Rhode Island, USA. He is also director of the IT Innovation Center, Tribhuvan University. He served as Executive Director at the National Information Technology Center, Government of Nepal, and also head of the Department of Electronics and Computer Engineering, Director of the Center for Information Technology, and Chairman of the Electronics and Computer Engineering Subject Committee, Institute of Engineering, Tribhuvan University. He has also served as coordinator of EURECA (European Research and Educational Collaboration with Asia), IDEAS (Innovation and Design for Eurasian Scholars), and LEADER (Links in Europe and Asia for engineering, education, enterprise, and research exchanges). The project is financed by the European Commission through the Erasmus Mundus Program. He is the advisor member of the National Information Technology Committee, Government of Nepal. He has delivered over 30 keynotes and invited speeches at international conferences and workshops. He has published over 150 scientific/technical articles and 5 books. He has been serving as an Editor/Guest Editor for over 15 international journals. He is the expert member of the Board of studies at South Asian University, India.

He is the Life Member of Indian society for mathematical modeling and Computer Simulation, IIT, Kanpur, India, Senior Member of IEEE, member of the Society of Digital Information and Wireless Communications, Senior Member of International Association of Computer Science and Information Technology, fellow member of Scientific Society of Advanced research and social change and Senior member of science and engineering institute, (SCIEI), www.sciei.org. He has supervised more than 100 Master's theses, 10 Ph.D. theses, and 7 Ph.D. theses are in progress. He was awarded by Nepal Education Leadership Awards 2017, 18 Dec 2017 and outstanding contribution to education, 17 Dec 2018 by World CSR Day and World Sustainability. He was awarded 100 most dedicated professors, 4th July, 2019 and also awarded best professor in Computer Engineering studies, 10th Dec 2019 by World Education Congress. He is Chief Editor of the Journal of Artificial Intelligence and Capsule Networks (AICN). He has served as Chairman, technical committee and committee member in many international conferences, such as Springer and IEEE related to Computer Science and ICT as chairman. He is a keen interest in research and development of ICT, e-government systems, information security for e-Government system, multimedia system, computer systems simulation and modeling, cloud computing and security, software and information system and computer architecture.

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Hazrat Abu Huraira (RA) said, A man came to the Messenger of Allah (PBUH) and asked, “O Rasulullah, who are among all human beings should I interact more properly?”

Rasulullah replied, “Your mother”

He asked again: “Then who else?”

The Prophet said : “Your mother”

The man repeats his question: “Then who else?”

The Prophet replied: “Your mother”

He repeated the question again: “Then who?”

Rasulullah SAW answered: “Your father”.

- Sahih al-Bukhari

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Applications of Artificial Intelligence Methods in Life Sciences.

Abstract: Artificial Intelligence techniques are finding increasingly innovative applications in life sciences for making novel discoveries and for gaining deeper insights into various processes of life. In this talk, we will first present an introduction to artificial intelligence, molecular biology, and bioinformatics. We will then discuss case studies in three areas, namely single cell RNA-seq data analytics, multi objective optimization in drug design, and graph-based approaches in drug interaction studies.

Biography: Prof. Sanghamitra Bandyopadhyay did her B Tech, M Tech, and Ph.D. in Computer Science from Calcutta University, IIT Kharagpur, and Indian Statistical Institute, respectively. She then joined the Indian Statistical Institute as a faculty member, and became the Director in 2015. Since 2020 she is continuing in her second tenure as the Director of the Institute. Her research interests include computational biology, soft and evolutionary computation, artificial intelligence and machine learning. She is the recipient of several awards, including the Shanti Swarup Bhatnagar Prize in Engineering Science, TWAS Prize, Infosys Prize, JC Bose Fellowship, Swarnajayanti Fellowship, INAE Silver Jubilee Award, INAE Woman Engineer of the Year award (academia), IIT Kharagpur Distinguished Alumni Award, Humboldt Fellowship from Germany, Senior Associateship of ICTP, Italy, young engineer/scientist awards from INSA, INAE, and ISCA, and Dr. Shanker Dayal Sharma Gold Medal and Institute Silver from IIT, Kharagpur, India. She is a Fellow of the Indian National Science Academy (INSA), National Academy of Sciences, India (NASI), Indian National Academy of Engineers (INAE), Indian Academy of Sciences (IASc), Institute of Electrical and Electronic Engineers (IEEE), The World Academy of Sciences (TWAS), International Association for Pattern Recognition (IAPR), and West Bengal Academy of Science and Technology. She serves as a member of the Science, Technology, and Innovation Advisory Council of the Prime Minister of India (PM-STIAC). In 2022, she received the Padma Shri award, the fourth highest civilian award of the Government of India.



Prof. Dr. Ujjwal Maulik

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Machine Learning for Healthcare

Abstract: In this lecture first, we will discuss current trends in Artificial Intelligence (AI) and Machine Learning (ML). In addition to the fundamentals of AI and ML, we will demonstrate the importance of using Deep Learning (DL), Graph Neural Network (GNN) and explainable Artificial Intelligence (AI). While DL has been used very successfully for image analysis, GNN is being used extensively for unstructured datasets, including biological datasets available in the form of graphs containing the interaction between genes, drugs, diseases, etc.

In the second part of the lecture, we will discuss how DL and GNN can be used effectively in the healthcare system with the goal of improving therapeutics. Both image based as well as biological molecule based approaches will be discussed.

Finally, we will discuss the future challenges of AI and ML.

Biography: Dr. Ujjwal Maulik is a Professor in the Dept. of Comp. Sc. and Engg., Jadavpur University since 2004. He was also the former head of the same department. He also held the position of the principal in charge and the Head of the Dept. of Comp. Sc. and Engg., Kalayni Govt. Engg. College. Dr. Maulik has worked in many universities and research laboratories around the world as visiting Professor/ Scientist including Los Alamos National Lab., USA, Univ. of New South Wales, Australia, Univ. of Texas at Arlington, USA, Univ. of Maryland at Baltimore County, USA, Fraunhofer Institute for Autonome Intelligent Systems, St. Augustin, Germany, Tsinghua Univ., China, Sapienza Univ., Rome, Italy, Univ. of Heidelberg, Germany, German Cancer Research Center (DKFZ), Germany, Grenoble INP, France, University of Warsaw, University of Padova, Italy, Corvinus University, Budapest, Hungary, University of Ljubljana, Slovenia, International Center for Theoretical Physics (ICTP), Trieste, Italy. He is the recipient of the Alexander von Humboldt Fellowship, Germany, Senior Associate of ICTP, Italy; and Fulbright-Nehru Academic and Professional Excellence Fellowships, US. He is the Fellow of Indian National Academy of Engineers (INAE), India, National Academy of Science India (NASI), International Association for Pattern Recognition (IAPR), USA; the Institute of Electrical and Electronics Engineers (IEEE), USA; and the Asia-Pacific Artificial Intelligence Association (AAIA), Hong Kong. He is also the distinguish member of the ACM. He is a distinguish speaker of IEEE as well as ACM. His research interests include Machine Learning, Pattern Analysis, Data Science, Bioinformatics, Multi-objective Optimization, Social Networking, IoT and Autonomous Car. In these areas, he has published ten books, more than four hundred papers, mentored several start-ups, filed several patents, and already guided twenty five doctoral students. His other interests include outdoor sports and classical music.



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Electrical and Structural Properties of Superconducting Materials of Ba-Pb-Bi-O

Abstract: Bismuthate superconductor material has a transition from a semiconductor/conductor to a superconductor. Research on this transition temperature has attracted many researchers' attention to reveal this material's superconducting properties. We synthesized the materials by the solid-state reaction method. Samples were synthesized with variations in sintering temperature and also with variations in Bi-doping. X-ray diffractometer (XRD), scanning electron microscope (SEM), and resistivity versus temperature measurements were used to analyze the crystal structure, morphology, and electrical characteristics, respectively. Based on SEM results, there were no significant changes with the increase in sintering temperature. However, from $x = 0$ to 0.40 , there was a change in the crystallization properties, which changed according to the amount of doping of the Bi element. Based on the XRD results, the major phases were $\text{Ba}_4\text{Bi}(\text{PbO}_4)_3$ with a tetragonal crystal structure and $\text{P}4/\text{mmm}$ space group, and BaPbO_3 with a cubic crystal structure and $\text{Pm}-3\text{m}$ space group. The increase in the sintering temperature causes a change in the insulator-metal-insulator properties. In the variation of Bi composition, the evolution of phase formation of $\text{Ba}_4\text{Bi}(\text{PbO}_4)_3$ starts at $x = 0.20$ and then decreases drastically when $x = 0.40$. T_C was detected at a value of x less than 0.35 , indicating that the effect of Bi composition below $x = 0.35$ does not significantly affect the electrical properties. The increase in the Bi composition causes changes in the metal-insulator-metal properties. At $x = 0.2$ to 0.25 , there is a change in the crystal structure, which is thought to cause the semiconductor properties to be above the T_C .

Biography: Agung Imaduddin was born in Bandung, Indonesia, on September 29, 1971. Agung graduated from the Faculty of Engineering, Department of Metallurgy, Iwate University, Japan (1995), continued to receive a Master degree in Material Sciences from the same university in March 1997, and then also received a Doctoral degree in Material Sciences, from the same university in March 2001. He Joined the Research Center for Metallurgy and Materials (LIPI) from 2001 to 2021. Since January 1, 2022, he has joined the Research Center for Advanced Materials at the Nanotechnology and Materials Research Organization - National Research and Innovation Agency (BRIN), as an Associate Expert Researcher in the field of superconducting materials. His current research interests include the development of superconducting materials in the form of wire, magnetic, thermoelectric, and magnetoresistance materials with applications as superconducting transformers. Has produced more than 100 scientific papers and more than 5 patents related to the superconducting materials of MgB_2 , BiPbSrCaCuO , BaPbBiO_3 , etc. Also active in professional organizations as a member of the Indonesian Magnetic Society (IMS).



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Developing Novel Therapies for Cancer Chemoprevention and Treatment

Abstract: Cancer is the second leading cause of death globally and in the United States of America. Due to the widespread systemic toxicity of chemotherapy agents, natural compounds in fruits, vegetables, and spices have drawn much attention from researchers and the general public for cancer prevention and treatment. Curcumin is a diet-derived natural compound isolated from the Indian spice Curcuma longa and has been extensively studied for its anticancer potential. Unfortunately, low bioavailability resulting from poor water solubility and absorption and rapid biotransformation impede its success in clinical trials. Multiple approaches have been undertaken to circumvent the bioavailability issue of curcumin, including the synthesis of potent analogs, modifying the delivery system, and combining with other compounds to prevent biotransformation or achieve synergism. While screening a library of curcumin analogs, our laboratory has identified two analogs, namely 1,5-Bis-(4-hydroxy-3,5-dimethoxy-phenyl)-penta-1,4-dien-3-one (FLLL12) and 1,5-Bis-(2,4,6-trimethoxy-phenyl)-penta-1,4-dien-3-one (FLLL22), which are highly potent with GI₅₀ below 1 μ M against a panel of lung and head and neck cancer cell lines. FLLL12 induces apoptosis of lung cancer cell lines by activating the death receptor pathway and head and neck cancer cell lines by modulating the expression of both anti- and proapoptotic BCL2 proteins. Further mechanistic studies reveal that FLLL12 is an antioxidant and activates the NRF2-dependent antioxidant genes important for ameliorating oxidizing stress, the major cause that initiates carcinogenesis, and is suitable for cancer chemoprevention. In addition, FLLL12 directly binds to JAK2 and inhibits the JAK-STAT3 pathway and transcription of EGFR, FGFR, and AKT1 genes. On the other hand, FLLL22 serves as a prooxidant and activates the DNA damage pathways, including the activation of p53 and downstream genes. Animal pharmacokinetics studies demonstrate that FLLL12 has better pharmacokinetics than curcumin, and a pharmacologically effective dose is achievable in vivo. Finally, FLLL12 and FLLL22 significantly inhibit xenografted head and neck tumor growth in nude mice. Taken together, our findings strongly suggest that FLLL12 and FLLL22 are two potent curcumin analogs with better pharmacological and pharmacokinetic properties but different mechanisms of action that could be developed further for cancer chemoprevention and treatment.

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Biography: A.R.M. Ruhul Karim obtained B. Pharm and M. Pharm degree in Pharmaceutical Sciences from the University of Dhaka, Bangladesh, in the year 1990 and 1991, respectively. He obtained Ph. D degree in Medical Sciences in the year 2003 from Nagoya University, Nagoya, Japan. He did post-doctoral research in Cancer Therapeutics at the Case Western Reserve University, Cleveland, OH and Emory University, Atlanta, GA, USA in the year 2007 and 2008, respectively.

Currently, he is working as an Associate Professor in the School of Pharmacy, Marshall University since July 2023. He served as an Assistant Professor (07/2017-06/2023) in the School of Medicine at the University, Huntington. He also served as an Assistant Professor/ Instructor (08/2007-07/2017) in the Winship Cancer Institute of Emory University, Atlanta.

Followings are the Honors of his career:

- 2022 Teacher of the Year, Marshall University School of Pharmacy
- 2022 Dean's Award of Excellence in Research, Marshall University School of Pharmacy
- 2020 Distinguished Researcher Award, Association of Pharmacy Professionals
- 2013 Rising Star, Department of Hematology and Medical Oncology, Emory University
- 2013 Robbins Scholar Award, Winship Cancer Institute
- 1998 Japanese Government Monbukagakusho Scholarship
- 1998 1998 CRO/UNESCO fellowship to attend "International training course on Molecular Biology of Cancer Cells

Research Interests:

Understanding the mechanisms of apoptosis and drug resistance and developing more effective and safer drugs for the treatment and prevention of cancers using natural and molecularly targeted compounds. His research area is in Cell Biology, Molecular Biology and Cancer Research.

He has more than 60 research publications in the peer reviewed international indexed journals. Complete List of Published Works available in:

<https://www.ncbi.nlm.nih.gov/sites/myncbi/a.r.m..amin.1/bibliography/47921469/public/?sort=date&direction=ascending>

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Computer as a Technological Backbone for an Innovative Learning Environment in Engineering

Abstract: An innovative environment is one that can expand and adapt as educational practices change, maintaining future-focused on strengths-based teaching and learning while providing students and teachers with flexibility, agency, ubiquity, and connection. Innovative learning is a method of learning that prioritizes students and their needs. There is no longer a barrier between teachers and students; rather, there is a link that allows pupils to grow and become more prepared for the real world. Learning and teaching are facing significant new inventive difficulties around the world, mainly due to technological breakthroughs in the engineering education sector fueled by computer technology. This presentation centers on the creation of an innovative learning environment for engineering problem solving through the use of computers technology Integration. It also provides an overview of emerging technologies that can be used with computers, as well as an analysis of the capabilities of computers that teachers can use in the classroom. The importance of computers in learning and teaching is demonstrated by the automation of repetitive tasks, simulations, increased productivity, and efficiency in the design and analysis process. Finally, the use of the finite element method in solving engineering problems has been greatly enhanced by computers. The work recommends that in curriculum development in engineering, a computer course that will foster innovative teaching and learning be introduced at all levels for easy of learning. The work compares the trends of innovative teaching and learning with the traditional mode of teaching and learning in engineering and enumerates the importance of innovative teaching and learning and its area of application in innovative science and engineering technology.

Biography: Dr. Amadi Oko Amadi is a native of Unwana in Afikpo north Local Government area of Ebonyi State, Nigeria. He graduated in Computer Engineering from the Akanu Ibiam Federal Polytechnic Unwana, Nigeria in 2005. He obtained an M.Sc. in Information Technology in 2013 from the Michael Okpara University, Abia State as well as M.Eng. in Electronics and Communication Engineering from the National Open University of Nigeria. He completed his Ph.D. in Electronics and Communication Engineering Texas A & M University-Kingsville, United states in 2022. He was a former Technologist in the Federal Polytechnic Nekede, Owerri, Imo State, Nigeria and now a Senior lecturer at the Akanu Ibiam Federal Polytechnic, Unwana in Ebonyi State Nigeria. He is also a corporate member of the prestigious Nigeria Society of Engineers.

He has research experience in Dynamic modelling and simulation of hydrocarbon pipeline tracking leaks, Oil & Gas pipeline integrity management, Data Analysis Renewable energy field. He is the author of many peers reviewed journal articles and conferences/seminar papers.

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Molecular Modelling Studies of Quinazoline and Pyrimidine Compounds as Potential Antibacterial Compounds

Abstract: Antibiotic resistance presents a critical global health threat, necessitating the development of innovative strategies to combat bacterial infections. This research seeks to address the pressing challenge of antibiotic resistance by leveraging computational methods to explore novel quinazoline and pyrimidine analogues as potential antibacterial agents. Molecular dynamics (MD) simulation of the top 2 docked compounds from each of the quinazoline and pyrimidine analogues was conducted in this investigation to discover the interactions against four vital bacterial enzymes. AutoDock and AMBER suites were used to prepare and simulate the binding of these compounds with FtsZ, GyrB, DHFR, and TS that were obtained from the Protein Data Bank. In step 1, a virtual library of 500 compounds has been screened using a grid-based docking approach embedded in the AutoDock 4.2.6 suite to select compounds with good dock scores and narrow down the promising analogues. In step 2, molecular dynamics simulations using the AMBER suite were conducted to identify the MMGBSA score. Analysis supplemented with root mean square deviation (RMSD), root mean square fluctuation (RMSF), and hydrogen bond frequency. The dynamic studies of Q100 complexed with FtsZ show it is the most stable, with lower RMSD values (1.4 Å for Q100 while FtzZ is 2.3 Å) and lesser overall variation in RMSF. Although Q100 does not form a significant hydrogen bond with FtsZ, it has a higher negative free energy binding value (-25.48 kcal/mol) compared to Q56 with favourable hydrophobic and electrostatic interaction. While Q44 also shows the complex with GyrB is slightly more stable, with RMSF in residue 1 (3.0 Å), stable RMSD (1.2 Å for Q44 and 2.6 Å for 3U2D), and a higher negative value of free binding energy (-23.21 kcal/mol) with favourable hydrophobic interaction. However, Q44 does not form a significant hydrogen bond as the occupancy is nearly zero. The dynamic studies of P36 complexed with DHFR showed that it is stable with RMSD values ranging from 0.1 Å to 2.1 Å and RMSF values of less than 1.2092 Å. Meanwhile, the dynamic studies of P73 complexed with TS showed that it is stable, with RMSD values ranging from 0.2 Å to 1.91 Å and an RMSF value of less than 1.5925 Å. Additionally, the total free energy difference of -26.5792 kcal/mol for P36 and -39.5811 kcal/mol for P73 implies favourable interactions within the ligand-receptor complex. Binding interactions such as hydrogen bonds and Van Der Waals showed a significant result for P36 except for electrostatic interactions. As for P73, all binding interactions showed significant results. Q100 and Q44 are the potential quinazoline derivatives to act on the FtsZ and GyrB, respectively, and P36 and P73 are the potential pyrimidine derivatives to act on the DHFR to TS, respectively. This approach advances our understanding of specific inhibitors to continue to the next step in drug design as a new antibacterial drug candidate.

Keywords: Molecular Docking, Molecular dynamics; Quinazoline and Pyrimidine derivatives; Filamenting Temperature-Sensitive Z Protein; DNA gyrase subunit B; Dihydrofolate Reductase, Thymidylate Synthase, AutoDock, AMBER

Biography: Mr. Imtiaz is a pharmacist by training and currently serves as an Associate Professor and Head, Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Cyberjaya (UOC). He obtained his Diploma in Pharmacy from the Board of Technical Education, Bombay, Maharashtra, India, Bachelor of Pharmacy at Gulbarga University, Gulbarga, Karnataka, India, and Masters in Pharmaceutical Chemistry at the Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India. He also obtained his post graduate certificate in teaching methodology (PGCTM) at Asia Metropolitan University, Cheras, Selangor, Malaysia.

He served as a community pharmacist in Saudi Arabia for 2 years and joined academia in 2000, and his experience contributed significantly to his teaching with a good balance between theoretical and practical. He has experience in other areas, like pharmacy practice, research, and administration.

He pioneered the establishment and development of a pharmaceutical chemistry department in the faculty of pharmacy at UOC. He is actively involved in the development of integrated curriculum for pharmacy and as an external assessor, academic advisor, & curriculum review committees for pharmacy schools in Malaysia.

He is the leading person who initiated the pharmacognosy laboratory and museum, which is unique to the faculty and to UOC. He is consistently and continuously involved in the development of the pharmaceutical chemistry department towards teaching- learning and research activities among pharmacy students at UOC. His areas of expertise include inorganic, organic, medicinal, and pharmaceutical chemistry, pharmaceutical analytical chemistry, pharmacognosy and phytochemistry, natural product chemistry, and computational chemistry.

His research areas include Computer Simulation Studies of Biologically Active Molecules, Extraction, Isolation and Characterisation of Natural Products, Synthesis and Characterization of Small Molecules, and Pharmacy Education. He has attended and presented many papers in the local and international conferences. He has published many papers as the outcome of his research.

He has been a member of the Indian Pharmacy Council (IPC), the Malaysian Pharmaceutical Society (MPS), and the Malaysian Association of Education in the Medical & Health Sciences (MAEMHS).

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Partial Discharge Detection and Recognition using Multi Cylindrical Slots Patch Antenna for Power Transformer

Abstract: Essentially, power transformers were becoming the indicator of the early industrial revolution. The popularity and flexibility of the AC system are extensive, owing to its ability to transmit electrical energy beyond human imagination during this period. Therefore, the premature breakdown is not tolerable for power utility providers caused by insufficient maintenance or unsolved abnormality during the operation or manufacturing phase with a condition-based maintenance regime. Recorded by CIGRE, 58% of the power transformer breakdown was contributed by insulation failure that was associated with partial discharge. In the power transformer, insulation parts are the indicator of power transformer health. According to the literature, no study has been conducted to create partial discharge (PD) detection utilizing a single microstrip patch antenna that is combined with a noise filter. Other researchers in the PD recognition literature analysis plainly focused on the kind rather than PD severity. There appear to be two separate research gaps in this field, as well as the possibility to fix this problem. These practices endanger power transformer reliability and stability since power transformer PD activity is generally evaluated using either an integrated sensor or oil sample. This antiquated approach may be the cause of premature power transformer failure. In this work, the research targeted to develop a new partial discharge antenna in an ultra-high frequency range between 1.5 and 2.6 GHz. The PD antenna was designed and simulated using the Computer Simulation Technology Studio environment to gather important parameters before being fabricated using selected FR-4 substrates. The important modification on the antenna is on its ground plane, the feed leg, embedding with slots or cavities, and adding the final parasitic patch before rasterizing and verifying its important parameter and operational performance in the anechoic chamber. The data collected from the fabricated antenna in the lab scaled power transformer are then used to classify the PD severity using Self Organizing Maps hybrid with statistic extraction features technique with advanced U- Matrix PD mapping. As a result, the proposed antenna design is fabricated accordingly before being subjected to rigorous testing in the anechoic chamber to gather essential parameters using a vector network analyzer (VNA) and contrasting with the CST simulation results. The proposed PD antenna is verified in the lab-scale modelled power transformer, and the ability is compared to the conventional monopole antenna with both detected PD signals at approximately 68 μ s. The new and compact PD antenna design that is integrated with a parasitic noise filter effectively generates an improvement in detection ability with a minimum 25% noise reduction. While, in the hybridization of SOM implementation with extracted statistical features, the recognition is faster for about 4 s compared to the conventional phase-resolved partial discharge method that achieved results within 15 s. To conclude, the proposed PD antenna successfully yielded better results compared to a conventional antenna method with better noise rejection and a suitable operational bandwidth and PD SOM recognition produced better and faster classification results for novel PD severity assessment.

Biography: Muzamir Isa was born in Padang Besar, Malaysia, in 1979. He received the first degree in electrical engineering from University Technology Malaysia, in 2001, and the master's degree in electrical power engineering from University Tun Hussein Onn Malaysia, in 2004. In 2012, he received his doctoral degree in power systems &

high voltage engineering from Aalto University, Helsinki, Finland. His research interests are partial discharge measurement, detection and location technique, and power system transient studies, including EMTP-ATP simulation. In 2020 until 2022, he was appointed as a head for the Centre of Excellence for Renewable Energy at Universiti Malaysia Perlis. Currently, he is working as a professor at the Faculty of Electrical Engineering & Technology, Universiti Malaysia Perlis, Malaysia and actively involved in postgraduate supervision. He is also active as a senior IEEE member in Malaysia, especially for the IEEE DIES Malaysia Branch



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Safety Engineering at Workplaces or at Home

Abstract: SAFETY this simple word speaks volumes and might be what stands between life and death. We all want to be safe. We feel good when we feel safe, whether it's at home, in the streets, or at workplaces.

Safety Engineering aims to manage risk in the workplace by eliminating or reducing it to an acceptable level. Risk is the combination of the probability of occurrence of an accident and the severity (exposure level) resulting from the accident.

When dealing with the subject of safety in the engineering context, we may loosely divide it into two aspects – safety at the workplace and a career as a safety engineering professional – though both are closely interlinked. Safety engineering aims to manage risk in the workplace by eliminating or reducing it to acceptable levels.

Ideally, safety measures start during the early design of a system. Safety engineers consider what undesirable events can occur under what conditions, and project the related accident risk. In the oil and gas industry, for instance, safety measures for an LPG industry such as having relevant gas detection/ flame detection system, or overfill protection of an LPG storage should be considered in the early stages of the project; otherwise if an accident happens in these contexts, it will not only cost the project financially but also with the invaluable lives of human beings. Indeed, it is the safety engineer's job to make sure an existing, completed design is safe. If a problem is located only after a building or the set-up is completed, it may cost much more to rectify. Apart from financial costs, such design faults can also endanger human lives and cause damage to the environment.

As its name implies, Safety Engineering is about preventing an accident from occurring and, if it occurs, minimizing its exposure so that the consequences will not be life-threatening.

Biography: Engr. Mir Jahangir Md. SALIM completed his B. Sc. in Electrical & Electronics Engineering in 1996 from Chittagong University of Engineering and Technology (CUET) .After graduation, he has started his career as Plant Engineer in a steel re-rolling mills in Chittagong. In 1998, he joined IIUC – International Islamic University of Chittagong as lecturer in the department of Computer Science and Engineering (CSE). From 1999 – 2001, he rendered his service in a textile mill as Manager Engineering. Afterwards, he switched over to the LPG industry with a renowned MNC in the energy industry named TotalEnergies. From February 2002 to date (almost 23 years) he has been serving for TotalEnergies. Now he is looking for Health & Safety department as Functional Head.

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Enhancing Assisted Living with Privacy-Preserving and Trustworthy Machine Learning Applications

Abstract: In today's world, machine learning transforms assisted living, providing better support and care for individuals. This talk will explore how we can use machine learning in a private and trustworthy way.

We start by looking at techniques that help make data easier to understand and use. These methods simplify complex data by focusing on the most important parts and uncovering hidden factors. They improve our ability to categorize and analyze data, proving useful in a wide range of real-world applications such as image processing and text analysis. The talk also focuses on deep learning, which plays a significant role in recognizing patterns and processing information. It is especially effective for tasks involving images and time-based data. Advanced learning methods can also use structured signals and graphs to better understand the data. Transfer learning allows us to apply knowledge from one area to another, enhancing the effectiveness of our models. Then, to explain machine learning decisions, it is better to discuss Explainable AI (XAI), which is crucial as it provides insights into how AI makes decisions, which is important for building trust in these systems.

Next, we discuss practical applications of sensors, machine learning, and XAI in assisted living. Wearable sensors can help computers understand human actions. Real-time activity recognition can instantly tell if someone is running, walking, or doing other activities. Advanced cameras can track body movements in real-time. Home monitoring systems use sensors to watch for changes and predict what might happen next, making homes safer. Health monitoring can predict oxygen levels, pulse, and respiration, making healthcare more personalized and efficient. These examples show how technology can greatly improve assisted living.

In conclusion, machine learning can greatly enhance assisted living by providing personalized care and real-time monitoring. It is essential to ensure these applications are private and trustworthy. Using advanced machine learning techniques and XAI, we can create powerful, reliable, and respectful systems. The future of assisted living is bright, with technology playing a key role in improving people's lives.

Biography: Dr. Md Zia Uddin received his bachelor's degree in computer science and engineering from International Islamic University Chittagong, Bangladesh, in 2004. He then completed his MS Leading to Ph D degree in Biomedical Engineering from Kyung Hee University, South Korea, in 2011. Currently, he is a senior research scientist in the human-computer interaction group at SINTEF Digital, Oslo, Norway, where he continues contributing to his research field.

Dr. Zia's research primarily focuses on data and feature analysis, physical and mental healthcare, human-machine interaction, pattern recognition, deep learning, and artificial intelligence. His innovative work has been published in prestigious journals such as Information Fusion, IEEE Transactions on Consumer Electronics, and Future Generation Computer Systems, showcasing his peers' high regard for his research.

His research outcomes have earned him best/outstanding paper awards at several peer-reviewed international conferences. His expertise is further validated by his role as a reviewer for many renowned journals, including IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), Information Fusion, IEEE Transactions on Industrial Informatics, and IEEE Transactions on Biomedical Engineering.

Dr. Zia received a Gold Medal Award in 2008 for academic excellence in his undergraduate studies. He was also awarded the Korean Government IT Scholarship and the Kyung Hee University President Scholarship from March 2007 to February 2011 to pursue his PhD.

He has extensive teaching experience, having taught more than 20 computer science-related courses at various academic levels, from bachelor's to PhD, and supervised many students' research works at these levels as well. He is a senior member of IEEE, an academic editor of the PLOS One and Sensors journals, an associate editor of IEEE Access and the International Journal of Computers and Applications, a guest editor of Frontiers in Human Neuroscience, and a keynote speaker at various international conferences.

Dr. Zia has over 150 research publications (more than half as the leading author), including international journals, conferences, book chapters, and single-authored books. His Google Scholar citations are around 5000. He has led and participated in numerous national and international research projects. His significant contributions have earned him recognition in the World's Top 2% Scientists (career-long and single-year-based), a list prepared by Stanford University and Elsevier BV.

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High-Performance P-Type TFTs Using SiC-Doped SnO Channels: Achieving Enhanced Mobility and Stability through Optimized Doping and Post-Deposition Annealing

Abstract: P-type thin-film transistors (TFTs) such as SnO, NiO, and CuO maintain stable p-type conductivity through intrinsic tin vacancies, making them suitable for transparent displays and optoelectronic devices. These materials have a wide bandgap (2.5-3 eV) and transparency, and their low-temperature fabrication allows for use with flexible plastic substrates. P-type SnO TFTs enable CMOS circuit fabrication using only oxide materials, enhancing circuit efficiency. High-quality interfaces between SnO and gate dielectrics minimize interface trap densities, ensuring stable electrical characteristics. However, p-type TFTs face challenges with hole mobility and reliability, essential for fast switching and efficient operation. SnO (Sn^{2+}) is thermodynamically metastable, often converting to n-type SnO_2 (Sn^{4+}) or intermediate phases like Sn_2O_3 or Sn_3O_4 , complicating pure SnO channel deposition and high carrier mobility achievement.

In this study, we fabricated back-gate type TFTs with SiC-doped SnO channels. A 10 nm SiC-doped SnO layer was deposited on a highly doped P++ Si substrate with a 250 nm thick SiO_2 layer using co-sputtering from SiC and SnO_x targets. The oxygen partial pressure ratio during deposition was maintained at 0% ($\text{Ar}/\text{O}_2 = 20/0$ SCCM), and the SiC concentration was varied at 0%, 1%, and 1.5%. Following deposition, high vacuum (5×10^{-4} Pa) post-deposition annealing (HVPDA) was performed at 250°C. Source and drain electrodes were formed by depositing 100 nm Ni via thermal evaporation.

Our fabricated back-gate type TFTs with SiC-doped SnO channels consistently demonstrated p-type characteristics with good performance. The optimized device achieved a field-effect mobility (μ_{FE}) of 1.8 cm^2/Vs and an on/off current ratio (I_{on}/I_{off}) of 5.2×10^4 . Our investigation into critical parameters for achieving high-performance p-type TFTs provides valuable insights into optimizing SiC concentration doping and the high vacuum post-deposition annealing process. The integration of SiC doping and optimized post-deposition annealing significantly enhances the performance of p-type SnO TFTs. Our findings demonstrate the potential of SiC-doped SnO channels in achieving high mobility and stable electrical characteristics, making them promising candidates for future applications in transparent displays, flexible electronics, and CMOS circuits.

Acknowledgement:

1. Mr. Md Ahsan Habib, Department of Electrical and Electronic Engineering, Begum Rokeya University, Rangpur, Bangladesh.
2. Mr. Ahatahamul Islam, Aqua Photonics Research Field, Graduate School of Agricultural Science, Faculty of Agriculture, Kobe University, Japan.
3. Dr. Agung Imduddin, Research Center for Advanced Materials, National Research and Innovation Agency (BRIN), Jakarta, Indonesia.

Biography: Dr. Md Rauf ul Karim Khan graduated with a degree in Electrical and Electronic Engineering from the American International University Bangladesh (AIUB) in 2012. He subsequently earned an M.Sc. in Applied Science for Electronics and Materials (ASEM) in 2018 and a Ph.D. in 2022, both from Kyushu University, Japan. His M.Sc. thesis was titled “Temperature Dependency Thermal Conductivity of Indium Gallium Zinc Oxide Thin Films with Three Omega Method and Characterizing Microstructure Analysis,” and his Ph.D. dissertation was on “Microstructure Analysis of IGZO Thin Films and Its Thin-Film Transistor Application.”

Dr. Khan's professional journey is characterized by his extensive exploration of advanced technologies and scientific progress in the semiconductor device domain. He has specialized in the fabrication of novel thin-film transistors, with a particular focus on analyzing electrical properties, fabrication techniques, and controlling conduction characteristics through ultra-thin film formation and doping. His expertise includes the formation of transistor structures using semiconductor thin films (both n-type and p-type) with thicknesses ranging from 1 to 5 nm. He has conducted comprehensive analyses of conduction functions and terminal current injection mechanisms, applying these insights to refine film formation processes. Additionally, he has eight years of practical experience working in controlled cleanroom environments, ensuring strict adherence to quality standards. His research areas encompass oxide thin-film-transistor and touch sensor panel technologies, oxide thermoelectric materials for electronic device heat management, transmission electron microscopy for materials science, nanostructure characterization of advanced structural and functional materials, electron tomography for crystalline materials, and magnetoresistance and superconducting properties.

Since April 1, 2023, Dr. Khan has been serving as an Assistant Professor in the Department of Advanced Materials Science and Engineering, Faculty of Engineering Sciences, at Kyushu University, Fukuoka, Japan. He is also affiliated with the National Institute for Materials Science (NIMS) as a researcher. Previously, he was a Postdoctoral Research Fellow at the same university from February 1, 2022, to March 31, 2023. Dr. Khan has numerous research publications to his name. His career includes enriching experiences as a Visiting Researcher at Hanyang University, South Korea, and as an Intern at Toshiba, Japan. These opportunities allowed him to delve into the electrical properties analysis and fabrication processes of thin-film transistors (TFTs), hydrogen MEMS sensors, and flexible and stretchable devices. He has actively engaged in collaborative research initiatives on electronic devices and materials with esteemed institutions such as the University of Dhaka, Bangladesh, the Indonesian Institute of Science (LIPI), and National Taiwan University. Currently, he collaborates with key stakeholders to provide specialist solutions in planning and designing research experiments.

**Dr. Nahidul Hoque Samrat**

Research Scientist- Satellite Data Assimilation
Bureau of Meteorology, Melbourne, Australia
e-mail: nahidul.samrat@bom.gov.au

Observation Impact on Numerical Weather Prediction: Global and Regional Scale Perspectives

Abstract: We have recently conducted observational system experiments at both global and regional scales to investigate the potential impact of observation data on weather forecasts produced by the Met Office global and the Bureau of Meteorology regional NWP system.

On a global scale, we have conducted a series of global data denial experiments (DDEs) at Met Office to measure the relative impact of each observing system on NWP forecasts. The DDEs are run over three months using the observations from December 15, 2022 to March 15, 2023 and use a configuration very close to the Met Office operational global NWP suite. The control uses the complete observing system assimilated operationally at the time, and data from all the main observing systems (e.g., microwave sounders, IR hyperspectral sounders, Clear-sky GEO sounders, AMVs, conventional data, etc.) are denied categorically for the trials. The results of these experiments are then compared with a similar experiment conducted in 2021, which demonstrated a statistically significant reduction in mean forecast skill when all major observing systems are removed. Our conclusions provide recommendations on possible evolutions of the global observing system for NWP.

The following experiments focused on examining the influence of satellite observations on the Bureau's hourly cycling 1.5km resolution regional "City" models, also referred to as ACCESS-C. These experiments were conducted by running a series of data denial tests from November 25, 2021, to January 31, 2022, on two of the seven ACCESS-C domains: the "Sydney" and "Darwin" domains. The initial set of experiments involved the removal of satellite sounding data (ATOVS, IASI, ATMS, and CrIS), while the second set of experiments encompassed the exclusion of all satellite data, including sounders, atmospheric motion vectors from Himawari, ground based GNSS zenith total delay observations, and scatterometer winds.

Biography: Nahidul Samrat works as a Research Scientist specializing in Satellite Data Assimilation at the Bureau of Meteorology in Australia. He earned his Ph.D. in Geodesy and Remote Sensing from the University of Tasmania, Australia, in 2020. With over eight years of experience, he has conducted research in remote sensing, earth observation data management, and their applications in atmosphere and Earth science. He also worked at Geoscience Australia and later joined CQ University, Australia, as a Research Fellow in 2019, where he was involved in geospatial data processing and analysis in managing the environment and natural resources. During his role at CQUniversity, he secured three research grants as a chief investigator (2 projects) and co-investigator (1 project) in the remote sensing and data analysis area. These grants are from internal and external funding bodies: the CQUniversity, the Australian Government, and Simplot Ltd. (a leading Agtech company). Currently, he contributes to the vital area of satellite data assimilation to increase the use and benefits of satellite observations in numerical weather forecasts.



Dr. Tomohiro ICHIBA

Assistant Professor

Information Science, Sustainable Innovation, Research Center, for Exponential Biomedical DX (Excellent Core), Japan Advanced Institute of Science and Technology (JAIST)

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Ab Initio Structural Search for High-Pressured Solid Hydrogen Over 0.5 TPa

Abstract: The elucidation of the structural phase diagram of high-pressure solid hydrogen is a significant experimental challenge due to the difficulty of synthesizing hydrogen crystals and identifying hydrogen positions under extreme pressures up to hundreds of GPa. Whereas phase boundaries have been identified up to around 500 GPa through Raman/IR spectroscopy, only the structure of Phase I (at around 100 GPa or lower) has been experimentally determined. Other potential structures have been explored and validated through ab initio calculations, offering strong predictions for experimentally confirmed phases. However, the structural phase diagram for high-pressures above 500 GPa remains largely unexplored. Although it is challenging to artificially realize such high-pressure solid hydrogen, they often exist in celestial bodies. Understanding the phase diagram above 500 GPa would aid in more accurately predicting the internal states of celestial bodies.

In this study, we identified the structural phase diagram in the pressure range of 0.5 TPa to 2 TPa using an approach that combines structure search based on evolutionary algorithms and ab initio quantum diffusion Monte Carlo (DMC) methods. The structure search, utilizing energy evaluations from density functional theory, identified low static enthalpy structures at various pressures, revealing several new structures. We then conducted high-precision static enthalpy predictions using the DMC method and performed vibrational free energy calculations based on phonon analyses to evaluate their stability as dynamic enthalpy. In this presentation, we will discuss these findings and the reliability of the results by comparison with previous studies.

Biography: Dr. Tom Ichibha, Ph.D. in Information Science, is an Assistant Professor at the School of Information Science at the Japan Advanced Institute of Science and Technology (JAIST). His research focus is on Material Simulation. He earned his BSc in Physics from Tokyo University of Science in 2015 and his Ph.D. in Information Science from JAIST in 2019. He majored in many-body theory, working on the excitation spectrum of an iron complex. In 2017, he received the Excellent Student Prize from the Information Processing Society of Japan. Dr. Ichibha was awarded a fellowship by the Japan Society for the Promotion of Science (JSPS) for his research on vacancy-mediated self-diffusion in the Cu-Sn alloy (2018-2020/JAIST). He later secured a postdoctoral position at Oak Ridge National Laboratory (ORNL) (2019-2022). In December 2022, he transitioned to his current faculty position at JAIST. Throughout his career, he has specialized in the Quantum Diffusion Monte Carlo (DMC) method. During his time at ORNL, he utilized the Summit supercomputer to apply DMC to cutting-edge numerical problems. As a recognized expert in Material Simulation Research, Dr. Ichibha has contributed to several workshops, including the African School on Electronic Structure Methods and Applications (ASESMA). He has also published tutorials in his book (ISBN: 978-4627170322).

**Dr. Yuslina Zakaria**

Associate Professor, Department of Clinical Pharmacy
Faculty of Pharmacy, Universiti Teknologi MARA
(UiTM), Selangor, Malaysia
e-mail: yuslina@uitm.edu.my

Harnessing AI for Transformative Healthcare: From Drug Procurement to Patent Care

Abstract: In modern healthcare, the integration of Artificial Intelligence (AI) and big data analytics is driving significant innovation and efficiency. This presentation explores the transformative impact of AI on healthcare, from drug procurement to patient care, emphasising research at the intersection of computer science, bioinformatics, and healthcare.

The presentation will begin with the application of machine learning (ML) for modelling drug procurement needs in Malaysian hospitals. By analysing historical procurement data, stock levels and usage patterns, ML models predict future drug demand, optimize resource allocation and minimize shortages. For neurodegenerative diseases, ML analyses multiomics data to predict Alzheimer's disease, integrating metabolomics, transcriptomics, and cytokinomics for early disease prediction and timely therapeutic interventions. The presentation also highlights the role of ML in predicting drug-drug interaction (DDI) and drug gene interaction (DGI) between anti-tuberculosis (anti-TB) medications and comorbid conditions, particularly in polypharmacy-related patients. This ensures patient safety and optimizes treatment regimens in complex treatment scenarios. Text mining techniques for predicting DDIs and related genes leverage natural language processing in pharmacovigilance, extracting and analysing data from scientific literature and clinical reports to provide real-time insights into potential drug interactions and their genetic correlations. In addition, big data analytics predicts tuberculosis (TB) transmission by analysing extensive datasets, including patient and contact information. Predictive models forecast transmission patterns, enabling targeted public health interventions.

Overall, this comprehensive approach demonstrates the transformative potential of AI in healthcare by optimizing drug procurement processes and advancing patient care through predictive analytics and personalized medicine. The integration of AI-driven solutions leads to more efficient, accurate, and patient-centric healthcare systems.

Biography: Zakaria is a disguised member of the Faculty of Pharmacy, Universiti Teknologi MARA (UiTM), Malaysia. She holds a Ph.D. in Bioinformatics from the University of New South Wales in Australia, as well as MSc and BSc degrees in Computer Science (Software Engineering) from Universiti Teknologi Malaysia. Her interdisciplinary areas of study span pharmacy, public health, dentistry, and accounting.

Dr. Yuslina's expertise lies in leveraging machine learning, deep learning, and big data analytics to address critical challenges in healthcare. Her research focuses on developing predictive models for adverse drug reactions, disease classification, and treatment adherence, aiming to improve patient outcomes and healthcare efficiency. She has successfully led and collaborated on numerous research projects funded by national and international grants.

With an interdisciplinary approach to postgraduate supervision, Dr. Yuslina mentors students across various faculties, including Pharmacy, Medicine, Computer Science, Dentistry, and Accounting, fostering a collaborative and integrative research environment. This approach not only broadens the scope of her research but also enriches the academic experience of her students.

International consultations and collaborations further highlight her impact in the field. Dr. Yuslina serves as an international consultant for the Provincial and Municipal Governments project in Indonesia and leads a different research project in collaboration with Jordan's higher institution. Domestically, she collaborates with the Ministry of Health Malaysia on a tuberculosis (TB) project, and on enhancing TB medication supply chains to mitigate financial leakages through a pharmacoconomics project with the Pharmacy Services Programme under the ministry.

In addition to her research and supervision, Dr. Yuslina has earned several awards for innovation and has published extensively in high-impact journals. Her contributions as an international consultant, expert reviewer, and holder of several intellectual properties for innovative healthcare solutions make her a prominent figure in the scientific community.



Prof. Dr. Zuraidah Mohd Sanusi

Director

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Universiti Teknologi MARA, Malaysia
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Strategic Leadership and Innovative Competency for Global Research Leaders

Abstract: A central component of the talk is the development of global research leaders' competencies. It focuses on enhancing skills in quantitative and qualitative research methods, experimental design, and data collection techniques. Participants learn to apply critical thinking to complex problems and develop innovative solutions, skills imperative for leadership in high-impact research environments. Additionally, the course stresses the importance of effective communication, enabling participants to present their findings persuasively and publish in peer-reviewed journals. It also addresses the need for adaptability and resilience in the face of research challenges and evolving academic landscapes. Through structured learning and practical application, the course aims to advance the capabilities of academicians and administrators, equipping them with the skills necessary to contribute effectively to the academic community and enhance their institutions' global reputation. The ultimate goal of this talk is to support strategic objectives of achieving excellence and performance driven by values by the year 2025.

Biography: Prof. Dr. Zuraidah is currently serving as Director at the Accounting Research Institute- HICOE, Universiti Teknologi MARA (UiTM). She holds a Doctorate in Business Administration (Accounting) from Universiti Kebangsaan Malaysia, and a Master of Science and a Bachelor of Science in Accounting from Syracuse University in New York, USA. With over 30 years dedicated to UiTM, Prof. Dr. Zuraidah has been ranked among the top 5% globally in Accounting & Finance and Economics & Econometrics and is No. 1 in UiTM under the World Scientist and University Ranking 2023. Her research achievements include best paper awards at various conferences, gold medals for product innovation exhibitions, and a publication record of over 200 articles in high-impact journals. She boasts an H-index of over 30 and has successfully supervised and mentored 18 PhD graduates. Prof. Dr. Zuraidah has also held several significant posts, including Director of the Centre for Profiling and Assessment at the Institute of Leadership and Development, Universiti Teknologi MARA (2018-2023), Deputy Director of ARI, and Deputy Dean of the Faculty of Accountancy. She has been instrumental in designing and implementing competency frameworks to assess and enhance the skills and capabilities of academic staff and administrators in higher learning organizations.



Technical Session Schedule in Detail

Detail Technical Program

Technical Sessions: Day 1, Saturday, 26 October 2024

Plenary Session 1: Day 1, Saturday, 26 October, 2024	
Venue: IIUC Auditorium	Time: 11:00 – 13:00, Sat
Session Chairs: Prof. Dr. Md. Saidur Rahman , Prof. Dept. of CSE, BUET Professor Dr. Ryo Maezono , Japan Advanced Institute of Science and Technology (JAIST), Japan.	
Moderators: Mr. Md. Abu Sayeed, Associate Professor, Pharmacy, IIUC Mrs. Taniya Sultana, Lecturer, CSE, IIUC	
Name of Keynote Speaker	Topic of Speech
Prof. Dr. A.K.M. Azharul Islam , FInstP. C.Phys, FBAS Professor Emeritus and former Vice-Chancellor of International Islamic University Chittagong, Bangladesh.	MXene based Nanotech Wonders: 'Science Fiction' or Emerging Reality.
Professor Dr. A B M Shawkat Ali, SMIEEE Vice- Chancellor, Bangladesh University of Business and Technology (BUBT), Bangladesh. Former Professor of Data Science, the Fiji University, Fiji	Securing Landownership Through BlockchainDApp for Fraud Prevention in Real Estate Transactions
Dr. M. Rezwon Khan.FBAS, SMIEEE Professor Emeritus, Dept. of EEE, United International University	Solar PV in Bangladesh: A Plan to Convert the Consumers to Prosumers for Clean and Cost-Effective Power Generation

TS-1A: Power and Green Energy System-1	
Venue: SE LAB C201, CSE Main Building	Time: 14.00 – 15:30, Sat
Session Chairs: Prof. Dr. Muhammad Asad Rahman, EEE, CUET Dr. Md. Aasim Ullah , Assistant Professor, EEE, IIUC	
Moderators: Mr. Md. Sazidul Haque, Lecturer, EEE, IIUC Mr. Md. Lokman Hossain, Lecturer, EEE, IIUC	

Paper ID	Title of the Paper
137	An Energy-Efficient Design of a Grid-tied PV System Wielding the Roof Area of a University in Dhaka with Net Metering Scheme
172	Evaluation of the Performance of Natural Dye-Sensitized Solar Cells Using Red Spinach and Henna: Combining Fabrication Insights with ML-Based Efficiency Predictions
184	Design and Analysis of a DC-DC fast EV charger for a Renewable energy-based EV Charging Station
202	Impacts on Distribution Network due to Coordinated Electric Ferry Charging
321	IOT-enabled Automatic Underground Cable Fault Detection and Monitoring System
441	Advanced Estimation of SoC&SoH for Li-Ion EV Batteries Using Soft Computing Techniques

TS-1B: Electronics, Materials Science, VLSI and Real Time Systems-1	
Venue:	Computer Lab R323, EEE Department, FSE Building
Session Chairs:	
Prof Dr. Quazi Delwar Hossain, CUET	
Dr. Md Ismail Haque, Associate Professor, EEE, IIUC	
Moderators:	
Md. Rasheduzzaman, Assistant Professor, EEE, IIUC	
Mr. Raihan Chowdhury, Lecturer, EEE, IIUC	
Invited Talk	Electrical and Structural Properties of superconducting materials of Ba-Pb-Bi-O Dr. AgungImaduddin,Senior Researcher, Research Center for Advanced Materials (PRMM), National Research and Innovation Agency (BRIN), Indonesia .
Paper ID	Title of the Paper
71	Design of an Analog Content Addressable Memory with Memristor
76	Comparative Analysis of p-type Graded vs Uniform Channel Double Gate Junctionless FETs
86	STDP Learning Implementation with CMOS LIF Neuron and Twin-Memristor Synapse
95	Design and Evaluation of a Controllable Heat Therapy Device with Dynamic Monitoring and Feedback System
182	Comparative Analysis of Performance Factors of an 8-bit SIPO Shift Register using JK Flip-Flop with a Very Low Dynamic Power and High Noise Margin

TS-1C: Artificial Intelligence and Intelligent Computing-1	
Venue:	AI LAB_C101, CSE Main Building
Session Chairs:	
Dr. Mohammad Jahirul Islam, Professor, SUST	
Dr. Kaushik Deb, Professor, CSE, CUET	

Moderators:

Mr. Abdullaheil Kafi, Assistant Professor, CSE, IIUC

Mr. G.M. Al Arafat Shaown, Assistant Lecturer, CSE, IIUC

Paper ID	Title of the Paper
87	Insights into Zooplankton Abundance Dynamics in Tropical Temporary Ponds using Machine Learning and Explainable AI
93	Autonomous Pollination System for Tomato Plants in Greenhouses: Integrating Deep Learning and Robotic Hardware Manipulation on Edge Device.
170	Broken Stitch Detection Method for Sewing Operation using Deep Learning
191	Forecasting Geomagnetic Storms for Earth Using LSTM with Solar Wind and IMF Features
246	Enhancing Parkinson's Diagnosis: Unleashing the Potential of Machine Learning via Vocal Features Fusion
250	Enhancing Prediction Accuracy using Ensemble Deep Learning Methods on Time Series Data

TS-1D: Data Science and Big Data Analytics -1

Venue: PLAB #1_C301, CSE Main Building	Time: 14:00 – 15:30, Sat
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Session Chairs:

Dr. Mohammad Shamsul Arefin, Professor ,Dean, Faculty of Electrical & Computer Engineering, CUET

Dr. Mohammad Aman Ullah, Associate Professor & Chairman, Dept. of CSE, IIUC

Moderators:

Mrs. Subrina Akter, Assistant Professor, CSE, IIUC

Mrs. Farzana Tasnim,Lecturer, CSE, IIUC

Invited Talk Video	Enhancing Assisted Living with Privacy-Preserving and Trustworthy Machine Learning Applications Dr. Md Zia Uddin, SMIEEE , Senior Research Scientist, Sustainable Communication Technologies Department SINTEF Digital, Oslo, Norway
Paper ID	Title of the Paper
27	Enhancing Job Matching Through Natural Language Processing: A BERT-Based Approach
43	Unveiling Bangladesh's Climate Tapestry: A Quantitative Exploration of Change
130	Consistency of Contextual Embedding in Literary Texts
138	Exploring Machine Learning Approaches for Stress Detection in Reddit Content: An Evaluation of Performance and Effectiveness
154	Cyberbullying Detection from Bangla Text Using Cascaded Deep Hybrid Network

TS-1E: IOT and Signal Processing -1

Venue: Room No.-306, AI & Machine Learning Lab, Dept. of CCE	Time: 14:00 – 15:30, Sat
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Session Chairs:

Dr. Md. Saiful Islam, Associate Professor, Dept. of ETE, CUET

Dr. Yasir Arafat, Associate Professor and chairman, Dept. of EEE, IIUC

Moderators:

Mr. Md. Humayun Kabir, Lecturer, Dept. of CCE, IIUC

Mr. Mohammad Nadib Hasan, Lecturer, Dept. of CCE, IIUC

Invited Talk Video	Partial Discharge Detection and Recognition using Multi cylindrical Slots Patch Antenna for Power Transformer. Prof. Dr. Muzamir Isa. SMIEEE , School of Electrical System Engineering, Universiti Malaysia Perlis (UniMAP), Malaysia.
Paper ID	Title of the Paper
75	Real-Time Bangla Sign Language Recognition Using Transfer Learning Model
96	Automated Grading and Classification of Hand-Drawn Sketches Using Deep Learning
117	Trace Chain BD: Securing Supply Chains from Counterfeiting in Bangladesh with Blockchain and IoT Integration
128	A Wrist-Mounted IoT Accessory for People with Auditory Disabilities: A Smart Communication and Safety Solution
485	Enhancing Home Automation and Security with IoT-based Solutions

TS-1F: Communication and Computer Networks – 1

Venue: R421, ETE Department, FSE Building	Time: 14:00 – 15:30, Sat
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Session Chairs:

Prof. Dr. Mohammad Jakir Hoassain, Dhaka University of Engineering Technology

Dr. Sikder Sunbeam Islam, Associate Professor, Dept. of EEE, IIUC

Moderators:

Mr. Syed Zahidur Rashid, Assistant Professor, Dept. of ETE, IIUC

Mr. Mohammad Woli Ullah, Assistant Professor, Dept. of ETE, IIUC

Paper ID	Title of the Paper
155	Tetrahedral Molecular Shaped Metamaterial Absorber for Ku and K Band Applications
156	Design and Characterization of a Nonlinear Graphene Metasurface for Enhanced Third Harmonic Generation in the Terahertz Spectrum
193	S-Shape Polarization Insensitive Metamaterial Absorber for SAR Reduction at 3.5 GHz
196	Quadruple X Shaped Rotational Symmetric Metamaterial Absorber for C and X Band Applications
295	Back to Back C Shaped Rotational Symmetric Metamaterial Absorber for Triple Band Application
314	Middle F shape Split-Ring Resonator Metamaterial Absorber for Wireless Technology

TS-1G: Pharmacy and Biological Science -1	
Venue: Seminar: Seminar Hall, Auditorium Building	Time: 14:00 – 15:30, Sat
Session Chairs:	
Professor Dr. M. Abdur Rashid PhD FRSC , Dept of Pharmaceutical Chemistry, DU	
Professor Dr. Pharkphoom Panichayupakaranant , Faculty of Pharmaceutical Sciences, Prince of Songkhla University, Songkhla, Thailand	
Moderators:	
Mr. Mohammed Abu Sayeed, Associate Professor, IIUC	
Mr. Md. Nazmul Islam, Assistant Professor, IIUC	
Invited Talk	Developing Novel Therapies for Cancer Chemoprevention and Treatment Dr. A.R.M. Ruhul Amin , Associate Professor ,Department of Pharmaceutical Sciences, Marshall University School of Pharmacy, Huntington, WV 25755, USA.
Invited Talk Video	Molecular Modelling Studies of Quinazoline and Pyrimidine Compounds as Potential Antibacterial Compounds. Dr. Imtiaz Khalid Mohammad , Associate Professor, Head of Pharmaceutical Chemistry, University of Cyberjaya, Malaysia .
Paper ID	Title of the Paper
298	Modeling and Analysis of Vascular Stenosis in Microchannel
386	Phytochemical Screening, In-vitro Thrombolytic, In-vivo Antidepressant and Anxiolytic evaluation of Methanol extract of Persicariachinensis L.H. Gross Leaves
450	Antioxidant, Cytotoxic, and Antidepressant Potentials of Lepidagathis incurva
469	In-vivo Neuropharmacological Studies on Methanol Extracts of Bruguira Sexangula Leaves

Plenary Session 2: Day 1, Saturday, 26 October 2024	
Venue: IIUC Auditorium	Time: 16:15 – 17:45, Sat
Session Chairs:	
Dr. Mohammad Jahirul Islam, Professor, SUST	
Prof. Dr. Engr. Muhammad Abu Yusuf, P. Eng, Chairman, CE, IIUC	
Moderators:	
Sayed Allamah Iqbal, Associate Professor, EEE, IIUC	
Dr. Md. Shafiqul Islam Aziz, Assistant Professor, CE, IIUC	
Name of Keynote Speaker	Topic
Prof. Dr. Abdullah Al-Mamun C.Eng, P.Eng, FIEB .Department of Civil Engineering Kulliyyah of Engineering, International Islamic University Malaysia (IIUM)	Sustainable Drainage and Storm water Management for Bangladesh.

Professor Dr. Ryo Maezono School of Information Science, Japan Advanced Institute of Science and Technology (JAIST), Japan.	Computational Materials Science in JAIST
Prof. Dr. Christophe Fumeaux , FIEEE President-Elect of IEEE AP Society School of Electrical Engineering and Computer Science The University of Queensland Brisbane, QLD, Australia,	75 years of IEEE AP-S Research: Retrospective and Future Prospects for Antenna Technologies and Applications.
Prof. Dr. Mohammed Moshiul Hoque, SMIEEE Chair, IEEE BDS. Department of Computer Science and Engineering Chittagong, University of Engineering and Technology Chittagong. Bangladesh.	Multimodal Aggressive Memes Classification in Low-resources Languages.

TS-2A: Power and Green Energy System-2	
Venue: SE LAB_C201, CSE Main Building	Time: 18:15 – 19:45, Sat
Session Chairs:	
Prof. Dr. Nur Mohammad, Head of EEE, CUET Dr. Yasir Arafat , Associate Professor & Chairman, Dept. of EEE, IIUC	
Moderators:	
Mr. Raihan Chowdhury, Lecturer, EEE, IIUC Engr. Md. Nazmus Sakib, Lecturer, Dept. Of EEE, IIUC	
Paper ID	Title of the Paper
205	Multi-Objective Optimization and Feasibility Study of Hybrid Energy System Considering Future Load of 2041 using Machine Learning
232	A Techno-Economic Analysis of an IEEE 39 Sustainable Grid Bus for DSM on Load Flexibility Options
262	Real-Time Power Monitoring and Fault Detection in Power Distribution System Using FPGA and cRIO 9039
302	Dual Feedstock Biodiesel Production: Using Sesame Seed Oil and Waste Cooking Oil with KOH Catalysts
308	Real Time Economic Dispatch Using Bat Algorithm Optimization Technique
310	Construction and Feasibility Investigation of a Small-Scale Single-Basin Solar Still for Remote Areas

TS-2AP: Power and Green Energy System – 3	
Venue: Seminar Hall, Auditorium Building	Time: 18:15 – 19:45, Sat
Session Chair:	
Dr. M. Shafiqul Alam, EEE, University of Asia Pacific Dr. Md. Aasim Ullah , Assistant Professor, EEE, IIUC	

Moderators:

Mr. M. Tanvirul Hoque, Lecturer, EEE, IIUC
Engr. Mohammad Jalal Uddin, Assistant Professor, EEE, IIUC

Paper ID	Title of the Paper
502	Performance Enhancement of Single-Ended Primary-Inductor Converter for Low Power and Photovoltaic Applications.
516	Reduction of Total Harmonic Distortion (THD) in Source Current Using a Shunt Active Power Filter with P-Q Theory and PI Controller.
519	Performance Analysis of Ground-Mounted SPV Plant vs. Floating SPV Plant .
528	Development of a Rotational Freestanding Triboelectric Nanogenerator Based Anemometer for Wind Vector Measurement for Wind Turbines.
547	Optimizing Electric Vehicle Efficiency with Advanced Climate Control System .
554	Optimization of Cost-based Dynamic Economic Dispatch Problem using Mathematical Programming.

TS-2B: Electronics, Materials Science, VLSI and Real Time Systems -2

Venue: Computer Lab R323, EEE Department, FSE Building	Time: 18:15 – 19:45, Sat
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Session Chair:

Prof Dr. Muhibul Haque Bhuyan, AIUB
Dr. Md. Shamimul Haque Choudhury, EEE, IIUC

Moderators:

Mr. Riazul Islam, Lecturer, EEE, IIUC
Mr. Md Lokman Hossain, Lecturer, EEE, IIUC

Invited Talk	High-Performance P-Type TFTs Using SiC-Doped SnO Channels: Achieving Enhanced Mobility and Stability through Optimized Doping and Post-Deposition Annealing. Dr. Rauful Karim Khan, Assistant Professor , Department of Advanced Materials Science and Engineering, Faculty of Engineering Sciences, Kyushu University, Japan.
Paper ID	Title of the Paper
110	Highly Sensitive All Dielectric Fabry-Perot Etalon Based Perfect NIR Biosensor
201	Biosynthesis and Characterization of TiO ₂ Nanoparticles Using Allium Sativum Peel Extract with Detailed Optical Properties
221	Investigation of the Microstructural and Dielectric Properties of Strontium Doped Calcium Copper Titanate Electroceramics
243	Direct growth and Characterization of Ca ₁₂ Al ₁₄ O ₃₃ Bulk Crystal Electride by Vertical Bridgeman Technique
440	Ultra-Fast Core Mode Prediction in Plasmonic Crystal Fiber Sensor: A Machine Learning Approach

TS-2C: Artificial Intelligence and Intelligent Computing -2

Venue: AI LAB_C101, CSE Main Building	Time: 18:15 – 19:45, Sat
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Session Chairs:

Dr. Rashed Mustafa, Professor, CSE, CU

Dr. Muhammed Jamshed Alam Patwary, Assistant Professor , IICT, CUET

Moderators:

Dr. Siddique Ahmed, Assistant Professor , CSE, IIUC

Mr. A.B. M. Yasir Arafat, Assistant Professor , CSE, IIUC

Paper ID	Title of the Paper
192	Enhanced Osteoarthritis Classification through Transfer Learning and Hyperparameter-Tuned Multi-Layer Ensemble Models
206	A Deep Learning and Machine Learning Approach to Crop Recommendation for Sustainable Farming in Bangladesh
214	Explainable Transfer Learning for Precise Alzheimer's Disease Prediction from MRI data
218	Leukemia Disease Classification using Concatenated Convolutional Neural Network with Vision Transformer
225	A Deep Learning Approach to Forecast Electricity Demand in Sylhet of Bangladesh
244	YOLOv5-Driven Decision Fusion Approach for Aiding Automated Tomato Harvesting: Detection, Maturity Classification, Peduncle Estimation and Picking Point Determination

TS-2D: Data Science and Big Data Analytics -2

Venue: PLAB #1_C301, CSE Main Building	Time: 18:15 – 19:45, Sat
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Session Chairs:

Dr. Mohammad Aman Ullah, Associate Professor & Chairman, Dept. of CSE, IIUC

Dr. Abu Nowshed Chy, Assistant Professor, Computer Science & Engineering, CU

Moderators:

Mrs. Sabrina Jahan Maisha, Lecturer, CSE, IIUC

Mrs. Nuren Nafisa, Lecturer, CSE, IIUC

Invited Talk	Research Leader Competency: Perspective of Human Resource. Prof. Dr. Zuraidah Mohd Sanusi , Director, Research and Innovation Accounting Research Institute, UniversitiTeknologiMARA , Selangor, Malaysia.
Paper ID	Title of the Paper
169	Multilabel Aggressive Comments Detection from Social Media using Deep Learning Techniques
190	Deep AD-Insight: A Benchmark Evaluation of Deep Learning Architectures for Multiclass Alzheimer's Disease Classification and Staging from Brain MRI Data
219	Depression Detection from Social Media Comments Using Deep Learning with Interpretability
220	Automated Literature Review Using NLP Techniques and LLM-Based Retrieval-Augmented Generation
230	A comparison of Bangladeshi daily news portals' various clustering techniques for online revenue generation

TS-2E: IOT and Signal Processing -2

Venue: Room No.-306, AI & Machine Learning Lab, Dept. of CCE **Time:** 18:15 – 19:45, Sat

Session Chairs:

Prof. Dr. Mohammad Osiur Rahman, Professor, Dept. of CSE, CU

Prof. Md. Razu Ahmed, Chairman, Dept. of CCE, IIUC

Moderators:

Mr. Md. Humayun Kabir, Lecturer, Dept. of CCE,IIUC

Mr. Mohammad Nadib Hasan, Lecturer, Dept. of CCE,IIUC

Invited Talk Video	Observation Impact on Numerical Weather Prediction: Global and Regional Scale Perspectives. Dr. Nahidul Hoque Samrat Research Scientist- Satellite Data Assimilation Bureau of Meteorology, Melbourne, Australia.
Paper ID	Title of the Paper
175	Head Motion Controlled Mouse With Home Appliance Control For Quadriplegic Patient
273	Design of a Cost Effective IoT Based Advance Aquaculture with Real Time Environment and Water Assessments
276	Photoplethysmogram-based Cerebrovascular Disease Detection: A Machine Learning Approach
281	IoT Based Smart Walking Stick for Enhanced Mobility of The Visually Impaired
296	Dopamiini: Real-Time Interaction to Combating Loneliness with Smart Wheelchair Integrated Chatbot Support Model

TS-2F:Communication and Computer Networks-2

Venue: ETE Dept. Room 421 **Time:** 18:15 – 19:30, Sat

Session Chairs:

Dr. Foez Ahmed, Associate Professor Dept. of ICE, Rajshahi University

Dr. Saif Hannan, Assistant Professor, Dept. of ETE, IIUC

Moderators:

Mr. Syed Zahidur Rashid, Assistant Professor, Dept. of ETE, IIUC

Mr. Mohammad Woli Ullah, Assistant Professor, Dept. of ETE,

Paper ID	Title of the Paper
180	Optimization and Performance Evaluation of Implantable Rectennas for Enhanced Wireless Power Transfer Efficiency for Medical Applications.
210	A Highly Efficient Microstrip Patch Antenna for 6G Applications with High Gain and Ultrawide Bandwidth.
211	A Highly Efficient Fractal Based Microstrip Patch Antenna for 5G Applications with High Gain.
242	Design and Performance Analysis of Trident-shaped Slot Microstrip Patch Antenna for 5G Applications
289	A 2×2 MIMO Antenna for 28 GHz 5G Communication Applications with High Isolation.
399	Design and Analysis of a MIMO Antenna with DGS for Wireless Applications

Technical Sessions: Day 2, Sunday, 27 October 2024

Plenary Session 3: Day 2, Sunday, 27 October 2024	
Venue: IIUC Auditorium	Time: 09:00 – 11:00, Sun
Session Chairs: Prof. Mohammed Shamsul Alam, Dean, FSE. Dr. Md. Golam Rabiul Alam, Professor, Dept. of CSE, BRAC University	
Moderators: Mr. Md Mostafa Amir Faisal, Assistant Professor, ETE, IIUC Engr. Sk. Md. Golam Mostafa , Associate Processor, EEE, IIUC	
Name of Keynote Speaker	Topic
Prof. Dr. Subarna Shakya, SMIEEE Director, IT Innovation Center, Institute of Engineering, Tribhuvan University, Nepal	Security Challenges in softwareas a service environment
Professor Dr. Pharkphoom Panichayupakaranant Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkhla University, Songkhla, Thailand	Natural Product Innovation Based on the Bio-Circular-Green (BCG) Economy Model.
Prof. Dr. Debatosh Guha, FIEEE Institute of radio physics and Electronics, University of Calcutta. 92, A P C Road, Kolkata 700 009, India	Role of Antennain Magical Transformation of Engineering in the light of 75th Anniversary of IEEEAP Society.
Dr. Sanghamitra Bandyopadhyay, FIEEE Professor , Machine Intelligence Unit Director, Indian Statistical Institute 203 B. T. Road, Kolkata - 700 108, India	Applications of Artificial Intelligence Methods in Life Sciences

TS-3A: Power and Green Energy System – 4	
Venue: SE LAB_C201, CSE Main Building	Time: 11:30 – 13:00, Sun
Session Chairs: Prof. Dr. Mohammad Rubaiyat Tanvir Hossain, EEE, CUET Dr. Yasir Arafat , Associate Professor & Chairman, Dept. of EEE, IIUC	
Moderators: Mr.Asifur Rahman, Lecturer, EEE, IIUC Mr. Md. Sazidul Haque, Lecturer ,EEE, IIUC	
Invited Talk	Safety Engineering: At Workplaces or at Home Engr. Mir Jahangir Md. SALIM , Head of HSE & Technical Integrity, Total Energies, Bangladesh , Premier LP Gas Limited

Paper ID	Title of the Paper
328	Numerical Simulation and Performance Optimization of All Inorganic CsPbI ₂ Br Perovskite Solar cell Using SCAPS-1D.
365	Assessment of Solar Energy Potential in Bangladesh's Central and Peripheral Regions
372	Study and Comparative Analysis on Fractional Order PID Controlled Buck Converter
379	Financial Analysis of a Grid-Tied Rooftop Solar PV System for University Campus: A Case Study
408	An Advanced Optimized Virtual Inertia Control Technique for Wind Energy Integrated AC Microgrids

TS-3B: Electronics, Materials Science, VLSI and Real Time Systems-3	
Venue:	Computer Lab R323, EEE Department, FSE Building
Session Chairs:	
Prof Dr. Muhibul Haque Bhuyan, AIUB	
Dr. Md. Shamimul Haque Choudhury, EEE, IIUC	
Moderators:	
Mr. M. Tanvirul Hoque, Lecturer, EEE, IIUC	
Engr. Mohammad Jalal Uddin, Assistant Professor, EEE, IIUC	
Invited Talk	Ab Initio Structural Search for High-pressured Solid Hydrogen over 0.5 TPa Dr. Tomohiro ICHIBA , Assistant Professor, Information Science, Sustainable Innovation, Research Center, for Exponential Biomedical DX, (Excellent Core), Japan Advanced Institute of Science and Technology (JAIST), Japan.
Paper ID	Title of the Paper
57	Study and analysis of structural, electrical, and optical properties of CaPSe3 for solar cell application
275	SiO ₂ Nanosphere for Reducing Reflection in Perovskite Solar Cell by Using AnsysLumerical
297	Enhancing Efficiency of CdS/CdTe Solar Cells with Double BSF Layer by Numerical Analysis
303	TMDC Material Integration as Buffer Layer for Cost-Effective and High Performance CIGS Solar Cell
439	Investigation of varied Doping of ZnO as an ETL for KSnI ₃ based Perovskite Solar Cell with ETL and Absorber Thickness Optimization

TS-3C: Artificial Intelligence and Intelligent Computing-3	
Venue:	AI LAB_C101, CSE Main Building
Session Chairs:	
Dr. Md. Golam Rabiul Alam, Professor, Dept. of CSE, BRAC University	
Dr. Shahid Md. Asif Iqbal, Professor & Chairman ,Department of Computer Science and Engineering Premier University, Chattogram	

Moderators:

Mr. Mohammad Zainal Abedin Assistant Professor, CSE, IIUC

Mr. Mohammad Sazid Zaman Khan, Assistant Professor, CSE, IIUC

Paper ID	Title of the Paper
90	Exploring Augmentation Strategies for Balanced Skin Lesion Classification: An Explainable Lightly Tuned DenseNet 169 Architecture
119	Attention Enhanced Inception-V3: A Multi-Scale Feature Fusion Network for Skin Lesion Detection with Explainable Artificial Intelligence
256	Early Prediction of Crop Yield in Bangladesh Using Ensemble Learning
264	A Comprehensive Analysis of COVID-19 Detection Using Bangladeshi Data and Explainable AI
268	A Hybrid DCNN ECOC-SVM System for Detecting Semiconductor Wafer Defects Using Histogram Equalization
271	Survival Analysis of Heart Failure Patients through Logic Mining in Discrete Hopfield Neural Network

TS-3CP: Artificial Intelligence and Intelligent Computing-4

Venue: CN LAB_C401, CSE Main Building

Time: 11:30 – 13:00, Sun

Session Chairs:

Dr. Mohammad Jahirul Islam, Professor, SUST

Dr. Taskeed Jabid, Professor, Department of Computer Science & Engineering, East West University

Moderators:

Mrs. Sanjida Sharmin, Lecturer, CSE, IIUC

Mrs. Taniya Sultana, Lecturer, CSE, IIUC

Paper ID	Title of the Paper
279	Anemia Detection through Sclera and Vessel Analysis: A Machine Learning and Deep Learning Perspective
282	Brain Tumors classification of MRI Based Imaging using Deep Learning-based Approach
288	Fuzzy Based Intelligent Transportation Systems for Smart Cities to Mitigate Road Traffic Congestion
309	Health Trauma and Wellbeing Assistant for Bengali Seniors in Household: A Multimodal Approach
312	A Real-Time Application-Based Convolutional Neural Network Approach For Mango Leaf Disease Classification
323	A Multi-modal Approach of Sentiment Analysis on Samsung Cell Phone Review

TS-3D: Data Science and Big Data Analytics-3

Venue: PLAB #1_C301, CSE Main Building

Time: 11:30 – 13:00, Sun

Session Chairs:

Dr. Engr. Abdul Kadar Muhammad Masum Professor, Department of Software Engineering, Daffodil International University

Dr. Muhammed Jamshed Alam Patwary, Assistant Professor , IICT, CUET

**Moderators:**

Ms. Shafayetuz Zohra, Lecturer, CSE, IIUC
Ms. Yamina Islam, Assistant Lecturer, CSE, IIUC

Paper ID	Title of the Paper
339	Analyzing Public Sentiments from Bangladeshi Tour and Travel Vlog Video Comments Using Machine Learning
364	ACoD: Detecting Abusive Comments from Transliterated Bengali Text Using Deep Learning Techniques
395	Depression Detection from Social Media Posts using Ensemble Machine Learning
402	An AI-NLP based Interactive Chatbot Model for Patient Prescreening at Doctor's Consultancy
481	A Dynamic Resampling Method for Credit Card Fraud Detection in Imbalance Classification

TS-3E: IOT and Signal Processing-3

Venue: Room No.-306, AI & Machine Learning Lab, Dept. of CCE **Time:** 11:30– 13:00, Sun

Session Chairs:

Dr. Md. Sajjal Islam, Associate Professor, Dept. of CSE, CIU
Prof. Md. Razu Ahmed, Chairman, Dept. of CCE, IIUC

Moderators:

Mr. Amanul Hoque, Assistant Professor, Dept. of CCE, IIUC
Mr. Hassan Jaki. Lecturer, Dept. of CCE, IIUC

Paper ID	Title of the Paper
391	An Interpretable Skin Cancer Classification Using Optimized Deep Transfer Learning Method
394	Machine Learning Techniques for Brain Tumor Classification: A CNN-SVM Approach
397	Audio Signal Analysis and Recognition of Bengali Alphabets: A Comparative Study of Machine Learning Approaches
432	An IoT-based Smart Waste Management System for Efficient Waste Segregation and Collection
468	Enhancing Workplace Efficiency: An Intelligent Office Automation System Leveraging IoT
478	Optimizing Water Management: An IoT-Driven Approach to Smart Irrigation

TS-3F: Communication and Computer Networks-3

(Antennas and Propagation: Special Session by IEEE AP-S MGA, Bangladesh)

Venue: Room 421, ETE Department FSE Building **Time:** 11:30– 13:00, Sun

Session Chairs:

Dr. Foez Ahmed, Associate Professor, Dept. of ICE, University of Rajshahi
Dr. Saif Hannan, Assistant Professor, Dept. of ETE, IIUC

Moderators:

Mr. Md Mostafa Amir Faisal, Assistant Professor, Dept. of ETE, IIUC
Mr. Ahmad, Lecturer, Dept. of ETE

Invited Talk	IEEE AP-S Membership (The Organization, Its Mission and Benefits) Dr. Foez Ahmed, Associate Professor, Dept. of ICE, University of Rajshahi
Paper ID	Title of the Paper
261	Design of a unique H-L shape EBG Antenna for 5G Telecommunication Technology
460	A Wrench Shaped MIMO Antenna with Enhanced Bandwidth and Isolation for 5G Applications.
480	Graphene-integrated Microstrip Patch Antenna with MIMO for IoT/6GTHz Applications.
487	A Novel Tri-band MIMO Antenna for 5G Wireless Communication.

TS-3G: Pharmacy and Biological Science -2

Venue: Seminar Hall, Auditorium Building. **Time:** 11:30 – 13:00, Sun

Session Chairs:

Professor Dr. Mohammad Ashik Mosaddik, Pro-Vice chancellor, East West University, BD
Dr. A.R.M. Ruhul Amin, Associate Professor, Department of Pharmaceutical Sciences, Marshall University School of Pharmacy, USA

Moderators:

Mr. Mohammed Abu Sayeed, Associate Professor, Pharmacy, IIUC
Mr. Md. Ashraf Uddin Chowdhury, Lecturer, Pharmacy, IIUC

Invited Talk Video	Harnessing AI for Transformative Healthcare: From Drug Procurement to Patent Care. Dr. Yuslina Zakaria , Associate Professor. Department of Clinical Pharmacy, Faculty of Pharmacy , Universiti Teknologi MARA (UiTM), Puncak Alam Campus,42300 Bdr PuncakAlam, Selangor, Malaysia
Paper ID	Title of the Paper
483	Bioactivity Studies on N-Hexane and Aqueous Fractions of Merremia Vitifolia Stem by In Vitro Approach
490	Exploring the Pharmacological and Therapeutic Horizons of Methanolic Merremia Vitifolia (Burm.f) Hallier f. Leaf Extract: Bridging In Vitro and In Vivo Pharmacological Insights
494	Investigation of in vitro Anthelmintic, Cytotoxic, and in vivo Anti-Diarrheal, Analgesic Activity of Ethanol Extract of Mussaenda Glabra Leaves
497	Biological Efficacy of Thymoquinone (TQ) in Alzheimer's Disease: Focus on the TQ-mediated Amelioration of Disease Pathology

Plenary Session 4: Day 2, Sunday, 27 October 2024

Venue: IIUC Auditorium **Time:** 14:00 – 15:45, Sun

Session Chairs:

Dr. A.R.M. Ruhul Amin, Associate Professor , Marshall University School of Pharmacy, Huntington, WV 25755, USA.

Dr. Tomohiro ICHIBA, Assistant Professor, Information Science, Sustainable Innovation, Research Center, for Exponential Biomedical DX (Excellent Core), Japan Advanced Institute of Science and Technology (JAIST), Japan.

Moderators:

Md. Ashraf Uddin Chowdhury, Lecturer, Pharmacy,IIUC
Mrs. Nuren Nafisa, Lecturer, CSE, IIUC

Name of Keynote Speaker	Topic
Prof. Ir. Nofri Yenita Binti Dahlan Director, Solar Research Institute (SRI) UniversitiTeknologi MARA 40450 Shah Alam, Selangor, Malaysia	Empowering Research and Innovations: Revolutionizing Campus Sustainability through Smart Microgrids.
Professor Dr. Mohammad Ashik Mosaddik Professor of Pharmacy. Pro-Vice chancellor, East West University, Bangladesh.	Nanomedicine- is a revolution in the Pharmaceutical Sciences.
Prof. Mohamed-Slim Alouini , FIEEE Distinguished Professor, Electrical and Computer Engineering King Abdullah University of Science and Technology', KSA.	Towards Connecting the Unconnected
Prof. Ujjwal Maulik, FIEEE Jadavpur University Department of Computer Science and Engineering, Kolkata, WB, 700032, India.	Machine Learning for Healthcare

TS-4A: Power and Green Energy System-5	
Venue: SE LAB_C201, CSE Main Building	Time: 16:15 – 17:45, Sun
Session Chairs: Dr. Sampad Ghosh, EEE, CUET Dr. Md. Aasim Ullah , Assistant Professor, EEE, IIUC	
Moderators: Mr. Asifur Rahman, Lecturer, EEE, IIUC Mr. Riazul Islam, Lecturer, EEE, IIUC	
Paper ID	Title of the Paper
212	Design and Feasibility Analysis of a 1 MWp Grid-Connected Floating Solar Photovoltaic Plant in Kaptai, Bangladesh
420	A Proposal on Self-Healing Control Strategy for Smart Grid Protection Using Auto-Recloser.
446	Enhancement of Aluminum Polytetrafluoroethylene Based Triboelectric Nanogenerator for High Temperature Environment.
455	Towards a Deeper Understanding of Transformer for Residential Non-intrusive Load Monitoring
479	Investigation into different types of uncertainties of power distribution system using Geographic Information System (GIS) Mapping.
484	Performance Analysis of A Modified Bridge Current Limiter in Mitigating Asymmetrical and Symmetrical Faults in Power Systems.



TS-4B: Electronics, Materials Science, VLSI and Real Time Systems–4

Venue: Computer Lab R323, EEE Department, FSE Building	Time: 16:15 – 17:45
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Session Chairs:

Prof Dr. Muhibul Haque Bhuyan, AIUB

Dr. Zahid Hasan, EEE, IIUC

Moderators:

Md. Sazidul Haque, Lecturer, EEE, IIUC

Raihan Chowdhury, Lecturer, EEE, IIUC

Paper ID	Title of the Paper
235	Topology Optimization of a 3D Printable Prosthetic Foot.
305	Exploring Age-Related Changes in Bioimpedance across Diverse Biological Samples.
307	Mathematical Models Development of Intracellular Fluid with Bioelectrical Impedance Analysis.
412	A Numerical Approach to Design and Optimization of Highly Efficient CuInS ₂ /CMTS Based Tandem Solar Cell for Sustainable Energy Solution.
428	Design & Optimization of a Lead Free High Performance Cs ₂ SnI ₆ -Based Inorganic Perovskite Solar Cell by SCAPS-1D
438	Design and Optimization of CH ₃ NH ₃ SnBr ₃ /CuInSe ₂ Monolithic Tandem Solar Cell with Enhanced Efficiency using SCAPS-1D.

TS-4C: Artificial Intelligence and Intelligent Computing -5

Venue: AI LAB _C101, CSE Main Building	Time: 16:15 – 17:45, Sun
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Session Chairs:

Dr. Engr. Abdul Kadar Muhammad Masum Professor, Department of Software Engineering, Daffodil International University

Dr. Taskeed Jabid, Professor, Department of Computer Science & Engineering, East West University

Moderators:

Mrs. Farzana Tasnim,Lecturer, CSE, IIUC

Ms. Ashifatul Ferdousi, Assistant Lecturer, IIUC

Paper ID	Title of the Paper
340	An experimental analysis on different pivot selection approaches for the quicksort algorithm.
346	BrainACGAN: Auxiliary Classifier Generative Adversarial Network for Brain Tumor Images.
347	ChestACGAN: Auxiliary Classifier Generative Adversarial Network for Chest X-ray Images.
358	X-LeafNet: A Modified Xception Model for Identifying Tea Leaf Diseases with Explainable Artificial Intelligence.
373	Developing a Loan Recommendation System using Genetic Algorithm.
376	Integrating XAI with Hybrid BiGRU-BiLSTM Model for Comprehensive Maternal-Fetal Health Risk Monitoring.

TS-4CP: Artificial Intelligence and Intelligent Computing -6

Venue: PLAB#1_C301, CSE Main Building	Time: 16:15 – 17:45, Sun
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Session Chairs:

Dr. Mohammad Jahirul Islam, Professor, SUST

Dr. Shahid Md. Asif Iqbal, Professor & Chairman ,Department of Computer Science and Engineering Premier University, Chattogram

Moderators:

Mrs. Sayma Hoque, Assistant Professor, CSE, IIUC

Ms. Tanzim Mustary, Lecturer, EEE, IIUC

Invited Talk Video	Computer as a technological backbone for an innovative learning environment in engineering. Dr. Amadi Oko Amadi , Senior Lecturer, Department of Computer Engineering Technology, AkanulBiam Federal Polytechnic, Unwana, Nigeria.
Paper ID	Title of the Paper
430	Traffic Sign Classification Using Generative Adversarial Network.
445	Enhancing Object Detection for Autonomous Vehicles Using YOLO-NAS on Bangladeshi Dataset.
503	DeepWeb: A Web Application for Advanced Lung Cancer Identification using Novel CNN Model.
522	Integration of Deep Learning Based Image Analysis in Lung Cancer Pathology.
551	Load Balancing Algorithm: A Markov Chain Model Using Queuing Theory Approach.

TS-4E: IOT and Signal Processing -4

Venue: Room No.-306, AI & Machine Learning Lab, Dept. of CCE	Time: 16:15 – 17:45, Sun
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Session Chairs:

Dr. Md. Azad Hossain, Professor and Chairman, Dept. of ETE, CUET

Dr. Mohammed Saifuddin, Assistant Professor, Dept. of CCE, IIUC

Moderators:

Mr. Hassan Jaki, Lecturer, Dept. of CCE, IIUC

Mr. Amanul Hoque, Assistant Professor, Dept. of CCE, IIUC

Paper ID	Title of the Paper
82	Enhanced Skin Lesion Detection Using Concatenated DenseNet and Multi-Attention Mechanisms
498	Enhancing Traffic Flow and Reducing Congestion: A Smart City Approach with an IoT-based Intelligent Traffic Management System.
512	Real-Time IoT-Based Toxic Gas Monitoring and Comparative Analysis of Machine Learning Techniques for Air Quality Index Prediction in Dhaka.
517	Perceptual Quality Restoration of Laparoscopic Videos via GAN-Based Smoke Elimination.
525	Visualizing Crop Disease Detection Exploring Deep Learning with Custom CNN Model and XAI for Enhanced Interpretability.
530	Hand Gesture Recognition based Speed and Direction Control of DC Motor Using CNN

TS-4F: Communication and Computer Networks–4	
Venue: Room 421, ETE Dept, FSE Building	Time: 16:15 – 17:45, Sun
Session Chairs:	
Prof. Dr. Md. Sanaullah Chowdhury, Dean, FSE, University of Chittagong Dr. Abdul Gafur, Associate Professor, Dept. of ETE, IIUC	
Moderators:	
Mr. Md Mostafa Amir Faisal, Assistant Professor, Dept. of ETE, IIUC Mr. Ahmad, Lecturer, Dept. of ETE	
Paper ID	Title of the Paper
215	Design of Low Dispersion Silicon Nanowire Optical Rectangular Waveguide for Label-Free Biosensing Applications
252	Design of an Effective Multiband Linear and Circular Polarization Converter Using Reflective Metasurface.
401	Fan Grill Shaped Circular Split-ring Loaded Metamaterial Absorber For X, Ku & K Band Applications.
419	Analysis of Energy Consumption and Efficiency in the Two-tier Network for LoRa and LR-FHSS IoT Sensor Communication.
431	Suppressing Grating Lobesina Transmitting All-Metal Phase-Gradient Metasurface.

TS-4S: Special Session	
Venue: Seminar Hall, Auditorium Building	Time: 16:15 – 17:45, Sun
Session Chairs:	
Dr. Md. Shamimul Haque Choudhury, EEE, IIUC Dr. Muhammed Jamshed Alam Patwary, Assistant Professor , IICT, CUET	
Moderators:	
Mr. Sahariar Reza , Lecturer, CSE, IIUC Mr. Md. Taiseer Alam, Lecturer, CSE, IIUC	
Paper ID	Title of the Paper
167	IoT Based Smart Healthcare System for Real Time Monitoring and Diagnostics in Bangladesh
322	Tomato Shelf Life Prediction using IoT and Machine Learning
415	Optimization of Distribution Network Reconfiguration Using Various Algorithms for Power Loss Minimization
457	Design and Performance Comparison of Radiation-Tolerant and Conventional 8:1 Multiplexers in 90 nm Technology
496	Design and Simulation of a polarization insensitive Terahertz Metamaterial Absorber for Enhanced Refractive Index Sensing



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Paper ID: 27

Enhancing Job Matching Through Natural Language Processing: A BERT-Based Approach

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Abstract: With the rise of web-based job sites, job-seeking has undergone a significant transformation, making it easier to find suitable opportunities. This study proposes a solution using machine learning and natural language processing to enhance job recommendations. The dataset used is free from prior user interactions, ensuring fairness in the system's recommendations. The system combines collaborative and content-based filtering methods to develop candidate recommendation algorithms. Its performance is evaluated using precision, recall, and F1 score metrics. This approach helps job seekers streamline their job search, saving time and effort. Additionally, improving the chances of finding a job that closely matches their qualifications, increases their likelihood of success in the highly competitive job market.

Paper ID: 43

Unveiling Bangladesh's Climate Tapestry: A Quantitative Exploration of Change

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Abstract: This study investigates the impact of climate change on Bangladesh, focusing on key challenges across multiple sectors. The country faces rising temperatures, changing precipitation patterns, sea level rise, and increasing extreme weather events, which threaten agriculture, health, water resources, and coastal ecosystems. To address these problems, the research employs a combination of statistical and mathematical models, analyzing historical and projected climate data. By evaluating correlations between climate variables and sectoral impacts, the study provides a comprehensive understanding of the risks posed. Additionally, mathematical models simulate future scenarios, while socio-economic surveys capture community perspectives and adaptation challenges. The results are expected to highlight vulnerable areas and provide targeted recommendations for policymakers and stakeholders to address climate-related risks. The result of this study emphasizes the importance of bridging the gap between scientific research and practical climate adaptation strategies, offering actionable insights for sustainable resilience in Bangladesh. Through the use of a comprehensive method, this research aims to give Bangladesh the knowledge needed to address the effects of climate change and promote sustainable resilience.

Paper ID: 57

Study and Analysis of Structural, Electrical, and Optical Properties of CaPSe3 for Solar Cell Application

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Abstract: The several physical properties including structural, electronic, and optical properties of CaPSe3 have been investigated for the first time for solar cell applications. The possible results of CaPSe3 have been compared to other perovskite compounds for the reliability of this work. VASP (Vienna Ab initio Simulation Package) was employed during this investigation. In this study, band structure calculation is performed and this compound shows a band gap of 2.12 eV. The band gap meets the optimal band gap of the solar cell. In addition, the optical properties such as absorption, reflectivity, loss function, and refractive index are also added in this report. Moreover, the analysis of toxicity-free, structural stability, high absorption, tunable band gap, low reflectivity, and less loss function reveals the potential utilization of CaPSe3 in photovoltaic applications. Based on these calculated results, this perovskite is a potential candidate for photovoltaic applications.

Paper ID: 71

Design of an Analog Content Addressable Memory with Memristor

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Abstract: Content Addressable Memories (CAMs) are critical enablers for in-memory computing (IMC), which offers significant improvements in energy efficiency and throughput compared to traditional computing methods. Analog CAMs (aCAMs) have recently been proposed to enhance storage density and energy efficiency. In this work, we present a novel aCAM cell that improves power efficiency and reduces area compared to existing aCAM designs. The design leverages the unique properties of memristors and a specialized read-write algorithm for storing analogue data ranges and performing efficient pattern matching. Simulations using TSMC's 65nm CMOS process and the VTEAM memristor model demonstrate significant improvements in power efficiency ($9.2 \mu\text{W}$) and area reduction ($1.4 \mu\text{m}^2$) while maintaining robust performance under process variability conditions. This architecture is well-suited for energy-efficient neuromorphic computing and machine learning applications. Future work will focus on enhancing search speed and integrating the design into broader in-memory computing systems..

Paper ID: 75

Real-Time Bangla Sign Language Recognition Using Transfer Learning Model

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Abstract: Sign languages are recognizable languages that are expressed by body, face, and hand gestures. The gap that separates us from the world of people with poor linguistic or auditory abilities is filled using sign language. A variety of gestures are done with the hands, fingers, arms, heads, and faces that aid in communication between the deaf and the hearing impaired and vice versa. In Bangladesh and some parts of India, deaf individuals typically interact through Bangla Sign Language (BdSL), usually referred to as



Bengali or Bangladeshi Sign Language. The aim of our research is to design architecture by using a transfer learning model to recognize Bangla sign language and form simple words by capturing images consecutively in real-time. For this study, we used a publicly available dataset namely BdSL 49 which has 14475 images that include different images of 2 special characters, 10 numeric characters, and about 37 alphabets to correctly recognize the Bangla sign. In this research, we implemented some transfer learning models such as MobileNet, Xception, ResNet50, and InceptionV3. After 25 epochs Xception performed best out of all the models where the testing accuracy was 97.86%. The testing accuracy of the Xception model proves its adequate ability for real time identification of BdSL sentences.

Paper ID: 76

Comparative Analysis of p-type Graded vs Uniform Channel Double Gate Junctionless FETs

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Abstract.: In this research, A 2D simulation model for p-type graded channel double gate with different material JLFET using spacer with high-k-dielectric (GC-DG-DM-JLFET-SP) has been developed in Silvaco(TCAD) software. The surface potential, input characteristics, output characteristics, nonidentical short channel effects like subthreshold swing (SS), and drain-induced barrier lowering (DIBL), threshold voltage variation for different drain voltages, on/off ratio, and different analog performance parameters such as transconductance generation factor(gm/I_{sd}), transconductance (gm), drain output conductance(GD) and early voltage (VEA) of p-type GC-DG-DM-JLFET-SP have been compared with those of p-type uniform channel double gate with different material junctionless field effect transistor with high-k dielectric spacer (UC-DG-DM-JLFET-SP). It can be shown that the graded channel device has an excessive on/off current ratio, lower value of DIBL and SS, higher transconductance(gm) (for higher drain voltage), improved GD , enhanced TGF(gm/I_{sd}) and slight degradation of early voltage(VEA).

Paper ID: 82

Enhanced Skin Lesion Detection Using Concatenated DenseNet and Multi-Attention Mechanisms

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Abstract. Skin lesions, which often signal underlying health issues, represent deviations from normal skin appearance. Skin diseases, including the potentially serious condition of skin cancer characterized by abnormal cell growth, encompass a spectrum of health concerns. The timely detection of lesions is paramount for diagnosis and cancer prevention, yet pinpointing affected areas accurately presents challenges due to the complexity and expense of diagnostic tests. This paper presented an innovative automated solution that leveraged transfer learning through the integration of DenseNet models, fine-tuned with three attention mechanisms, to efficiently extract salient features for lesion detection. This was achieved by iteratively concatenating the models. Initially, all DenseNet models underwent incorporation and fine-tuning with attention mechanisms, followed by concatenation to derive final features. This process was reiterated across all DenseNet variants, culminating in the creation of Concatenated DenseNet (CDN). Evaluation on the ISIC 2018 dataset revealed a notable accuracy of 97.08% for our proposed model. Additionally, Gradient Class Activation Map (GradCAM) was utilized to find out the specific region of interest during classification, which improved the explainability of the architecture. Our study not only enhanced accuracy but also advanced the utilization of transfer learning and various augmentation approaches. The insights from this research offered promising avenues for enhancing early detection of skin lesions, thereby contributing to the prevention of skin cancer.

Paper ID: 86

STDP Learning Implementation with CMOS LIF Neuron and Twin-Memristor Synapse

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Abstract: Neuromorphic computing is an emerging field that aims to replicate the brain's neural structure to overcome the limitations of traditional von Neumann architecture. In this paper, we present the implementation of a Spike-Timing-Dependent Plasticity (STDP) learning system using CMOS Leaky Integrate and Fire (LIF) neurons and twin-memristor synapses. Our design targets low power consumption, high computational efficiency, and adaptability for Spiking Neural Networks (SNNs). The system was built using 65nm CMOS technology, optimizing the neuron and synapse configurations to reduce power consumption and enhance learning performance. The synaptic strength is modulated by the precise timing of spikes between the pre-and post-neurons, allowing the system to mimic biological learning through Long-Term Potentiation (LTP) and Long-Term Depression (LTD). Simulation results validate the effectiveness of our system, showing improved performance over previous implementations in terms of energy efficiency, power consumption, and spike rate, making it suitable for real-time, low-power neuromorphic applications.

Paper ID: 87

Insights into Zooplankton Abundance Dynamics in Tropical Temporary Ponds using Machine Learning and Explainable AI

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Abstract: Determining the health and resilience of ecosystems depends on an understanding of the dynamics of zooplankton abundance in tropical temporary ponds. Using ensemble modelling and explainable artificial intelligence (XAI) techniques, this paper explores the complex dynamics of zooplankton abundance in tropical temporary ponds. This study uses a Machine Learning framework to evaluate the predictive performance of models such as k-nearest Neighbors (kNN) regression, Random Forest Regression, Lasso Regression, Passive Aggressive Regression, Ridge Regression, and Ensemble Voting Regression. Among the machine learning models tested, the ensemble model, which combines ridge and ridgeCV, performs best, with metrics such as MAE of 0.02, MSE of 0.00, and R² of 1.00. The Shapley Additive ExPlanations (SHAP) analysis identifies 'Rotifers', 'Culex', 'Chironomidae', and 'Calanoids' as significant predictors. Data preprocessing techniques improve the dataset derived from a study of fish predation effects in tropical temporary ponds. Our research advances our understanding of zooplankton ecology and provides insights into conservation strategies and management practices in these ecosystems. Using ensemble modelling and explainable AI, we contribute to developing accurate predictive models for the long-term management of tropical temporary pond ecosystems.

Paper ID: 90

Exploring Augmentation Strategies for Balanced Skin Lesion Classification: An Explainable Lightly Tuned DenseNet 169 Architecture

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Abstract : Skin lesions indicate abnormalities in the skin, while skin cancer results from uncontrolled cellular proliferation due to cellular injury. Detecting these anomalies timely is crucial to prevent cancer progression. However, conventional methods are often resource-intensive and time-consuming, requiring sophisticated equipment. In response, this paper introduces an automated system that utilizes a Convolutional Neural Network (CNN) integrated with Transfer Learning (TL). The research focuses on fine-tuning the DenseNet169 model to improve learning efficacy, achieving an empirical accuracy of 98.42% on the ISIC 2020 dataset. Additionally, our approach implements various augmentation strategies to address dataset imbalances, with Prior Augmentation (PA) reducing bias toward the majority class, as demonstrated by the confusion matrix. While alternative augmentation methods yield similar outcomes, they tend to favor the majority class. Furthermore, this study involves identifying the responsible regions for lesion detection using the Gradient Class Activation Map (GradCAM) visualization method. This visualization enhances the explainability of the black-box model by pinpointing the regions crucial for decision-making

Paper ID: 93

Autonomous Pollination System for Tomato Plants in Greenhouses: Integrating Deep Learning and Robotic Hardware Manipulation on Edge Device

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Abstract: Air pollination is important for plants like tomatoes as it plays a vital role in the reproduction and productivity of crops. Tomatoes, being predominantly self-pollinated, depend on airflow to transfer pollen from the anther to the stigma within the flower. In isolated environments like greenhouses, ensuring effective air pollination presents a significant challenge. Due to limited natural airflow, greenhouses often rely on mechanical ventilation systems which cannot adequately replicate the natural pollination process. In this work, a low-cost but efficient autonomous pollination system is developed for tomato plants in greenhouses that utilize both deep learning capability as well as robotic hardware manipulation. The deep learning model is based on the YOLOv8 Nano architecture that is customized with a transformer module which achieved an mAP@50 score of 94.6 percent for mature flower detection. Explainable AI (XAI) like EigenCAM and XGrad-CAM approach showed correct visualization over the flower area with minimum noise. The developed model was implemented on the Nvidia Jetson Nano where the BoT-SORT tracking algorithm was used to avoid over pollination of the same flower. For real-time application, a Graphical User Interface (GUI) app was developed which functioned together with the hardware system using closed-loop feedback control on a pan-tilt mechanism for targeting each mature tomato flower. This technique ensured consistent pollination throughout the day and offers efficiency, precision, and cost-effectiveness by increasing yield.

Paper ID: 95

Design and Evaluation of a Controllable Heat Therapy Device with Dynamic Monitoring and Feedback System

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Abstract: Musculoskeletal and neuromuscular disorders comprise diverse conditions affecting bones, joints, muscles, nerves, and connective tissues. These days, muscle strains and spasms are also typical. Heat therapy is used to reduce cellular damage, heal from musculoskeletal injury, and relieve pain from a range of health conditions. The mechanism by which superficial heat therapy improves blood flow and circulation is vasodilation, which causes an area to become warmer. Even a small temperature increase can help to reduce pain and improve muscular elasticity in the affected area. Heat treatment helps repair the damaged tissues as well as relaxation of muscles. Conventional heating pads cannot provide the right temperature required for a particular issue. Additionally, receiving heat therapy from a physiotherapy center is expensive and challenging, particularly for elderly patients. This article provides a design methodology along with an evaluation of the produced controllable heat therapy device, which addresses a critical issue in traditional therapy systems by offering temperature and duration control features crucial for patient safety. Unlike traditional devices, this device includes monitoring mechanisms to prevent burns caused by excessively high temperatures. Users can conveniently adjust settings and monitor the temperature and the timer in real time via a user-friendly mobile app. The device has demonstrated the capacity to enhance the average blood flow rate by an increase of 25-35%. Additionally, it has shown a notable reduction of 2-4 points in the Visual Analog Scale (VAS) pain score. Moreover, the proposed system serves as exceptional telemedicine equipment, offering affordability and usefulness for home settings.

Paper ID: 96
Automated Grading and Classification of Hand-Drawn
Sketches Using Deep Learning

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Abstract: Automated evaluation systems have the potential to greatly simplify the assessment process in educational environments. However, traditional automated evaluation systems often fall short when assessing hand-drawn sketches, a prevalent component of student responses. They struggle to effectively assess hand-drawn sketches, particularly those exhibiting diverse color variations and shapes. This research introduces a deep learning-based approach to address this limitation. The system effectively executes multi-class classification and quality assessment of hand drawn images using the VGG16 convolutional neural network (CNN) architecture. Trained on a dataset labeled by human experts, the

model learns to extract patterns and features from sketches, enabling accurate categorization into predefined classes and reliable grade prediction. Experimental results demonstrate exceptional performance, achieving an accuracy of 96.60% for label classification and 88% for grade assessment. These findings underscore the potential of deep learning for automating the assessment process in educational settings, providing a more efficient and objective evaluation of student work.

Paper ID: 110
Highly Sensitive All Dielectric Fabry-Perot Etalon Based Perfect
NIR Biosensor

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Abstract: A highly sensitive fabry-perot etalon-based perfect biosensor in the near-infrared regime is presented. A perfect reflection dip is obtained due to strong admittance matching with negligible absorption loss within the structure. We analyzed the reflection and transmission spectra using the finite-difference time-domain and the transfer matrix method. Our structure achieved the best sensitivity of 1216.216 nmRIU⁻¹ with the change in the refractive index of the different analytes. The proposed structure is independent of polarization angles, providing flexibility for design sensors. The proposed structure can pave the way to designing real-time and label-free bio-sensors for chemical and biomedical applications.

Paper ID: 117
Trace Chain BD: Securing Supply Chains from Counterfeiting in
Bangladesh with Blockchain and IoT Integration

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Abstract: The scheme uses blockchain technology in Bangladesh's supply chain to eliminate counterfeit products, improve tax compliance, and build consumer trust. By ensuring product authenticity, it safeguards brand reputations and boosts government revenue. Manufacturers, distributors, and retailers can enter product data which will then generate QR codes. In case of receiving the product or checking its authenticity, they can scan these QR codes via their mobile or a dedicated IOT device and all the information will be stored in Blockchain. Since blockchain data is secure and immutable, it cannot be altered, consumers can easily check product details by scanning QR codes, and if a product is flagged as suspicious, the Mobile Court Management System can trace its origin. This blockchain-based approach ultimately helps prevent counterfeit goods from entering the market and enhances the government's ability to collect taxes.

Paper ID: 119

Attention Enhanced Inception-V3: A Multi-Scale Feature Fusion Network for Skin Lesion Detection with Explainable Artificial Intelligence

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Abstract: Skin lesions, although often benign, can pose significant risks if they develop into cancer, underscoring the critical importance of early and accurate detection for effective treatment and cancer prevention. However, traditional research approaches utilizing transfer learning (TL) techniques often fall short due to inadequate fine-tuning, posing challenges in extracting both shallow and deep features. To address this gap, this study introduces a novel approach by incorporating a feature fusion of diverse attention mechanisms, including Soft Attention (SA), Channel Attention (CA), and Squeeze and Excitation, into a finely tuned Inception-V3 architecture. This integration results in the development of Attention Enhanced Inception-V3 (AEIV3), which is capable of dynamically focusing on relevant features to enhance discriminative feature extraction, consequently leading to improved classification accuracy. Leveraging the PAD UFES 20 dataset comprising patient data and smartphone-captured clinical images, rigorous pre-processing techniques are employed to ensure balanced class distributions, thus facilitating robust model evaluation. Experimental results showcase the superior performance of AEIV3 compared to existing algorithms, yielding a remarkable accuracy score of 99.58%. Moreover, to provide insights into the decision-making process of the proposed model, Gradient Class Activation Map (Grad-CAM) visualization is utilized, highlighting the regions responsible for decision-making. Overall, we believe that our work will significantly contribute to the early detection of skin lesions, ultimately aiding in the advancement of research in this critical domain.

Paper ID: 128

A Wrist-Mounted IoT Accessory for People with Auditory Disabilities: A Smart Communication and Safety Solution

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Abstract: The Internet of Things (IoT) has emerged as a vital technology, attracting global attention due to recent improvements. This study offers a novel wearable gadget based on ESP32 and an OLED display, principally designed as a smart watch. This device acts as a full communication aid, enabling the translation of spoken words into text, displayed fluidly on an OLED screen. Notably, it possesses the unique quality to detect extra environmental noises, such as automobile horns, and transform them into discrete vibrations. The device capitalizes on cutting-edge technologies, incorporating Convolutional Neural Networks (CNN) for sound identification and aiding real-time speech-to-text translation. Additionally, it incorporates advanced algorithms for American Sign Language (ASL) conversion, further boosting its communicative adaptability. The operational capability of this wearable gadget is designed to function silently in the background, adept at differentiating between a variety of auditory signals, including car horns, human conversation, animal noises, and ambient quietness. Furthermore, it features Flutter, a dynamic and user-friendly interface, ensuring seamless interaction and accessibility. Leveraging ML for sound recognition further bolsters its abilities to recognize and understand complicated audio cues. One of the defining aspects of this wearable technology is its seamless integration with a smartphone. Through efficient synchronization and data transfer, the device easily communicates, and transfers interpreted data to a compatible smartphone, expanding its accessibility beyond the smart watch platform. The system demonstrated its efficiency and practicality in the actual world by achieving an 83.98% accuracy in speech-to-text translation, with a smooth display synchronization time of 1.4 seconds.

Paper ID: 130
Consistency of Contextual Embedding in Literary Texts

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Abstract: Despite the fact that computational analysis has opened a wider window for literature and its pertinent text-based studies, it is not well-proven whether the contextual embedding technique works better with seemingly complex literary texts. In this regard, this research has investigated the consistency of contextual embedding in literary corpus. Based on a small corpus consisting of two novels of Ian Fleming and two short stories of Guy De Maupassant, this study employs the formidable capabilities of BERT to dissect the consistency of contextual embedding in literary texts. By the combination of a fine-tuned BERT model and extraction of contextual embeddings, this study performed five correlated comparative studies among two shorter and two longer literary texts, which uncovered the striking contrasts within each narrative. A series of comparative studies among the assigned literary texts ensures the comprehensive examination of the semantic relationships and thematic associations between words. This study confirmed that contextual embedding works significantly better with literary texts and produces consistent outcomes while preserving the thematic accuracy of the narratives.

Paper ID: 137
An Energy-Efficient Design of a Grid-tied PV System Wielding the Roof Area of a University in Dhaka with Net Metering Scheme

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Abstract: Abstract. Meeting the exceptionally high energy demands of the current world has been proven to be exceedingly challenging with limited non-renewable resources like fossil fuels, mining, and nuclear fuel. Understanding this acute limitation, a growing shift towards renewable energy sources is occurring with solar energy emerging as a superior alternative. This research focuses on designing and evaluating an energy-efficient PV system installed on the roof of a private university named European University of Bangladesh (EUB) located in Dhaka, Bangladesh to meet its electricity demand. The viability of the proposed system is evaluated in terms of energy efficiency analysis, economic inspection and environmental impact. Under standard test conditions (STC), the proposed system can generate 303.2 MWh of electricity annually. This generated electricity can consummate the energy demand of the building and the surplus power can be sold to the national electricity grid. According to the ‘Net Metering Guideline-2018’, an estimated BDT of 3.66 lac can be profited annually by selling electricity to the grid. The most alluring feature of the proposed system is that it offers an astonishingly cheap ‘Cost of Energy’ (COE) of 5.23 BDT/kWh. The novelty of this optimized rooftop PV design is that it is practically implementable, offers economical COE, is nearly able to meet the building’s electricity demand and is a profit-making project under the Net Metering Guideline. Therefore, this research is an ideal blueprint to emulate similar rooftop PV systems by other educational institutions, contributing to the broader adoption of SDG7 goals.

Paper ID: 138

Exploring Machine Learning Approaches for Stress Detection in Reddit

Content: An Evaluation of Performance and Effectiveness

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Abstract: Depression is a serious mental health condition that is difficult to diagnose, particularly in social media settings. The goal of this research is to enhance early intervention and prevention efforts by creating a machine learning model for identifying depression in Reddit posts. Evaluating the efficacy of various machine learning methods in stress detection is the aim of this research project. By examining Reddit Contents, this assessment seeks to advance the creation of an automated system for the early diagnosis of depression. 'clean text' is the raw text data from Reddit posts, and 'is depression' is the target variable in this dataset that was gathered for the study. To extract features, count vectorization is used in this instance. Using the training and testing sets, four machine learning algorithms—SVM, Random Forest, Naive Bayes, and KNN are trained and assessed. By utilizing a VotingClassifier with hard voting, an ensemble model is constructed. With 99.93% accuracy on the training set and 95.54% accuracy on the test set, the Random Forest model proved to be the most accurate of all the models. This study shows how machine learning algorithms and ensemble approaches can be used to identify depression in Reddit posts. The ensemble model offered a marginally improved accuracy, although the Random Forest and SVM models fared the best. These findings suggest that machine learning is a useful technique for helping mental health professionals recognize and treat depression in virtual environments.

Paper ID: 154
Cyberbullying Detection from Bangla Text Using Cascaded Deep Hybrid Network

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Abstract: The use of social media is increasing tremendously due to the ease of the internet. As a result, cyberbullying or online harassment of people across social media platforms is increasing progressively. The detection and prevention of harassment texts and comments on social media are crucial for several major languages. Bengali is the sixth most widely used language worldwide, and more people are using social media. So, finding an efficient detection technique to manage and prevent cyberbullying is neces

sary. A significant number of studies on detecting cyberbullying use machine learning and have been conducted in English, Chinese, and Arabic. There are very few publications regarding Bengali languages. In this study, we simply present a hybrid deep learning model for Bengali text that can distinguish cyberbullying by analyzing and experimenting with several methods to find a feasible way of classifying such comments. We have used 44001 user comments from Facebook, divided into the following five categories: religious, sexual, threat, and not-bully. Our proposed hybrid deep neural network model performed better than baseline models and compared all these models with our proposed network. To analyze textual patterns in Bangla text, we conducted comprehensive experiments using baseline models of long-short-term memory (LSTM), BiLSTM, and CNN-BiGRU models. We proposed a CNN-BiLSTM model which cascaded by CNN and BiLSTM methods with various execution epochs, model layers, and tuning hyperparameters. To give a comparative comparison, different criteria were used to assess the effectiveness and performance of the models. The performance of our proposed CNN-BiLSTM architecture performed the most effective and accurate prediction, with validation accuracy of 88.5% and 80%, respectively, over binary classification and multi-class classification. The CNN-BiGRU performed with the second-largest accuracy of 86% over binary classification.

Paper ID: 155
Tetrahedral Molecular Shaped Metamaterial Absorber for
Ku and K Band Applications

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Abstract: In this article, a metamaterial absorber with a tetrahedral molecular-shaped structure is proposed for Ku and K band applications. The preferred measurement for the metamaterial absorber is 9.6 by 9.6 millimeters. Designing the structure and analyzing its reflection coefficient are done using Computer Simulation Technology (CST) Microwave Studios. Different parametric studies have been conducted to enhance the structure's design and size. Through simulation, satisfactory absorption levels were achieved at desired resonance frequencies. Additionally, a single negative value was observed, confirming the presence of metamaterial characteristics. The unit cell of the metamaterial absorber was created utilizing FR-4, a readily available and cost-effective substrate material characterized by a dielectric constant of 4.3. The metamaterial absorber has an absorbance of 99.43% at 12.769 GHz, 99.59% at 13.415 GHz, 97.23% at 17.139 GHz, 95.99% at 22.687 GHz, and 97.92% at 26.221 GHz. Because of the uncomplicated design of the suggested absorber, the manufacturing process can be straightforward. Consequently, this absorber can be applied effectively in tasks like sensing, detection, and imaging.

Paper ID 156

Design and Characterization of a Nonlinear Graphene Metasurface for Enhanced Third Harmonic Generation in the Terahertz Spectrum

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Abstract: We introduce a novel strategy employing ultrathin nonlinear metasurfaces that incorporate graphene ribbon to tackle inherent efficiency challenges in nonlinear processes. Our primary goal is to elevate third harmonic generation, specifically targeting the far-infrared and terahertz frequency ranges. Through the stimulation of localized plasmons along the graphene surface and the incorporation of a metallic substrate, we achieve precise confinement and substantial signal amplification. This arrangement results in a narrowed resonant response bandwidth, causing zero transmission and the establishment of standing waves. The distinctive design significantly enhances the efficiency of third harmonic generation. These compact metasurfaces present a promising solution for nonlinear sources in the far-infrared and terahertz spectrum, with potential applications spanning frequency generation, wave mixing, nonlinear THz spectroscopy, and noninvasive THz imaging.

Paper ID: 167

IoT Based Smart Healthcare System for Real Time Monitoring and Diagnostics in Bangladesh

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Abstract: With the increasing adoption of healthcare Overseeing systems globally, there arises a critical concern for the security and accessibility of such systems, particularly in nations lacking robust mechanisms for public health monitoring. This paper addresses the absence of a comprehensive healthcare monitoring system in Bangladesh by proposing an IoT based smart healthcare solution. The primary objective is to develop a wireless monitoring system utilizing mobile devices to Perpetually monitor vital signs and symptoms, providing real time data transmission over the internet. The proposed system integrates sensors, a data gathering device, a Control unit, and website to record, display, and monitor key physiological parameters such as temperature, heart rate, and electrocardiogram. Through field testing, the dependability and accuracy of the system have been confirmed, demonstrating its efficacy in measuring patient physiological data. Using the MQTT communication protocol, all data are transmitted wirelessly. By leveraging inexpensive Elements and innovative IoT technology, this embedded system offers a cost-effective solution for healthcare monitoring, tailored to the context of Bangladesh. Consequently, this research contributes to bridging the gap in Civic health monitoring infrastructure and lays the groundwork for scalable and accessible healthcare solutions in resource constrained settings.

Paper ID: 169

Multilabel Aggressive Comments Detection from Social Media using Deep Learning Techniques

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Abstract: In recent years, researchers have attempted to identify and classify unwanted textual information (i.e., aggressive, abusive, offensive, hateful, and toxic) in online media due to its adverse effects on society. Several initiatives have been actualized to reduce the consumption and propagation of such information. However, most research was accomplished mainly in English and other high-resourced languages, leaving low-resource languages (e.g., Bengali) out of the scope. This paper proposes an intelligent technique using deep learning (DL) to identify aggressive Bengali text into five categories: ReAG, PoAG, VeAG, GeAG, and RaC. Due to the scarcity of benchmark corpora, this work constructed an aggressive Bengali corpus containing 4002 comments totaling 65,436 words to carry out the multilabel aggressive comments identification task. Five ML models (LR, Linear SVC, MNB, DT, RF) and three DL models (CNN, LSTM, and BiLSTM) are exploited on the developed corpus with various feature extraction techniques to address the downstream task. The comparative analysis revealed that CNN with Glove embedding (CNN+GloVe) outperforms the other employed techniques by achieving the highest weighted f1 score (0.88) on the developed test dataset.

Paper ID: 170

Broken Stitch Detection Method for Sewing Operation using Deep Learning

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Abstract.: The garment industry in Bangladesh confronts multifaceted challenges, notably fabric defects and manpower shortages, which have the potential to impede quality assurance. Although classic automatic flaw detection applications have demonstrated good performance, these techniques are frequently set up using custom features created by a human operator. Recently many deep learning methods like Convolutional Neural Networks (CNN) have been proven to perform exceptionally well in a wide variety of computer vision applications. In this paper, we tested CNN, VGG-16, and VGG-19 to detect sewing defect images from correct stitching images and broken stitching images. This experiment was performed on a set of stitched images (500) consisting of correct stitching images (250) and broken stitched images (250). To increase the effectiveness of these models, we applied filters to remove noise from the train images. The final performance analysis demonstrated that the VGG-16 algorithm provides a higher accuracy of 86%. VGG-19 and CNN obtained 82% and 75% accuracy respectively.

Paper ID: 172

Evaluation of the Performance of Natural Dye-Sensitized Solar Cells Using Red Spinach and Henna: Combining Fabrication Insights with ML-Based Efficiency Predictions

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Abstract: This research evaluates the effectiveness of various TiO₂ paste compositions in natural dye-sensitized solar cells (DSSCs) using machine learning (ML) models to predict their performance under both indoor and outdoor conditions. The study investigates the impact of key factors, including electrolyte layer thickness, use of industrial-grade TiO₂, and electrolyte concentration, on cell electrical properties and durability. Natural dyes used for sensitization were red spinach (*Amaranthus cruentus*) and henna (*Lawsonia inermis*). Multiple ML models were employed to analyze the influence of these parameters on solar irradiance. Under controlled laboratory conditions, the ML models accurately predicted the performance of DSSCs across various environmental conditions. In comparative tests under the AM 1.5G solar spectrum, typical of Bangladesh, it can be confirmed that DSSCs sensitized with red spinach achieved a significantly higher efficiency of 0.81% compared to those sensitized with henna (0.018%).

Paper ID: 175

Head Motion Controlled Mouse with Home Appliance Control for Quadriplegic Patient

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Abstract: People with severe disabilities often struggle to interact with home devices, making even basic tasks difficult or impossible due to their physical limitations. The Human Computer and human Gesture Interface System is a lightweight wearable prototype that uses head movements for cursor control and cheek muscle twitches for clicks and appliance control, specifically designed to aid individuals with quadriplegia. Quadriplegia is a spinal cord injury which turns to paralysis of the whole body at least the shoulders down which is a great barrier. This paper proposes a prototype of human computer and human gesture interface device, using which, a quadriplegic patient can control a computer cursor and home appliances exclusively with head motions and cheek muscle twitches. The proposed system aims to create a hands-free head motion subjugated device for computer cursor and electrical appliance control by using an accelerometer to read the values created by the patient's head movement and translate that into mouse cursor movement and flex sensors to detect cheek muscle twitches and translate that into mouse cursor clicks and turn home appliance switches on and off. This study presents the entire process for developing a system prototype, as well as the system's capabilities and benefits over currently available assistive technology. Those who suffer from arm problems or quadriplegia may find great assistance from this promising technological advancement.

Paper ID: 180

Optimization and Performance Evaluation of Implantable Rectennas for Enhanced Wireless Power Transfer Efficiency for Medical Applications

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Abstract: Recent advancements in wireless power transfer (WPT) via radio frequency (RF) technology have significantly impacted the development of implantable medical devices (IMDs), including pacemakers, neurostimulators, and drug delivery systems. This study presents a comprehensive analysis of the optimization and performance evaluation of implantable rectennas, which are essential for converting electromagnetic energy into direct current (DC) power, thereby enabling the sustained operation of IMDs without reliance on batteries. The research addresses critical design considerations such as power conversion efficiency, biocompatibility, and the dimensional and operational frequency specifications of the antennas. To ensure safety and accuracy, a human tissue model incorporating specific absorption rate (SAR) limitations was employed to simulate rectenna performance within the human body. The results indicate that the optimized rectennas achieve a remarkable RF-to-DC conversion efficiency of up to 97.84%, surpassing the capabilities of prior models. Furthermore, advancements in 3D printing and material science have contributed to the miniaturization and improved functionality of rectennas, offering significant potential for enhanced power management in biomedical applications.

Paper ID: 182

Comparative Analysis of Performance Factors of an 8-bit SIPO Shift Register using JK Flip-Flop with a Very Low Dynamic Power and High Noise Margin

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Abstract: This paper undertakes a comprehensive comparative analysis of Serial-In-Parallel-Out (SIPO) shift register circuit design constructed using Master-Slave JK flip-flops employing five distinct technologies, e.g., Gate Diffusion Input (GDI), Complementary Metal-Oxide-Semiconductor (CMOS), Transmission Gate (TG), Pass Transistor (PT), and Pseudo-NMOS Logic circuit. Each technology's design process and key performance parameters of an 8-bit SIPO shift register are thoroughly investigated and compared, focusing on critical performance metrics of the SIPO shift register. The study extends its analysis by contrasting the performance parameters of the JK flip-flops, which is the main constituent of the 8-bit SIPO shift register, designed with these technologies against previous research findings. Our analysis shows a very low dynamic power consumption of $14.1 \mu\text{W}$, area of 839.14 nm^2 , propagation delay of 5.6 ns, slew rate of 79.75 GV/s, and a high noise margin of 50.18 mV. This study stands out as a significant progression in performance metrics. Results demonstrate the competitive advantages and trade-offs inherent in each technology with new findings for the SIPO shift register. This offers valuable guidance for digital circuit designers in selecting the most suitable approach for digital circuit implementations.

Paper ID: 184

Design and Analysis of a DC-DC fast EV charger for a Renewable energy-based EV Charging Station

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Abstract: With the recent developments in the Electric Vehicle (EV) sector, fast charging has emerged as a viable option to reduce charging times significantly. This paper addresses the critical challenges posed by the increasing number of EVs on the power grid, focusing on the necessity for reliable and efficient Level 3 charging solutions. To ensure rapid and sustainable charging, we propose a reliable and fast DC-DC charger that can be effectively integrated into solar-powered EV charging systems. This system charges LTO and NMC based battery up to 60-80 kWh within 45-60 minutes. The proposed solution leverages advanced power electronics and optimization algorithms to enhance charging efficiency and grid stability. By incorporating solar energy, the system promotes renewable energy usage while mitigating the impact of EV charging on the grid. This paper also explores various strategies to manage the additional load, including the development of new charging infrastructure, energy storage systems, consumption limitations, and optimal power distribution.



Paper ID: 190

Deep AD-Insight: A Benchmark Evaluation of Deep Learning Architectures for Multiclass Alzheimer's Disease Classification and Staging from Brain MRI Data

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Abstract: Alzheimer's Disease (AD), a progressive neurodegenerative condition, poses a significant public health challenge. Early and precise diagnosis is crucial for timely intervention and effective management. However, there remains a need for further exploration and integration of methodologies to enhance accuracy, interpretability, and generalizability across diverse datasets and clinical settings. This study investigates the efficacy of various deep learning models in classifying AD using brain MRI images. The research conducted a comprehensive analysis of popular deep learning and machine learning architectures. Methodology involved obtaining a Kaggle dataset of approximately 6400 brain MRI images categorized into four classes: 'MildDemented', 'ModerateDemented', 'NonDemented', and 'VeryMildDemented'. Models were trained on the training set and evaluated on the validation set, using several metrics. The CNN model achieved an impressive 95.90% accuracy, outperforming other architectures. Here findings contribute to ongoing efforts in developing accurate and reliable AD diagnosis methods, paving the way for improved early detection and intervention strategies.

Paper ID: 191

Forecasting Geomagnetic Storms for Earth Using LSTM with Solar Wind and IMF Features

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Abstract: When the solar wind interacts with Earth's field, it can cause geomagnetic storms, which pose serious risks to vital infrastructure such as satellite communication, GPS systems, and electric power transmission. We presented a novel method for forecasting the Disturbance Storm-Time Index (Dst) using a longshort-term memory (LSTM) neural network in order to meet the urgent requirement for precise predictions. Our model employs sensing data from NASA's ACE and NOAA's DSCOVR satellites to analyze the complex relationship between interplanetary magnetic field & plasma from solar wind & sunspot activity. These factors are crucial to understanding geomagnetic disturbances. The LSTM model accumulates complex patterns and temporal relationships within the space weather data by including realtime data assimilation, resulting in enhanced weather prediction capabilities. Evaluation metrics like the root mean square error (RMSE) and coefficient of determination (R²) are used to assess the model's performance and reliability. The outcomes indicate that the LSTM model is highly effective in accurately predicting geomagnetic storms. The predicted values offer vital information for operators of satellites, power grids and magnetic navigation systems, enabling them to implement preemptive actions to mitigate the effects of any disruptions caused by geomagnetic storms. The research we accomplished helps to improve the approaches employed for forecasting space weather. This provides decision-makers with a useful and timely tool to strengthen vital systems and prepare for geomagnetic disturbances.

Paper ID: 192

Enhanced Osteoarthritis Classification through Transfer Learning and Hyperparameter-Tuned Multi-Layer Ensemble Models

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Abstract: Knee osteoarthritis (OA) significantly limits activity and causes physical disability in older adults. Early classification of OA is crucial to slowing its progression. This paper introduces a method for OA classification using a transfer learning fusion network with hyperparameter tuning and a Multi-Layer Ensemble approach. The process begins by balancing the dataset through data augmentation and then integrates a pre-trained model with a customized CNN model. The architecture includes four convolutional blocks with varying filter sizes (32, 64, 128, and 256), dropout layers (0.1, 0.3, 0.5, and 0.7), and Mish activation functions. The flattened output of the last MaxPool2D layer is fed into three fully connected layers (256, 128, and 5 neurons) with Softmax activation for multi-class prediction. The performance of various models is combined through a Multi-Layer Ensemble, resulting in superior performance with 75.73% accuracy. Our proposed method achieves a well-performing model for OA classification and overcomes prior limitations, emphasizing the importance of automated knee OA classification and providing an effective solution.

Paper ID: 193
S-Shape Polarization Insensitive Metamaterial Absorber
for SAR Reduction at 3.5 GHz

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Abstract: A polarization-insensitive metamaterial absorber with an S-shaped structure is proposed to reduce the Specific Absorption Rate (SAR) at 3.5 GHz. This absorber exhibits single-negative (SNG) metamaterial characteristics and achieves an absorption rate of over 90% for all electromagnetic polarization angles. In the era of 5G, numerous applications operate at various frequency ranges, emitting substantial amounts of electromagnetic (EM) energy that have elevated SAR values. This radiation impacts the human body, particularly the head and hands, which are most exposed. In Malaysia, a frequency band of 3.5 GHz has been designated for 5G communication. However, this has led to the emission of undesirable signals due to high SAR values. To address this issue, the proposed absorber will be implemented to reduce SAR levels. Additionally, we have included an ADS equivalent circuit to solidify our results.



Paper ID: 196

Quadruple X Shaped Rotational Symmetric Metamaterial Absorber for C and X Band Applications

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Abstract: A quadruple X-shaped rotational symmetric dual band absorber is designed here for SATCOM, amateur radio, and radar monitoring applications. We get single negative (SNG) values at 7.68 GHz, 9.15 GHz, and 10.56 GHz, with the maximum absorption being over 99%. Ensured subwavelength size with good effective medium ratio (EMR) and compact size make it useful to use in sensor, Radar Cross-Section Reduction. A $0.23\lambda \times 0.23\lambda$ dimensioned patch was designed with a negative refractive index and permeability near zero, providing maximum absorption with polarization and incident angle insensitivity. The transverse electromagnetic (TEM) mode has been used to measure the result and then compare the result with recent relevant work to prove its potential.

Paper ID: 201

Biosynthesis and Characterization of TiO₂ Nanoparticles Using Allium Sativum Peel Extract with Detailed Optical Properties

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Abstract: In this study, TiO₂ nanoparticles have been effectively synthesized by eco-friendly biosynthesis method using the Allium sativum peel extract. The extract functioned as reducing and capping agent, replacing conventional chemicals in nanoparticle synthesis. The synthesized nanoparticles underwent characterization via X-ray Diffractometer (XRD), Field Emission Scanning Electron Microscopy (FESEM), and UV-vis spectroscopy. The XRD investigation affirmed the formation of pure anatase phase TiO₂ nanoparticles with a crystallinity of ~76%. Crystallite size was estimated to be 9.66 nm using the Scherrer equation and 8.41 nm via the Williamson-Hall plot analysis. Rietveld refinement was utilized to ascertain the lattice parameters, cell volume, and X-ray density. The FESEM analysis revealed spherical-shaped TiO₂ nanoparticles with a size range of 10-60 nm and an avg. size of 29.11 nm. The UV-vis spectroscopy absorption profile of the TiO₂ nanoparticles exhibited a single, broad absorption peak at 354 nm wavelength region. The Tauc plot analysis based on the absorption profile indicated a bandgap of 3.06 eV.

Paper ID: 202
Impacts on Distribution Network due to Coordinated Electric Ferry Charging

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Abstract: The maritime sector significantly contributes to greenhouse gas emissions that prompts a shift towards renewable-powered electric vessels. This research investigates the impacts of coordinated EF (electric ferry) charging on local distribution network of Gladstone, Queensland, Australia as a case study. Using DigSilent PowerFactory and actual load data, the simulated network includes four BESSs (battery energy storage systems) as proposed charging stations. A dynamic BESS model from MATLAB Simulink and a hybrid GA-PSOBF control algorithm optimize BESS operations which is

based on load demand and network parameters. Since the transformers of the test network is only 15% loaded, initial power flow analysis is conducted without BESS integration (base case) at 80% transformer loading which is then compared with fully utilized charging stations (with BESSs) at similar load in coordinated charge-discharge mode. Results show a 2%-3% increase in bus voltages and a 6% decrease in transformer loading in coordinated charge-discharge mode, with line loading dropping by 1%-2.8%. These findings suggest that coordinated charge-discharge operation improve system parameters and enable BESSs to aid in peak shaving and valley filling, acting as a spinning reserve for shore-side distribution network. This demonstrates the potential of electric ferry storage to support and stabilize local power grids.

Paper ID: 205

Multi-Objective Optimization and Feasibility Study of Hybrid Energy System Considering Future Load of 2041 using Machine Learning

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Abstract: Electricity usage in Bangladesh is drastically rising, as a result of industrial expansion and rising living standards, particularly in the major cities. Despite the country's ever-increasing demand, she is already facing a power crisis around the nation. Furthermore, the majority of the electricity generation units use traditional sources, which have finite limits. Chittagong, one of the country's important cities, also faces these problems. This research work addresses an issue regarding the ever-increasing energy consumption in Chittagong City of Bangladesh and expresses its concerns for the continuation of the recent energy crisis in the city. To address these issues, the study proposes an AI-based Load Forecasting Model to predict the future load of 2041 and a Multi-Objective Hybrid Energy System (HES) that combines renewable and conventional sources to meet the predicted demand in an optimized way. The goal of the study is to propose a long-term energy plan for a densely populated region in Chittagong (KHULSHI) using HES to reduce the pressure on the national energy grid and eradicate the deficiency of electricity by the year 2041. Deep Learning Models like Long-Short-Term-Memory (LSTM) and Gated-Recurrent-Unit (GRU) are built, trained, and tested using the collected load data where the GRU model outperformed LSTM, with an accuracy of GRU (97.9%) and LSTM (96.9%). Then, the forecasted 2041 load data is applied to the Hybrid Energy System (HES) model, with HOMER optimizing for Net Present Cost (NPC), Levelized Cost of Energy (LCOE), and CO₂ emissions. RETScreen software is used to conduct a feasibility analysis by analyzing technical aspects, and economic aspects of the research project and reducing Greenhouse-gas (GHG) production.



Paper ID: 206

A Deep Learning and Machine Learning Approach to Crop Recommendation for Sustainable Farming in Bangladesh

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Abstract: Bangladesh agriculture sector provides approximately 11 to 12% GDP to the country and total B2C market size of agriculture related products is nearly \$47.54 billion. This study focuses on usage of Machine Learning algorithm for forecasting correct recommendations of crops according to the environmental and soil characteristics for instance Nitrogen, Phosphorus, Potassium, Temperature, Humidity, pH Value, and Rainfall etc. By the standard tool of machine learning and especially deep learning, then we are able to arrive at an astounding 99.55% accurate determination of the most appropriate crops to grow under certain conditions. This high accuracy helps a lot for farmers in making a decision of which crop grows best in the current conditions and in the expected conditions in the near future. The higher crop yield and production is achieved through this technique also help in improved farming methods with respect to weather and a soil type.

Paper ID: 210

A Highly Efficient Microstrip Patch Antenna for 6G Applications with High Gain and Ultrawide Bandwidth

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Abstract: This work primarily focuses on design and developing a compact microstrip patch antennas for 6G applications with better performance. In this paper, by using CST - Computer Simulation Technology AG (CST) software we have designed and analyzed a smaller size, wider bandwidth, superb gain, better return loss and highly efficient microstrip patch antenna with a rectangular shape operating at a frequency of 123 GHz in the frequency range of 6G applications.

In the range of 50 ohm microstrip transmission line or fed line is used to developed antenna in order to achieve the expected design, we have used Rogers RT/Duroid 5880 as a substrate, characterized by a specific dielectric constant (ϵ_r) = 2.2 with substrate thickness = 0.508 mm. Upon evaluating the design, we have determined that this design approach is highly efficient and dependable for 6G applications at 123 GHz of resonant frequency having excellent return loss of -51.32 dB, superb antenna radiation efficiency of 88.53%, ultrawide-bandwidth of 6.4 GHz and excellent gain of 11.61 dBi..

Paper ID: 211**A Highly Efficient Fractal Based Microstrip Patch Antenna for 5G Applications with High Gain****Md. Ashraful Amin, Mohammad Torikul Huda, and Arif Mohammad Siddiky**

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Abstract: For the purpose of 5G communication, this paper proposes the design and simulations of a microstrip patch antenna that operates at a frequency of 28 GHz. The antenna comprises a defective ground structure and a unique kind of radiating patch with slots and fractal shape, together with a parasitic patch. The objective of this work is to use computer simulation technology (CST) tools to develop and model a compact microstrip patch antenna with high gain, specifically for 5G applications. The proposed antenna is specifically designed with a 50 ohm transmission feed line to achieve the desired design objectives. The dielectric substrate used in this study is a Roger RT5880, with a specific dielectric constant (ϵ_r) of 2.2. The substrate has a height of 0.508 mm. After simulating the design, the antenna demonstrates impressive performance. It resonates at a frequency of 28 GHz, showcasing a remarkable return loss of -52.68869 dBi. Additionally, it boasts an exceptional radiation efficiency of 91.45%, a wide bandwidth of 695 MHz, and an impressive gain of 10.18 dBi.

Paper ID: 212**Design and Feasibility Analysis of a 1MWp Grid-Connected Floating Solar Photovoltaic Plant in Kaptai, Bangladesh**

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Abstract: The increasing energy demand and limited fossil fuel reserves have shifted focus to solar energy, which is abundant, eco-friendly, and sustainable. Despite its advantages, the implementation of solar projects on land in Bangladesh faces significant challenges. These challenges include issues related to land availability, land development, land acquisition, a high rate of electricity pricing, and CO₂ emissions. To address these issues, this study explores on-grid floating photovoltaic (FPV) systems as a solution to reduce land use and lower electricity generation costs. A floating grid-connected photovoltaic system was simulated using PVsyst software, focusing on the Kaptai Lake area in Rangamati, Bangladesh. The study determines the optimal configuration by evaluating factors such as panel positioning, solar panel efficiency, available surface area, and economic and environmental benefits, projecting a total electricity generation of approximately 1 MW. The results, based on simulated data and theoretical analysis, suggest that FPV systems offer a viable and effective solution to the land scarcity challenges in Bangladesh, benefiting local communities. Overall, floating solar PV systems present a promising alternative to traditional land-based installations, addressing land scarcity while promoting sustainable energy. This research also has wider applicability in other remote coastal regions with no grid connection and adjacent lakes, demonstrating potential for sustainable development in such areas.

Paper ID: 214

**Explainable Transfer Learning for Precise Alzheimer's Disease
Prediction from MRI Data**

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Abstract: Alzheimer's disease (AD) is one of the most prevalent chronic neurological illnesses among older persons. Early diagnosis of AD enables timely intervention and management, traditionally achieved through clinical assessments, cognitive tests, and neuroimaging techniques like Magnetic Resonance Imaging (MRI). MRI can diagnose AD at various stages, including early mild cognitive impairment (MCI), moderate MCI, and advanced stages of AD. The goal of this study is to categorize AD stages from MRI images using transfer learning. Deep learning has shown remarkable performance in medical image analysis, surpassing conventional machine learning methods. We have used seven transfer learning models: EfficientNetB0, Resnet152, InceptionV3, Resnet101, VGG16, VGG19, and Resnet50 for our imbalanced dataset and got the highest weighted accuracy of 97.42%. Elevated accuracy levels do not necessarily equate to genuine predictive strength, particularly in the presence of uneven data distributions. Therefore, it is crucial to implement different evaluation techniques to more precisely gauge the model's classifying proficiency. We also have applied the explainable artificial intelligence (XAI) technique, specifically LIME, to identify the most salient regions in the MRI images and to assign feature importance scores to the input variables. We have assessed the quality and usefulness of the explanations using various metrics.

Paper ID: 215

Design of Low Dispersion Silicon Nanowire Optical Rectangular Waveguide for Label-Free Biosensing Applications

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Abstract: This paper presents an in-depth investigation into silicon nanowire optical rectangular waveguides designed specifically for label-free biosensing applications. Silicon nanowire waveguides possess numerous advantageous characteristics, making them highly suitable for applications in both communication and sensing within photonic integrated designs. These optical rectangular waveguides efficiently guide light through optimized dimensions of low refractive index gaps. Employing a finite-element method for numerical analysis provides substantial evidence to validate the guiding properties of these waveguides. In exploring their sensing capabilities, it is crucial to understand various

influential factors. The initial phase of this exploration focuses on how nanowire waveguides, guided by low refractive indices, propagate and exhibit sensing behavior. The results underscore the importance of surface sensing. Examining the impact of functionalization layer coverage on silicon wire surfaces, as reflected in the waveguide confinement factor, highlights enhanced interaction with sensing analytes when the functionalization layer fully covers the surface. Thus, integrating a functionalization layer over the waveguide sensing surface is imperative for devising label-free surface sensing optical devices. Ultimately, the silicon nanowire optical rectangular waveguide proves instrumental in facilitating efficient sensing within the advancing domain of photonics.

Paper ID: 218

Leukemia Disease Classification using Concatenated Convolutional Neural Network with Vision Transformer

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Abstract: One of the lethal diseases that has a high mortality rate in both adults and children is acute lymphoblastic leukemia (ALL). A clinical pathologist examines the microscopic pictures of white blood cells to get the traditional diagnosis of this illness. Nevertheless, this method is based on manual observation and frequently yields unreliable outcomes. This study suggests combining a convolutional neural network (CNN) approach with a vision transformer (ViT) to create an automated system for diagnosing acute lymphoblastic leukemia. This study was conducted using the ALL IDB databases for this purpose. However, to address the overfitting issue in the model, data augmentation approaches have been used to create images. Using 8 heads and 8 transformer layers, the Concatenated CNN-ViT model produced encouraging results with a projection dimension of 32. Nonetheless, the outcomes demonstrated that, in the diagnosis of ALL, the proposed model achieved 98.62% accuracy, 98.66% precision, 98.41% recall, and 98.53% F1-score. The high accuracy indicates that compared to other studies published in the same field, it offers a more efficient method of diagnosing acute lymphoblastic leukemia..

Paper ID: 219

Depression Detection from Social Media Comments Using Deep Learning with Interpretability



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Abstract: Depression is one of the most prevalent and serious psychological disorders. If left untreated for a long time, it can lead to serious consequences. Therefore, early intervention can be significantly helpful in this regard. Nowadays, people often express themselves freely on social media, which makes these platforms a very good means for detecting depression among users. Various deep learning models can be used to automate the process of detecting depression from text data as they have proven very effective in text classification tasks. In this work, we have analyzed the performances of deep learning models having RNN layers and that of BERT Base Uncased, which is a pre-trained transformer model, on the Reddit depression dataset available on Kaggle. Results show that the BERT model outperforms the RNN-based deep learning models with accuracy, precision, recall, and f1 score values of 98.02%, 98.06%, 98.02%, and 98.02% respectively. Finally, we analyze the predictions made by the classifier models using the LIME XAI model to gain further insight into the classification mechanism. Implementation of XAI models alongside the deep learning models can assert faith in the predictions made.

Paper ID: 220

Automated Literature Review Using NLP Techniques and LLM-Based Retrieval-Augmented Generation

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Abstract: This research presents and compares multiple approaches to automate the generation of literature reviews using several Natural Language Processing (NLP) techniques and retrieval-augmented generation (RAG) with a Large Language Model (LLM). The ever-increasing number of research articles provides a huge challenge for manual literature review. It has resulted in an increased demand for automation. Developing a system capable of automatically generating the literature reviews from only the PDF files as input is the primary objective of this research work. The effectiveness of several Natural Language Processing (NLP) strategies, such as the frequency-based method (spaCy), the trans-

former model (Simple T5), and retrieval-augmented generation (RAG) with Large Language Model (GPT-3.5-turbo), is evaluated to meet the primary objective. The SciTLDR dataset is chosen for this research experiment and three distinct techniques are utilized to implement three different systems for auto-generating the literature reviews. The ROUGE scores are used for the evaluation of all three systems. Based on the evaluation, the Large Language Model GPT-3.5-turbo achieved the highest ROUGE-1 score, 0.364. The transformer model comes in second place and spaCy is at the last position. Finally, a graphical user interface is created for the best system based on the large language model.

Paper ID: 221

Investigation of the Microstructural and Dielectric Properties of Strontium Doped Calcium Copper Titanate Electroceramics

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Abstract: The conventional solid-state reaction method was used to produce CaSrCu₃Ti₄O₁₂ (CSCTO) ceramics. The investigation focused on examining the microstructure and dielectric properties of polycrystalline CSCTO sample that were subjected to sintering at 1080 °C. Abnormal grain growth was observed in the CSCTO sample through field emission scanning electron microscopy (FESEM), and the grain size was calculated and found to be approximately 5.466 μm using ImageJ software. The dielectric constant of the prepared sample exhibited significant frequency dependence within the frequency range of 40 Hz to 110 MHz. At room temperature and a frequency of 40 Hz, the measured dielectric constant yielded a value of 18000. The dielectric loss is close to 1.3. Also, the imaginary impedance increases with the increasing frequency. Nyquist plot also provides the resistance behavior of the prepared ceramics.

Paper ID: 225

A Deep Learning Approach to Forecast Electricity Demand in Sylhet of Bangladesh

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Abstract: Electricity demand forecasting is essential for efficient resource allocation, infrastructure planning, and sustainable energy management. However, achieving a precise prediction of electricity demand is difficult due to noise and randomness. This paper presents a comparative analysis of deep learning and machine learning models for forecasting electricity demand in Sylhet, a rapidly developing urban area in Bangladesh. We applied Time Series Dense Encoder (TiDE), which has not been used in this field before, to achieve higher accuracy in electricity demand forecasting. To assess the performance of the proposed approach, we compared it with three different machine learning models: linear regression, XGBoost, and an ensemble of linear regression and XGBoost. Each model's accuracy was evaluated using MAPE, RMSE, MAE, and the coefficient of determination(r^2). Based on the research outcomes, the TiDE model had MAPE values of 1.139%, 1.672%, 2.887%; RMSE values of 0.0081, 0.0139, 0.0230; MAE values of 0.0065, 0.00972, 0.0162; and Coefficient of Determination values of 0.91, 0.814, 0.717 for the three forecast horizons in these order – days seven, fifteen and thirty.

Paper ID: 230

A Comparison of Bangladeshi Daily News Portals' Various Clustering Techniques for Online Revenue Generation

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Abstract: The newspaper is often regarded as one of the most effective means of acquiring news and remaining informed about both local and global occurrences. Technological improvements have contributed to the comparable popularity of online newspapers and traditional magazines. The datasets used in this analysis were obtained from the online newspaper sections of two well-known and respected English and Bengali daily newspapers in Bangladesh, "The Daily Star" and "Prothom Alo". This study examines several aspects of the analysis, organizing them into distinct categories. Similarly, online newspapers are using Google Analytics to monitor both overall views and unique page views. Consequently, this industry has been the focal point of various scholarly publications. In this study, different clustering techniques were used, and it was observed that in both newspapers, Spectral Clustering performed better than the other clustering techniques. Spectral Clustering obtained 89% and 83% Silhouette Scores for the Daily Star and Prothom Alo respectively. Achieving this goal will allow newspapers to obtain significant insights on market trends and customer behavior, as well as increase revenues and attract more readers.

Paper ID: 232

A Techno-Economic Analysis of an IEEE 39 Sustainable Grid Bus for DSM on Load Flexibility Options

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Abstract: To estimate the flexibility and benefit of the system integration of demand side management (DSM), this paper evaluates the techno-economic aspects of DSM in a sustainable 39-bus grid with renewable energy sources (RES) and load flexibility options (e.g., time flexible, temperature flexible, and light flexible). This 39-bus impedances have been adopted from southern power grid of Bangladesh and IEEE 39 bus system. By including environmental considerations, integration of RES in the system a sustainable grid consideration implemented. The findings demonstrate that load shifting and reduction by DSM may take the place of load shedding and can also balance transient fluctuations. Analysis of DSM's effects on other flexibility choices reveals that, while baseload power plants see an increase in both, peak load plants get a decrease in utilization and contribution margin. DSM causes a countrywide increase in power consumption by reducing imports and exports.

Paper ID:235

Topology Optimization of a 3D Printable Prosthetic Foot

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Abstract: This research tackles a novel prosthetic foot design, simulation and FDM (Fused Deposition Modeling) 3D printing by customizing it for a human of 50 kg body mass. An initial foot model was created in SolidWorks software using actual human foot dimensions and then topology optimization was applied to reduce mass by 70 % while maintaining structural integrity under a 500 N external load and a factor of safety of 1.5. The three components of the stance phase—heel-strike, mid-stance, and toe-off—were simulated in a static manner utilizing force on the tibia. The results showed stress levels below the yield strength, confirming the foot's capacity to sustain body weight while standing without failing. Using PLA (Polylactic acid) material, the revised and optimized design was manufactured using

a Creality Ender-3 S1 Plus 3D printer. The prosthetic foot weighed 564 grams and had 60 % infill after 3D printing. The effectiveness of optimization process is demonstrated by the notable mass reduction from the 2.34 kg mass of the original design model. The PLA material qualities are taken into account in the computations and simulations. This prosthetic foot is a financially sensible option, as indicated by its computed cost of about 5,574 Taka. The presented design shows a significant percentage reduction of material as well as cost in comparison to the commercially available prosthetic feet.

Paper ID: 242

Design and Performance Analysis of Trident-shaped Slot Microstrip Patch Antenna for 5G Applications

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Abstract: A microstrip patch antenna with a trident-shaped slot is presented here. With the inclusion of the proposed trident-shaped slot, gain, directivity, and radiation efficiency enhanced by 3.4 dB, 3.29 dB, and 2.7%, respectively, revealing that the radiation pattern is highly focused, and a larger portion of the input power is radiated into space. Meanwhile, a slight decrease in S11 (return loss) and VSWR suggests better impedance matching due to the trident-shaped slot. In addition, antenna physical parameters such as feedline width, substrate length and width, and ground length were varied and optimized, and performance parameters were analyzed. The antenna simulated return loss (S11) is -24.02 dB, which shows improved impedance matching. A voltage standing wave ratio (VSWR) of 1.13 was measured, which means that the transmitted signal is not reflected back, and good power transmission efficiency was achieved. The antenna achieves as high as 8.32 dB of gain, which indicates good directionality for a high-frequency antenna design. The antenna's radiation efficiency is 87.51 %, which indicates that this structure can effectively convert input power into radiated electromagnetic waves. The bandwidth of 29.16 GHz to 29.72 GHz results in a 0.56 GHz range of frequency, guaranteeing that the filter acts relatively ideally throughout its operating frequency spectrum. The comprehensive analysis may act as a guide for the experimental fabrication of efficient and low-cost Trident-shaped Slot Microstrip Patch Antenna for 5G applications.



Paper ID: 243

Direct growth and Characterization of Ca₁₂Al₁₄O₃₃ Bulk Crystal Elec-tride by Vertical Bridgman Technique

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Abstract: The nanoporous crystal 12CaO₇Al₂O₃:e- electride or mayenite electride (C₁₂A₇:e-) growth directly via melt by the vertical Bridgman (VB) technique is an attempt for the first time. In present VB growth technique, we have grown C₁₂A₇ crystalline electride directly at various growth rate of 7.46 3.2 mm/h by using stoichiometric C₁₂A₇ feed rod in contrast to fabricate by Ca/Ti metal vapor treatment from insulating 12CaO₇Al₂O₃ single crystals. The funnel shaped carbon crucible was used in an inert gas atmosphere such as argon. The design of funnel shape carbon crucible was optimized based on the quality of the grown crystals. We have checked the crystallinity of as grown electrides by using X-ray diffraction pattern. The compositional analysis was carried out by scanning electron microscope (SEM) photograph and electron probe micro analyzer (EPMA). The electride grown at 3.2 mm/h using funnel shaped crucible shows the relatively better crystallinity in compared to use of hemispherical and cone shaped crucibles. The grown electride has exhibited semiconducting behavior with the conductivity of 1.20, 10⁻³ S/cm at room temperature.

Paper ID: 244

YOLOv5-Driven Decision Fusion Approach for Aiding Automated Tomato Harvesting: Detection, Maturity Classification, Peduncle Estimation and Picking Point Determination

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Abstract: The first step in automating fruit harvesting entails developing a computer vision system to locate, categorize, and determine the most suitable spot for picking. Tomato detection and picking point estimation typically involve three key components: ascertaining the tomato's bounding box, categorizing its ripeness, and identifying the optimal picking point. This study proposes a two-part decision fusion approach based on YOLOv5 to locate, classify maturity, and estimate the peduncle position of tomatoes in unstructured environments considering real-world scenarios. In the tomatoes' identification and maturity classification task, YOLOv5mu achieves an F1 score of 89.4% and a mAP50 of 0.931. Meanwhile, YOLOv5su achieves a precision of 100% and a recall of 48.5% in estimating peduncle positions, demonstrating enhanced precision compared to the current approaches. Finally, the predictions from these two models are merged to obtain the decision-fused output. The picking points, chosen as the central point of the peduncle estimation boxes, can be used as reference points to direct a robotic arm in facilitating the automated harvesting operation.

Paper ID: 246

Enhancing Parkinson's Diagnosis: Unleashing the Potential of Machine Learning via Vocal Features Fusion

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Abstract: Parkinson's disease (PD) is a degenerative brain disease that worsens with age, causing areas of the brain to weaken. The main focus of this study has been on the characteristics of the voice modality with a wide range of features including vocal fold, MFCC(Mel-Frequency Cepstral Coefficients), baseline features, wavelet features, temporal frequency features and Tunable QFactor Wavelet Features. The proposed models introduced dimensionality reduction techniques such as PCA(Principal Component Analysis) and ICA(Independent Component Analysis) to improve the quality of the data with different Machine Learning (ML) classifiers (K-Nearest Neighbors, Support Vector Machines, Naïve Bayes etc) and their ensemble technique for classification of PD. Moreover, an ensemble approach comprising multiple Deep Neural Networks (DNNs) models was employed to assess the efficacy of the proposed methodology. Through the incorporation of a weighted average, the DNN ensemble exhibited a notable accuracy of 88.74% in effectively classifying Parkinson's patients. However, the fusion of MFCC and vocal fold feature sets yielded exceptional results, showcasing a robust accuracy of 98.68% with the utilization of a traditional ML ensemble model.

Paper ID: 250

Enhancing Prediction Accuracy using Ensemble Deep Learning Methods on Time Series Data

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Abstract: Time series prediction, which has numerous applications in several fields like electricity consumption management, business, healthcare, and so on, is addressed as one of the core tasks of data analytics. Traditional methods are often not able to capture the complicated sequences inherent in real-data. Nowadays, deep learning methods are investigated to forecast the time series pattern. However, the expected accuracy of the prediction is not obtained in many cases. In this paper, we propose an ensemble method that unifies the recurrent neural network (RNN) and convolutional neural network (CNN) models into one framework, allowing for improved predictive performance. In the proposed ensemble method, several models, like the long short-term memory (LSTM) recurrent neural network, gated recurrent unit (GRU), and temporal convolutional network (TCN) are used as weaker models and extreme gradient boosting (XGBoost) is used to combine an ensemble from the baseline models. In the ensemble method, a more accurate feature set is generated, put through dense layers, and the combined features are used for further predictions. In the experimental results, it is observed that the proposed ensemble method outperforms several efficient single models and hybrid models on real-time time series datasets.

Paper ID: 252

Design of an Effective Multiband Linear and Circular Polarization Converter Using Reflective Metasurface

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Abstract: This paper presents a design for a metasurfacebased polarization converter. The converter features a metallic circle intersected by a gap of a 45° inclined cross, creating four quadrant-like segments, along with an intermediate dielectric layer and a bottom metal layer. This configuration allows for both linear cross-polarization and linear-to-circular polarization conversion. Simulations indicate that the converter effectively transforms a linearly polarized incident wave into its orthogonal counterpart within frequency bands of 7.85 GHz to 8.33 GHz and 14.95 GHz to 17.8 GHz, and into a circularly polarized wave within the ranges of 7.385 GHz to 7.63 GHz, 8.645 GHz to 10.11 GHz, and 11.13 GHz to 14.035 GHz. The design maintains moderate angular stability up to 30° oblique incidence while achieving high efficiency, demonstrating its practical applicability. The proposed metasurface is suitable for use in electromagnetic measurements, stealth technology, antenna designs and sensor applications. Additionally, this configuration can be adjusted to create wideband polarization converters for different frequency bands.

Paper ID: 256

Early Prediction of Crop Yield in Bangladesh Using Ensemble Learning

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Abstract: Farmers in Bangladesh face financial losses due to difficulties in choosing optimal crops, influenced by factors like pesticides, fertilizer, and rainfall. To address this, early crop yield prediction is crucial, particularly for rice, sugarcane, potato, and maize. This research employs machine learning algorithms- K Nearest Neighbors, Random Forest, Gradient Boosting, AdaBoost, CatBoost, Decision Tree, and XGBoost to evaluate their predictive performance. K-Nearest Neighbors, Random Forest, and Gradient Boosting emerged as the top performers. Advanced ensemble learning techniques, including stacking with various base and final estimators using these three models, are then explored to improve predictive accuracy. Rigorous evaluation metrics are applied, with maize yield prediction achieving R² 0.99 and MAE 0.04, rice R² 0.98 and MAE 0.04, potato R² 0.99 and MAE 0.11, and sugarcane R² 0.99 and MAE 0.36. This research advances agricultural prediction and demonstrates the effectiveness of ensemble learning in optimizing machine learning models for complex tasks. The findings provide stakeholders in agriculture with reliable tools for early crop yield estimation, essential for effective resource management and decision-making.



Paper ID: 261

Design of a unique H-L shape EBG Antenna for 5G Telecommunication Technology

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Abstract: A novel H-L shape electromagnetic band gap (EBG) antenna set by a 50-ohm microstrip line for good performance parameters in the higher frequency range of telecommunication technology is originated in this paper. An I-shape microstrip patch antenna is also preferred as a foundation for better performance also fed by a microstrip line. FR-4 materials (lossy) are used as a substrate of 10×10 mm² dimensions in this design having a dielectric constant is 4.3 and a thickness is 1.6 mm. The split gap of the design is 0.5 mm. The overall dimensions of this design are 8×8 mm² structured by the simulating software CST Studio Suite 2021. By placing the EBG unit cell design on the ground plane (EBG structure), the antenna provides finer return loss, enhanced far-field directivity, gain, higher bandwidth, and current flowing performance in the surface area. The return loss of -48.179 dB (Without EBG) provides perfect input impedance matching in our work. At the resonance frequency of 33.81 GHz, the return loss is obtained at -71.09 dB in an H-L shape EBG antenna with a higher bandwidth is about 7.35 GHz (31.298 GHz to 38.695 GHz).

Paper ID: 262

Real-Time Power Monitoring and Fault Detection in Power Distribution System Using FPGA and cRIO 9039

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Abstract: This paper details developing and implementing a comprehensive power monitoring system, designed for real-time data acquisition and fault detection. Utilizing a cRIO 9039 platform, the system measures voltage and current, calculates RMS values, frequency, and complex power, and identifies fault conditions in voltage levels, frequency, or power factor. A unique aspect of our approach integrates FPGA-based data processing, ensuring high-speed data handling and error detection without interrupting primary data flow. The system also features a user-friendly interface for real-time data display and fault management. If any errors have been detected, the user will be notified using visual and audio warning and the reading and timestamp corresponding to the fault will be recorded. The system accurately monitors power metrics and detects deviations, enhancing industrial power management systems. The architecture, workflow, and user interface design align with industrial standards, offering practical insights into power system monitoring.

Paper ID: 264

A Comprehensive Analysis of COVID-19 Detection Using Bangladeshi Data and Explainable AI

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Abstract: COVID-19 is a rapidly spreading and highly infectious virus which has triggered a global pandemic, profoundly affecting millions across the world. The pandemic has introduced unprecedented challenges in public health, economic stability, and societal structures, necessitating the implementation of extensive and multifaceted health interventions globally. It had a tremendous impact on Bangladesh by April 2024, with around 29,495 fatalities and more than 2 million confirmed cases. This study focuses on improving COVID-19 detection in CXR images by utilizing a dataset of 4,350 images from Bangladesh categorized into four classes: Normal, Lung-Opacity, COVID-19 and Viral- Pneumonia. ML, DL and TL models are employed with the VGG19 model achieving an impressive 98% accuracy. LIME is used to explain model predictions, highlighting the regions and features influencing classification decisions. SMOTE is applied to address class imbalances. By providing insight into both correct and incorrect classifications, the study emphasizes the importance of XAI in enhancing the transparency and reliability of models, ultimately improving the effectiveness of detection from CXR images..

Paper ID: 268

A Hybrid DCNN ECOC-SVM System for Detecting Semiconductor Wafer Defects Using Histogram Equalization

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Abstract: In the semiconductor manufacturing sector, identifying defective wafers is a challenging task. Several techniques are conducted for detecting defective and non-defect semiconductor wafers. However, these developed techniques are not able to detect tiny defects in defective wafer maps accurately. Also, these techniques are unable to identify complex patterns in semiconductor wafers precisely. To overcome these limitations this paper proposes a hybrid approach with histogram equalization. The hybrid system comprises the deep convolutional neural network (DCNN) and error-correcting output code-based support vector machines (ECOC-SVM) classifier model. In this proposed method, histogram equalization is performed on the real wafer map dataset of WM811K to improve the visibility of tiny defects in wafer maps. The DCNN architecture extracts valuable features from histogram-equalized wafer map images. The swish function is used in the DCNN architecture and DCNN extracts features from complex defect patterns of wafer maps. The extracted features are used for training and testing purposes of the classifier model. The error-correcting capability of the ECOC-SVM classifier model improves the overall robustness and accuracy of the hybrid system for detecting eight types of wafer defects and one non-defect type wafer. The testing accuracy of the hybrid model is 96.1%. In this paper, comparative studies are given between the proposed system and another hybrid system that does not use the histogram equalization technique and swish function in the DCNN. The findings demonstrate that the proposed system accurately detects the tiny defects in defective wafers and identifies the complex patterns in semiconductor wafer maps. This paper also provides a comparative analysis of the proposed system with relative research methods..

Paper ID: 271

Survival Analysis of Heart Failure Patients through Logic Mining in Discrete Hopfield Neural Network

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Abstract: Survival analysis of a disease is vital to ensure the treatment of patients appropriately. Artificial Intelligence, particularly the application of Artificial Neural Networks, is garnering substantial interest within the healthcare sector due to its promising potential to enhance patient outcomes. This includes its potential to improve the diagnosis and management of various diseases, notably heart failure. Medical practitioners or specialists are not able to diagnose a disease accurately when there are several numbers of attributes/ risk factors that make the disease life-threatening for a patient.

Logic mining is one of the platforms to induce significant attributes through the logical rules from large data sets. Boolean 2 Satisfiability logic can be used to represent real-life data sets incorporated with the Hopfield Neural Network. This study proposes a novel approach to extracting logical rules from medical datasets using the Modified Boolean 2-Satisfiability Reverse Analysis (MB2SRA) technique. The performance of the extracted rules is evaluated using RMSE, MAE, and accuracy metrics. Our computational simulations demonstrate the efficacy of the proposed model in predicting patient survival post-heart failure.

Paper ID: 273**Design of a Cost Effective IoT Based Advanced Aquaculture with Real Time Environment and Water Assessments**

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Abstract: The fishing sector is becoming increasingly interested in Internet of Things (IoT)-based aquaculture. Aquaculture 4.0 is a field that is lagging in many nations despite the fact that IoT technology is propelling agriculture 4.0 forward. This article describes the development of a precise, smart aquaculture device that is based on the Internet of Things. It offers a thorough method for monitoring many water and environmental parameters, such as temperature, humidity, salinity, pH, and dissolving oxygen. Multiple sensors, including DO, salinity, pH, turbidity, MQ-135, and DHT-11 sensors, are integrated with the ESP32 NodeMcu microcontroller in the system. This is our device's front-end hardware. Google Spreadsheet and Blynk are two prime parts of the backend sector. Blynk assists with monitoring all metrics using desktop and Android applications on smart devices. The spreadsheet is an essential component of the prototype model since it functions as a safe database to hold all the parameters for additional research. Using the paired sample test in SPSS software, sensor validation was conducted to verify our findings regarding commercial products. In this paper we are going to monitor, store real time environmental and pond parameters along with statistical analysis of those metrics so that anyone can decide this pond is suitable for aquaculture or not. This paper is a crucial component of our research that will assist later researchers in reconstructing this model for use in their studies.

Paper ID: 275**SiO₂ Nanosphere for Reducing Reflection in Perovskite Solar Cell by Using Ansys Lumerical**



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Abstract: This study presents the potential of Mie scattering-based light trapping for enhancing the performance of perovskite solar cells by using spherical nanostructure. Utilizing the Lumerical FDTD simulations, investigation of the influence of SiO₂ nanosphere with varying radii (50-250 nm) placed on the cell surface had been studied. The results revealed significant improvements in light absorption, reduced reflection losses and enhanced generation rates due to the incorporation of the sphere. Notably, a 28% reduction in reflection loss led to a remarkable boost in electrical performance of the solar cell..Later, the Lumerical CHARGE Solver analysis of the atop sphere cell showed superior electrical parameters compared to the planar cell, as the results demonstrated VOC 0.995 V, JSC 23.44 mA/cm², FF 89.7%, and PCE of 20.91% compared to 19.57% PCE for the planar cell (without the atop sphere). This work demonstrates the promising potential of Mie scattering for improving perovskite solar cell efficiency, paving the way for further exploration of nano-spherical arrays and alternative materials for even greater performance optimization..

Paper ID: 276

Photoplethysmogram-based Cerebrovascular Disease Detection: A Machine Learning Approach

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Abstract: Cerebrovascular disease is responsible for hemorrhage stroke which is one of the leading causes of morbidity in the world. Detection at an early stage is necessary to avoid further complications. However, the traditional ways of detecting this disease are image-based analysis like magnetic resonance imaging (MRI) and computed tomography (CT) scan. These are costly and time-consuming processes which can be replaced by Photoplethysmogram (PPG) signal analysis. It can identify the changes in blood volume, hence has the potential to detect Cerebrovascular disease causing problems

swith blood flow in the brain region. So far only a few studies have used PPG signal to detect Cerebro-vascular disease from PPG signal. Also, the use of frequency domain features for detecting the disease is yet to be explored. In this study, 84 PPG segments have been selected from a publicly available dataset. Later, several frequency domain and time domain features have been extracted and used separately in different machine learning classifier designs. Among the various models tested, KNN performed the best providing 97.61% accuracy using the combination of both types of features. Additionally, the study has determined that frequency domain features extracted from PPG signals have lower capability as they have provided the least accuracy. This lightweight approach may pave the way for a reliable point-of-care solution offering a potential breakthrough in enhancing patient monitoring and embedded system design for treatment purposes in future.

Paper ID: 279**Anemia Detection through Sclera and Vessel Analysis: A Machine Learning and Deep Learning Perspective**

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Abstract: Anemia needs to be properly and promptly diagnosed because it is a major worldwide health concern. A decrease in red blood cells is known as anemia. In this research, we have used a range of machine learning techniques, including Random Forest, k-Nearest Neighbors, Polynomial Support Vector Machines, and AdaBoost. Specifically, these techniques have been applied to identify patterns and correlations within the extensive information on the diagnosis of anemia. In this work, incorporating these numerous models into an ensemble has been a significant and innovative tactic. This ensemble model, which combines the best aspects of Random Forest, Polynomial SVM, AdaBoost, and k-Nearest Neighbors, has produced remarkable results. It has been noted for its strong performance in the vessel and sclera classifications. We studied machine learning techniques before moving on to advanced computational techniques, such as deep learning approaches. We have primarily discussed convolutional neural networks, covering well-known models such as VGG16, VGG19, MobileNetV2, and InceptionV3. A detailed analysis of CNN based models has yielded several surprising conclusions: We have observed very high accuracy rates for the vascular and sclera categories, respectively. This study has demonstrated the significant impact of state-of-the-art computational technologies on the delivery of healthcare solutions. Recent works have extended the reach of anemia detection capabilities and added to the increasing corpus of literature, highlighting the critical role that technology plays in managing complex medical scenarios.

Paper ID: 281

IoT Based Smart Walking Stick for Enhanced Mobility of The Visually Impaired

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Abstract: Vision is a crucial aspect of human life, but unfortunately, some people are visually impaired and face significant daily challenges. This issue intensifies when navigating unfamiliar areas. Blindness still lacks adequate global support, despite numerous efforts to improve mobility for the visually impaired. Traditional white canes remain basic tools, and while various electronic aids are available, they often suffer from high costs, limited user-friendliness, and accuracy issues. Our research introduces an IoT-based Smart Walking Stick designed to enhance self-sufficiency for blind individuals. This system provides real-time monitoring and safety alerts through pre-recorded voice messages, ensuring user security. It integrates several components, including the ESP32, ultrasonic sensors for obstacle detection in front, left, and right directions, IR sensors for detecting road obstacles, a water level sensor for detecting the probability of water in potholes, and a mini solar panel for battery backup. Pre-recorded voice messages, stored on an SD card, offer auditory alerts to the user. Additionally, GPS and GSM modules facilitate live location tracking and SMS alerts to guardians. The ESP32 processes and transmits sensor data to a Node.js server via MQTT, enabling guardians to monitor the user's location and status through a dedicated website or mobile app. This smart stick is crafted to empower visually impaired users by improving their independence and comfort through an affordable and innovative solution.

Paper ID: 282

Brain Tumors classification of MRI-Based Images using Deep Learning-based Approach

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Abstract: Brain tumors are created from the abnormal development of cells within the skull. Magnetic Resonance Imaging (MRI) is a significant healthcare modality. MRI images provide superior soft tissue contrast without ionizing radiation, unlike CT scans and X-rays including brain tumors. MRI's positive impact is its ability to provide high-quality, non-invasive, and versatile diagnostic information, improving patient care and overall well-being. Before beginning treatment, the most significant problem is

identifying and categorizing brain MRI scans. For a very long time, scientists have been trying to figure out the best method for more accurately identifying real-world medical images. Traditional approaches rely on manual interpretation, and feature extraction, making diagnosis time-consuming, error-prone, and subjective. Using a deep learning-based method can be automated with great accuracy and efficiency. This research investigates a customized Convolutional Neural Network (CNN) to classify brain tumors from MRI images. The experimental result of customized CNN obtained 99.57% total accuracy, 99.98% f1-score, 99.99% precision, and 99.98% recall respectively, which is more efficient than existing techniques for identifying brain tumors. According to this research, MRI is a state-of-the-art modality that can transform patient care by offering tailored diagnoses. Radiologists and doctors can obtain a more efficient and precise diagnosis process by utilizing the capabilities of this customized CNN.

Paper ID: 288

Fuzzy Based Intelligent Transportation Systems for Smart Cities to Mitigate Road Traffic Congestion

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Abstract: Traffic congestion in smart cities is a growing concern. This paper explores the application of Fuzzy Logic in Intelligent Transportation Systems (ITS) to address this challenge. Fuzzy logic can handle imprecise and dynamic traffic data and offers advantages over traditional fixed-time signal control. The research proposes a Fuzzy-based ITS framework for dynamically traffic signal control. This framework utilizes real-time sensor traffic data to adjust signal timings, dynamically prioritizing congested areas. The system also incorporates emergency vehicle detection using siren sensors. This ensures priority for emergency vehicles by granting them the right of way. This paper discusses the design of the fuzzy inference system, including the selection of fuzzy variables and membership functions. The effectiveness of the proposed system is evaluated through simulations, demonstrating its potential to reduce traffic congestion and improve traffic flow in smart cities.

Paper ID: 289

A 2×2 MIMO Antenna for 28 GHz 5G Communication Applications with High Isolation

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Abstract: Global communications are predicted to radically change with the arrival of fifth-generation (5G) mobile communications technology. This paper proposes a 2×2 MIMO antenna for 28 GHz broadband communications applications. The design is initiated by designing an antenna for 28 GHz, then a rectangular slot is added to enhance the impedance matching, and finally, a circular patch is inserted. The single element of the anticipated MIMO antenna on the RT5880 substrate resonates at 28.09 GHz with an S11 of -39.35 dB. The MIMO structure has a volumetric dimension of $30.32 \times 30.32 \times 1.575$ mm³, resonates at 28.13 GHz, and achieves a working bandwidth of 3.07 GHz (26.63 to 29.70 GHz). Moreover, it achieves a maximum isolation of -58.04 dB, a maximum efficiency of 99%, and a peak gain of 7.41 dBi. The achieved ECC ≤ 0.0005 , and the DG is nearer 10 dB. Compared to the recently reported mmWave MIMO antennas, the designed MIMO antenna demonstrates superior performance in terms of operating bandwidth, isolation, gain, efficiency, ECC, and DG, which makes it an effective nominee for 5G mmWave, satellite, and mobile communication applications.

Paper ID: 295

Back to Back C Shaped Rotational Symmetric Metamaterial Absorber for Triple Band Application

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Abstract: This work presents a back-to-back C-shaped rotating polarization-insensitive metamaterial absorber (MMA) for triple band (C, X, and Ku) applications. The findings demonstrate that the absorption rate is constant regardless of the co- and cross-polarization angle. With maximum absorptions of 93%, 94%, 99.84%, and 97%, respectively, the study shows resonance frequency with single negative (SNG) MM characteristics at frequencies of 5.552, 6.432, 11.568, and 16.496 GHz. The absorber exhibits polarization insensitivity, marking a significant advancement in versatile electromagnetic wave absorption technologies. Rigorous simulations conducted in CST revealed a fascinating trend of a near-zero effective refractive index, permeability, and permittivity at specific frequencies. Due to its superior absorption qualities and clear construction compared with recent work on MM, this absorber has a special function in satellite communications, Wi-Fi, WLAN, medical imaging, radio astronomy, and radar applications, outperforms more current, comparable works using FR4 substrate.



Paper ID: 296

Dopamiini: Real-Time Interaction to Combating Loneliness with Smart Wheelchair Integrated Chatbot Support Model

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Abstract: The "Dopamiini" wheelchair, which integrates four control systems and a personalized AI chatbot to help older people overcome their obstacles and loneliness, was developed in this paper. This prototype was constructed using the GPT-3 API for chatbot functionality and the Python library pyttsx3 for offline text-to-speech conversion. When it comes to obstacle recognition, our proposed wheelchair shows an error of no more than ± 0.4 cm up to a distance of 400 cm. It takes an average of 5.6 seconds to reach the maximum speed. In order to monitor and regulate its performance in real time, this is equipped with a dashboard and a GPS navigation system. To make the prototype portable and effective, its weight is close to 2.7 kg.

Paper ID: 297

Enhancing Efficiency of CdS/CdTe Solar Cells with Double BSF Layer by Numerical Analysis

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Abstract: Cadmium telluride (CdTe) has emerged as a leading material for solar energy applications due to its high efficiency and affordability. This work primarily focused on optimizing the structure of CdTe-based solar cells to enhance their performance. The Solar Cell Capacitance Simulator (SCAPS-1D) was used to model and evaluate the performance of these solar cells. In this study, a CdTe cell without a back surface field (BSF) was used as the baseline model. The research showed that the standard CdTe cell with a 4000 nm thick absorber layer achieved an efficiency of 16.41% ($J_{sc} = 24.72 \text{ mA/cm}^2$, $FF = 76.21\%$, $V_{oc} = 0.87 \text{ V}$) without a BSF layer. A modified CdS/CdTe solar cell was then developed by introducing a 100 nm AZO buffer layer, reducing the CdTe absorber layer to 1 μm , and adding a GeTe layer over MoTe₂ as a BSF. The effect of incorporating a double BSF in the base cell was analyzed using the band diagram. The modified cell demonstrated a significantly higher efficiency of 28.74%, with $J_{sc} = 24.94 \text{ mA/cm}^2$, $V_{oc} = 1.27 \text{ V}$, and $FF = 90.20\%$. The proposed cell showed enhanced stability at elevated working temperatures, with a low temperature coefficient of $-0.116\%/\text{ }^\circ\text{C}$ for the GeTe/MoTe₂ double BSF layer. These findings highlight the potential for further research into using thinner CdTe absorber layers and GeTe/MoTe₂ BSF layers to boost efficiency in CdTe solar cell architectures.

Paper ID: 302

Dual Feedstock Biodiesel Production: Using Sesame Seed Oil and Waste Cooking Oil with KOH Catalysis

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Abstract: Biodiesel is a sustainable fuel derived from animal fats and plant oils. It provides economical alternatives for transportation fuel and is compatible with current petroleum infrastructure. With the growing worldwide need for renewable transportation fuels, biodiesel might be a viable option to integrate into current infrastructure. Biodiesel is made from animal fats or plant oils collected from renewable resources like algae, sunflower, canola, palm, jatropha, oilseed radish, soybean, peanut, castor bean etc. In this research, waste cooking oil (WCO) and sesame seed oil as sources for biodiesel production in Bangladesh were evaluated. Biodiesel production used transesterification, employing 5:1 ratio methanol: triglyceride with KOH acting as a catalyst, and yielded 95.45% output yield for WCO production while for sesame seed oil output reached 89.1% yields. Biodiesel derived from waste cooking oil (WCO) and sesame oil has similar characteristics to conventional diesel fuel, such as cetane numbers, viscosities, and calorific values, which meet or exceed the standards set for traditional fuel. This study emphasizes the economic and environmental benefits of producing biodiesel from waste cooking oil (WCO) and sesame oil. These advantages are particularly relevant for developing countries like Bangladesh, since they contribute to energy security and promote environmental sustainability.



Paper ID: 303

TMDC Material Integration as Buffer Layer for Cost-Effective and High Performance CIGS Solar Cell

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Abstract: In this study, the significance of reducing indium usage in CIGS solar cells is emphasized due to the scarcity and expense of this material. Employing proper tuning of the CIGS layer bandgap and electron affinity, the research aims to minimize the reliance on indium. SCAPS-1D software is utilized in the research to evaluate the performance of a single-junction solar cell featuring CIGS as the absorber material. This evaluation incorporates the use of TMDC materials such as WS₂ and WS_{Se} as buffer layers, aiming to avoid the toxicity typically associated with CdS. It is found that CIGS cells with a WS_{Se} buffer layer exhibit an enhanced efficiency of 25.99% with a reduced indium content of 36%. Moreover, integrating a CGS back surface field layer enhances efficiency (~27.71%) while reducing CIGS thickness, thus decreasing indium usage and improving cost-effectiveness. Subsequently, the optimization of cell thickness and doping density contributes to overall performance enhancement. Notably, a maximum power conversion efficiency (PCE) of 27.86%, Voc of 1.044 V, Jsc of 31.73 mA/cm², and FF of 84.06% is achieved for the optimized Al/Al: ZnO/ WS_{Se}(150nm)/ CuIn0.36-Ga0.64Se2 (1000nm)/CGS (1000nm)/Mo based solar cell device with a temperature coefficient of -0.141% per °C. This research offers a viable approach to enhance the efficiency of CIGS solar devices while simultaneously reducing reliance on expensive indium materials.

Paper ID: 305

Exploring Age-Related Changes in Bioimpedance across Diverse Biological Samples

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Abstract: Technology based on bioimpedance has proven itself very useful in a wide range of applications, particularly within the realm of tissue characterization. Notably, it has found significant utility in categorizing various food types, such as meats, fruits, and beverages. As biological samples, such as chicken, fruits, and vegetables, lose freshness after preservation, their internal structures transform due to distinct biological reactions, resulting in alterations to their internal properties and bonds. Consequently, the electrical properties of the tissues change. In this study, the effect of aging on different biological samples after preservation in a refrigerator was investigated over a wide range of frequencies. Freshly excised animal tissue (chicken) and vegetables (gourd, papaya, brinjal) were considered biological samples. The transfer impedance values were measured over the frequency range of 100Hz to 100kHz using an impedance spectrometer placing four electrodes on the samples. The findings revealed a consistent decrease in the electrical impedance of biological samples over time across all measured frequencies. The observed impedance changes exhibited a Gaussian decay curve, offering a reliable means to monitor the freshness of the samples. This technique demonstrates significant potential for enhancing the quality control of perishable foods.

Paper ID: 307

Mathematical Models Development of Intracellular Fluid with Bioelectrical Impedance Analysis

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Abstract: This paper represents mathematical models for intracellular fluid (ICF) of the human body based on a non-invasive way termed as bioelectrical impedance analysis. A total of 1455 (male = 720, female = 735) participants have been considered for developing the models and 1362 (male = 677, female = 685) participants for the validation of the models. Single-frequency (1 MHz) bioelectrical impedance analysis has been utilized as the method for ICF estimation. Two new mathematical models have been developed for both males and females and further verified statistically. Models' validation revealed a correlation coefficient for males and females of 0.995 and 0.990, respectively, which aligns excellently with actual data. Besides, the validated models show less root mean square value (RMSE), and the bland atman plot shows that the errors are within the 95% limits of agreement interval. In comparison to the results of prior models, it becomes evident that the proposed model offers a more precise measurement of intracellular fluid (ICF) than its predecessors.



Paper ID: 308

Real- Real Time Economic Dispatch Using Bat Algorithm Optimization Technique

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Abstract: This study presents a Real-Time Economic Dispatch (RTED) algorithm utilizing the Bat Algorithm (BA) optimization technique to enhance the integration of renewable energy resources in power systems. The approach aims to minimize operational costs by optimizing energy and calculating optimal participation factors, considering minute-to-minute variability in wind, solar, and load demand over a scheduling period. The results demonstrate that the BA method significantly reduces total costs by approximately 1.7% compared to conventional sequential methods and improves system stability, as indicated by better voltage stability indices (VSEI). This optimization technique shows superior performance in minimizing fuel costs across various load demands compared to other methods such as Genetic Algorithm (GA), Particle Swarm Optimization (PSO), Tabu Search (TS), and Artificial Bee Colony (ABC). The study's findings indicate that BA optimization is a promising tool for real-time economic dispatch in power systems, particularly in scenarios with significant renewable energy integration.

Paper ID: 309

Health Trauma and Wellbeing Assistant for Bengali Seniors in Household: A Multimodal Approach

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Abstract: The increasing number of elderly individuals living alone has emerged as a pressing global concern. Our research aims to address this issue by developing advanced modules that can be integrated into a system to enhance the quality of life for older adults. The modules focus on medicine detection, fall detection, reminders for important tasks and events and providing companionship through friendly verbal interactions. Through the integration of deep learning techniques, diverse models and natural language processing (NLP), we have successfully designed an effective medication and well-being assistant. These modules use computer vision technology along with reinforced learning from human feedback and convolutional neural networks (CNNs) to reach our goal. The modules can be integrated into systems to empower elderly individuals to lead more active and fulfilling lives. Finally, this research contributes to the well-being and happiness of the elderly, highlighting the significance of comprehensive support systems in promoting their overall wellbeing.

Paper ID: 310

Construction and Feasibility Investigation of a Small-Scale Single-Basin Solar Still for Remote Areas

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Abstract: With the global fresh water shortages that limit readily accessible freshwater availability to only 0.5%, developing efficient and sustainable desalination technology has become essential. Traditional solar stills - often considered the oldest and most widespread desalination technique - often fail to achieve maximum output due to limited solar access and inefficiency. Passive desalination systems provide an attractive alternative for treating brackish and saline water in rural, energy-limited regions. In this research article, we review the performance of an economical single-basin solar still system (with 2 cm basin depth), in Khulna, Bangladesh during the winter season. This research investigates the efficiency of passive desalination systems at harvesting solar energy and turning it into distilled water, at an impressive daily average production rate of roughly 0.67 L/m².day. These findings have important consequences for dealing with water shortage problems worldwide, especially in regions that are sensitive to water pressure caused by climate change. This research highlights the potential of passive desalination technologies as a promising solution to address the increasing global need for freshwater, particularly in regions with limited access to energy and resources. It contributes to the existing information on these technologies and highlights their sustainable nature.



Paper ID: 312

A Real-Time Application-Based Convolutional Neural Network Approach for Mango Leaf Disease Classification

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Abstract: The mango tree, thriving in tropical and subtropical climates, bears not only delicious fruits but also serves as a significant source of income. This study's primary aim is to bolster mango production in Bangladesh, addressing the mango leaf diseases impacting mango yields. This study has proposed a Custom Lightweight Convolutional Neural Network (CLCNN) tailored to accurately classify seven distinct mango leaf diseases alongside their healthy counterparts. The CLCNN model, designed to offer an effective yet lightweight solution, emerges as a promising approach for disease classification. To affirm its efficacy, the performance of the CLCNN is compared against established pre-trained models such as VGG16, InceptionV3, F-Net, AlexNet, and ViT. The comparative analysis underscores the superiority of the proposed CLCNN model, attaining a notable testing accuracy of 98% surpassing the performance of pre-trained models. Moreover, the model is converted to TensorFlow light model which has been leveraged to develop an Android-based application for efficient classification of mango leaf diseases..

Paper ID: 314

Middle F shape Split-Ring Resonator Metamaterial Absorber for Wireless Technology

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Abstract: This work covers the characterization and design of a metamaterial-based microwave absorber that is polarization-insensitive, optimized to demonstrate resonant behavior spanning five consecutive frequencies in the Ku-, X-, and C- bands, particularly for wireless technologies. This MMA, with Electric Ring Resonators (ERR) in four-fold and a single-layer coupled symmetry of rotation, is used to get the requisite absorption. The unit cell of this MMA had been made using FR-4, a widely available and low-cost substrate material whose dielectric value is 4.3. Five major absorption peaks have been found between 4 and 18 GHz. At frequencies of 4.88 GHz, 6.46 GHz, 7.88 GHz, 11.30 GHz, and 17.22 GHz, microwave absorption levels are 99.3%, 94.9%, 94.5%, 98.7%, and 92.5%. Electromagnetic responses and numerical analysis show polarization insensitivity and wide-angle to co-polar waves. The unit cell's compact size is a result of its subwavelength dimensions, with an electrical length of $0.16\lambda \times 0.16\lambda \times 0.03\lambda$ at 4.88 GHz, the lowest operational frequency. The proposed MMA absorbs 99% at 4.882 GHz. It also shows steady absorption over horizontal and vertical angles, specifically phi= 0 to 90 degrees and Theta = 0 to 60 degrees, and its refractive index is negative or almost zero. Due to its compact design, strong absorption, wide angular stability, and effective electromagnetic response, this material is highly suitable for wireless communication systems, particularly for satellite applications such as reducing electromagnetic interference, stealth technology, imaging, and radar systems.

Paper ID: 321

IoT-enabled Automatic Underground Cable Fault Detection and Monitoring System

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Abstract: As technology advances, underground cables are chosen over overhead lines for more reliability, and to make greater use of available space in metropolitan areas. Although underground cables have several advantages, their maintenance can be somewhat challenging. Locating an underground cable fault is often expensive, time-consuming, and complicated when any problem arises. This research investigates underground cable fault distance locators that utilize a microcontroller integrated with GSM, GPS, and other modules. It employs a simple application of Ohm's law, which demonstrates

that voltage drop varies with changes in cable length. The cable length in kilometers is simulated using a series of resistors. A detailed simulation was conducted for the proposed circuit arrangement, including the rectification phase to step down the power supply voltage from 220V to 12V and 5V. This setup allows for the identification of fault locations in all three phases. Based on the simulation, a PCB board has also been constructed with the appropriate resistors and switches to detect and measure short and open circuit faults. GSM and GPS technology have been utilized to leverage IoT capabilities. A continuous monitoring system has been proposed where, if a fault occurs, it locates the exact fault location. This system displays the fault's phase and distance on an LCD, sends a mobile alert notification with precise map coordinates, and triggers an LED light indication at the base station. This prototype can be a promising solution though the accuracy depends on several parameters and system specifications during real-time application.

Paper ID: 322

Tomato Shelf Life Prediction using IoT and Machine Learning

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Abstract: Predicting tomato shelf life is crucial for optimizing supply chains and reducing waste. This study utilizes IoT and machine learning to analyze postharvest characteristics of tomatoes in four ripening stages under controlled conditions until the rotten phase. Key findings include significant reductions in weight and dimensions, increased red and decreased green color components indicating ripening, and longer shelf life for unripe tomatoes. Green 1 tomatoes had the most extended shelf life of 18 days. pH trends showed higher levels during ripening (pH 3.5) compared to the green stage (pH 4.5). To predict the shelf life, various machine learning models were applied and the Random Forest Regression was the most accurate model, exhibiting the lowest errors and highest predictive reliability.



Paper ID: 323

A Multi-modal Approach of Sentiment Analysis on Samsung Cell Phone Review

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Abstract: Sentiment analysis, the scientific art of understanding human emotions. The motive of sentiment analysis is to extract and predict human emotions and sentiment through text, speech or facial expressions. It is proposed an integrated study that uses text review given by buyers of Samsung phones at Amazon to analyze sentiments and satisfaction towards a Samsung phone. In research, it has been seen that potential customers look for text reviews besides numeric rating to get an overview of positive and negative impressions of the product. This research helps to get critical insights for analyzing customers' text review and giving a sentiment score for a specific text review by sentiment analysis algorithmic model. This research compares numeric and text reviews based on sentiment scores and predicts overall customer sentiment based on a text review's sentiment score. The objective of this research is to analyze customer's sentiment on Samsung cell phone using a multimodal approach (Text-Blob, VADER, and LSTM). It extracted positive and negative features of Samsung brand or product as per buyers' opinion, which is called opinion mining using Word Cloud dictionary library of NLP. Applied LDA model for topic modeling, used XGBoost to extract feature importance for sentiment classification, implemented VADER and TextBlob algorithm for sentiment analysis, and tested accuracy to VADER and TextBlob, applying LSTM for sentiment prediction. The research's implication is that both customers and brand understand the recent market trends directly through the customer's sentiment. Customers can decide to buy or not a product; the brand can find out where to improve a product.

Paper ID: 328

Numerical Simulation and Performance Optimization of All Inorganic CsPbI₂Br Perovskite Solar cell Using SCAPS-1D

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Abstract: There is an increasing demand of power generation in the world. Lately, there has been an increased interest in third-generation thin-film solar cells. The design and study of lead-based Perovskite solar cells are the focus of this work. The components of the architecture ITO/ZnO/CsPbI₂Br/CZTSe/ back contact (Au). The simulation makes use of the SCAPS-1D software to examine the performance and efficiency of this solar cell. Numerous factors were examined, including the impact of thickness, the absorber layer's band-gap variation, bandgap, absorber defect density, temperature, and J-V graph. Based on simulation work, the device's initial structure has an efficiency of 14.75%, respectively. It is discovered that the solar cell device's final optimum performance characteristics are improved with a short-circuit current density (J_{sc}) of 20.59 mA/cm², an open-circuit voltage (V_{oc}) of 1.1448 V, a fill factor (%FF) of 66.11%, and a power conversion efficiency (%PCE) of 20.30% after the SCAPS simulation with the optimization of basic parameters in this work.

Paper ID: 339

Analyzing Public Sentiments from Bangladeshi Tour and Travel Vlog Video Comments Using Machine Learning

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Abstract: Public sentiment analysis of tour and travel vlog reviews is crucial in all languages due to its vast usage in the tourism and heritage industry. Unfortunately, to our knowledge, no work has yet been done in this domain for the Bangla language. This study proposes a new dataset of 49,125 reviews collected from 24 different YouTube Bangla tour and travel vlogs which is publicly accessible in the repository <https://github.com/cseku170202/Bangla-Tour-and-Travel>. The prime goal of this investigation is to employ various machine learning algorithms to precisely recognize the sentiments expressed in Bangla tour and travel vlog reviews and apply explainable AI to provide explanations. Our empirical study considered several algorithms including the ID3, ANN, ResNet, and a Stacking ensemble learner. Among the algorithms implemented, the Stacking model outperformed others and achieved the highest 84.64% accuracy. Local Interpretable Modelagnostic Explanation (LIME) and SHapley Additive exExplanation (SHAP) from explainable AI are also considered in this work to observe the reason behind the model's performance.



Paper ID: 340

An Experimental Analysis on Different Pivot Selection Approaches for the Quicksort Algorithm

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Abstract: The research primarily examines the significance of pivot selection of the widely used Quick-Sort algorithm in order to increase the overall performance and efficiency. Quicksort has an average time complexity of $O(n\log n)$, but its performance can degrade to $O(n^2)$ in the worst-case scenario, which occurs when a pivot element is chosen badly. This study focuses on the influence of different pivot selection techniques on the efficiency of the Quicksort algorithm through empirical evaluation. To determine which strategy works best for an individual data set and array size, different methods have been evaluated, aiming to choose a pivot that is in close proximity to the median of the subarray, evaluating their efficiency and any drawbacks. In terms of efficiency, the Median of Seven (MO7) and Median of Three (MO3) exhibits the best results, where MO7 gives an execution time of 0.0112s and MOT of 0.0124s. A comparative decision criteria has also been proposed in this research in choosing the optimum approach among the best performing MOT and MO7, where MOT being simpler and MO7 being more efficient. These insights offer practical guidance for optimizing Quick Sort implementations in real-world scenarios, where its performance is paramount..

Paper ID: 346

BrainACGAN: Auxiliary Classifier Generative Adversarial Network for Brain Tumor Images

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Abstract: Application of machine learning in the medical field has considerably improved throughout the past decade due to the ability of autonomous process. Algorithms now assist doctors and physicians to detect and diagnose various diseases with minimal errors. However, obtaining sufficient medical data to develop efficient and generalized algorithms is still challenging due to socio-economic, administrative, and demographic issues. Training algorithms with limited data might introduce biases and mistakes, which can lead to misdiagnosis and perilous treatments. Overcoming data limitation is crucial for effective implementation of deep learning models in medical imaging. To solve these limitations, our study used an advanced image generation technique called auxiliary classifier generative adversarial network (ACGAN) to expand MRI brain tumor image dataset. The dataset is enhanced by creating high-quality synthetic images identical to actual images and then real and synthetic images are combined and fed into a customized convolutional neural network to evaluate the effectiveness of image generation. Results exhibit that average classification accuracy is increased significantly from 88% to 99% after expanding the dataset. Moreover, a notable improvement in precision, recall and F1 score is observed which indicate the promising impact of ACGAN image generation on our research. This study will contribute to overcome the limitation of small dataset and improve the accuracy of classifying and diagnosing brain tumor using deep learning model..

Paper ID: 347

ChestACGAN: Auxiliary Classifier Generative Adversarial Network for Chest X-ray Images

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Abstract: Computer vision is becoming very popular in the medical sector due to data collection remains costly and data availability is limited. To solve this issue, a generative adversarial network can be used as a sustainable solution, given its ability to generate realistic images that can be used as samples in medical sector and introducing significant variation in the generated dataset. Consequently, this paper suggests employing a GAN-based data generation technique to handle the constraint of limited data availability, alongside custom CNN model for detecting pneumonia from chest x-ray images. In

our paper, auxiliary classifier GAN is used to extend dataset by enabling the management of labels for generated images. ACGAN generate high-quality synthetic images identical to actual images, and then real and synthetic images were concatenated and fed into a custom-designed convolutional neural network model to validate the efficacy of data generation. Our research findings show that average classification accuracy increased significantly from 92.3% to 99.46% after expanding the dataset with generated data. This study is anticipated to have a substantial impact on the medical sector, with the generation of realistic images that can be beneficial to doctors and experts.t

Paper ID: 358

X-LeafNet: A Modified Xception Model for Identifying Tea Leaf Diseases with Explainable Artificial Intelligence

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Abstract: This study presents “X-LeafNet,” a novel approach for identifying tea leaf diseases using a modified Xception model integrated with Explainable Artificial Intelligence (XAI) techniques. The system aims to classify tea leaf images into six distinct classes: Algal Spot, Brown Blight, Gray Blight, Healthy, Helopeltis, and Red Spot. Utilizing transfer learning, the modified Xception model (X-LeafNet) serves as a robust multiclass image classifier. Prior to model input, images undergo a series of preprocessing steps to enhance classification accuracy. To elucidate the decision-making process of the modified Xception-based convolutional neural network (CNN), XAI methods such as Gradient-weighted Class Activation Mapping (Grad-CAM) and Local Interpretable Model-Agnostic Explanations (LIME) are employed. These techniques facilitate the identification of critical image regions that influence the model’s predictions. Experimental results demonstrate the efficacy of X-LeafNet, achieving remarkable accuracies: 99.41% for Red Spot, 100% for Algal Spot, Brown Blight, Gray Blight, and Healthy leaves, and 99.82% for Helopeltis. With an average accuracy, precision, recall, and F1-score of 99.71%, X-LeafNet significantly outperforms existing methods, providing a reliable and interpretable solution for tea leaf disease classification...

Paper ID: 364

ACoD: Detecting Abusive Comments from Transliterated Bengali Text Using Deep Learning Techniques

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Abstract: Abusive comment detection refers to the process of identifying and flagging comments or messages in online communication platforms that contain abusive, offensive, or harmful language. Due to inadequate resources and related language processing tools, abusive comment detection is challenging in low-resource languages like Bengali. The prevalence of transliterated Bengali comments on social media adds to the challenge, as monolingual techniques cannot capture them. Regrettably, the absence of a publicly accessible transliterated Bengali corpus for abusive comment investigation highlights a significant gap in available resources. Therefore, this work introduces a new dataset named BACoD, comprising 6162 transliterated Bengali texts labeled into two categories: \textit{abusive} and \textit{non-abusive}. This work explores several machine learning (LR, RF, SVM, MNB) and deep learning (CNN, LSTM, BiLSTM) models for the downstream task and evaluates the developed dataset. Experimental analysis revealed that the CNN+BiLSTM with Keras embedding outperformed the other employed models, achieving the highest F1-score (0.92).

Paper ID: 365

Assessment of Solar Energy Potential in Bangladesh's Central and Peripheral Regions

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Abstract: The focus on solar energy as an advantageous alternative to traditional non-renewable energy sources has increased because of the growing need for clean and sustainable energy sources on a worldwide scale. Enhancing the generation of solar energy becomes crucial as the world moves toward clean energy, especially in areas with high solar potential. In previous studies on solar energy potential has mainly focused on assessing solar irradiance and energy output using remote sensing and Geographic Information Systems (GIS). It is very essential for determining the most

suitable locations for solar projects, optimizing energy production, and lowering expenses for this reason the study has been conducted on a comparative evaluation of solar energy potential. This study aims to compare and analyze the solar irradiance and potential energy output of Dhaka, Teknaf, Satkhira, Sylhet, and Syedpur. These regions provide a comprehensive overview of Bangladesh's solar energy potential by covering various climatic and environmental conditions, from coastal and urban areas to hilly and arid regions. The goal of the study is to identify the most suitable locations for solar PV systems. To maximize energy production, the study focuses on the demand for a systematic approach to identify regions with the maximum solar potential. According to the analysis, Teknaf shows the greatest potential for solar photovoltaic (PV) implementation as it has the highest average values of solar irradiance (Avg. G) at 599.76 kWh/m²/day and average energy output (Avg. E) at 56.61 kWh. Satkhira and Sylhet follow as regions with relatively lower potential. Syedpur and Dhaka show the least beneficial regions for the extensive implementation of solar photovoltaic (PV) systems. These findings highlight the significance of site-specific assessments for the successful implementation of solar panel installations.

Paper ID: 372

Study and Comparative Analysis on Fractional Order PID Controlled Buck Converter

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Abstract: The non-linear nature of power converters makes them challenging to manage, thus the search for smart and effective controllers is continuing. In recent years, Fractional Order controllers have shown excellent performances in power electronic systems. This article describes the design and operations of a Fractional Order Proportional Integral Derivative (FOPID) controller to control the output voltages of a Buck Converter. The “MATLAB Simulink Design” simulation tools are used here to simulate the operations of controlling. Pulse Width Modulation (PWM DC-DC) is used as a switch with a frequency of 5 kHz. To understand the performance of the FOPI controller more efficiently we compare the output of this controller with the commonly used PID, PI, and PD converter. The result shows FOPI controller responds more rapidly and accurately than other controllers in terms of controlling the output voltages of the converter.



Paper ID: 373

Developing a Loan Recommendation System using Genetic Algorithm

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Abstract: The digital world is flooded with an overload of digital contents, creating challenges for users the tasks of finding, choosing, and purchasing. Recommender systems, acting as intelligent filtering mechanism that compile a catalogue of potential preferred items for users. This greatly minimizes the time users need to spend choosing from the extensive array of options on websites and streamlining the entire process. To circumvent the intricacies and time demands associated with conventional statistical and computational programming, intelligent methods have gathered significant interest in various financial research domains, with a particular focus on optimizing decision-making within the banking sector. Nevertheless, the problem of selecting an optimal lending decisions to maximize the banking revenue is still considered as a substantial and enduring challenge. Recommendation generation is a difficult job because there are some challenges engaged such as like cold start and sparsity that curb the production of correct and high quality recommendation. Genetic algorithm based recommendation systems mitigate such issues by generating paramount recommendations without utilizing the similarity metric. In this work, we have developed an efficient genetic algorithm based loan recommendation system that can suggest potential borrowers that are eligible to get the desired loan. On the other hand, this is a system that can maximize the fitness function and thereby the bank's overall profitability.

Paper ID: 376

Integrating XAI with Hybrid BiGRU-BiLSTM Model for Comprehensive Maternal-Fetal Health Risk Monitoring

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Abstract: Pregnancy health risk analysis is a critical concern as it impacts the well-being of both mother and the fetus. This task demands frequent assessments and prompt interventions to avoid clinical complexities. Despite medical advancements, challenges persist while monitoring health risk during pregnancies. This study aimed to develop an automated system to mitigate these risk factors by employing Deep Learning (DL) and Machine Learning (ML) approaches along with Hybridization and Ensemble Learning techniques. By leveraging both Maternal and Fetal health datasets, the system intended to aid in taking informed decisions for improving health outcomes. Data quality was ensured through preprocessing, addressing class imbalance and data size limitations with Synthetic Minority Over-sampling Technique (SMOTE) and Conditional Generative Adversarial Network (cGAN). Thorough hyperparameter tuning, including inspection with various optimizers and rigorous evaluation processes was conducted. The generalizability was validated through crossdata analysis and cross-validation. A hybrid BiGRU-BiLSTM model was then proposed for demonstrating superiority with 96.21% and 97.38% accuracies on Maternal and Fetal datasets respectively. SHapley Additive exPlanations (SHAP) analysis was conducted to interpret model's predictions and identify key features from existing datasets to create a merged dataset for adaptability evaluation. The proposed model yielded over 85% accuracy on this data. Subsequently, Local Interpretable Model-Agnostic Explanations (LIME) analysis was availed to gain deeper insights into the concluded predictions. These findings highlight the proposed model's potential applicability to enhance maternal and fetal health risk detection.

Paper ID: 379

Financial Analysis of a Grid-Tied Rooftop Solar PV System for University Campus: A Case Study

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Abstract: This paper presents the financial analysis of a grid-tied rooftop solar PV system with a net metering mechanism for a university campus to determine the profitability and acceptability of a rooftop solar PV system. The proposed rooftop solar PV system shows the ability to fulfill the maximum energy demand consumed by the different administrative buildings, academic buildings, student halls, and residential buildings and supply surplus power to the national grid which contributes to national energy management. The required data of the total electricity consumption of the university campus and the available rooftop area of the different buildings of the campus has been collected. The source of funding and the cost of capital is the interest rate which should be paid to the lender organization has been identified. The net present value (NPV), profitability index (PI), payback period, average return on average investment (ROI), internal rate of return (IRR), and the modified internal rate of return of the project have been calculated which are the indicators of the project's profitability and acceptability. The overall result of this financial analysis of the grid-tied rooftop solar PV system is found to be feasible to be installed on the rooftop of the buildings of the university campus.

Paper ID: 391

An Interpretable Skin Cancer Classification Using Optimized Deep Transfer Learning Method

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Abstract: The skin, the largest organ in the body, acts as a vital layer of defense but can also develop several diseases, including skin cancer, one of the top three cancers. There are various forms of skin cancer, each of which poses multiple challenges for identification and treatment. This study investigates the effectiveness of deep learning approaches, namely convolutional neural networks (CNNs), for the rapid and exact diagnosis of skin cancer types. Using the ISIC Skin Cancer Challenge 2019 dataset, our research sheds insight into CNNs ability to distinguish diagnostic accuracy for skin cancer diagnosis. We used 12,295 skin lesion images from this dataset, where three forms of skin cancer: nevus, melanoma, and basal cell carcinoma are focused. During the preprocessing step, the photographs were augmented, normalized, and resized. The MobileNetV2 transfer learning model is evaluated against DenseNet121, InceptionV3, ResNet152V2, CNN and comparative analysis with the current state of the art. After testing, the model achieved the greatest accuracy at 97.48%. Our MobileNet V2 transfer learning model surpasses earlier models in terms of dependability and robustness. Beyond providing an in-depth assessment of current difficulties, it further promotes critical conversation and collaboration in medical image analysis and healthcare innovation.



Paper ID: 394

Machine Learning Techniques for Brain Tumor Classification: A CNN-SVM Approach

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Abstract: Brain tumours are the tenth most common type of tumour affecting people of all ages and are a leading cause of death in humans. However, early detection significantly enhances treatability. Classification of brain tumours typically relies on biopsy, a procedure often deferred until definitive brain surgery. Developing image classification techniques for tumor disorders is crucial to minimize errors in manual diagnoses by radiologists and to accelerate treatment. Advancements in machine learning (ML) offer a promising approach for assisting radiologists in diagnosing tumours using non-invasive magnetic resonance imaging (MRI). This research introduces a network based on feature extraction, where features are derived using a Convolutional Neural Network (CNN) and subsequently classified with a Support Vector Machine (SVM). The process involves transforming the multidimensional feature maps into a 2D array where each row represents the features of a single image. The proposed method was evaluated using MRI brain images of three types of tumours: pituitary, meningioma, and glioma. The CNN-SVM method attained an accuracy of 98.75%, surpassing the CNN-RF (Random Forest) method, which achieved an accuracy of 96.25%. This result surpasses the performance of many other models. The effectiveness of the proposed approaches is analysed based on different metrics and outcomes compared to various methods.

Paper ID: 395

Depression Detection from Social Media Posts using Ensemble Machine Learning

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Abstract: Depression is a significant global health concern, especially among social media users who experience mental pressures. It is a vital mental health issue due to undiagnosed and untreated that can lead to chronic mental disease and even suicide. In the recent decade, depression has increased day by day. It needs early detection and treatment to improve people's mental health. This paper proposed an ensemble machine learning approach to detect human depression from social media posts efficiently. The proposed method is an ensemble solution to sentiment analysis in textual data combining LSTM networks with a BERT-embedded layer. The model can capture the contextual nuances and sequential patterns of language. This paper employed two different social sentiment analysis textual datasets of depression and self-harm respectively. The proposed method gives an accuracy of 98.4% for the depression dataset and 92.3% for the self-harm dataset. Those datasets also used other machine learning approaches such as LSTM with a convolutional layer, BERT, Logistic Regression, and combined LSTM and BERT. The proposed method significantly improves accuracy compared to existing state-of-the-art methods and models. To ensure immediate action and quick recovery and minimize possible serious instances like suicide, this research attempts to identify early indicators of depression.n.

Paper ID: 397

Audio Signal Analysis and Recognition of Bengali Alphabets: A Comparative Study of Machine Learning Approaches

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Abstract: This research focuses on signal pattern analysis for Bengali alphabet recognition in audio, utilizing established machine-learning approaches. It addresses inherent linguistic challenges, presents insights derived from the collected data, and discusses benchmark results. The primary focus is on processing raw Bengali audio files through advanced signal pattern analysis for efficient feature extraction and adapting machine learning models for Bengali alphabet recognition. Specific techniques, such as windowing and overlap-add, were applied to address the unique characteristics of Bengali vowels. Feature extraction methods include Root Mean Square Energy, Zero Crossing Rate, and Mel-frequency Cepstral Coefficients (MFCCs). In experimental settings, MFCCs consistently demonstrated superior performance compared to other methods. Various machine learning models, including Linear Regression, MLP Classifier, SVM, and LSTM, were employed, with MFCCs consistently showing enhanced performance for Bengali alphabet recognition. Future research will focus on advancing automatic speech recognition for Bengali alphabets, with the goal of seamless integration into embedded systems, such as Arduino, for practical applications based on raw audio data. Additionally, this study explores ensemble learning techniques for Bangla phoneme identification, aiming to improve the robustness and accuracy of classification systems.



Paper ID: 399

Design and Analysis of a MIMO Antenna with DGS for Wireless Applications

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Abstract: This work presents the design as well as the analysis of a Micro-strip antenna's bandwidth enhancement using the Defect in Ground Surface (DGS) with the aid of CST STUDIO software. The simulated antenna is found to be operating in the C band, Sub-6GHz, and X-band of IEEE frequency bands with a gain in the boundary of 3.3 dBi–4 dBi. FR-4 (1.6 mm thick) substrate material with a relative permittivity of 4.30 and a loss tangent of approximately 0.025 was used for the design. The suggested tri-band antenna is 10mm × 10 mm × 1.6 mm in total size. Greater than 80% is found to be the overall simulated radiation efficiency. Additionally, the suggested antenna design is evaluated using MIMO performance measures, demonstrating good MIMO operation and a maximum envelope correlation coefficient value as well as the diversity gain (DG) are noted; these are discovered to be below the typical cutoff. ECC is <0.01 and DG is 10 dB is noted.

Paper ID: 401

Fan Grill Shaped Circular Split-ring Loaded Metamaterial Absorber For X, Ku & K Band Applications

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Abstract: This paper presents a Fan grill-shaped circular split-ring loaded MM absorber for X, Ku & K band applications. The unit cell is a single negative (SNG) absorber with an FR4 substrate and a subwavelength size of $0.26\lambda \times 0.26\lambda$. This complex design absorber is incident angle insensitive in both normal and oblique polarization angles in transverse electromagnetic mode (TEM). The absorber exhibits five resonance frequencies with an absorption rate ranging from 92.77% to 99.98%. Due to its superior absorption qualities and clear construction compared with recent work on MM, this absorber has a special function in Stealth technology, Radar applications, and Satellite communications.

Paper ID: 402

An AI-NLP based Interactive Chatbot Model for Patient Prescreening at Doctor's Consultancy

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Abstract: Diabetes is a prevalent issue in Bangladesh, presenting significant challenges for healthcare systems. This project aims to develop an integrated health prescreening solution that combines an interactive chatbot with sensor modules for vital health data logging. Effective diabetes treatment requires comprehensive information from patients, including lifestyle, dietary habits, medications, and comorbidities, which typically consumes a lot of time during medical consultations. The proposed system streamlines this process by using dedicated sensors to collect essential health data, such as temperature, heart rate, and oxygen levels. Patients interact with a conversational chatbot to provide additional information, including symptoms and medical history. This data is then displayed on a screen at the end of the conversation for easy reference by healthcare professionals. The project progresses through four main stages: requirement analysis, system design, chatbot development, and sensor integration. While the sensor output may show slight fluctuations compared to medical-grade equipment, the chatbot achieves high accuracy (>90%) in conversation and information extraction. By integrating vital sign monitoring with an interactive chatbot, this project aims to reduce waiting times, enhance efficiency of medical checkups, and improve doctor-patient communication in a modern healthcare setting.

Paper ID: 408

An Advanced Optimized Virtual Inertia Control Technique for Wind Energy Integrated AC Microgrids

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Abstract: Wind energy-integrated AC microgrids encounter difficulties in preserving voltage and frequency stability because of the fluctuating characteristics of wind power. Also, power electronic converter decoupling between wind generators and AC microgrids reduces overall inertia. Effective energy management systems are essential for maintaining a balance between the supply and demand of energy, considering the sporadic and unpredictable wind patterns. Moreover, the use of wind energy necessitates sophisticated control systems to address power quality concerns and guarantee the reliable functioning of the microgrids. This paper introduces a new optimized virtual inertia control technique to stabilize the frequency during natural fluctuations and contingencies in the systems. A dynamic model of the AC microgrids is developed, considering the wind turbine, thermal generator, load, and energy storage device, to facilitate controller design and analysis. A fractional order controller is introduced in the virtual inertia loop to achieve a higher degree of freedom compared to a conventional integer order controller. A gray wolf optimizer is used to tune the parameters of the proposed virtual control technique. Simulation studies are conducted considering fluctuating wind energy and disturbances to guarantee frequency stability with the proposed controller.

Paper ID: 412

A Numerical Approach to Design and Optimization of Highly Efficient CuInS₂/CMTS Based Tandem Solar Cell for Sustainable Energy Solution

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Abstract: This research is primarily focused on addressing the increasing worldwide demands for energy while minimizing environmental impact by developing renewable and efficient energy alternatives. The objective of this research is to examine and enhance the progress of a tandem solar cell that possesses thermal stability, cost-effectiveness, and exceptional efficiency in power generation. Chalco-genide materials are highly regarded as promising choices for the sub cells in tandem configurations. Copper Indium Disulfide (CuInS₂) is regarded as the upper sub cell, whereas Copper Manganese Tin Sulfide (CMTS) is chosen as the lower sub cell, ensuring appropriate alignment of their bandgaps. The work utilizes comprehensive modelling and optimization approaches through SCAPS-1D software to identify a highly promising combination, namely CuInS₂/CMTS, which achieves remarkable power conversion efficiency of 38.03%, excellent thermal stability of -0.067%/°C, a short circuit current of 20.94 mA/cm², an open circuit voltage of 2.208 V, and a fill factor of 82.23%. During single cell simulation, for top and bottom cell, PCE was 18.34% and 26.2% respectively. Short circuit current in top, bottom and tandem cells was 20.91 mA/cm², 20.93 mA/cm², 20.94 mA/cm² respectively, which ensures current matching of these cells. During the designing, working temperature was maintained at 300K. Tandem solar cells, which exceed single-junction performances in both stability and efficiency, are widely acknowledged to be essential in determining the development of solar energy in the future. This research significantly contributes to the current attempts to pioneer novel and economically feasible solar technology using a paradigmatic approach. It has enormous implications for global energy sustainability projects.

Paper ID: 415

Optimization of Distribution Network Reconfiguration using Various Algorithms for Power Loss Minimization

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Abstract: Optimal reconfiguration of distribution networks represents a critical problem in power systems aimed at minimizing power losses while ensuring network reliability and stability. This study evaluates the performance of three optimization algorithms: Archimedes Optimization Algorithm (AOA), Particle Swarm Optimization (PSO), and Genetic Algorithm (GA), in solving the distribution network reconfiguration (DNR) problem. The algorithms were tested and AOA outperformed PSO and GA, achieving power loss reductions of 34.42%, 65.40%, and 35.88% in the 7-bus, 11-bus, and 16-bus systems, respectively, with faster computation times. The results demonstrate that the AOA consistently achieves superior performance compared to PSO and GA, with significant reductions in power losses and improved voltage profiles. These findings highlight the robustness and efficiency of the AOA, making it a promising tool for optimizing distribution networks.

Paper ID: 419

Analysis of Energy Consumption and Efficiency in the Two-tier Network for LoRa and LR-FHSS IoT Sensor Communication

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Abstract: This paper investigates the quality of service and efficiency of two-tier network topologies in Internet of Things (IoT) sensor communication, focusing on Long Range (LoRa) and Long Range - Frequency Hopping Spread Spectrum (LR-FHSS) technologies. In this research, single base-station with single tier network and two-tier communication network are investigated for analyzing their impact on power consumption, network lifetime, and overall system efficiency. Through extensive simulations, we provide a detailed comparison of network topologies across various metrics, including energy per bit, network scalability, and resilience. Our findings indicate that single-tier communication networks for IoT sensors offer simplicity and energy efficiency in small-scale deployments but multi-tier architecture provide better scalability and resilience for large-scale IoT applications with low energy consumption, albeit with compromised throughput for uncertainty like node failure. This article offers valuable insights for IoT network designers and operators, enabling informed decisions on topology selection based on specific application requirements and energy constraints.



Paper ID: 420

A Proposal on Self-Healing Control Strategy for Smart Grid Protection Using Auto-Recloser

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Abstract: The global improvement of electrical infrastructures has led to a rise in popularity of smart grid technology. Smart grid technologies make it possible to integrate large-scale renewable energy, which helps to slow down global warming. One important characteristic of the smart grid is its self-healing capacity, which guarantees prompt power restoration and reduces lengthy outages brought on by transient faults. Self-healing techniques with auto-reclosers will be discussed in this paper. The recloser immediately disconnects the line in the event of a system malfunction, and it stays disconnected for 0.05 seconds. After that, it reconnects the line and maintains the connection for 0.05 seconds more. The system resumes normal operation if the issue is fixed within this time limit. The reclosers were created with Simulink in MATLAB. Only short-term faults were found to be resolved by this time, though. Due to this, a new timing strategy was put into place with a 0.05 second delay and a 0.12 second dead time to avoid long-term issues. This modification successfully stopped a variety of errors. Upon analysis of these results, the smart grid system's self-healing design was successfully implemented.

Paper ID: 428

Design & Optimization of a Lead-Free High Performance Cs₂SnI₆ -Based Inorganic Perovskite Solar Cell by SCAPS-1D

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Abstract: Due to rising global energy consumption, renewable energy is essential. Solar photovoltaic technology is a viable and eco-friendly alternative to fossil fuels. Perovskite-based third-generation solar cells are gaining popularity for their efficiency and lower cost. This research evaluates inorganic perovskite solar cells using eco-friendly, tin-halide Cs₂SnI₆-based perovskite, a non-toxic alternative to lead-based perovskite cells. Simulations with SCAPS-1D software explored different layer configurations, including various ETLs (ZnO, CdS, TiO₂, ZnSe), HTLs (PEDOT, Spiro-OMeTAD, P3HT, CZTSe, CuSCN, CuI, MoO₃), and back metal contacts (Cu, Ag, Fe, C, Au, Ni). Cs₂SnI₆, ZnSe, MoO₃, and Ni were found optimal for stable, efficient inorganic perovskite cells. The current investigation introduces a novel architectural design, namely, FTO/ZnSe/Cs₂SnI₆/MoO₃/Ni, which exhibits remarkable device performance with a power conversion efficiency of 28.79%, a short-circuit current (J_{sc}) of 27.157 mA/cm², an open-circuit voltage (V_{oc}) of 1.34V, and a fill factor (FF) of 79.33%. The suggested structure exhibits a high level of concurrence to the current experimental findings and it is suitable for forthcoming lead-free and tin-halide-based inorganic perovskite solar cells (PSCs).

Paper ID: 430

Traffic Sign Classification Using Generative Adversarial Network

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Abstract: The development of autonomous vehicles has seen rapid progress in the last few years due to its enormous potential. Autonomous driving technologies depend on accurate discrimination of traffic signs. To improve the safety and efficiency of autonomous vehicles, this paper aims to create a reliable model that can recognize traffic signs from pictures taken by onboard cameras. For this task, the use of the generative adversarial network (GAN), more specifically, an autoencoder/generator, and a discriminator/classifier are investigated in this work. The suggested approach uses a discriminator network for classification after a convolutional autoencoder that artificially creates suitable training images from real photos. By harnessing the adversarial training process, the autoencoder can produce more diverse features, thereby enhancing overall classification accuracy. The effectiveness of our approach in accurately classifying traffic signs with high-performance metrics is reported through extensive experimentation and evaluation. The proposed GAN model demonstrates competitive performance and achieves classification accuracy of 97.06% where the accuracy of the second-best model is 96.39%.



Paper ID: 431

Suppressing Grating Lobes in a Transmitting All-Metal Phase-Gradient Metasurface

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Abstract: Radiofrequency (RF) transparent all-metal phase-gradient metasurfaces (PGMs), which are essential components for implementing an all-metal Near-field Meta-Steering (NFMS)

Antenna system, introduce undesired dominant grating lobes that severely restrict their potential applications. This study reveals a practical method to identify and suppress unwanted grating lobes. First, the dominant propagating modes are determined by analyzing the floquet modes, and then the undesired grating lobes are reduced by applying an evolutionary algorithm. The concept is validated through full-wave numerical simulations by designing four-layered metallic meta-atom and supercell. The present research shows that it is feasible to suppress the grating lobes significantly, indicating the promising potential of all-metal PGMs as a building block for fully metallic beam-steering antenna systems.

Paper ID: 432

An IoT-based Smart Waste Management System for Efficient Waste Segregation and Collection

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Abstract: Rapid urbanization in densely populated countries like Bangladesh presents significant challenges for traditional waste management systems. This inefficiency leads to environmental degradation and increased costs. Daily waste generation in urban areas is substantial, yet collection methods remain outdated, relying on fixed schedules and neglecting waste segregation. These practices contribute to soil and groundwater contamination from plastics and polythene. Modernizing waste collection necessitates the adoption of intelligent waste management systems. This paper proposes an Internet of Things (IoT)--based waste monitoring and management solution. Our system promotes waste segregation, reduces collection frequency, and optimizes bin placement. We introduce an intelligent bin that integrates with a central administration system. This bin monitors fill levels and analyzes data to inform bin placement strategies and collection route optimization. The resulting benefits include reduced workforce costs, lower fuel consumption, and minimized air pollution from waste collection vehicles. Additionally, the system alleviates traffic congestion and fosters a healthier living environment

Paper ID: 438

Design and Optimization of CH₃NH₃SnBr₃/CuInSe₂ Monolithic Tandem Solar Cell with Enhanced Efficiency using SCAPS-1D

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Abstract: In the recent years, there have been tremendous breakthroughs in renewable energy due to the growing emphasis on decreasing human environmental effect. Many reasons, including an ever-increasing human population, better living standards, increased urbanization and increased international trade, have contributed to the dramatic increase in energy use in recent decades. As an excellent alternative to the fossil fuels, solar cells are seen as a modern power generation source. The low price and great performance of third-generation solar cells are making them increasingly popular. This is especially true with cells made of perovskites. Solar cells with a tandem structure are more efficient than those with a single junction because they can absorb more of the sun's radiation. By incorporating CuInSe₂ as the bottom cell and Methylammonium Tin Bromide (MASnBr₃) as the top cell, this study brings new concepts to the table. An impressive efficiency of 41.68% is achieved by the tandem structure with MASnBr₃ as top cell and CuInSe₂ as bottom cell, featuring Voc of 1.71 volts, J_{sc} of 30.55 mA/cm², and FF of 80.07%. The improved efficiency is attributed to the low bandgap of the bottom cell and the high bandgap of the top cell material.



Paper ID: 439

Investigation of varied Doping of ZnO as an ETL for KSnI₃ based Perovskite Solar Cell with ETL and Absorber Thickness Optimization

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Abstract: Lead toxicity in PSCs necessitates exploration of lead-free alternatives where KSnI₃ emerges as a considerable option. Since, the ETL regulates the performance of the cells, this study investigates the influence of various types of doping for the ZnO as an ETL for KSnI₃-based PSC through SCAPS-1D simulation. The effect of dopant type (Al, In, P) on electrical properties (J_{sc}, V_{oc}, FF, PCE) was examined within the FTO/ETL/KSnI₃/CuI/Au device structure. Indium-doped ZnO exhibited the highest performance, achieving a PCE of 21.84%, representing a 0.85% absolute improvement in PCE and a 4.05% relative improvement compared to the undoped ZnO reference cell (PCE = 20.99%). This demonstrates a significant efficiency gain through doping. Comparing the other dopants, Al based model also outperformed the undoped ZnO cell as it reached 21.37% PCE, but the P-doped ZnO fell behind the undoped model since it only reached 19.82% of PCE. These findings highlight the potential of In-doped ZnO ETLs to improve the performance and efficiency of lead-free KSnI₃-based PSCs.

Paper ID: 440

Ultra-Fast Core Mode Prediction in Plasmonic Crystal Fiber Sensor: A Machine Learning Approach

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Abstract: This study introduces a novel approach to improving Photonic Crystal Fiber (PCF) Surface Plasmon Resonance (SPR) sensors by incorporating machine learning (ML) models for predicting core mode index. Traditionally, identifying core phenomena in PCF SPR sensors required manual visual inspection by experts, a process that is both time-consuming and prone to errors. To address this, a dual-core PCF model is developed and used Finite Element Method (FEM) simulations to create extensive training data for ML models. The proposed PCF model shows exceptional sensitivity to wavelength changes, with a recorded sensitivity of 6000 nm/RIU, making it highly effective for accurate mode prediction. The study evaluated nine ML models, including XGBoost, Random Forest, and Decision Tree, achieving accuracies of 0.9742, 0.9645, and 0.9667, respectively. By integrating ML models, the core mode identification process is significantly faster and more efficient, offering major benefits for PCF SPR research. This work not only advances PCF sensor technology but also enhances efficiency and accuracy in various SPR-based applications.

Paper ID: 441

Advanced Estimation of SoC and SoH for Li-Ion EV Batteries Using Soft Computing Techniques

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Abstract: The transition towards battery-powered technologies, driven by environmental sustainability goals and the need to reduce reliance on finite fossil fuels, has accelerated the demand for efficient energy storage solutions. Batteries, pivotal in enabling clean energy adoption and powering electric vehicles (EVs), necessitate robust Battery Management Systems (BMSs) for optimal performance and longevity. A critical function of BMSs is the accurate estimation of State of Charge (SoC) and State of Health (SoH), which measures the remaining energy in a battery relative to its full capacity. This paper explores advanced methodologies, including machine learning (ML) techniques, for enhancing SoC estimation accuracy in lithium-ion batteries. The study evaluates several ML models—Convolutional

Neural Networks (CNNs), Feedforward Neural Networks (FNNs), and Long Short-Term Memory (LSTM) —using real-world data from controlled charging and discharging cycles. The results demonstrate that LSTM models exhibit superior performance in SoC and SoH estimation, achieving low Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE) values across different operational scenarios. The research underscores the importance of model selection and data preprocessing techniques such as normalization and feature engineering in optimizing SoC and SoH estimation accuracy. Furthermore, the paper discusses the implications of battery aging and operational profiles on estimation methods and battery health monitoring.

Paper ID: 445

Enhancing Object Detection for Autonomous Vehicles Using YOLO-NAS on Bangladeshi Dataset

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Abstract: In autonomous driving, understanding unstructured road scene conditions like in Bangladesh, is crucial as it enables the machine to capture the visual perspective of the environment. Autonomous vehicles depend on a strong object detection model to perceive complex road scenarios and respond to these situations accurately. Recently, Deep Learning (DL) has emerged as a highly promising approach in such object detection tasks. This study explores and evaluates the deep learning-based YOLO-NAS (small, medium, large) algorithm for detecting various objects based on the RSUD20K dataset. The dataset consists of more than 20,000 images, including 130,000 annotations and 13 object categories, and it is tailored to the unorganized and unstructured road conditions of Bangladesh. The algorithm's performance is evaluated by broadly accepted metrics including Precision, Recall, Mean Average Precision (mAP). The findings of this study indicate that YOLO-NAS_M outperforms the other variants with a mean average precision at 50 (mAP@50) of 82.6%, closely followed by YOLO-NAS_L at 81.55% and YOLO-NAS_S at 76.4%. Overall, this work demonstrates the capabilities of YOLO-NAS in the context of object detection for autonomous vehicles.



Paper ID: 446

Enhancement of Aluminum Polytetrafluoroethylene Based Triboelectric Nanogenerator for High Temperature Environment

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Abstract: Triboelectric nanogenerators (TENGs) are self-powered devices that experience low open circuit voltages at high temperatures. This paper is intended to enhance the output voltages of a TENG in a high-temperature environment. Here, we have incorporated aluminum as electrodes and polytetrafluoroethylene (PTFE) as a freestanding layer into the framework of TENG. The proposed arrangement is analyzed both numerically and experimentally. Both results indicate that the TENG displayed its highest output voltages at room temperature and consequently reduced its voltages as temperature increased. However, placement of the two friction layers of a triboelectric nanogenerator (TENG) at different temperatures results in improved output voltages that closely approximate those at ambient temperature. Although the present measured power is modest, it can be efficiently improved by implementing a booster circuit. The obtained data may explore the use of TENG in a vibrating source environment with a temperature difference.

Paper ID: 455

Towards a Deeper Understanding of Transformer for Residential Non-intrusive Load Monitoring

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Abstract: Transformer models have demonstrated impressive performance in Non-Intrusive Load Monitoring (NILM) applications in recent years. Despite their success, existing studies have not thoroughly examined the impact of various hyper-parameters on model performance, which is crucial for advancing high performing transformer models. In this work, a comprehensive series of experiments have been conducted to analyze the influence of these hyper-parameters in the context of residential NILM. This study delves into the effects of the number of hidden dimensions in the attention layer, the number of attention layers, the number of attention heads, and the dropout ratio on transformer performance. Furthermore, the role of the masking ratio has explored in BERT-style transformer training, providing a detailed investigation into its impact on NILM tasks. Based on these experiments, the optimal hyper-parameters have been selected and used them to train a transformer model, which surpasses the performance of existing models. The experimental findings offer valuable insights and guidelines for optimizing transformer architectures, aiming to enhance their effectiveness and efficiency in NILM applications. It is expected that this work will serve as a foundation for future research and development of more robust and capable transformer models for NILM.

Paper ID: 457

Design and Performance Comparison of Radiation-Tolerant and Conventional 8:1 Multiplexers in 90nm Technology

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Abstract: This study presents the design and performance trade-offs between the radiation-tolerant and conventional 8:1 multiplexers using 90 nm semiconductor technology in cadence virtuoso, focusing on their performance metrics and radiation resilience characteristics. Radiation tolerance is a crucial factor for electronic systems deployed in radiation-intensive environments. The motivation of this study is generated from the need of creating reliable electronic systems in radiation-rich environments. The methodology involves the design and simulation of both conventional and radiation-hardened multiplexers, followed by a detailed analysis of their performance under simulated radiation conditions. The analysis evaluates key design parameters including propagation delay, power consumption, area utilization, layout design and transistors. Results indicate that radiation-tolerant multiplexers demonstrate enhanced resilience against SEE, albeit with slightly higher power consumption and area overhead than conventional designs optimized for speed and efficiency. The study concludes that the choice between these multiplexer types should be guided by specific application needs, balancing the trade-off between performance efficiency and robustness in radiation-sensitive environments..



Paper ID: 460

A Wrench Shaped MIMO Antenna with Enhanced Bandwidth and Isolation for 5G Applications

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Abstract: The wrench shaped single antenna is transformed into a four element Multiple Input Multiple Output (MIMO) antenna in this study to increase spectrum efficiency and data rate. MIMO provides many users with a stable data link while also improving coverage and range, all of which are critical for 5G technology. This study describes a single antenna with a bandwidth of (3.22-22.91) GHz that is turned into a four element MIMO antenna. With a star slot in the middle of the radiating patch, each of the four single antennas on this MIMO resembles a wrench. There is a rectangular gap in the upper middle of the partial ground as well. The wrench-like antenna is essentially a patch antenna that is circular and has a star-shaped slot. The MIMO is constructed on a large FR4 (lossy) substrate dimension $44 \times 44 \times 1.6$ mm³ while patch and ground are made of copper (annealed). This MIMO antenna's performance features include mutual coupling coefficients $S_{21} \geq -38.89$ dB, $S_{31} \geq -21.58$ dB, $S_{41} \geq -38.83$ dB, and reflection coefficients S_{11} less than -10 dB in the 3.22 GHz to 22.91 GHz range. In addition, the maximum reflection coefficient is around -46.92 dB at 4.31 GHz. Furthermore, the performance characteristics of the proposed four-element MIMO antenna observed are Diversity Gain (DG) ≤ 10 , and Envelope Correlation Coefficient (ECC) < 0.005 . Those are good simulated values and they fall within acceptable bounds.

Paper ID: 468

Enhancing Workplace Efficiency: An Intelligent Office Automation System Leveraging IoT

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Abstract: Traditional office automation systems generally depend on human procedures and obsolete technology, leading to inefficiencies and heightened costs. Since the advent of Internet of Things (IoT) technology, substantial transformations have transpired in both personal and professional domains. By incorporating IoT devices into their work environments, businesses may obtain real-time data on many operational aspects. This enhances organizational decision-making using data and automates processes. This research introduces a novel framework for workplace environments, utilizing the revolutionary capabilities of IoT technology. We provide a distinctive framework for intelligent workplace settings to replace manual switches with mobile control, improve security measures, and raise safety standards. This framework utilizes the capabilities of the IoT. The paper highlights the prospective benefits of IoT-enabled smart workplaces through research investigations and simulations employing Cisco Packet Tracer. The essential components of the proposed framework include access control that is based on RFID technology, intelligent sensor devices, technologies that are efficient with energy, tight security processes, and automation mechanisms. The findings provide evidence that the IoT is effective in managing administrative tasks, improving network connectivity, reducing latency, and protecting workplace safety and security.

Paper ID: 478

Optimizing Water Management: An IoT-Driven Approach to Smart Irrigation

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Abstract: This paper presents an IoT-based smart irrigation system designed to optimize water usage and improve crop growth by providing real-time monitoring and automated control of key water parameters. The system integrates soil moisture, temperature, and humidity sensors with microcontrollers, transmitting data to a cloud platform for remote access via an intuitive user interface. This eliminates manual data collection and allows farmers to monitor and adjust irrigation settings in real time. The architecture is flexible, easy to implement, and adaptable to different crops. Results show significant improvements in water efficiency and crop yields, with future work to incorporate predictive irrigation through machine learning.

Paper ID: 479

Investigation into Different Types of Uncertainties of Power Distribution System Using Geographic Information System (GIS) Mapping

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Abstract: Uncertainty is an ongoing issue in power systems, as it is difficult to describe precisely current or future states of parameters in power systems because of the many uncertainties that could expose the systems to potential issues. In this study, Geographic Information System (GIS) for assessment of consumer pattern, growth, find out the overload line and overload transformer and finally proximity analysis of consumer connection and high voltage line. For these 20 years, the growth of consumer data and other uncertainties of Network Operation and Commercial Service (NOCS) of a power distribution system have been analyzed. Here, the uncertainties have been resolved with the application of GIS mapping. From this study, the load growth is understandable easily, the ways to check the proper service connection to the consumer and last but the most important is to detect the unethical trees and constructions surrounding high voltage lines.

Paper ID: 480

Graphene-integrated Patch Antenna with MIMO for IoT/6G THz Applications

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Abstract: This research presents a graphene-integrated single and 2-element MIMO antenna for IoT/6G THz applications where graphene is used as the conductive material. The single antenna operates at 3.31 THz, 7.06 THz, and 8.69 THz with reflection coefficients of -39.52 dB, -24.20 dB, and -37.26 dB, and the observed gain of those frequencies are 9.922 dBi, 11.06 dBi and 9.26 dBi respectively. A 2-element MIMO antenna is developed from the basis of the single-element antenna and achieved an improved gain of 8.73 dBi, 16.5 dBi, and 17.9 dBi at the same resonant frequencies as the single antenna with the efficiency above 80%. The performance parameters of the 2 elements MIMO antenna which are Diversity gain, Channel Capacity Loss (CCL), Envelope Correlation Coefficient (ECC), and Mean Effective Gain (MEG) are measured to ensure the efficiency of the designed MIMO antenna for IoT and 6G communication systems applications in the THz frequency band.

Paper ID: 481
A Dynamic Resampling Method for Credit Card Fraud Detection in Imbalance Classification

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Abstract: The inconsistency of classes in the dataset is one of the primary challenges in data mining and machine learning, since it tends to forecast predictive results towards a specific class. In such instances, the synthetic minority oversampling technique (SMOTE) is the most commonly utilized resampling method, despite its class mixture and other limitations. To address class unbalanced difficulties in binary classification, in this research we present a dominant SMOTE oversampling method. The proposed method is compared to the standard SMOTE, Out Layer SMOTE, ADYASAN that belongs to the data level solution of the imbalanced dataset. In terms of precision, accuracy, recall, f1-score, true positive rate(TPR) and false positive rate(FTR), the experiment is validated using the credit card imbalanced dataset. The experiment result shows that the proposed method has achieved better results of 99% precision, 98% accuracy, 98% recall, 98% f1-score, 87% TPR and 13% FTR than traditional methods.



Paper ID: 484

Performance Analysis of a Modified Bridge Current Limiter in Mitigating Asymmetrical and Symmetrical Faults in Power Systems

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Abstract: This paper presents a comprehensive performance analysis of a Modified Bridge Current Limiter (MBCL) in mitigating both asymmetrical and symmetrical faults within power systems. The work concentrates on the penetration of Inverter-Based Distributed Generators (IBDG) like solar photovoltaic and wind turbines and the issues surrounding fault management within increased fault currents and low source impedance. The first category is the traditional kind which includes circuit breakers and current limiting reactors both of which are quite ineffective at dealing with the high fault currents in their initial few microseconds. Our newly proposed MBCL, a non-superconducting fault current limiter, is designed to improve fault current limiting capabilities in IBDG systems. Control strategy for the MBCL depends on the use of Insulated-Gate Bipolar Transistor (IGBT) switch, to its dynamic operation to clear fault currents fast. Extensive simulations in MATLAB/Simulink confirms that the application of the MBCL effectively mitigates fault currents during 2-line-to-ground and 3-line-to-ground fault conditions. The results show that the MBCL outperforms conventional methods, such as Series Dynamic Braking Resistors (SDBR), in terms of peak current reduction and voltage stability, highlighting its potential for improving the fault ride-through performance of IBDG systems.

Paper ID: 485

Enhancing Home Automation and Security with IoT-based Solutions

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Abstract: Technology has become an integral part of our everyday lives. Televisions, smartphones, laptops, the Internet, and other technological advancements have become indispensable to modern life. Internet of Things (IoT)-enabled control of various home features, activities, and appliances, known as home automation. Home automation enables control of equipment within your residence from any location globally via end devices. This research aims to efficient control systems, reduce power consumption and enhance security in home automation systems. In our proposed method, the home automation systems utilise the HC SR04 sonar sensor, the DS18B20 temperature sensor, the LDR analogue sensor, and the NodeMCU ESP8266 microprocessor relays. This allows the automated regulation of household devices according to human presence, door locks, temperature, ambient light, and water pump operation. We thoroughly evaluated the hardware prototype for an extended duration. The test findings verified that the prototype operated effectively and could automatically and manually manage electrical appliances using the web application. Implementing a Next Generation Access Control approach, which collaborates with IPSec and VPN to identify unwanted access and address Smart Home security concerns. Finally, this research highlights the potential of IoT-based home automation to improve energy efficiency and increase safety and security.

Paper ID: 487

A Novel Tri-band MIMO Antenna for 5G Wireless Communication

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Abstract: In this research article, a novel tri-band MIMO antenna is proposed; the resonating bands of the antennas are X-band, K-band, and Ka-band. With a dielectric constant of 2.2, Roger RT5880 is utilized as a substrate while designing the antenna. The total aspect of the introduced single-element antenna is $10 \times 12 \times 0.254$ mm³, and the 4×4 MIMO antenna is $22 \times 22 \times 0.254$ mm³. The resonating frequency of a single element and 4×4 MIMO antenna is within the X-band, K-band, and Ka-band. Maximum gain obtains by the simulation of single element antenna is 2.25 dB, 4.9 dB, and 3.77 dB at the frequencies of 9.85 GHz, 28 GHz, and 38.53 GHz, respectively. On the other hand, for the MIMO antenna, the recorded gain at 10.491 GHz is 4.3 dB, at 28.79 GHz is 5.06 dB, and at 38.89 GHz is 4.3 dB. Both antennas provide high efficiency, 90 and above. The performance parameters of the MIMO antenna, like the envelope correlation coefficient (ECC), Mean effective gain (MEG), and Diversity gain (DG), are also calculated for performance analysis, all of which provide satisfactory results..

Paper ID: 496

Design and Simulation of a Polarization Insensitive Terahertz Metamaterial Absorber for Enhanced Refractive Index Sensing

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Abstract: This study introduces a novel metamaterial absorber (MMA) for refractive index sensing, utilizing a unit cell structure composed of a resonator and ground plane made of gold and a PTFE substrate. The proposed MMA exhibits exceptional absorption performance, with four distinct resonant peaks at 5.23, 5.82, 6.25, and 6.58 THz, achieving near unity absorption of 90.6%, 99.90%, 88.74% and 99.7% respectively. Utilizing Finite Integration Technique (FIT), impedance matching was analyzed, polarization dependency, and angular stability of the MMA. Polarization Conversion Ration being zero ensures the structure being an absorber and not a polarizer. The MMA achieves quality factors of 243.06, 208, 114.3 and 102.97. Sensitivities of 0.68, 0.61, 0.83, and 0.91 THz/RIU and FOM of 31.62, 21.78, 15.17, 14.24 was found for the respective resonance frequencies. This demonstration of high sensitivity to refractive index changes, makes it suitable for applications such as fuel adulteration detection and cancerous cell identification.



Paper ID: 498

Enhancing Traffic Flow and Reducing Congestion: A Smart City Approach with an IoT-based Intelligent Traffic Management System

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Abstract: With burgeoning populations and booming industries straining urban landscapes, traffic management has become a critical issue for cities worldwide. Traffic congestion is a significant challenge modern cities face, leading to wasted time, increased fuel consumption, and air pollution. This research investigates how Smart City technologies can revolutionize urban traffic management. We propose an Intelligent Traffic Management System (ITMS) utilizing the Internet of Things (IoT) to tackle traffic congestion, a significant hurdle for modern cities. The ITMS gathers real-time traffic data (vehicle count, speed, lane occupancy) through strategically positioned sensors at intersections. A central control system analyzes this data and dynamically adjusts traffic signals, allocating green time based on actual traffic flow. This approach aims to optimize traffic flow, significantly reduce congestion, and improve efficiency. The paper explores the potential benefits of the proposed system, including shorter travel times, improved air quality, and enhanced safety for pedestrians and vehicles. Finally, the proposed system indicates significant potential benefits, including reductions in waiting time 17.37%; congestion time 18.43%, leading to smoother traffic flow and improved phase departure time 29.20% or higher increase in throughput, signifying that more vehicles can pass through intersections within a given time-frame.

Paper ID: 502

Performance Enhancement of Single-Ended Primary-Inductor Converter for Low Power and Photovoltaic Applications

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Abstract: The ever-growing reliance on electronic devices and the burgeoning field of green energy necessitate efficient and different gain AC-DC converters for a myriad of applications, from electric drives to solar cells and grid-connected inverters. This paper introduces a hybrid closed-loop bridged and bridgeless Single-Ended Primary-Inductor Converter (SEPIC) topologies featuring switched-capacitor networks, showcasing promising improvements in Power Factor Correction (PFC), Total Harmonic Distortion (THD) and efficiency when compared to contemporary converters. Both topologies demonstrate a 0.996 input power factor, surpassing their open-loop counterparts and PID-controlled closed-loop Cuk topology. Utilizing a dual-loop Proportional-Integral (PI) controller with a feedforward scheme minimizes distortion, yielding the lowest THD value of 7.96%. The single-stage network achieves 99.1% peak efficacy, outperforming closed-loop Cuk and SEPIC-Cuk combination configurations. Furthermore, the proposed topology's performance is validated in the context of solar plant implementation, demonstrating a smooth 5V output with minimal ripple. This research underscores the potential for significant advancements in designing efficient renewable energy systems, particularly in Photovoltaic (PV) and wind applications.

Paper ID: 503

DeepWeb: A Web Application for Advanced Lung Cancer Identification using Novel CNN Model

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Abstract: Lung Cancer is one of the deadliest forms of cancer that affects people which increases mortality rates worldwide. Identifying anomalies in medical photographs at the very early stage is crucial for both quantitative image study and patient care. So, in our research, we present a fully automated web application to predict lung cancer early on CT scan images using a robust deep learning model called Convolutional Neural Network (CNN). We also performed transfer learning models i.e. ResNet50 and VGG16 on the same dataset. Still, these models could not achieve higher accuracy than CNN as it showed an excellent performance achieving 99% accuracy and 97% of F1-score value. The proposed model is established in three phases: image augmentation is done initially as preprocessing steps on the Kaggle IQ-OTH lung cancer dataset, followed by lung cancer classification using the CNN model, and finally, this model is used to create a web application. Our web application developed using Streamlit, can successfully predict normal, benign, and malignant classes of lung cancer showing the confidence score of each image inserted by the user. This prompt user experience with our web application based on the robust Convolutional Neural Network will assist medical professionals in enhancing the automated early screening and diagnosis of lung cancer as well as raising the patient survival rate effectively.

Paper ID: 512

Real-Time IoT-Based Toxic Gas Monitoring and Comparative Analysis of Machine Learning Techniques for Air Quality Index Prediction in Dhaka

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Abstract: Toxic gases pose health risks, including respiratory disorders. Predicting the air pollution index aids in traffic management and identifying critical pollutants. This study compares machine learning methods-Logistic Regression (LR), Discriminant Analysis (DA), Decision Tree (DT), K-Nearest Neighbors (KNN), and Support Vector Machine (SVM)-for forecasting the air quality index in Dhaka, Bangladesh. Additionally, the research implements a sensor-based system using Arduino Uno, NodeMCU ESP8266, MQ-4, MQ-135, and MQ-136 sensors to detect ammonia (NH₃), methane (CH₄), and sulfur dioxide (SO₂). Experimental findings reveal significantly higher sensor readings in polluted air

conditions: MQ-4 sensor (clean air: 0.0854 ppm, contaminated air: 120.0423 ppm), MQ- 135 sensor (clean air: 0.0585 ppm, contaminated air: 140.184 ppm), and MQ-136 sensor (clean air: 0.0641 ppm, contaminated air: 100.8128 ppm). Various data pre-processing techniques were employed prior to modeling using Kaggle's Dhaka dataset. Among the models, Decision Tree (DT) yielded the highest performance metrics ($R^2 = 0.9999$, MSE 0.4410, RMSE = 0.6641), demonstrating superior predictive capabilities for Dhaka's air quality index compared to other methods.

Paper ID: 516

Reduction of Total Harmonic Distortion (THD) in Source Current Using a Shunt Active Power Filter with P-Q Theory and PI Controller

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Abstract. The rising prevalence of non-linear loads at the point of common coupling (PCC) is severely affecting power quality, emphasizing the urgent need for shunt active power filters (SAPFs). In order to comply with the strict regulations set by contemporary utility grids, these filters are essential for reducing harmonics and guaranteeing power systems' dependability. The main goal of this research is to create a system that can provide a balanced, sinusoidal source current waveform that is precisely synced with the matching voltage. Achieving a unity power factor and a notable decrease in the source current's Total Harmonic Distortion (THD) are made possible by this synchronization. A thorough and systematic approach to the design of a SAPF for mitigating current harmonics is presented in detail. The goal of the suggested approach is to lower the source current's THD. Utilizing the instantaneous power theory (p-q theory), the reference current is obtained. A proportional-integral (PI) controller controls the DC-link voltage, and hysteresis current control generates gate pulses that control the Voltage Source Inverter (VSI) switches. Comprehensive modeling and simulation of the SAPF are carried out in MATLAB/Simulink for a balanced system with non-linear loads. According to the acceptable limitations specified in IEEE Standard 519-2014, the result of simulation demonstrate that the suggested filter successfully lowers harmonic distortion.



Paper ID: 517

Perceptual Quality Restoration of Laparoscopic Videos via GAN-Based Smoke Elimination

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Abstract: A supervised image-to-image translation method is developed to remove smoke from laparoscopic video recordings, which can be significantly damaged due to laparoscopic surgery. Tissue dismemberment tool smoke can obscure a surgeon's view and cause mistakes in computer vision-based systems that are utilized for clinical navigation operations. Redesigned Generative Adversarial Network (GAN) is introduced to eliminate the noise while maintaining an image quality that is perceptually adequate. The proposed approach is trained and tested using the Laparoscopic Video Quality (LVQ) assessment dataset. The experimental result segment provides examples of the qualitative results obtained using the proposed approach. More refinement of the results is anticipated if a bigger and more comprehensive database is used for testing and training. The recommended method outperformed existing methods and generated smokefree photos or videos.

Paper ID: 519

Performance Analysis of Ground-Mounted SPV Plant vs. Floating SPV Plant

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Abstract: A comparative study of ground mounted and floating solar photovoltaic (PV) systems is presented in this research. Solar energy is abundant and sustainable, reducing dependence on fossil fuels. This paper aims to investigate the performance and efficiency of Ground-Mounted Solar Photovoltaic (GMSPV) systems compared to Floating Solar Photovoltaic (FSPV) systems. The comparison is conducted based on simulations to model the energy output of both systems to offer recommendations for maximizing the use of solar energy. PVsyst and AutoCAD have been used to investigate the performance of the two systems. According to simulations results with all losses accounted to be the same for both GMSPV and FSPV, it has been observed that Ground-Mounted Solar Photovoltaic system has overall 2% more performance, which is 376 MWh/yr or mega unit electric energy per year compare to Floating Solar Photovoltaic system.

Paper ID: 522
Integration of Deep Learning Based Image Analysis in Lung Cancer Pathology

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Abstract: The recognition, prognosis, and medical treatment planning of lung cancer heavily depend on segmenting whole slide histopathology image analysis. Our research focused on analyzing lung tissue Whole Slide Images (WSI) using deep learning to get the best accuracy and reduce errors. This is especially important for analyzing medical images, such as detecting or separating tumors from healthy tissue. In this paper, we do annotation, data cleaning, data augmentation, and splitting. This process creates a collection of about 200,000 separate pictures that are ready to be studied and manipulated. We applied deep learning models like Fully convolutional network (FCN), and Convolutional Neural Network (CNN). Machine learning models such as clustering for grouping normal patches and tumor patches, as well as Principal Component Analysis (PCA), are also used. We have achieved 85.05% accuracy for the CNN model which gives us the highest accuracy. Histopathology image analysis to detect lung cancer and extract the features is important in medical education and helps to control cancer in society.



Paper ID: 525

Visualizing Crop Disease Detection Exploring Deep Learning with Custom CNN Model and XAI for Enhanced Interpretability

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Abstract: Accurately detecting plant diseases is essential for safeguarding food security and promoting agricultural sustainability. This study presents an advanced deep learning approach using Convolutional Neural Networks (CNNs) to classify plant leaf diseases. Utilizing the Plant Village dataset, a custom CNN model was developed, which achieved superior accuracy of 96.11%, surpassing popular transfer learning models such as ResNet152-v2 (94%), VGG16 (91%), and Inception-v3 (88%). Key aspects of this work include the implementation of robust data preprocessing techniques like image augmentation and the design of an optimized CNN architecture to enhance performance while maintaining computational efficiency. Furthermore, explainability was explored using Layer CAM, which provided more detailed visual explanations than Grad-CAM, thereby increasing the model's transparency and trustworthiness. These results confirm the effectiveness of the proposed method for accurate plant disease identification, positioning it as a promising tool for agricultural disease diagnosis. Future efforts will focus on expanding the dataset, improving model generalization, and deploying the model for real-time field applications.

Paper ID: 528

Development of a Rotational Freestanding Triboelectric Nanogenerator Based Anemometer for Wind Vector Measurement for Wind Turbines

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Abstract: Developing anemometers that can harvest wind energy and measure wind speed simultaneously using a single, onboard renewable source is proven to be a significant hindrance. This work introduces a novel design for a self-powered anemometer that surpasses conventional limitations. This novel system offers a combined functionality of self-powered operation and simultaneous wind speed and direction sensing. This is achieved by integrating two co-axially arranged Rotational Triboelectric Nano-generators (R-TENGs), referred to as the inner and outer TENG, within a single compact disc-like structure. Additionally, four strategically positioned anemometers, spaced at 90° intervals, facilitate comprehensive wind data acquisition. Finite element method simulations predicted an open-circuit voltage of 500 V. The inner TENG, responsible for powering the anemometer circuit, exhibited a notable short-circuit current generation response ranging from 602.8 mA to 4.9 A across a wind speed range of 3 m/s to 25 m/s.

Paper ID: 530

Hand Gesture Recognition Based Speed and Direction Control of DC Motor Using CNN

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Abstract: Gesture recognition is a way for computers and other electronics to read and understand the movement of various body portions as commands. Using neural networks and hardware control to recognize gestures shows how easy it is to combine complex algorithms with managing physical devices. This paper talks about a new way to acknowledge hand motions and use them controlling the speed and direction of a DC motor. A webcam is used to take pictures of the hands, CNNs are used to process the images in MATLAB, and the motor is controlled by a microcontroller. The goal is to develop an easy and effective way to use hand movements to control motors. In real-time, the movements are analyzed and put into groups. The motor's direction is then set by control commands from these movements. The system's ability to quickly and accurately recognize gestures and control motors. When an external dataset is successfully validated, the accuracy that is created usually stays high, between 98.70% and 99.90%.



Paper ID: 547

Optimizing Electric Vehicle Efficiency with Advanced Climate Control System

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Abstract: The application of Model Predictive Control (MPC) to automotive air conditioning systems is crucial for electric vehicles (EVs) and future-connected technologies due to the significant energy consumption of current climate control systems. These systems struggle to balance cabin comfort with battery power conservation, especially during extreme weather conditions, leading to reduced driving range and accelerated battery degradation. This research explores the integration of predictive analytics, renewable energy sources (RES), and adaptive climate control to address these challenges. These innovations aim to minimize energy consumption, enhance battery performance, and improve overall vehicle efficiency while ensuring passenger comfort. A comprehensive review indicates that adaptive climate control can boost energy efficiency by around 20-22% by dynamically adjusting to occupant preferences. Addressing these challenges is crucial for extending EV operational lifespans and facilitating broader adoption. The proposed model was developed using MATLAB Simulink optimization, demonstrating its potential in real-world applications.

Paper ID: 551

Load Balancing Algorithm: A Markov Chain Model Using Queuing Theory Approach

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Abstract: This study addresses efficient task scheduling in data centers, crucial for optimal resource use and timely task completion. It explores whether a custom algorithm can enhance load balancing efficiency compared to traditional algorithms like Round Robin. The study uses Markov Chain Approach simulations to evaluate the proposed algorithm's performance. Results show that while Round Robin's execution time grows exponentially, the proposed algorithm exhibits a more controlled increase, mitigating rapid execution time growth. A strong negative correlation was found between service rate and queue length. By analyzing parameters such as server utilization, arrival rate, average service time, total server capacity, and queue length, the study identifies the best load-balancing approach. The practical implication is that organizations can implement the proposed algorithm to boost their Data Center's operational efficiency. The study's originality lies in its unique evaluation and comparison approach, proving invaluable for professionals and researchers in data center management.

Paper ID: 554

Optimization of Cost-based Dynamic Economic Dispatch Problem using Mathematical Programming

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Abstract: This paper introduces a robust and effective methodology for addressing the dynamic economic dispatch (DED) optimization problem, which is pivotal in power system operations and planning. DED is basically an enhanced version of static economic dispatch (SED) problem that involves scheduling a set of generation units over a typical operational period, often spanning 24 hours, to cover the predicted load demand with the on/off status of each generation unit predetermined. The literature distinguishes between two main types of DED: cost-based and price-based. This paper focuses on the cost-based approach, utilizing quadratic constrained programming (QCP) to model the problem effectively. QCP is particularly suited for this task as it optimally manages the ramp rate constraints and capacities of the available generation units maintaining the minimum operating cost. To demonstrate the effectiveness of the proposed methodology, simulations were conducted using two distinct scenarios involving 5-unit and 10-unit power dispatch strategies. The results, obtained through the general algebraic modeling system (GAMS), clearly presents the superiority of GAMS in achieving optimal solutions when compared to other existing metaheuristic techniques.



Abstract of Papers

(Non-IEEE Track)

Paper ID: 298

Modeling and Analysis of Vascular Stenosis in Microchannel

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Abstract: A microchannel is a tiny duct that offers a platform for studying vascular stenosis at a level that is comparable to the body's micro vascular networks. It provides an approach to mimic the dynamics of blood flow in constricted capillaries since their diameters can resemble those of tiny blood vessels. Vascular stenosis refers to the narrowing of blood arteries due to various factors such as the buildup of plaque. In this study, vascular stenosis was modelled in square, rectangular and circular shaped microchannel. The stenotic posts in the microchannel were designed in square, circular, tapered and sudden occlusion shapes. It replicated 50%, 75% and 90% vascular stenosis. The least distance for blood flow to be fully developed was determined between two consecutive stenosis posts. This value helps to understand the optimum distance to design two successive stenotic posts and allows low cost and less time-consuming fabrication. Our result indicates the design of efficient microfluidic system to understand the change of fluid behavior in a stenotic region, visualize the pattern of wall shear stress for contrasting stenotic posts and simplify analyses in various conduits.

Paper ID: 386

Phytochemical Screening, In-vitro Thrombolytic, In-vivo Antidepressant and Anxiolytic evaluation of Methanol extract of Persicaria chinensis L.H. Gross Leaves

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Abstract: *Persicaria chinensis* L.H. Gross is a herb member of the *Persicaria* genus and the *Polygonaceae* family. The current study uses several different experimental methods to investigate the presence of bioactive metabolites and the roles that *P. chinensis* methanol leaf extract (MEPCL) plays in reducing thrombosis, anxiety, and depression. Blood withdrawal from fresh volunteers underwent an in-vitro examination to assess thrombolytic activity. The anxiolytic effects were observed employing elevated plus maze (EPM) and hole-board (HBT) tests, while the antidepressant effects were evaluated using forced swimming (FST) and tail suspension tests (TST). Alkaloids, steroids, saponins, glycosides, phenols, tannins, flavonoids, terpenoids, quinones, and reducing sugar are the secondary metabolites present in MEPCL, which was the preliminary investigation of this study. The MEPCL showed mild thrombolytic activity. The immobility duration of both doses of MEPCL was significantly decreased in TST and FST. In HBT, the higher doses showed the most considerably increasing number of head dipping, and, in the EPM test, time spent in the open arm was increased significantly with increasing the dose. Based on these results, it would be concluded that the herb has imperative potential in managing thrombosis, anxiety, and depression-like disorders.

Paper ID: 450
Antioxidant, Cytotoxic, and Neurobehavioral Properties of
Lepidagathis Incurva

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Abstract: Abstract: *Lepidagathis incurva*, locally known as 'Kandi-phul' is a 30-100 cm tall herbaceous plant characterized by a frequently visibly woody root and anisophyllous leaves. It is utilized as traditional medicine by the Chakma tribe for the treatment of skin allergies. Despite its traditional use, there

has been no prior evaluation of its bioactivities. Therefore, this study aims to elucidate the antioxidant, cytotoxic, and neuropharmacological potential of *L. incurva*. Our findings reveal significant levels of phenolic, flavonoid, and tannin constituents within the plant. Notably, the methanolic extract exhibits promising antioxidant activity as demonstrated by reducing power assays. However, no cytotoxic effects are observed in the brine shrimp lethality assay. Furthermore, dose-dependent and substantial anxiolytic and antidepressant effects are detected ($p<0.0001$). In conclusion, the methanolic extract of *L. incurva* demonstrates noteworthy antioxidant, anxiolytic, and antidepressant properties.

Paper ID: 469

In-vivo Neuropharmacological Studies on Methanol Extract of *Bruguira Sexangula* Leaves

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Abstract: This study was designed to assess the CNS depressant, anxiolytic, and analgesic effects of methanol extract of *Bruguira sexangula* leaves. The CNS depressant effects were assessed using the forced swim test and the tail suspension method. In contrast, the anxiolytic effects were assessed using the elevated plus-maze test, light and dark test and hole board method. To evaluate the analgesic potential, the acetic acid-induced writhing test, formalin induced licking test were employed. At doses of 200 and 400 mg/kg, MEBSL exhibited a notable CNS depressant effect ($p < 0.01$ to 0.001) in both tests measuring CNS depressant activity. Both doses of MEBSL demonstrated significant anxiolytic activity ($p < 0.01$ to 0.001) in both the elevated plus-maze (EPM) and hole board tests. Both doses of MEBSL demonstrated significant analgesic effects ($p < 0.01$ to 0.001) in two tests assessing analgesic properties. In conclusion, *B. sexangula* shows promising bioactivity based on our in vivo analysis. Our findings support the traditional use of this plant, highlighting its potential as a source for developing new drug candidates.

Paper ID: 483

Bioactivity Studies on N-Hexane and Aqueous Fractions of *Merremia Vitifolia* Stem by In Vitro Approach



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Abstract: The goal of research was to determine the in vitro antioxidant, anti-inflammatory, and anti-microbial activity of aqueous and n-hexane fractions (AFMV, NFMV) of Merremia Vitifolia stems. The plant extracts are valued for its ethnomedicinal and traditional benefits. The Kupchan scheme is used to prepare fractional extracts of plants. The fractions (AFMV and NFMV) are strong antioxidants that can get rid of free radicals that attack DPPH. Their IC₅₀ values are 97.48 µg/ml and 106.39 µg/ml, respectively. The standard method for testing antioxidant activity showed that both fractions had high amounts of phenolic (1048 ± 2.886 , 1454.67 ± 6.667 GAE/g) and flavonoid (76.716 ± 3.674 , 87.66 ± 4.8 QE/g). The study looked at the anti-inflammatory activity in vitro using the protein denaturation method and found that it was very strong. The highest levels of protein denaturation inhibition by NFMV and AFMV were $56.90\% \pm 1.28\%$ and $57.95 \pm 1.33\%$ at 100 µg/ml, respectively. The disc diffusion method showed that both fractions had strong antimicrobial activity. NFMV showed the most resistance against Pseudomonas aeruginosa, with a zone of inhibition of 28 mm at 500 µg/disc. Moreover, the A FMV demonstrated a 24 mm zone of inhibition against both Bacillus tropicus and Pseudomonas aeruginos. The results imply that future drug development could utilize the plant.

Paper ID: 490

Exploring the Pharmacological and Therapeutic Horizons of Methanolic Merremia vitifolia (Burm.f) Hallier f. Leaf Extract: Bridging In Vitro and In Vivo Pharmacological Insights

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Abstract: Merremia vitifolia (Burm. f.) is an important ethnomedicinal species utilized by tribal populations for the management of various health issues, including headaches, fevers, eye irritations, arthritis, digestive problems, jaundice, and urinary tract infections. The aim of this research is to explore the

biological and therapeutic properties of the methanolic crude extract derived from the leaves of *M. vitifolia* (MEMVL). Using both in vitro and in vivo techniques, this study was done its cytotoxicity, anti-diabetic effects, anthelmintic qualities, and antidiarrheal activities.

The anti-diabetic properties were investigated using an α -glucosidase inhibition assay, and the cytotoxic effects were evaluated in vitro brine shrimp mortality bioassay. In addition, a model that measured parasite mortality and paralysis was used to assess the anthelmintic activity. For this evaluation, different concentrations of plant extract had to be applied to the parasites, and their motility and survival rates had to be monitored. The extract's demonstrated capacity to cause the parasites to become paralyzed and die indicates that it may have use as an anthelmintic agent. Additionally, a castor oil-induced diarrhea model in mice was used to investigate the in vivo antidiarrheal effects. This model involved giving castor oil to induce diarrhea and then treating the mice with the plant extract to assess its impact on the frequency and intensity of diarrheal episodes.

In vitro model demonstrated noteworthy paralysis and mortality of parasites and concentration-dependent α -amylase inhibition ($77.72 \pm 1.48\%$ at 1000 $\mu\text{g}/\text{ml}$) and significant cytotoxic potential ($\text{IC}_{50} = 276.89 \mu\text{g}/\text{mL}$). In vivo, MEMVL treatment significantly reduced bowel movement frequency and defecation in a dosage-dependent manner. Loperamide, the standard drug, inhibited feces, and diarrhea by 80% ($****P < 0.001$). However, a tested dosage of 200 mg/kg MEMVL showed the highest defecation reduction at 77.39% ($****P < 0.001$), with higher doses exhibiting a slightly lower inhibition rate (71.30%, $****P < 0.001$). The results indicate that MEMVL possesses significant anti-diabetic, anthelmintic, cytotoxic, and antidiarrheal effects, highlighting its potential as a versatile therapeutic agent. Additional studies are necessary to comprehensively explore and harness its medicinal advantages.

Paper ID: 494

Investigation of in vitro Anthelmintic, Cytotoxic, and in vivo Anti-Diarrheal, Analgesic Activity of Ethanol Extract of *Mussaenda glabra* Leaves

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Abstract: Despite being an ethnomedicinal plant, *Mussaenda glabra* has not received sufficient scientific attention regarding its pharmacological properties. Thus, this research aims to investigate its therapeutic benefits comprehensively. Qualitative Phytochemical Screening was conducted, followed by assessments of anti-anthelmintic, cytotoxic, antidiarrheal and analgesic properties of the ethanol extract of *Mussaenda glabra* leaves (EEMGL). In vitro tests included tapeworm and brine shrimp lethality assays, while in vivo evaluation involved formalin-induced analgesic tests and castor oil-induced antidiarrheal efficacy. The ethanol extract exhibited an LC₅₀ value of 507.23 $\mu\text{g}/\text{ml}$. Notably, EEMGL

demonstrated dose-dependent anthelmintic activity at concentrations of 5, 8, and 10 mg/ml, alongside significant antidiarrheal efficacy in a dose-dependent manner. In formalin-induced analgesic tests, doses of 200 mg/kg and 400 mg/kg inhibited licking time by varying percentages in both early and late phases. The study underscores the remarkable therapeutic potential of *Mussaenda glabra*, supported by its rich bioactive compounds and diverse pharmacological benefits. The ethanol-based extract, EEMGL, stands out for its robust antidiarrheal and analgesic properties, accentuated at higher doses, alongside noteworthy anthelmintic and cytotoxic activities, aligning with traditional uses.

Paper ID: 497

Biological Efficacy of Thymoquinone (TQ) in Alzheimer's Disease: Focus on the TQ-mediated Amelioration of Disease Pathology

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Abstract: Thymoquinone (2-methyl-5-isopropyl-1,4-benzoquinone; logP = 2.54) is the major bioactive compound found in black seed oil (*Nigella sativa* L.), which can penetrate the blood-brain barrier due to its simple structure and lipophilicity. TQ demonstrated potent antioxidant, anti-inflammatory, and anticancer activities in several pre-clinical studies. It is also a promising compound for treating neurodegenerative diseases such as Alzheimer's disease (AD) and Parkinson's disease (PD). This review explores the mechanistic role of neuroprotective action of TQ that is potential in the therapy for AD. TQ ameliorated toxin-induced changes in amyloid-beta, tau, and apolipoprotein expressions. It also protected toxin-induced neurotoxicity by reducing the neuroinflammation, oxidative stress and apoptosis that cause neuronal cell death. However, the molecular mechanism that involved in neuroprotective action of TQ is not fully understood. TQ needs to be investigated in familial AD and sporadic AD models, and characterization of the mechanism of TQ is necessary before conducting a clinical trial in AD patients.



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International Islamic University Chittagong

IEEE IIUC Student Branch



About IEEE IIUC Student Branch

The IEEE Student Branch (SB) at International Islamic University Chittagong (IIUC), established in 2016, continues to excel in promoting technological innovation and leadership. With a dynamic community of 182 active members in 2023 session, the branch successfully organized 30 diverse programs through its six organizing units, which includes the IEEE IIUC Student Branch, four technical societies, and the Women in Engineering (WIE) Affinity Group. IEEE IIUC SB has been awarded Best Promising Student Branch in Bangladesh by IEEE in 2017. Moreover, the IEEE Power and Energy Society (PES) IIUC SB Chapter of IEEE IIUC SB has received the High Performing Student Branch Chapter Award in 2024 for its outstanding contributions during the 2023 session. The chapter has achieved this prestigious recognition for the third consecutive time, showcasing consistent excellence and dedication.

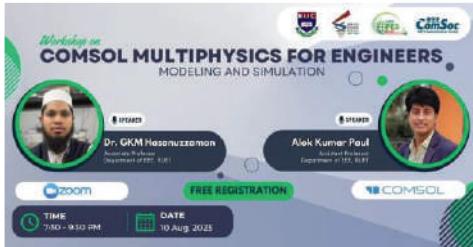
Leadership Structure

The branch operates under the guidance of a dedicated teaching committee, which includes:

- Dr. Yasir Arafat (Counselor, IEEE IIUC SB)
- Engr. Mohammed Abdul Kader (Mentor, IEEE IIUC SB)
- Farzana Tasnim (Advisor, IEEE WIE Affinity Group)
- Dr. Md. Aasim Ullah (Advisor, IEEE Power & Energy Society IIUC SB Chapter)
- Dr. Sikder Sunbeam Islam (Advisor, IEEE Robotics & Automation Society IIUC SB Chapter)
- Prof. Mohammed Shamsul Alam (Advisor, IEEE Computer Society IIUC SB Chapter)
- Md. Mostafa Amir Faisal (Advisor, IEEE Communication Society IIUC SB Chapter)

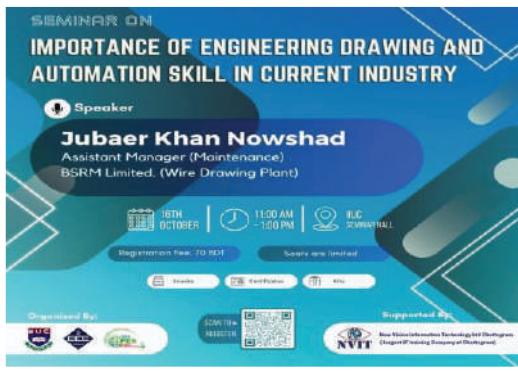
The student -led executive committee, which includes chairpersons, vice - chairpersons, secretaries, and other key positions, ensures the efficient execution of activities and the overall growth of the branch.

Activity Summary of IEEE IIUC SB 2023 Session

Sl. No.	Event Name	Event Date	Event Poster
01.	Webinar on Liquid Crystal Phased Array Antenna	07.07.2023	
02.	Webinar on Intelligent Power Systems and Machine Learning	06.08.2023	
03.	Workshop on Comsol Multiphysics Modeling	10.08.2023	
04.	Webinar on Paper Publication Challenges	10.08.2023	
05.	Workshop on Enchanting Skies: Drone Crafting	11.08.2023	

06.	Seminar on Sales and Marketing for Engineers	12.08.2023	
07.	Seminar on Data Science and Machine Learning Research	12.08.2023	
08.	Workshop on AVIAN ACES: Drone Technology	05.09.2023	
09.	Webinar on Roadmap to Google	08.09.2023	
10	Closing Ceremony of Data Science Bootcamp	15.09.2023	

11.	Webinar on Engineering Excellence	22.09.2023	<p>Webinar Engineering Excellence Unveiled: Journeys, Accomplishments, Challenges, Leadership, Opportunities, and the Future of Technology</p> <p>Speaker's Profile</p> <p>Professor Rushali Thakkar is Vice Chair of IEEE WIE, Bombay Section, Research Scholar IIT&I Innovation Mission IIT Bombay. Professionally she is an Assistant Professor at the Department of Electrical Engineering, India. Her International Journal "Electric Power Generation using Piezoelectric Device", Volume 1 Issue 1, DOI: 10.4236/ojs.v1n1001, was published in 2020 procured from Mumbai University for research project on Design and development of Power Electronic converter for Active Filtering of Power Quality. For duration of 1 year in the academic year 2020-2021.</p> <p>Registration Details</p> <p>OPEN FOR ALL AWARD CERTIFICATE RASHI 1880 1829 597206 FOR ANY QUERIES 1880 181 589480</p> <p>Prof. Rushali Thakkar Vice Chair, IEEE WIE, Bombay Section, Research Scholar Senior Patel Institute of Technology, Branch Counselor</p>
12.	Webinar on Career Path	04.10.2023	<p>Webinar on Career Path Expert Insights and Guidance</p> <p>Platform: Zoom Free Registration</p> <p>DATE 04 October Wednesday, 2023 TIME 8:00 PM</p> <p>Afsana aziz Software Engineer Vivasoft Limited CSE'44JIUC</p> <p>SPEAKER</p>
13.	Info Session on IEEE Membership and IEEEExtreme	05.10.2023	<p>INFO SESSION ON IEEE Membership & IEEEExtreme</p> <p>SPEAKER NURE ALAM SAKIB Chairperson, IEEE IUGC DB Country Lead, IEEE Power & Energy Society (PES) 2023 Former President, IEEE Bangladesh Chapter, Hub Power Foundation Former Facilitator, Bangladesh Youth Leadership Center</p> <p>DATE 5 October 2023 TIME 8:30 PM Google Meet FREE REGISTRATION</p>
14.	IEEE Offline Membership Drive	07.10.2023 to 11.10.2023	<p>IEEE MEMBERSHIP DRIVE 2023 JOIN THE WORLD'S LARGEST TECHNICAL PROFESSIONAL ORGANIZATION</p> <p>OPEN FOR CSE EEE ETE COE CIVIL MEMBERSHIP DETAILS</p> <ul style="list-style-type: none"> IEEE STUDENT MEMBERSHIP: 150/- INR IEEE WIE MEMBERSHIP: FREE IEEE PES MEMBERSHIP: 150/- INR IEEE MTT-S MEMBERSHIP: 300/- INR IEEE CS MEMBERSHIP: 950/- INR IEEE COMSOC MEMBERSHIP: 150/- INR
15.	Celebration of IEEE Day 2023	11.10.2023	<p>Celebration of IEEE Day 2023 Leveraging technology for a better future</p>

16.	Webinar on Edge Computing in IoT	15.10.2023	 <p>WEBINAR ON From Cloud to Edge : Insights and Strategies for Edge Computing in IoT</p> <p>Program Outline:</p> <ul style="list-style-type: none"> - IoT and Edge Computing Overview - Importance of Edge Computing in IoT - Advantages of Edge Computing Technologies - IoT and Edge Computing Architecture - Safety and Security Considerations - Balancing Advantages and Drawbacks - Risk Mitigation Strategies <p>REGISTRATION FEE</p> <table border="1"> <tr> <td>IEEE MEMBERS - 40 BDT</td><td>NON IEEE-MEMBERS - 60 BDT</td></tr> <tr> <td>01628446291</td><td>01743824107</td></tr> </table> <p>CERTIFICATE (HARD COPY)</p> <p>ZUBAYER AL BILLAL KHAN CHIEF INNOVATION OFFICER, INDUSTRY 4.0 GROUP DIRECTOR, INSTITUTE OF RESEARCHES TECHNOLOGICAL INSTITUTE</p> <p>OPEN FOR ALL (MALE/FEMALE) ZOOM WEBINAR IS</p> <p>EVENT DATE: 15 October, 2023 Sunday, 7:30 PM</p> <p>REGISTER NOW</p>	IEEE MEMBERS - 40 BDT	NON IEEE-MEMBERS - 60 BDT	01628446291	01743824107
IEEE MEMBERS - 40 BDT	NON IEEE-MEMBERS - 60 BDT						
01628446291	01743824107						
17.	Seminar on Engineering Drawing and Automation Skills	16.10.2023	 <p>SEMINAR ON IMPORTANCE OF ENGINEERING DRAWING AND AUTOMATION SKILL IN CURRENT INDUSTRY</p> <p>Speaker Jubaer Khan Nowshad Assistant Manager (Maintenance) BSRM Limited, (Wire Drawing Plant)</p> <p>16TH OCTOBER 11:00 AM - 1:00 PM ITC SEMINAR HALL</p> <p>Registration fee: 70 BDT Seats are limited</p> <p>Organized By IITC CEC ComSoc IUC</p> <p>Supported By Babu Vidyasagar Technological Institute (Engineering Training & Development)</p>				
18.	Workshop on Python API Development	11.11.2023 To 13.11.2023	 <p>3 DAYS LONG WORKSHOP ON How to Build Robust Python APIs: A Hands-On Workshop</p> <p>SPEAKER Shaon Indrajit Barua Alex Software Engineer, Capgemini Ltd. Python System Instructor, Programming Head</p> <p>Event Details: Date: 11-13 November 2023 Time: 10:00 AM - 05:00 PM Place: ITC Seminar Hall Duration: 3 Days</p> <p>REGISTRATION PER INDIVIDUAL MEMBER BDT 1500/- INSTITUTION BDT 10000/- REGISTRATION DEADLINE 09 October 2023</p>				
19.	MetaCom Quiz Challenge on IEEE Communication Magazine	01.12.2023	 <p>MetaCom Quiz Challenge "Decode the IEEE Communications Magazine"</p> <p>Registration deadline - 25 October 2023</p> <p>COMMUNICATIONS MAGAZINE</p> <p>DON'T FORGET TO DOWNLOAD LINK IS IN THE DESCRIPTION</p>				
20.	Workshop on Public Speaking and Art of Storytelling	17.01.2024	 <p>ART OF STORYTELLING</p> <p>January 17, 2024 8:30 - 10:30 PM (Malaysia) 0:30 - 6:30 PM (Bangladesh)</p> <p>Keynote Speaker Youssif Efti Sales Leadership Trainer CEO, Future Icon Professor, Future Business School (PBS)</p> <p>REGISTER NOW http://tinyurl.com/Ageard84</p> <p>REGISTRATION VIA WEBSITE WORLD CLASS TRAINING FACILITY (CLINT) +880788066666</p> <p>For any Enquiry Email: info@worldclasstraining.com WhatsApp: +8807880666666</p> <p>FREE CERTIFICATE</p>				

21.	Seminar on IT Industry Opportunities	03.02.2024	
22.	Workshop and Competition on UI/UX Design	09.02.2024 To 11.02.2024	
23.	Seminar on Machine Learning and Networking	11.02.2024	
24.	Workshop on Cybersecurity Masterclass	09.03.2024 And 10.03.2024	
25.	Quiz Competition in celebration of IEEE PES Day 2024	22.04.2024	
26.	Webinar on Electric Vehicle Research Opportunities	22.04.2024	

27.	Webinar on Solar Energy: Exploring Pathways to Greener	23.04.2024	
28.	Competition on Poster-Making in celebration of PES Day 2024	23.04.2024	
29.	Seminar on Dev and DevOps	04.05.2024	
30.	Workshop on Professional Industrial Automation	06.05.2024	

Glimpse of IEEE IIUC SB, Its Societies and Affinity Group Activities in 2023 Session



Seminar on Sales & Marketing for Engineers



Enchanting Skies: "A Workshop on Crafting Drones- 2023"



Seminar on Engineering Drawing and Automation Skill



Seminar on Machine Learning and Networking



Next Big Opportunity in IT Industry



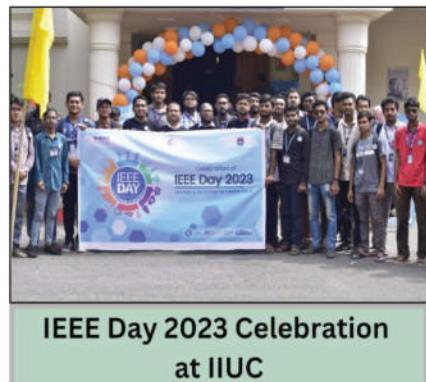
IEEE PES Day 2024 Inter University Quiz Competition



IEEE Membership Drive 2023 at IIUC



Avian Aces: Navigating the Skies with Style



IEEE Day 2023 Celebration at IIUC



ICISET 2016 - 2024: AT A GLANCE

By

Prof. Dr. Md. Delawer Hossain

Professor of EEE and Chair, ICISET Organizing Committee
International Islamic University Chittagong (IIUC)

i. Introduction

- ii.
- iii. In the name of Allah, The Most Beneficent, The Most Merciful.
- iv. Since 2016, the International Conference on Innovations in Science, Engineering, and Technology (ICISET) has been a multidisciplinary international conference organized by the Faculty of Science and Engineering (FSE) in association with the Center for Research and Publication (CRP) of International Islamic University Chittagong (IIUC).
- v.
- vi. The term 'innovation' is of significant importance to engineers and scientists working in educational institutions, industries, and engineering or application-oriented jobs. In a university environment, it is of utmost importance that researchers and students remain engaged in innovative activities and thoughts.
- vii.
- viii. The main thrust of ICISET is interdisciplinary research, which is based on a conceptual model that combines theoretical frameworks from various disciplines, uses study designs and methodologies that are not limited to any one field, and requires the perspectives and skills of the involved disciplines throughout multiple phases of the research process. The ICISET conference is that ideal place to learn about new tools being used in the field by engineers, academics, scientists, and students involved in similar streams of research.
- ix.
- x. The idea of organizing ICISET originated in 2016 under the Technical Co-Sponsorship of the IEEE Bangladesh Chapter. ICISET has been organized regularly (biannually) since the immensely successful inaugural events of ICISET-2016, ICISET-2018, and ICISET-2022. In 2020, ICISET could not be held due to the outbreak of the COVID-19 pandemic. The ICISET-2024 conference will take place on October 26-27, 2024, and will be conducted as an in-person meeting. Details are available on the conference website: <https://iciset.iiuc.ac.bd/iciset2024>.
- xi.
- xii. **Technical Co-Sponsor and publication of papers:** The IEEE Bangladesh Section is the Technical Co-sponsor for all ICISET conferences at IIUC. Having ICISET co-sponsored by IEEE has been immensely beneficial for both the conference and IIUC. Here are some glimpses of the benefits we have gained due to IEEE co-sponsorship.
- xiii.
- xiv. Papers presented at ICISET will be published in an online proceeding by IEEE and made available in the IEEE Xplore digital library. Copyrights for all articles published in IEEE Xplore are retained by IEEE. IEEE Xplore is a scholarly research database that indexes, abstracts, and provides full-text access to articles and papers on computer science, electrical engineering, and electronics.
- xv. Articles published in IEEE Xplore will be indexed by EI Compendex, which is maintained by Elsevier.
- xvi. ICISET conferences have been publicized on the IEEE website.
https://conferences.ieee.org/conferences_events/conferences/conferencedetails/
- xvii. The Call for Papers (CFP) for ICISET 2016, 2018, 2022, and 2024 was publicized by the IEEE Bangladesh Section on their Facebook page.

- xviii. A large number of people were attracted to and interested in participating in ICISET conferences by submitting papers due to IEEE co-sponsorship.
- xix. ICISET conferences provide the opportunity to build a professional network through publication in reputed indexed journals and to develop relationships with academic elites in one's field.
- xx. Authors of non-IEEE tracks have the option to publish their manuscripts or extended versions in the following indexed journals.
 Journal of Advanced Biotechnology and Experimental Therapeutics [SCOPUS indexed, for Pharmacy and Biological Science Track]
 Planning Malaysia Journal (PMJ) [SCOPUS indexed, for Environmental Science & Engineering Track]
 Authors of selected tracks have the option to publish their manuscripts or extended versions in the IIUC Journal of Science and Engineering.

The objectives of the ICISET conference are to share knowledge among all participants, including those with extensive experience and expertise in Computer Science, Electrical Engineering, Electronics and Communication Engineering, Civil Engineering, and Pharmacy. The conferences aim to discuss practical challenges and the solutions adopted. Thus, the ICISET conference provides a forum to exchange experiences, promote new trends in the fields of Science and Engineering, and foster young researchers in Information Technology and Communication Engineering, contributing to the ICT revolution and the achievement of a digital and developed Bangladesh.

The vision of ICISET is to become a platform for collaboration between researchers from home and abroad, where practitioners from the industry engage with researchers from academia to generate innovative solutions to contemporary challenges.

The Technical Program Committee oversees the submission and review of papers for the ICISET conferences. The

Table-1: Names of the Chair and Co-Chair of the Technical Program Committee, ICISET

Sl No	Names of the Chair and Co - Chair of ICISET Technical Program Committee	ICISET			
		2016	2018	2022	2024
1	Dr. M. Kaykobad, Prof. of CSE, BUET and BRAC University since 2022	Chair	Chair	Chair	Chair
2	Dr. Md. Shahadat Hossain, Prof. of CSE, CU	Co-Chair	x	x	x
3	Dr. M A Matin Bhuiyan, Prof. EEE, CUET	Co -Chair	Co -Chair	Co -Chair	Chair
4	Dr. Saiful Islam, Prof. of Pharmacy, DU	Co -Chair	x	x	x
5	Dr. M. Abdur Rashid, Prof of Pharmaceutical Chemistry, DU.	x	Co -Chair	Co -Chair	Chair
6	Dr. Md. Moshiul Hoque, Prof. of CSE. CUET	x	Co -Chair	Co -Chair	Chair
7	Dr. Md. Atiqur Rahman Ahad. Prof. EEE, DU	x	Co -Chair	x	x
8	Dr. Md. Saidur Rahman, Prof. of CSE, BUET	x	x	Co -Chair	Chair
9.	Dr. Md. Azad Hossain, Prof. of ETE, CUET	x	x	x	Chair

Reviewers and Review Process:

The ICISET organizing committee makes every effort to ensure the success of each ICISET conference by producing tangible outcomes. All ICISET conferences are managed through a comprehensive online process for abstract submission, paper submission, reviewer reports, and notification of acceptance. All accepted papers are submitted for inclusion in **IEEE Xplore**, subject to meeting IEEE Xplore's scope and quality requirements. Authors of selected tracks (Non-IEEE Tracks) will have the option to publish their manuscripts or extended versions in the IIUC Journal of Science and Engineering.

Each article undergoes a **rigorous review process** involving at least three reviewers who are **experts in the field and hold a Ph.D.**, conducted by the Technical Program Committee consisting of renowned professors. Due diligence is applied to **avoid any conflict of interest in the review process, which is mostly handled automatically by the submission system**. We express our gratitude to the reviewers from various countries who evaluated these articles and provided their valuable judgments despite their busy schedules. The number of reviews and reviewers involved in the ICISET conferences is shown in Table 2.

Table-2:

Reviewers and Reviews	ICISET 2024	ICISET 2022	ICISET 2018	ICISET 2016
Number of Reviews	~1200	1159	863	533
Number of Reviewers	260	217	147	112

Normally, less than 30% of the received papers are finally accepted for presentation. The ICISET conference has adopted tracks of scientific research. Submission and acceptance of papers (track-wise) for the ICISET conference are shown in Table 3.

Table 3: Information on Tracks and Track Chairs, Number of Papers Submitted and Accepted in the ICISET Conferences

ICISET 2016 (Face to Face)				
Track No	Title of Track	Name of the Track Chair	Number of Papers	
			Submitted	Accepted
Track-1	Power Systems and Renewable Energy	Dr. Nur Mohammad, CUET	48	9
Track-2	Motor Drives and Control Systems	Dr. Rezaul Azim, CU	16	5
Track-3	Circuit, Device and System	Dr. Mohibul Hoque, SEU	45	11
Track-4	Communication Engineering and Computer Networks	Dr. M. Sanaullah Chowdhury, CU	34	9
Track-5	Signal, Image and Multimedia Processing	Dr. Rashed Mustafa, CU	42	10
Track-6	Algorithms & Artificial Intelligence	Dr. Jahirul Islam, SUST	24	7
Track-7	Software Engineering & Data Science	Dr. Md. Samsul Arefin, CUET	34	9
Track-8	Pharmacy and Biological Science	Dr. Abdur Rashid, DU	30	14
Total (ICSET2016)			273	74

Percentage of acceptance = 27.16

ICISET 2018 (Face to Face)				
Track No	Title of Track	Name of the Track Chair	Number of Papers	
			Submitted	Accepted
Track-1	Power Systems, Renewable Energy & Green Technology	1.Dr. Abdul Matin Bhuiyan , CUET 2. Dr. R. Tanveer Hussain CUET 3. Dr. Md. Azad Hossain, CUET. 4. Dr. Nur Mohammad, CUET.	79	26

Track-2	Electronics and Materials Science	1.Dr. Mohibul Hoque SEU 2. Dr. Sirazul Islam , KUET	36	16
Track-3	Computing Architecture, Embedded Systems, VLSI and Control	1. Dr. Rezaul Azim, CU 2. Prof. Md. Rezaul Islam, RU	27	10
Track-4	Algorithms and Intelligent Computing	1. Dr. Jahirul Islam, SUST	40	10
Track-5	Software Engineering and Data Science	1. Dr. A.S.M. Latiful Hoque, BUET 2.Dr. Md. Samsul Arefin, CUET 3.Dr. Md. Moshiul Haque, CUET	70	20
Track-6	Computer Networks, Security and IoT	1.Dr. M.Sanaullah Chowdhury,CU 2.Dr. M.Rashid Khandkar, RU 3. Dr. Shamim Ahmed, RU	43	12
Track-7	Microwave, Satellite, Optical Communication	1.Dr. Md. Ahsanullah, CUET	20	9
Track-8	Mobile and Wireless Communication	1.Dr.Md. Emdadul Haque, RU,	15	5
Track-9	Pharmacy and Biological Science	1. Dr. Abdur Rashid, DU 2. Dr. Sohel Rana , JU	21	10
Total (ICISET 2018)			351	118
Percentage of acceptance= 33.6				

ICISET 2022 (Hybrid)

Track No	Title of Track	Name of the Track Chair	Submitted	Accepted
Track-1	Intelligent Computing, Signal and Multimedia Processing	Dr. Md. Jahirul Islam, SUST, Dr. Rashed Mustafa, CU	131	36
Track-2	Data Science and software Engineering	Dr. Md. Shamsul Arefin, CUET	125	21
Track-3	Power and Energy System	Dr. Md. R. Tanvir Hossain, CUET	54	20
Track-4	Electronics, VLSI, Embedded System and Material Science	Dr. Rezaul Azim, CU	59	25
Track-5	Communication and Computer Network	Dr. Md. Fokhrul Islam, IUT	71	15
Track-6	Pharmacy and Biological Science	Dr. M. Abdur Rashid, DU	21	10
Track-7	Civil and Environmental Engineering	Dr. Delwar Hossain, BUET	9	08

Total (ICISET 2022)	470	135
Percentage of acceptance= 28.7		
ICISET 2024 (Face to Face)		
Track-1	Power and Green Energy System	Dr. M. R. Tanvir Hossain, CUET
Track-2	Electronics, Materials Science, VLSI and Real Time Systems	Dr. Muhibul Haque Bhuyan, AIUB.
Track-3	Artificial Intelligence and Intelligent Computing	Dr. Rashed Mostafa.CU
Track-4	Data Science and Big Data Analytics	Dr. Mohammad Shamsul Arefin, CUET
Track-5	IOT and Signal Processing	Dr. Mohammad Osiur Rahman, CU
Track-6	Communication and Computer Networks	Dr. Md. Fokhrul Islam, IUT
Track-7	Civil and Environmental Engineering	Dr. Delwar Hossain, BUET
Track-8	Pharmacy and Biological Science	Dr. M. Abdur Rashid, DU
Total (ICISET 2024)		498
Percentage of acceptance =36		180

The ICISET organizing committee has sincerely tried to accommodate original and high-quality research work from various universities both domestically and internationally. The number of authors and universities, both foreign and local (public and private), is shown in Table 4.

Table 4: Summary of the sources of submitted papers in the ICISET conferences.

Sources of Submission	ICISET			
	2016	2018	2022	2024
Conference ID	40139	44941	54810	62123
Total Submission	273	351	470	498
Number of papers submitted from IIUC	134	127	130	138
Number of Universities / Institutions	63	80	122	92
Foreign Universities	20	23	40	30
Public Universities	18	19	25	25
Private Universities	25	38	15	37
Foreign Countries	14	16	21	16
Articles with all Foreign Authors	29	36	24	30
Articles with at least one foreign affiliation :			63	46

For ICISET conferences, we have had speakers and authors with domestic and international affiliations. The list of participating countries (speakers and authors) is shown in Table 5.

Table 5: List of participating countries (speakers and authors) in the ICISET conferences:

Conference Title	Name of the countries
ICISET 2016	Australia, Bangladesh, Canada, India, Malaysia, South Korea, Saudi Arabia and Thailand=10
ICISET 2018	Australia, Bangladesh, China, Egypt, Germany, India, Japan, KSA, Malaysia, Nepal, Norway, Pakistan, Somalia , Thailand, Turkey and USA=16
ICISET 2022	Australia, Bangladesh, China, Canada, Denmark, Egypt, France, Germany, India, Japan, KSA, Malaysia, New Zealand, Nepal, Norway, Qatar, South Korea, Sri Lanka, Switzerland, Turkey, Tunisia, UAE, UK, USA and Uzbekistan=26
ICISET 2024	Australia, Bangladesh, Canada, China, England, Ethiopia, Fiji, Holland. Hungary, Indonesia, India, Japan, KSA, Malaysia, Nepal, Nigeria, Norway, South Korea, Thailand and USA. = 20

We are grateful to the universities that IIUC has an MoU with for their support and participation in the ICISET 2016 to ICISET 2024 conferences. The names of these universities and their logos are provided in Table 6:

Table 6 :The Supporting Universities having MoU

Name of the University and Logo	ICISET 2016	ICISET 2018	ICISET 2022	ICISET 2024
Universiti Sains Islam Malaysia (USIM)				N/A
Universiti Malaysia Perlis (UniMAP)	N/A			
Universiti Teknologi MARA, Malaysia	N/A	N/A		
International Islamic University Malaysia	N/A	N/A	N/A	
Istanbul Sabahattin Zaim University, Turkey(IZU)	N/A	N/A		
Fatih Sultan Mehmet Vakif University, Turkey	N/A		N/A	N/A
Al-Madinah International University, Turkey	N/A		N/A	N/A

The ICISET organizing committees have made every effort to ensure productive ICISET conferences. These committees have managed all the ICISET conferences through a comprehensive online process for abstract submission, paper submission, reviewer reports, and notification of acceptance. We have successfully included keynote and invited speeches in a number of plenary and technical sessions, as shown in Table 7.

Table 7: Summary on number sessions and speakers' of ICIST conferences

Sessions	2016 (Face to Face)	2018 (Face to Face)	2022 (Online)	2024 (Face to Face)
Plenary Sessions	3	4	12	4
Keynote Speakers	6	10	14	15
Invited Speakers	4	11	9	12
Parallel Technical Sessions	14	24	25	26
Paper submitted	273	351	470	498
Papers accepted	74	118	135	176
Papers Registered	67	105	121	149
Papers Presented	61	104	121	-

For the ICISET conferences, the Organizing Committee is very pleased to provide the list of distinguished keynote speakers (Table 8), who have shared their expertise and forward-looking philosophies during the conferences. These keynote speakers are not only world leaders in their areas of expertise but also represent a wide range of topics relevant to ICT today. IIUC and the ICISET organizing committee are indeed very grateful to this distinguished panel of keynote speakers, who have enhanced the ICISET conferences with their expertise and vision for addressing current societal challenges brought about by the Fourth Industrial Revolution (4IR).

Table 8 : Information on Keynote Speakers of the ICISET Conferences

a. ICISET 2016 (Face to Face) Keynote Speakers		
SN	Names of Keynote speakers	Title of Keynote Speech
1	Prof. Dr. A.K.M. Azharul Islam, FInstP, CPhys, FBAS, IIUC, Bangladesh	Exciting 3D MAX phases and the derived 2D new wonder materials.
2	Dr. Anis Haque, PEng Calgary University, Canada	Health and Safety Education in Science and Engineering
3	Prof. Dr. Chowdhury Mahmud Hasan, Manarat International University, BD.	Future Prospects of Pharmacists in Bangladesh.
4	Prof. Dr. Kamaruzzaman Seman, USIM, Malaysia .	Internet of Things: Technology and Standardization.
5	Prof. Dr. Mohammad Tariqul Islam Universiti Kebangsaan, Malaysia ,	Title: UHF/VHF planar antennas for small satellite application.
6	Prof. Dr. Nowshad Amin Universiti Kebangsaan, Malaysia ,	Solar Photovoltaic Energy for a RE-enriched, Sustainable World with Versatility in Applications
b. ICISET 2018 (Face to Face) Keynote Speakers		
1	Prof. Dr Abu Bakar bin Abdul Majed, Universiti Teknologi MARA, Malaysia .	Early Detection of Brain Diseases Through Blood Testing
2	Prof. Dr. A.K.M. Azharul Islam, FInstP, CPhys, FBAS, IIUC, Bangladesh .	New Nanomaterial MXenes: Opening Exciting Technological Horizon.
3	Prof. Dr. Atsushi Inoue Eastern Washington University, USA	Blockchain and Artificial Intelligence ~Information Management Platform for the Next Generation.
4	Prof. Dr. Debatosh Guha, FIEEE, University of Calcutta, India	Scientific Innovations for the Antennas, by the Antennas.
5	Prof. Dr. Md. Atiqur Rahman Ahad, SMIEEE, Osaka University, Japan	Human Activity Recognition & Future Challenges

6	Prof. Dr. Nowshad Amin Universiti Tenaga Nasional, Malaysia	Large Scale Solar Farms in Energy Sufficiency Roadmap
7	Prof. Dr. Phalguni Gupta, IIT Kanpur, India.	Challenges in Fingerprint based Biometric System
8	Prof. Dr. Shoji Kobashi SMIEEE University of Hyogo, Japan	Radiomics for Neonatal Cerebral Diseases with MR Images.
9	Prof. Dr. V. R. Singh, FIEEE National Physical Laboratory, India	Innovations in Sensors Technology for better Health Care .
10	Prof. Dr Weerakorn Ongsakul, CFA, Asian Institute of Technology, Thailand	Short-Term Solar Forecasting by Deep Long-Short Term Memory Recurrent Network Program Considering Time Sequence Data.
c. ICISET 2022 (Hybrid mode) Keynote Speakers		
1	Prof. Dr. A.B.A. Majed, Universiti Teknologi MARA, Malaysia.	Intra-Nasal Drug Delivery of a Centrally active Drug.
2	Prof. Dr. A.K.M. Azharul Islam, FInstP, CPhys, FBAS, IIUC, Bangladesh	MAX phases etched into 2D MXene nanomaterials: Exciting Technological Horizon
3	Prof. Dr Celia Shahnaz, SMIEEE, BUET, Bangladesh .	Machine and Deep Learning for Biomedical and Healthcare Applications.
4	Prof. Dr. Faisal Hossain, FAMS, University of Washington, USA	Producing More with Less using Sensing, Information Technology and Machine Learning.
5	Prof. Dr. Jianqing Wang, FIEEE, Nagoya Institute of Technology Japan.	Wide Band Human Body Communication Technology for Wearable Robot Control.
6	Prof. Dr Lina Bertling Tjernberg FIEEE, KTH Royal Institute of Technology, Sweden.	Power grid technologies for a sustainable society
7	Prof. Dr. Md Atiqur Rahman Ahad, SMIEEE, Osaka University, Japan	Skeleton and Sensor for Healthcare
8	Prof. Mohamed-Slim Alouini, FIEEE, King Abdullah University of Science and Technology, KSA	Towards Connecting the Remaining 3+ Billion
9	Prof. Dr. Nikhil R. Pal, FIEEE, Indian Statistical Institute, India.	Artificial Intelligence-Are we ready for “AI everywhere”?
10	Prof. Dr. Shaikh Anowarul Fattah, SMIEEE, BUET, Bangladesh.	Multi-perspective Deep Learning for Bio-signal Analysis.
11	Prof. Dr. Sisi Zlatanova, University of New South Wales, Australia.	Spatial Digital Twins for Sustainable Urban Modelling
12	Prof. Dr. Tek Jing LIE, FIEEE , Auckland University of Technology New Zealand.	Hierarchical Control Strategies for DC Microgrids Clusters: A Review.
13	Prof. Dr Ujjwal Maulik, FIEEE, Jadavpur University, India.	Data Science and Artificial Intelligence: Recent Issues and Challenges.
14	Prof. Dr. Xi-Zhao Wang, FIEEE, Shenzhen University, China,	Uncertainty Modeling in Supervised Learning
d. ICISET 2024(Face to Face) Keynote Speakers		
1	Professor Dr. A B M Shawkat Ali, SMIEEE The University of Fiji, Fiji	Securing Landownership Through Blockchain DApp for Fraud Prevention in Real Estate Transactions
2	Prof. Dr. A.K.M. Azharul Islam, FInstP, CPhys, FBAS, IIUC, Bangladesh	MXene based Nanotech Wonders: ‘Science Fiction’ or Emerging Reality

3	Prof. Dr. Abdullah Al-Mamun, C.Eng, P.Eng, FIEB, International Islamic University Malaysia, Malaysia	Sustainable Drainage and Stormwater Management for Bangladesh
4	Prof. Dr. Christophe Fumeaux, FIEEE, The University of Queensland, Australia	75 years of IEEE AP-S Research: Retrospective and Future Prospects for Antenna Technologies and Applications.
5	Prof. Dr. Debatosh Guha, FIEEE, FIEEE, University of Calcutta , India	Role of Antenna in Magical Transformation of Engineering in the light of 75th Anniversary of IEEE AP Society.
6	Prof. Dr. Mohd. Ashik Mosaddik, East West University , Bangladesh	Nanomedicine- is a revolution in the Pharmaceutical Sciences.
7	Prof. Dr. Mohammed Moshiul Hoque, SMIEEE, CUET, Bangladesh	Multimodal Aggressive Memes Classification in Low-resources Languages.
8	Prof. Dr. Mohamed-Slim Alouini , FIEEE, King Abdullah University of Science and Technology, KSA	Towards Connecting the Unconnected
9	Prof Ir Dr Nofri Yenita Binti Dahlan, Universiti Teknologi MARA, Malaysia	Empowering Research and Innovations: Revolutionizing Campus Sustainability through Smart Microgrids.
10	Prof. Dr. Pharkphoom Panichayupakaranant, Prince of Songkhla University, Thailand	Natural Product Innovation Based on the Bio-Circular-Green (BCG) Economy Model
11	Prof. Pranab Kumar Muhuri, SMIEEE South Asian University, India ,	Fuzzy Systems
12	Prof. Dr. Ryo Maezono, JAIST, Japan	Computational Materials Science in JAIST
13	Prof. Dr. Sanghamitra Bandyopadhyay, FIEEE, Indian Statistical Institute, India	Applications of Artificial Intelligence Methods in Life Sciences
14	Prof. Dr. Subarna Shakya, SMIEEE, Tribhuvan University, Nepal ,	Security Challenges in software as a service environment
15	Prof. Dr. Ujjwal Maulik, FIEEE, Jadavpur University, India	Machine Learning for Healthcare

The ICISSET Organizing Committee is very pleased to provide the names of invited speakers (Table 9), who have shared their expertise at ICISSET conferences. We thank all these distinguished speakers for taking the time and effort to contribute to the ICISSET conferences, benefiting society, and supporting the development of Bangladesh.

Table 9: Information on Invited Speakers in the ICISSET Conferences

a. ICISSET 2016 (Face to Face) Invited Speakers		
SN	Names of Invited speakers	Title of Invited Speech
1	Dr. Azni Haslizan Ab Halim Universiti Sains Islam Malaysia, Malaysia	Framework of Packet Sanitization for Information Hiding In TCP/IP
2	Dr. Janatul Islah Mohammad Universiti Sains Islam Malaysia, Malaysia	Revelation of acoustics knowledge based on the Holy Quran.
3	Dr. Nadia Mohd Effendy, Universiti Sains Islam Malaysia, Malaysia	Alternative Medicines on Osteoporosis
4	Dr. Md. Safiqul Islam. Noakhali Science and Technology University, Bangladesh	Association of Different Genetic Polymorphisms with the risk of Lung, Breast and Colorectal cancer in the Bangladeshi Population.

b. ICISET 2018 (Face to Face) Invited Speakers		
1	Dr. Ali Nizam , Fatih Sultan Mehmet Vakif University, Turkey.	The R&D Strategies for Developing Countries.
2	Dr. Hafiz Mahfooz Ul Haque, The University of Lahore, Pakistan.	Modelling and Reasoning Smart Spaces using Context-aware Systems.
3	Dr. M. Norazizi Sham Bin Mohd Sayuti, Universiti Sains Islam Malaysia,	Early Design Space Exploration of Networks-On-Chip (NoC).
4	Dr. Muzamir Isa, Universiti Malaysia Perlis (UniMAP), Malaysia .	Partial Discharge Detection & Location Techniques for Covered-Conductor Overhead or Underground Distribution Lines.
5	Prof. Dr. Subarna Shakya, SMIEEE Tribhuvan University, Nepal.	Cloud Computing: Security Issues and Challenges
6	Prof. Dr S. M. Abdur Rahman. Dean, Faculty of Pharmacy, DU, Bangladesh	Application of Organic Synthesis for Construction of complex bioactive compounds and biomolecules.
7	Dr. Uttam Budhathaki, Department of Pharmacy, Katmandu University , Nepal.	Production, optimization and purification of xylanase by <i>Brevibacillus borstelensis</i> – MTCC 9874 isolated from soil sample of eastern Nepal.
8	Dr.Wael Yafooz , Al-Madinah International University, Malaysia	Big Data Issues and Challenges
9	Dr. W. Z. Wan Ismail, Universiti Sains Islam Malaysia, Malaysia.	Random Laser: A new potential biosensor.
c. ICISET 2022 (Hybrid) Invited Speakers		
1	Dr. Gökhan Erdemir, Istanbul Sabahattin Zaim University, Turkey.	A review: Robotic applications for power line inspection.
2	Prof. Dr. Man Hee Rhee, Kyungpook National University, South Korea.	Korean Red Ginseng and its circulation activity
3	Dr. Masanari Umemura, Yokohama City University Graduate School of Medicine, Japan.	Innovative Technology of Synthesizing Commercially Available Drugs with Intrinsic Magnetic Property.
4	Dr. Md Arafatur Rahman, SMIEEE, School of Mathematics and Computer Science, UK.	Intelligent Networking Connecting towards Multi-Domains in Computer Science & Engineering
5	Prof. Dr Md Jamal Uddin, Ewha Woman's University, Republic of Korea.	CO releasing molecule-2 protects acute kidney injury through HO-1-mitochondrial fitness in mice.
6	Prof. Dr. Md Raisuddin Khan, SMIEE International Islamic University Malaysia, Malaysia.	Evolutionary Modular Robot for Versatile Manipulation
7	Dr. Md Zakirul Alam Bhuiyan, SMIEEE Fordham University, NY.USA.	Is Your Smartphone Smart Enough to Prevent You from Being Watching Through its Wi-Fi: An Up-and-Coming Security Concerns?
8	Dr. Muzamir Isa. Universiti Malaysia Perlis (UniMAP), Malaysia.	On-Site Partial Discharge Measurement and Characterization Using Rogowski Coil for Insulation Condition Monitoring in Medium Voltage Cable.
9	Prof. Dr. Subarna Shakya, SMIEEE Tribhuvan University, Nepal.	Security solutions in SAAS Environment

d. ICISET 2024 (Face to Face) Invited Speakers		
1	Dr. Agung Imaduddin , National Research &Innovation Agency (BRIN), Indonesia.	Electrical and Structural Properties of superconducting materials of Ba-Pb-Bi-O
2	Dr. Amadi Oko Amadi, Akanu Ibiam Federal Polytechnic, Unwana, Nigeria.	Computer as a technological backbone for an innovative learning environment in engineering.
3	Dr. A.R.M. Ruhul Amin, Associate Marshall University School of Pharmacy, Huntington, USA.	Developing Novel Therapies for Cancer Chemoprevention and Treatment.
4	Dr. Imtiaz Khalid Mohammad University of Cyberjaya, Malaysia.	Molecular Modelling Studies of Quinazoline and Pyrimidine Compounds as Potential Antibacterial Compounds.
5	Engr. Mir Jahangir Md. SALIM, Head of HSE & Technical IntegrityTotal Energies, Bangladesh.	Safety Engineering: At Workplaces or at Home
6	Dr. Md Zia Uddin, SMIEEE, Sustainable Communication Technologies Dept. SINTEF Digital, Oslo, Norway.	Enhancing Assisted Living with Privacy-Preserving and Trustworthy Machine Learning Applications
7	Prof. Dr. Muzamir Isa. Universiti Malaysia Perlis (UniMAP), Malaysia.	Partial Discharge Detection and Recognition using Multi cylindrical Slots Patch Antenna for Power Transformer.
8	Dr. Nahidul Hoque Samrat ,Bureau of Meteorology, Melbourne, Australia.	Observation Impact on Numerical Weather Prediction: Global and Regional Scale Perspectives.
9	Dr. Rauf ul Karim Khan Kyushu University, Japan.	Investigating the Impact of SiC Doping on P-type SnO Thin-Film Transistors: Insights from High Vacuum Annealing
10	Dr. Tomohiro ICHIBA Japan Advanced Institute of Science and Technology (JAIST), Japan.	Ab Initio Structural Search for High-pressured Solid Hydrogen over 0.5 TPa
11	Dr Yuslina Zakaria, Universiti Teknologi MARA (UiTM), Malaysia.	Harnessing AI for Transformative Healthcare: From Drug Procurement to Patent Care.
12	Prof. Dr. Zuraidah Mohd Sanusi, Universiti Teknologi MARA, Malaysia.	Research Leader Competency: Perspective of Human Resource.

Activity of the IEEE IIUC student branch:

The same year the first ICISET was held in 2016, the IEEE IIUC Student Branch also began its journey, along with its Women in Engineering Affinity Group. Since then, the IEEE IIUC Student Branch has been regularly participating in ICISET conferences. The year 2021 was particularly notable, with the formation of four new IEEE societies: the IEEE Power and Energy Society, IEEE Robotics & Automation Society, IEEE Computer Society, and IEEE Communication Society. The Student Branch, along with its chapters, has arranged many events since 2016. We wish and pray for a bright future for the Student Branch, its affinity group, and its chapters.

University-industry linkage is one of the most important agendas in higher education policy-making. At the ICISET conferences, the organizing committee regularly organizes a '**Workshop on University-Industry Collaboration**' to strengthen the bond between the two sectors for the betterment of society.

I would like to offer my sincere thanks to my colleagues in the Faculty of Science and Engineering, who have continuously supported me from the very beginning of ICISET 2016 to the end of ICISET 2024. It is undeniable that the ICISET conferences are the result of the sincere efforts and dedication of many. They include members of the organizing committee, sub-committees, the Technical Program Committee, track coordinators and chairs, teachers, volunteers, and students from FSE, ICT, TMD, and LMD. In addition, I am grateful to all IIUC officers and staff, members of print and electronic media, and all else who have contributed consistently to making the ICISET conferences successful. The ICISET organizing committee is also grateful to the IIUC authorities for providing financial and logistical support in all respects.

May Allah guide us all to the path of success.

Prof. Dr. Md. Delawer Hossain





Professor Dr. Jamilur Reza Chowdhury addressing the session as the Chief guest at Inaugural session, ICISET-2016



Professor Dr. Kamaruzzaman Seman, Dean, Faculty of Engineering and Built Environment, University Sains Malaysia is delivering his speech at Inaugural ceremony, ICISET-2016



Professor Dr. A.K.M. Azharul Islam, honorable Vice Chancellor, International Islamic University Chittagong, Bangladesh is speaking at Inaugural ceremony of ICISET-2016



Prof. Dr. Md. Delawar Hossain, Dept. of EEE, IIUC, honorable Pro-Vice-Chancellor (In-Charge), IIUC & Chair, Organizing Committee of ICISET-2016 is delivering his speech



Prof. Dr. Mohammad Kaykobad, Dept. of Computer Science & Engineering, Bangladesh University of Engineering & Technology(BUET) & Chair, Technical Program Committee of ICISET-2016 is speaking at Inaugural ceremony of ICISET-2016



Prof. Dr. Md. Monirul Islam, Dean, Faculty of Science & Engineering, IIUC is seen to deliver his speech at Inaugural ceremony of ICISET-2016



A partial view of Inaugural ceremony of ICISET-2016 during National Anthem



As the chief guest at the opening ceremony of ICISET-2016, Professor Dr. Jamilur Reza Chowdhury was honored with a crest



A Partial view of Honorable Chair and guests seated on stage at the inaugural function of ICISET-2016



A view of the participants in the auditorium at the inaugural function of ICISET-2016



Professor Dr. Saiful Islam, Vice Chancellor, BUET delivering his speech as the chief guest at the opening ceremony of ICISET 2018.



The closing session of ICISET-2018 was addressed as the Chief Guest by Prof. Dr. Abu Bakar bin Abdul Majeed Rector, University Technology MARA Selangor, Malaysia.



Prof. Dr. Md. Delawar Hussain, Dept. of EEE, IIUC, giving the award at ICISET 2018



Prof. Dr. Abu Bakar bin Abdul Majeed from Universiti Teknologi MARA, Malaysia, was honored with a crest in recognition of his outstanding contributions while serving as the Chief Guest at the closing ceremony of ICISET-2018.



Prof. Dr. S. M. Abdur Rahman, Dean of the Faculty of Pharmacy, University of Dhaka, Bangladesh, was honored with a Crest at ICISET 2018.



Prof. Dr. Saiful Islam, VC, BUET along with teachers and participants of ICISET 2018 are seen at IIUC premises.



View of guests on stage at the inaugural function of ICISET-2022 during the National Anthem



Prof. Md. Anwarul Azim Arif, Honorable Vice-Chancellor, International Islamic University Chittagong, Bangladesh speaking at the inaugural function of ICISET-2022



Prof. Dr. Md. Rafiqul Islam, VC, IUT delivering his valuable speech at ICISET 2022



Prof. Dr. Mohammad Kaykobad, Dept. of Computer Science & Engineering, Bangladesh University of Engineering & Technology(BUET) is speaking at Inauguration ceremony of ICISET-2022



Prof. Dr. Mohammad Masrurul Mowla, honorable Pro-Vice-Chancellor, IIUC is delivering his speech at Inauguration ceremony of ICISET-2022



Prof. Dr. Md. Shahadat Hossain, Faculty of Computer Science & Engineering at Chittagong University is delivering his speech Inauguration Ceremony of ICISET-2022



Prof. Dr. Md. Delwar Hossain, Dept. of EEE, IIUC, & Chair, ICISET is delivering his speech at Inauguration Ceremony of ICISET-2022



Prof. Dr. Mohammad Aktar Sayeed delivering his valuable speech in the opening ceremony of ICISET-2022



Mr. Tanveer Ahsan, Associate Professor, CSE & Member Secretary, organizing committee , ICISET -2016 is delivering his speech



Mrs. Shahnaj Parvin, Associate Professor, CSE is presenting the inaugural ceremony of ICISET -2016



A partial view of Guests and participants at inaugural ceremony of ICISET -2016



A partial view of Guests and participants at inaugural ceremony of ICISET -2016



A partial view of Guests and participants at inaugural ceremony of ICISET -2016



A partial view of Guests and participants at inaugural ceremony of ICISET -2016



A partial view of Guests and participants at inaugural ceremony of ICISET -2016



Technical session 1B conducted by Dr. Muhammad Quamruzzaman,
CUET in ICISET -2016



Technical session 1C conducted by Dr. Muhibul Haque Bhuyan,
SEU in ICISET -2016



Technical session 1D conducted by Dr. Saiful Islam, DU in
ICISET -2016



Technical session 2A conducted by Dr. Shorif Uddin, JU
in ICISET -2016



Technical session 2B conducted by Prof. Dr. Md. Saiful Islam,
IICT, BUET in ICISET -2016



Technical session 2C conducted by Dr. Mahmoud Abdul Matin Bhuiyan,
CUET in ICISET -2016



Technical session 3A conducted by Dr. M. Jahirul Islam, SUST
in ICISET -2016



Mr. Mohammad Shamsul Alam, Co-chair, organizing committee is giving crest
to Dr. Quazi Delowar Hossain, CUET. in ICISET -2016



Technical session 3C conducted by Dr. Quazi Delowar Hossain,
CUET in ICISET -2016



Technical session 3C conducted by Dr. Quazi Delowar Hossain,
CUET in ICISET -2016



Technical session 4A conducted by Dr. Md. Atiqur Rahman
Ahad, DU in ICISET -2016



Technical session 4C conducted by Dr. Md. Nurunnabi Mollah,
KUET in ICISET -2016



A partial view of a workshop for Industrial Collaboration with IIUC
in ICISET -2016



Students explaining and showcasing their Projects
during conference. in ICISET -2016



Students explaining and showcasing their Projects
during conference. in ICISET -2016



Students' poster presentation during conference
in ICISET -2016



Workshop on University-Industry Collaboration during
conference in ICISET -2016



Guests and audience at Workshop during ICISET -2016



View exchange with USIM delegates during ICISET -2016



Cultural Program of ICISET -2016



Participants collecting their Conference ID Card in ICISET -2016



Participants are drinking tea in ICISET -2016



News of the conference has been broadcasting in national electronic media (NTV) in ICISET -2016

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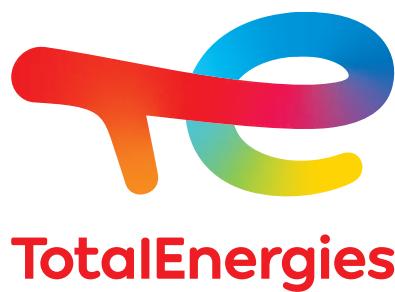
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- ১ কোটি মানুষের কর্মসংস্থান সৃষ্টি
- ৪৩ লক্ষাধিক সেলফিন গ্রাহক
- সর্বোচ্চ **কর প্রদানকারী** ব্যাংক

