



1ST INTERNATIONAL BIOMEDICAL & DIGITAL HEALTH CONFERENCE

22nd & 23rd November, 2022 at Karachi



Transforming Lives through Digital Health Intervention



The Institution of Engineers Pakistan
Karachi Centre

JOINTLY
ORGANIZED BY



NED University of Engineering
& Technology, Karachi

IN COLLABORATION WITH



Federation of Engineering Institutions
of Islamic Countries (FEIIC)



Federation of Engineering Institutions
of South & Central Asia (FEISCA)



Higher Education Commission
Pakistan



NED International Alumni Network
(NEDIAN) Association Pakistan



Sir Syed University of
Engineering & Technology, Karachi



Hamdard University
Karachi



Sindh University
Jamshoro



Ziauddin University
Karachi

SHU SALIM
HABIB
Salim Habib University
Karachi

A BRIEF ABOUT IEP



The Institution of Engineers Pakistan was founded with the blessing of the Father of the Nation, Quaid-e-Azam Muhammad Ali Jinnah, in 1948 with its Headquarter at Dhaka. In 1972 the Headquarter was shifted to Lahore. Presently IEP has 5 Capital & Provincial Local Centres at Islamabad, Karachi, Lahore, Peshawar & Quetta and 5 local centres at other major cities which includes Hyderabad, Sukkur, Multan, Faisalabad & Gujranwala. IEP also has 3 International Centres at Saudi Arabia, Bahrain & USA. Beside various Technical programs organized regularly, every year IEP Karachi Centre and NED University of Engineering & Technology, Karachi in collaboration with almost all PEC Accredited Engineering Institutions of Karachi & Balochistan organizes three International Conferences on Civil, Mechanical & Electrical Engineering. In these conferences International & Local researchers, academicians & distinguish Engineers from Industry actively participate and present their papers / research / achievements.

IEP IS AN ACTIVE MEMBER OF FOLLOWING INTERNATIONAL ORGANIZATIONS

1. World Federation of Engineering Organization (WFEO)
2. Federation of Engineering Institutions of Islamic Countries (FEIIC)
3. Federation of Engineering Institution of South & Central Asia (FEISCA)
4. The Asian Civil Engineering Coordinating Council (ACECC)
5. Common Wealth Engineers Council (CEC)
6. Collaboration Agreements with more than 40 National Engineering Bodies of various countries.

DO YOU KNOW WHY YOU SHOULD BECOME A MEMBER OF IEP?

Simply Because!

- ★ You will be exposed to International Experts, International Audience and International Organizations either ONLINE and /or through INPLACE Seminars/Lectures/Conferences
- ★ You will be able to attend; career counseling workshops, training on job seeking techniques, lectures and seminars on Entrepreneurship, skills and many more related topics.
- ★ You will enjoy online access to thousands of national and international engineering professionals, updates on job opportunities globally, information/Consultation regarding further study abroad
- ★ Discount on International Conferences, Congresses, Exhibitions and Workshop conducted regularly by IEP.
- ★ To fulfill the requirement of Pakistan Engineering Council (PEC) to become professional Engineers (PE), you will be able to attend CPD courses conducted by IEP.
- ★ Women Engineers can actively participate in the activities of IEP through IEP Women Engineers Forum (IEP-WEF)

SPECIAL GROOMING PROGRAMS AT IEP FOR YOUNG ENGINEERS

In order to groom the Young budding Engineers, IEP has launched following programs:

- ★ IEP Future Leaders Forum (IEP-FLF) for Young Engineers to show case their technical talents.
- ★ In order to encourage meritorious young engineering graduates to excel in their respective fields, Award of Gold Medal to First Position holders of all PEC Accredited Engineering Programs / Institutions of Karachi.
- ★ Seminar on Resume writing, cover letter and tips for preparation for job interview
- ★ Career counselling session by the academia and industry.
- ★ Job placement through IEP website where prospective Employee & Employer can find their match.
- ★ Various professional / certified training programs for Young Engineers in collaboration with internationally authorized training institutes which could be useful to develop their careers in their respective fields and to increase their employment opportunities.
- ★ Home Based Employment Initiatives for Women Engineers not actively involved in the profession.

IEP SPECIAL LIFE TIME MEMBERSHIP OFFER FOR ENGINEERS

IEP is now offering Life Time Membership to Engineers on payment of Rs.500/= only

THREE SIMPLE STEPS TO GET IEP MEMBERSHIP

1. Download the IEP membership form from IEP website www.iepkarachi.org.pk or collect the IEP membership form IEP Karachi Centre.
2. Fill the Form and submit the form with following documents:

- | | |
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| (i) Attested Photo Copy of Matric Certificate. | (v) Attested Copy of CNIC |
| (ii) Attested Photo Copy of Intermediate Certificate | (vi) Two Passport size photographs. |
| (iii) Attested Photo Copy of Degree Certificate, | (vii) Rs. 500/= by cash or pay order / cross cheque in favor of |
| (iv) Attested Photo Copy of Pakistan Engineering Council Certificate | The Institution of Engineers Pakistan, Karachi Centre |

3. Submit these documents to **The Institution of Engineers Pakistan, Karachi Centre**, 4th Floor, IEP Building, Opp: Hotel Regent Plaza, Shahr-e-Faisal, Karachi.

Tel: 32780233, 32781492, WhatsApp: 0311-2277721, E-mails: main@iepkarachi.org.pk, iepkc1948@gmail.com, Web: www.iepkarachi.org.pk

TO KNOW MORE ABOUT IEP, FEEL FREE TO CONTACT

Engr. Sohail Bashir, Chairman, IEP, Karachi Centre (E-mail: chairman@iepkarachi.org.pk) Engr. M. Farooq Arbi, Secretary, IEP Karachi Centre (E-mail: secretary@iepkarachi.org.pk)
Mr. Sikandar Mannan, Deputy Director, IEP Karachi Center (Cell # 0321-2723095) Mr. Sharif Khan, Assistant Director, IEP Karachi Center (Cell # 0312-2356316) Mr. Shaikh Saifuddin, Assistant Director, IEP Karachi Center (Cell # 0300-5784726)



MESSAGE

Murad Ali Shah

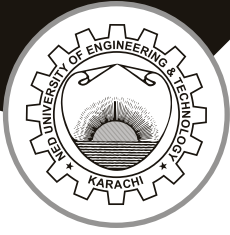
Chief Minister Sindh



“ It is a matter of great pride that the 1st International Biomedical & Digital Health Conference is being held at the NED University of Engineering & Technology in collaboration with the Institution of Engineers Pakistan, Karachi Centre. Engineers and professionals have a key role in the development of any country and platforms like this conference provide an excellent opportunity to keep themselves abreast of the latest advancements in their fields.

I am sure that this IBDC-2022 conference will provide a platform to the participants to benefit from the experiences of one another and to find solutions to our current problems. The knowledge transferred by this conference will be helpful for the participants, in increasing their professional abilities and find ways and means to tackle the national and international challenges.

I wish all those attending the conference a happy and comfortable stay of two days during the conference.



MESSAGE



Engr. Prof. Dr. Sarosh H. Lodi

Conference Patron in Chief

Vice Chancellor,

NED University of Engineering and Technology, Karachi

“ It is a moment of honor for NEDUET and the Institution of Engineers Pakistan to collaboratively initiate the first International Biomedical and Digital Health Conference 2022. The department of Biomedical engineering has envisioned the merit of progress by paving the way to highlight the current research and the future avenue of biomedical and digital health for being explored through the Conference.

It is the scope of engineering to inculcate the value of design and innovation as per modern engineering practices, where BME is the application of a cross-disciplinary field that integrates engineering knowledge and STEM with biomedical sciences and clinical practice.

The IBDC-2022 aims to address new developments in biomedical engineering and Digital health around the globe in collaboration with internationally renowned speakers from industry, academics, and research institutes. This endeavor will aid the young researchers to get engaged in these areas to contribute to their maximum capacity.

Finally, I congratulate all the members of the Organizing Committee whose untiring efforts have made it possible to organize the first IBDC-2022 and hope that all participants will be fully benefitted from this Conference to carry the legacy in the future.



MESSAGE



Engr Dr Javed Yunas Uppal

BSc Engg. Hons, PhD London, CEng, MICE, MASCE, FIE,
President Institution of Engineers Pakistan

“ I am very pleased to convey this message at the International Biomedical and Digital Health Conference 22-23 November 2022, organized by the Karachi Center, Institution of Engineers Pakistan, at Karachi, jointly with The NED University of Engineering & Technology, and NED International Alumni Network Association- Pakistan in collaboration with Federation of Engineering Institutions of Islamic Countries, Federation of Engineering Institutions of South and Central Asia, American Society of Heating Refrigerating and Air-Conditioning Engineers, Pakistan Chapter, Sir Syed University of Engineering Technology, Karachi Hamdard University, Karachi, Salim Habib University, Karachi and Ziauddin University, Karachi

I commend the organizers of the Conference to have chosen the subject of 'Biomedical and Digital Health' pointing towards the new avenues that are being opened up for the new emerging technologies of today; controls, robotics, automation, signaling, image and speech processing, IoT, ICT, big data, artificial intelligence, embedded systems, micro-electronics and nano-technology, and computer systems and networks. These technologies have enabled us to smash the distances, outreaching and bringing medical and health facilities to the remotest and forgotten populations.

Biomedical engineers combine medicine and engineering to help create products, including equipment and devices or computer systems and software, that are used daily by doctors and patients in the medical field. Biomedical engineers design computer software to run instruments, such as three-dimensional x-ray machines, and monitor drug therapies.

Digital health includes categories such as mobile health, health information technology, wearable devices, telehealth and telemedicine, and personalized medicine, electronic health records and electronic prescriptions.

Wearable devices like Fitbits or smart watches, for example, provide users with continual updates on their activity, such as their step count or heart rate. This technology provides users with important health information that has the potential to improve their individual health.

The engineers have to come forward and make maximum use of the opportunities for themselves as well ridding the society from the ill-health, poverty and deprivations. This is where the future of the engineering and technology lies in steering engineering developments towards welfare of people.

In Pakistan, we are severely lacking in use of digital platforms and electronic records to aid the process of healthcare delivery. There is a considerable lack in the understanding of how IT can revolutionize healthcare delivery. There is an urgent need for integrating the medical institutions with the engineering institutions to work together and bring digital health in making medical practice more effective, efficient and error proof; so that Pakistan can shake off the burden of a centuries old and obsolete system of healthcare delivery.

The international conference, such as this, helps to identify a roadmap vision for development of an integrated digital health system in Pakistan and the basic initiatives that must be taken at the grass roots level to expedite this process.



MESSAGE

Engr. Sohail Bashir, FIE, PE

Chairman

The Institution of Engineers Pakistan, Karachi Centre



“ The Institution of Engineers Pakistan (IEP) is playing a vital role in the development of Pakistan since its inception within the frame work of its aims & objectives which revolves around the promotion of technology, advancement of the engineering practice, application of principles of science in engineering and dissemination of technical knowledge. 1st International Biomedical Digital & Health Conference-2022 is being jointly hosted by the Institution of Engineers Pakistan-Karachi Centre and NED University of Engineering & Technology-Karachi with more zeal and enthusiasm. The theme of the conference is **“Transforming Lives through Digital Health Intervention”**. The conference shall dwell on the latest technological development in the field of Digital Health & Biomedical Engineering and allied disciplines which would not only broaden the vision of participants but shall led them to new frontiers in their existing knowledge and help them to develop way forward in this emerging technology.

The collaborative role of Higher Education Commission of Pakistan, Departments of Biomedical Engineering of NEDUET, Sir Syed University of Engineering & Technology-Karachi, Hamdard University-Karachi, Salim Habib University-Karachi, Ziauddin University-Karachi and Sindh University-Jamshoro, deserves special commendation for their active participation for the success of this conference.

On behalf of The Institution of Engineers Pakistan, Karachi Centre and the Organizing Committee of IBDC-2022, I would like to express my sincere appreciation for pro-active participation, both from academia and industry. Indeed, all the members of Advisory Board, Management Committee, and Technical Review Committee worked extremely hard to make this event a success. I have no doubt whatsoever that without their cooperation, support and active participatory role, this event would not have been possible for which I record my appreciation for all of them. Special thanks to the Conference Key Note Speakers of Inaugural session and Closing Session. Thanks to all invited speakers from industry, authors and HEC for strongly supporting the conference. My sincere gratitude are to Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice Chancellor, NEDUET & Patron in Chief IBDC-2022, Engr. Prof. Dr. Muhammad Tufail, Pro Vice-Chancellor, NEDUET & Patron IBDC-2022, Engr. Prof. Dr. Saad Ahmed Qazi, Dean Faculty of Electrical & Computer Engineering, NEDUET & Convener, IBDC-2022, Engr. Abdullah Butt, Digital Health Expert and Engr. Muhammad Farooq Arbi, Secretary, IEP Karachi for their guidance & help in organizing IBDC-2022.

I would like to take this opportunity to place on record my sincere appreciation for Engr. Dr. Eraj Humayun Mirza, Chairman Department of Biomedical Engineering, NEDUET & Co-Convener, IBDC-2022, Dr. Muhammad Abul Hasan, Conference Secretary, IBDC-2022, Engr. Dr. Syed Faraz Jawed, Programme Secretary, IBDC-2022, other faculty members, staff, student volunteers of Biomedical Engineering NEDUET for their hard work for IBDC-2022.

Finally, I would like to welcome each one of the participant and hope that they will find IBDC-2022 not only useful in enhancing their technical knowledge but also to be a forum to meet many highly respected professionals under one roof for effective interaction in future.



MESSAGE



Engr. Amir Zamirahmed Khan

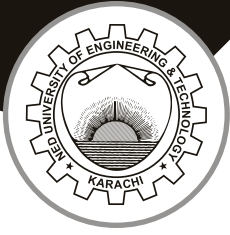
Secretary General

Institution of Engineers Pakistan

“ It is matter of great please pleasure that the Karachi Center, Institution of Engineers Pakistan, Karachi Centre, The NED University of Engineering & Technology, and NED International Alumni Network Association- Pakistan are holding the 1st International Biomedical and Digital Health Conference 22-23 November 2022, organized by in collaboration with Federation of Engineering Institutions of Islamic Countries, Federation of Engineering Institutions of South and Central Asia, Sindh Higher Education Commission, American Society of Heating Refrigerating and Air-Conditioning Engineers, Pakistan Chapter, Sir Syed University of Engineering Technology, Karachi Hamdard University, Karachi, Salim Habib University, Karachi ,Ziaudin University and Sindh University Jamshoro.

The Institution of Engineers Pakistan, Karachi Centre is working hard for disseminations of knowledge by holding National/International Engineering Conferences, Technical Seminars, Workshop and Lectures for the benefit of Engineering profession and development of the Country. I personally congratulate Chairman, Secretary, Organizer, and Members Organizing Committee , IEP Karachi Centre for organizing the Conference in the light of aims and objective of the Institution of engineers Pakistan.

I pray to Almighty Allah for the success of 7th International Biomedical Digital & Health Conference.



MESSAGE



Engr. Prof. Dr. Muhammad Tufail, FIE (Pak)

Conference Patron

Pro Vice-Chancellor

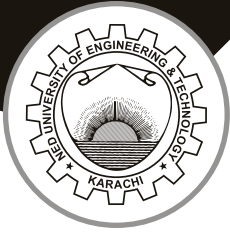
NED University of Engineering & Technology, Karachi

“ It is indeed a pleasure to see the efforts of the NED University of Engineering and Technology and Institution of Engineers Pakistan (IEP) to provide opportunities to researchers from all over the world to showcase their research work and skills in the field of Biomedical Engineering and Digital Health.

The two days conference, IBDC-2022 being the first of its kind, aims to facilitate researchers and biomedical engineers to pursue the advancements and trends in the field around the globe. This conference intends to host talks of internationally renowned speakers from industry, academics, and research institutes.

Apart from getting knowledge about new research, the participants will also interact with other participating institutions, which will establish collaboration between the institutions within the Country and abroad.

Wishing the prosperity of the event, I congratulate the Organizing Committee of the first IBDC-2022 for their commendable efforts in organizing this event and hope that it will continue as a legacy.



MESSAGE

Prof. Dr. Saad Ahmed Qazi

Conference Convener

Dean Faculty of Electrical and Computer

Engineering NED University of Engineering & Technology



“ The initiative to organize the first-ever International Biomedical and Digital Health Conference is a moment of pride for the faculty Of ECE and its department of Biomedical Engineering. The ambition has been made possible with the collaborative efforts of NEDUET and the Institution of Engineers Pakistan to provide the avenue to progress with the advancements and trends in biomedical engineering and medical sciences.

The two-day conference covers diverse potential thematic areas of biomedical engineering and digital health, including Artificial Intelligence, Machine Learning, E-Health, Neuroscience and Neuro-engineering, Big Data and varied regions. Along with the showcase of research and skills by the participants, sessions will be hosted by notable local and international speakers to share their expertise and raise awareness of modern-era biomedical and digital health solutions.

With such a notion in progress through the first IBDC-2022, I wish the initiative with prosperity and continuation of the endeavour as a legacy to come to fruition.



MESSAGE

Engr. M. Farooq Arbi

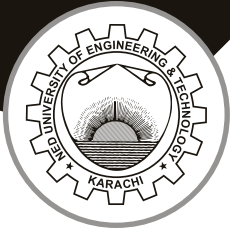
Secretary,
IEP, Karachi Centre



“ I am honored to warmly welcome all of you to the 1st International Biomedical Digital Health Conference-2022 being jointly organized by The Institution of Engineers Pakistan Karachi Centre, NED University of Engineering & Technology and NED International Alumni Network Association, Pakistan on 22nd & 23rd November, 2022. This time our collaborators include Federation of Engineering Institutions of Islamic Countries, Federation of Engineering Institutions of South & Central Asia, Higher Education Commission of Pakistan, The American Society of Heating Refrigerating and Air-Conditioning Engineers, Pakistan Chapter, Sir Syed University of Engineering Technology, Karachi Hamdard University, Karachi, Salim Habib University, Karachi, Ziauddin University, Karachi and Sindh University, Jamshoro on the theme “ The Transforming Lives Through Digital Health Intervention”.

I welcome each participant and hope that they will find the 1st International Biomedical Digital Health Conference-2022 not only useful in many respects but also to be a good opportunity to meet people and connect positively through networking in available time slots. Moreover, I take this opportunity to express my appreciation to the joint efforts of Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor, NEDUET & Chief Patron in Chief, IBDC-2022 and Engr. Sohail Bashir, Chairman, IEP Karachi Centre, for the success of this conference. Special thanks to Engr. Prof. Dr. Muhammad Tufail, Pro Vice-Chancellor, NEDUET & Convener IBDC-2022, Engr. Saad Ahmed Qazi, Dean Faculty of Electrical & Computer Engineering NEDUET & Convener, IBDC-2022, Dr. Engr. Eraj Humayun Mirza Conference Secretary, IBDC-2022 & Engr. Syed Faraz Jawed, Programme Secretary, IBDC-2022.

Once again my heartfelt thanks to all and I wish the organizers every success.



MESSAGE

Dr. Eraj Humayun Mirza

Chairperson

Department of Biomedical Engineering

NED University of Engineering and Technology



“ I feel privileged to be part of the team who laid foundation stone of digital health conference in Pakistan. We have carefully tailored the conference theme that will provide a horizon for new beginnings.

This conference will provide a transdisciplinary venue for academicians, scientists, clinicians and young generation to share ideas, nurture concepts and harbour knowledge in the ever-growing world of biomedical engineering and digital health.

I wish good luck to all participants and solicit them to invest in their scientific rigour and cultivate their thoughts for the benefit of humanity.

Thank you.

AIMS AND OBJECTIVES



1948

The Institution of Engineers Pakistan

The main goal of the Institution of Engineers, Pakistan is to Build Better World as appearing in its logo. The aims and objectives of the Institution are:

- a. To Promote and advance the science, practice, and business of engineering in all its branches throughout Pakistan.
- b. To Promote efficiency in the engineering practice and profession.
- c. To Regulate the professional activities and assist in maintaining high standard in the general conduct of its members.
- d. To Lay down professional code of ethics and to make it mandatory for its members in their professional conduct.
- e. To Help in the acquisition and exchange of technical knowledge.
- f. To Promote the professional interest and social welfare of its members.
- g. To Encourage original research in engineering and conservation and economic utilization of the country's materials resources.
- h. To Foster coordination with similar institutions in other countries and Engineering Universities, Institutions and Colleges in Pakistan and in other countries for mutual benefits in furthering the objects of Institution.
- i) To diffuse among its members information on all matters affecting engineering and to encourage, assist and extend knowledge and information connected therewith by establishment and promotion of lectures, discussions or correspondence, by the holding of conferences, by the publication of papers, periodicals and journals, proceedings, reports, books, circulars and maps or other literary undertaking, by encouraging research work or by the formation of library or libraries and collection of models, designs, drawings, and other articles of interest in connection with engineering or otherwise howsoever.
- j) To promote the study of engineering with a view to disseminating the information obtained for facilitating the scientific and economic development of engineering in Pakistan.
- k) To establish, acquire, carry on, control or advise with regard to colleges or other educational establishments where students and apprentices may obtain a sound education and training in engineering on such terms as may be settled by the Institution.
- l) To encourage, regulate and elevate the technical and general knowledge of persons engaged in or about to engage in engineering or in any employment manual or otherwise in connection therewith and with a view thereto function as an Educational Institution and to provide for holding of coaching wherever possible and to test by examination or otherwise the competence of such persons and to institute and establish professor-ships, student-ships, scholar-ships, rewards and other benefactions and to grant certificates of competency whether under any Act of the Government of Pakistan or Local Government under the Bye-Laws of the Institution regulating the conduct and qualification of engineer or otherwise howsoever.
- m) To-operate with various Government agencies and industrial and commercial enterprises connected with engineering and advising them in matters concerning the profession and practice of engineering and promotion of technical education.
- n) To encourage inventions and investigate and make known their nature and merits.
- o) To arrange and promote the adoption of equitable forms of engineering contracts and other legal documents, to encourage settlement of disputes by arbitration and to act as and nominate arbitrators and to act as and nominate arbitrators and umpires on such terms as may be expedient.
- p) To promote just and honorable dealing and to suppress mal-practice in engineering
- q) To do all such other acts and things as are incidental or conducive to the above objects or any of them.

The Institution ever since its inception has been taking concerted efforts to upgrade the knowledge and technical know-how of its member engineers by undertaking various technical activities. IEP has, on number of occasions, conducted numerous studies on various technical problems, and has submitted its recommendations to the government.

LIST OF ORGANIZATIONS, INSTITUTIONS HAVING AGREEMENT OF CO-OPERATION / AFFILIATIONS WITH IEP

1. World Federation of Engineering Organizations (WFEO)
2. Federation of Engineering Institutions of Islamic Countries (FEIC)
(comprising all Engineering Institution of Islamic Countries).
3. Federation of Engineering Institutions of South and Central Asia (FEISCA),
(all Engineering Institutions of SAARC Countries are its Members.)
4. Asian Civil Engineering Coordinating Council (ACECC)
5. Common-Wealth Engineers Council (CEC)
(which works under the aegis of United Nations Organization).
6. International Federation of Automatic Control (IFAC)
7. Consortium of Affiliates of International Programme (CAIP)
8. American Association for Advancement of Sciences (AAAS), USA.
9. International Association for Bridges & Structural Engineering (IABSE), USA.
10. Russian Engineering Academy, Russia
11. American Society for Civil Engineers, USA.
12. Canadian Society for Civil Engineering, Canada.
13. Royal Aeronautical Society, U.K.
14. Institution of Structural Engineers, UK.
15. Institution of Civil Engineers, UK.
16. Institution of Electrical Engineers UK.
17. Institution of Mechanical Engineers UK.
18. China Civil Engineering Society, China
19. China Mechanical Engineering Society, China.
20. China Highways & Transportation Engineering Society, China.
21. Chinese Society of Electrical Engineers, China.
22. China Institution of Electronics, China.
23. Cyprus Professional Engineers Association, Cyprus.
24. Institution of Engineers, Bangladesh.
25. Institution of Electrical Engineers of Japan
26. Institution of Engineers Sri Lanka.
27. Nepal Engineers' Association, Nepal.
28. Institution of Engineers Malaysia.
29. Institution of Engineers Indonesia.
30. Engineering Academy of Tajikistan.
31. Engineering Academy of Uzbekistan.
32. Engineering Academy of Kazakhstan.
33. Institute of Seismology and Seismological Construction, Tajikistan.
34. Republican Association of Young Engineers and Specialist, Kazakhstan.
35. Institution of Engineers Afghanistan.
36. Council of Aeronautical Science, USA.
37. Engineering Academy of Kirgistan.
38. Institution of Engineers, Australia.
39. Union of Chambers of Engineers & Architects, Turkey.
40. Korean Society of Civil Engineers, Korea.
41. Japan Society of Civil Engineers, Japan
42. Institution of Electrical and Electronics Engineers, USA.
43. Institute of Marine Engineering, Science & Technology, UK.
44. Bahrain Society of Engineers, Bahrain.

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NEDUET, Pakistan

INAUGURAL PROGRAMME



The Institution of Engineers Pakistan

INAUGURAL SESSION
on Tuesday the 22nd November 2022
at Main Auditorium Hall

NED University of Engineering & Technology, Karachi

14:30 - 14:45	Guests Arrival
14:45 - 15:00	Guests to be seated
15:00 - 15:05	Holy Quran Recitation
15:05 - 15:10	National Anthem
15:10 - 15:15	Conference briefing by Prof. Dr. Saad Ahmad Qazi, Dean Faculty of Electrical & Computer Engineering NEDUET & Convener IBDC-2022
15:15 - 15:20	Welcome Address by Engr. Sohail Bashir, Chairman, IEP, Karachi Centre
15:20 - 15:35	Keynote Address by Dr. Zakiuddin Ahmed, Chief Executive Officer Digital Care, Pakistan on "From Telemedicine to Digital Health – Past, Present & Future"
15:35 - 15:50	Keynote Address by Dr. Faheem Shaikh Chief Operating Officer, Ziauddin University Hospital, Pakistan, on "Transforming Health care system to Digital Health"
15:50 - 16:05	Keynote Address by Dr. Shariq Khoja Founder & Chief Executive Officer Tech4Life on "Telemedicine and Digital Health- B old solution to a critical Health Problem"
16:05 - 16:15	Digital Health Initiatives by Government Official
16:15 - 16:25	Address by Engr. Prof. Dr. Sarosh Hashmat Lodi, Vice-Chancellor NED University of Engineering & Technology & Patron in Chief IBDC-2022
16:25 - 16:35	Address by the Chief Guest
16:35 - 16:45	Presentation of Conference Mementos
16:45 - 16:50	Vote of Thanks by Dr. Engr. Eraj Humayun Mirza Chairman, Department of Biomedical Engineering, NEDUET & Conference Co-Convener IBDC-2022
16:50 - 17:00	Group Photograph
17:00 - 18:00	Prayers & Hi-Tea

TECHNICAL SESSIONS

Wednesday 23rd November, 2022 at NEDUET, Karachi

09:30 AM - 11:00 AM Technical Session 1 Digital Health and IoT at (A/V Hall) Department of Civil Engineering	11:30 AM - 13:00 PM Technical Session 2 Pharmaceutics and Regenerative Medicine at (A/V Hall) Department of Mechanical Engineering	11:30 AM - 13:00 PM Parallel Technical Session 3 Computational Modeling and Biomechanics at (A/V Hall) Department of Civil Engineering
13:00 PM - 14:00 PM ZUHUR PRAYERS & LUNCH BREAK		
14:00 PM - 15:40 PM Technical Session 4 Computational Intelligence and Neuroscience at (A/V Hall) Department of Mechanical Engineering	14:00 PM - 15:40 PM Parallel Technical Session 5 Telemedicine and Biomedical Sensors at (A/V Hall) Department of Civil Engineering	15:45 PM - 17:45 PM Closing Session at (A/V Hall) Department of Civil Engineering

REFRESHMENTS



TECHNICAL SESSIONS

CONFERENCE PROGRAM SCHEDULE FOR ORAL SESSION IBDC -2022

Technical Session-1, Wednesday Day-2 November 23, 2022

Digital Health and IoT

Session Chairs: **Dr. Ali Asghar (ZU), Dr. Danish Mujib (NEDUET), Dr. Engr. Abdul Ghani Abro (IEP)**

Venue: (A/V Hall), Department of Civil Engineering

Time	Paper ID	Title and Presenters
09:30 -09:50		Keynote address by Dr. Anila Kazmi on “Digital Health as Climate Calamity Solution”
09:50 -10:05	112223001	Implementation of Hospital Information System in Psychiatry <i>Muhammad Rizwan , Muhammad Wasim Munir , Sadia Arshad, Hafsa Aijaz</i>
10:05 -10:20	112223019	An IoT-Based Innovus Health Monitoring System <i>Khalid Mahmood, Nameerah Nafees, Tayyaba Khalid, Waleed Haider , Dr. Tariq Javid, Hareem Shakeel</i>
10:20- 10:35	112223099	Critical Thinking and Problem-Solving Intelligent Agent for High-Precision Simulated Image-Guided Cardiac Interventions <i>Faisal Mujtaba , Sumaiya Aziz , Ayesha Hasany , Tariq Javid , Muhammad Faris , Jawwad Sami</i>
10:35- 10:55		Keynote Address by Dr. Suhail Chughtai on “Clinical Telemedicine vs Video Consultations”
11:00 -11:30		Networking and Tea Break (Main Auditorium)

Technical Session-2, Wednesday Day-2 November 23, 2022

Pharmaceutics and Regenerative Medicine

Session Chairs: **Dr. Zeeshan Ul Haque (SHU), Dr. Eraj Humayun Mirza (NEDUET), Dr. Raja Masood Larik (IEP)**

Venue: (A/V Hall), Department of Mechanical Engineering

Time	Paper ID	Title and Presenters
11:30 -11:50		Keynote address by Dr. Ateeq ur Rehman on “Role of bioactive glasses in the biomedical implants”
11:50 -12:05	112223007	Development of Degradable Polymeric Film Mimicking Cartilage Tissue <i>Eraj Humayun Mirza, Aiman Yasha Naseem, Wasfa Shuja</i>
12:05- 12:20	112223009	Molecular Dynamics Study of Carbazochrome Encapsulation in Single-Walled Carbon Nanotube <i>Syed Hassan Sarwar , Saad Jawaid Khan, Syed Faraz Jawed</i>
12:20 -12:35	112223024	Evaluating the Effectiveness of Commonly Used Antibiotics in Pakistan <i>Amna Farrukh , Aena Rasheed, Eesha Adnan, Mohammad Abdullah Khan, Amna Amin Sethi</i>
12:35-12:50	112223020	Simulation of Suitable Carbon Nanotube as a Drug Delivery System: A Molecular Dynamics Study <i>Muhammad Jawad Shafique, Muhammad Usman Baig, Mariam Raziq, Syed Faraz Jawed</i>

Technical Session-3, Wednesday Day-2 November 23, 2022

Computational Modeling and Biomechanics

Session Chairs: **Dr. Saad Jawaid Khan (ZU), Dr. Ahmad Zahid Rao (NEDUET), Dr. Majida Kazim (IEP)**

Venue: (A/V Hall), Department of Civil Engineering

Time	Paper ID	Title and Presenters
11:30-11:45	112223004	Long-term monitoring of users' conditions using Smart Rollator <i>Nazia Ejaz, Mehwish Faiz, Saad Jawaid Khan, Wazir Muhammad, Fahad Azim</i>



TECHNICAL SESSIONS

11:45-12:00	112223006	The Impact of Lifting Heavy Load on The Human Posture <i>Myra Aslam Qureshi , Moazzam Ali Khan, Saad Jawaid Khan , Sana Rehan</i>
12:00-12:15	112223022	Design & Development of Adjustable Arm Support <i>Kulsoom Zaidi, Zobia Nadeem, Talia Murad, Ahmad Zahid Rao</i>
12:15-12:30	112223023	Selection of Genes for the Prediction of Breast Cancer <i>Hoor Abdul Ghani , Yumna Khan, Dr. Nisar Ahmed Shar, Amna Amin Sethi</i>
12:30-12:50		Keynote address by Dr. Salman Haleem on “Artificial Intelligence for Health Trajectory”
13:00-14:00		Networking and Lunch Break (Main Auditorium)
Technical Session-4, Wednesday Day-2 November 23, 2022 Computational Intelligence and Neuroscience Session Chairs: Dr. Tariq Javid (HU), Dr. Abul Hasan (NEDUET), Dr. Sadia Muniza Faraz (IEP) Venue: (A/V Hall), Department of Mechanical Engineering		
Time	Paper ID	Title and Presenters
14:00-14:20		Keynote address by Dr. Darakhshan Haleem on “Hunger and Satiety Signals in the control of obesity”
14:20-14:35	112223002	Terry's Nail Identification: A Novel Machine Learning Approach <i>Umer Hassan, Saad Jawaid Khan, Syeda Fatima Aijaz, Choudhary Sobhan Shakeel</i>
14:35-14:50	112223005	Predicting Respiratory Allergies Using a Machine Learning Algorithm <i>Kheekashan Kanwal , Saad Abdullah , Muhamamd Asif , Saad Jawaid Khan , Syed Ghufraan Khalid</i>
14:50-15:05	112223021	Comparative Analysis of Different Neuro Modalities on Reduction in Hand Pain Perception <i>Seemeen Nadir Shah Chagani , Maham Hamad , Osama Ejaz, Muhammad Danish Mujib , Muhammad Abul Hasan</i>
15:05-15:20	112223017	Design of a Computer Assisted Diagnosis System for Brain Tumor Detection
Technical Session-5, Wednesday Day-2 November 23, 2022 Telemedicine and Biomedical Sensors Session Chairs: Dr. Sidra Abid Syed (SSUET), Dr. Syed Faraz Jawed (NEDUET), Dr. Sundas Ali (IEP) Venue: (A/V Hall), Department of Civil Engineering		
Time	Paper ID	Title and Presenters
14:00-14:20		Keynote address by Dr. Saad Jawaid Khan on “Impact of Biomedical engineering after COVID-19”
14:20-14:35	112223011	Patient Telemonitoring Device for Remote Consultancy via Telecommunication <i>Taha Mushtaq Shaikh ,Hareem Rizwan Ahmed, Saad Jawaid Khan, Hassan Arif , Shehzeen Fatima</i>
14:35-14:50	112223003	Optimization of Conductive Ink Materials for Designing Cost-Effective Force Sensitive Resistor (FSR) Sensors for Soft Robotics <i>Amna Jawed Shaikh, Gul Munir, Hassan Ali , Tooba Khan</i>
14:50-15:05	112223016	Mobile Servo Robotic Arm <i>Nida Abdullah, Maryam Furqan, Hassan Ali, Tooba Khan</i>
15:05-15:20		Keynote address by Dr. Farhan Abdul Ghaffar on “Advanced RF Technology Solutions for Biomedical Applications”

LIST OF ABSTRACTS

S.NO	Paper ID	Paper Title	Full Name (Presenter)	Mode of Presentation
1	112223001	Implementation of Hospital Information System in Psychiatry	Sadia Arshad	On Campus (Physical)
2	112223002	Terry's Nail Identification: A Novel Machine Learning Approach	Umer Hassan	On Campus (Physical)
3	112223003	Optimization of Conductive Ink Materials for Designing Cost-Effective Force Sensitive Resistor (FSR) Sensors for Soft Robotics	Amna Jawed Khan	On Campus (Physical)
4	112223004	Long-term monitoring of users' conditions using Smart Rollator	Nazia Ejaz	On Campus (Physical)
5	112223005	Predicting Respiratory Allergies Using a Machine Learning Algorithm	Kehkashan Kanwal	On Campus (Physical)
6	112223006	The Impact of Lifting Heavy Load on The Human Posture	Myra Aslam Qureshi	On Campus (Physical)
7	112223007	Development of Degradable Polymeric Film Mimicking Cartilage Tissue	Wasfa Shuja	On Campus (Physical)
8	112223009	Molecular Dynamics Study of Carbazochrome Encapsulation in Single-Walled Carbon Nanotube	Syed Hassan Sarwar	On Campus (Physical)
9	112223011	Patient Telemonitoring Device for Remote Consultancy via Telecommunication	Taha Mushtaq Shaikh	On Campus (Physical)
10	112223016	Mobile Servo Robotic Arm	Maryam Furqan	On Campus (Physical)
11	112223017	Design of a Computer Assisted Diagnosis System for Brain Tumor Detection	Rafia Jabbar	On Campus (Physical)
12	112223019	An IoT-Based Innovus Health Monitoring System	Khalid Mahmood	On Campus (Physical)
13	112223020	Simulation of Suitable Carbon Nanotube as a Drug Delivery System: A Molecular Dynamics Study	Muhammad Jawad Shafique	On Campus (Physical)
14	112223021	Comparative Analysis of Different Neuro Modalities on Reduction in Hand Pain Perception	Maham Hamad	On Campus (Physical)
15	112223022	Design and Development of Adjustable Arm Support for Patients with Neuromuscular Disorders	Zobia Nadeem	On Campus (Physical)
16	112223023	Selection of Genes for the Prediction of Breast Cancer	Yumna Khan	On Campus (Physical)
17	112223024	Evaluating the Effectiveness of Commonly Used Antibiotics in Pakistan	Amna Farrukh	On Campus (Physical)
18	112223099	Critical Thinking and Problem Solving Intelligent Agent for High-Precision Simulated Image-Guided Cardiac Interventions	Faisal Mujtaba	On Campus (Physical)

Paper ID # 112223001

IMPLEMENTATION OF HOSPITAL INFORMATION SYSTEM IN PSYCHIATRY

Muhammad Rizwan, Sadia Arshad, Hafsa Aijaz, Muhammad Wasim Munir

Considering the growing awareness and acceptance towards mental health, the COVID-19 pandemic opened new windows to incorporate technology into psychiatry. With reduced hospital visits and social distancing being the new normal implementation of the Hospital Information System (HIS) for secure and easy data storage or transfer, the record of multiple hospital areas has become necessary. Mental health is still taboo in developing countries like Pakistan; therefore, developing a HIS system for psychiatry must be taken forward with high data security. This article proposes a HIS system built for psychiatric clinics or therapy centers on a cloud-based platform to make it cost-effective for low-medium income countries like Pakistan. A survey was conducted to determine the feasibility of this proposal in which 70 people participated through an online platform. Results were analyzed using SPSS 26.0, which concluded that 81.4% of the respondents agreed on implementing HIS into psychiatric clinics, while 12.9% of respondents were unsure.

Paper ID # 112223002

TERRY'S NAIL IDENTIFICATION: A NOVEL MACHINE LEARNING APPROACH

Umer Hassan, Saad Jawaid Khan, Syeda Fatima Aijaz, Choudhary Sobhan Shakeel

Terry's nail is a condition in which the nail seems to have a kind of leukonychia that is differentiated by the ground glass occlusion of the nail, pink nail bed at the distal border and the loss of the lanula. The objective of this study is to use a decision tree-based machine learning algorithm to classify Terry's nails and healthy nails. It has been possible to collect a dataset of a total of 87 nail images. It consists of 48 images of normal, healthy nails and 39 images of Terry's nails. The images are categorized using a decision tree to help with the classification. A total of twenty-seven nail images were evaluated, yielding an accuracy of 82.5% from the findings. As per the results, decision tree approaches have the capability of achieving robust categorization and efficiency.

Paper ID # 112223003

OPTIMIZATION OF CONDUCTIVE INK MATERIALS FOR DESIGNING COST-EFFECTIVE FORCE SENSITIVE RESISTOR (FSR) SENSORS FOR SOFT ROBOTICS

Amna Jawed Shaikh, Gul Munir, Hassan Ali, Tooba Khan

Force-sensitive resistors or force-sensing resistors play an important part in biomedical engineering as they are frequently used in soft robotics, prosthetics, and other devices that involve pressure detection. Commercially made FSRs are expensive and can be difficult to purchase in bulk for any experiment or research work. FSRs consist of a semi-conductive ink screen printed on them and their accuracy depends on the material used for the ink. Therefore, this study aims to optimize various conductive ink materials and design FSR sensors using the fabricated conductive ink. Furthermore, a comparative analysis is performed to compare the designed FSR sensor using optimized ink material with the commercially available FSR sensor. Results obtained from the study show that the graphite ink showed the least resistance and can be more conductive and the FSR designed using Graphite ink would be more effective for designing inexpensive FSR and has almost the same efficiency as the commercial one.

Paper ID # 112223004

LONG-TERM MONITORING OF USERS' CONDITIONS USING SMART ROLLATOR

Nazia Ejaz, Dr.Saad Jawaid Khan, Dr.Fahad Azim, Mehwish Faiz

About 20% of the elderly population of developing countries face gait and balance disorders which lead to postural instability. Moreover, a third of every elderly person needs to use assistive devices because of this disorder. As stated by the ICF (International Classification of Functioning, Disability, and Health) disability is the limitation of activity in the gait pattern. The restricted mobility within the gait has an adverse effect on the overall quality of life. Existing gait analysis procedures are expensive, time-consuming, and confined to specific environments so usually everyone can't able to assess their gait regularly. The smart rollator is best for users who need gait assessment for rehabilitation treatment follow-up. It's economical, easy to use, and monitors automatically, no external wearable sensors are used, no need for specific personnel and environments for monitoring. The ultrasonic sensor in the rear wheel counts the steps and the rotary encoder in the rear wheel measure distance and time while force sensors in the handle measure the upper limb forces. The observed spatiotemporal gait parameters from the rollator are Step time, Step length, Stride time, Stride length, Cadence, and walking velocity. The healthy users took less time and the minimum number of steps with greater stride length to complete the walk test so the cadence and walking speed of healthy users are greater than users with disabilities. It is also observed that muscle force decrease with the increase in age, this may lead to many muscular diseases in elderly patient e.g. muscular dystrophy.

Paper ID # 112223005

PREDICTING RESPIRATORY ALLERGIES USING A MACHINE LEARNING ALGORITHM

Kehkashan Kanwal, Muhamamd Asif, Syed Ghufraan Khalid, Saad Abdullah, Saad Jawaid Khan

Respiratory allergies are one of the most common problems that affect the lives of millions of children and adults around the world. Even though these allergies are rarely life-threatening, it is a fact that these allergies decline the quality of life of affected individuals and are an economic burden on the healthcare setting. The confirmatory tests are usually not available in resource- scarce settings and cause misdiagnosis and delays in treatment, making such individuals susceptible to other infections and diseases. In the present work, we have proposed photoplethysmography, a non-invasive, simple, and readily available optical sensor as a prediction tool for respiratory allergies. We have collected PPG data from 26 subjects and extracted time and frequency domain features from the PPG of subjects with allergies and trained a supervised machine learning algorithm to distinguish them from features extracted from healthy individuals with no allergies. An Ensemble classifier of boosted trees gave the best training accuracy of 87.82%, test accuracy of 85.98%, sensitivity of 86.43% and specificity of 89.04%.

Paper ID # 112223006

THE IMPACT OF LIFTING HEAVY LOAD ON THE HUMAN POSTURE

Myra Aslam Qureshi, Moazzam Ali Khan, Saad Jawaid Khan, Sana Rehan

Musculoskeletal complaints such as shoulder pain are the third most frequent orthopedic condition, typically brought on by a rotator cuff deficiency and/or an impingement syndrome. The chances of a rotator cuff tear or acute shoulder pain could be a result of a combination of physical strains at work. These may include carrying, pushing, pulling, and lifting heavy loads. Limitation of shoulder movement due to pain can cause significant disability and affect a person's ability to perform daily activities such as eating, working, etc. This study was conducted to systematically review the evidence supporting the hypothesis that the rotator cuff muscles stabilize the glenohumeral joint dynamically, for which twenty healthy, right-handed individuals, including men and women, participated. The subjects were asked to stand in an anatomical position and lift 10 kilograms of weight for 10 seconds. The readings were obtained using a goniometer and Pasco Capstone software. Researchers observed that the rotatory angles differed with gender, age, height, and weight. They concluded that carrying loads for a longer duration could cause acute shoulder pain and rotator cuff injuries. This study furthers research in the area of shoulder pain by identifying the problems that both females and males encounter when lifting heavy weights. It also determines if a certain amount of weight affects the posture of females and males, as well as the rotator cuff muscles.

Paper ID # 112223007

DEVELOPMENT OF DEGRADABLE POLYMERIC FILM MIMICKING CARTILAGE TISSUE

Dr. Engr. Eraj Humayun Mirza, Aiman Yasha Naseem, Wasfa Shuja

The current study provides insight into the development of degradable polymeric films mimicking cartilage tissue. The study focuses on the development and characterization of an elastic and biodegradable composite scaffold that is biocompatible, non-toxic, can effectively mimic cartilage tissue, and deliver mechanical strength associated with the surrounding environment. A polymeric film consists of a Synthetic polymer (Polyvinyl Alcohol) along with a natural polysaccharide (Sodium Alginate). Sodium Alginate (SA) is a biocompatible, non-toxic, and non-immunogenic biopolymer, while Polyvinyl Alcohol (PVA) is a hydrophilic synthetic polymer with good biocompatibility and toughness. The polymeric films are prepared via a chemical crosslinking technique involving solvent casting/molding and freeze and thaw methods in the process. Characterization techniques have been carried out for the analysis of the strength and potential of the developed material.

Paper ID # 112223009

MOLECULAR DYNAMICS STUDY OF CARBAZOCHROME ENCAPSULATION IN SINGLE-WALLED CARBON NANOTUBE

Syed Hassan Sarwar, Saad Jawaid Khan, Syed Faraz Jawed

Carbon nanotubes are one of the interesting nanocarriers when it comes to targeted drug delivery and precision medicine. In this study, molecular dynamics simulation study was carried out in order to investigate the encapsulation behavior of Carbazochrome drug molecule into an armchair (12,12) Single-Walled Carbon Nanotube SWCNT) using COMPASS forcefield. It was found out the drug molecule could get inside the SWCNT very quickly and could retain its position.

Paper ID # 112223011

PATIENT TELEMONITORING DEVICE FOR REMOTE CONSULTANCY VIA TELECOMMUNICATION

Taha Mushtaq Shaikh, Saad Jawaid Khan, Shehzeen Fatima, Hareem Rizwan Ahmed, Hassan

Objective: Research in a wide range of areas, including sensor networks, medical devices, wireless communication, middleware software, and software applications, is being pursued to advance healthcare systems. To monitor patients remotely, a patient care method called telemonitoring combines several information technologies. To provide teleconsultation we have designed this telehealth monitor to ensure telemonitoring-related outcomes while monitoring body temperature, oxygen saturation, and pulse rate in real-time through a touch screen LCD (Light Emitting Diode).

Methods: The telemonitor that we have built has taken the place of conventional vital sign monitoring equipment. We have developed tele-health that measures body temperature, heart rate, and oxygen saturation and can tele-consult the patient if any of the values are abnormal.

Results: This tele health monitor design includes an LCD touchscreen panel. The Raspberry Pi is attached to the back of the LCD panel together with all the other parts. On the front side, beneath the touch screen LCD, are the sensors. The Android GUI (Graphic User Interface) application is then given the patient's data.

Conclusion: Even though home telemetry has only recently become popular, a sizable amount of knowledge has been created and made accessible to policymakers and medical professionals. According to the results of our literature review, home telemonitoring for chronic diseases appears to be a good patient care strategy that produces precise and reliable data, empowers patients, alters their behavioral patterns, and may even improve their medical conditions. The patient's heart rate, oxygen saturation, and body temperature are all tracked by this tele health monitor to prevent any life-threatening conditions. Additionally, teleconsulting services are available. Using the GUI Android application, the parameters of the patient and the state of the camera were visualized.

Paper ID # 112223016

MOBILE SERVO ROBOTIC ARM

Nida Abdullah, Maryam Furqan, Hassan Ali, Tooba Khan

Trauma, cancer, vascular disease, congenital abnormalities, and other orthopedic diseases can restrict the range of motion of joints such as hinges, ball and socket joints, shoulder joints, and pivot joints. According to studies, Seventy percent of individuals with upper limb loss have their limbs amputated below the elbow, with ten percent having their limbs amputated at the hand or wrist. Any type of amputation in these joints affects patients' emotional well-being along with their ability to perform their daily activities. This study aims to develop a prototype mobile servo robotic arm that could be used to assist such patients. A mobile servo robotic arm that can be controlled with the other limb, assisting in mimicking the motions of a normal human limb and allowing for the completion of all daily activities. Servo motors are particularly useful for applications where precise positioning is essential, such as controlling and moving a robotic arm into a specific range. It was achieved in this study by coupling two servo motors that can rotate up to 180 degrees each which produced the pitch and roll motion for the robotic arm.

Paper ID # 112223017

DESIGN OF A COMPUTER ASSISTED DIAGNOSIS SYSTEM FOR BRAIN TUMOR DETECTION

Rafia Jabbar

The most common and serious condition, a brain tumor, has a life expectancy of only a few months. A range of imaging modalities, including CT, MRI, and ultrasound, have been utilized to assess cancers in the prostate, breast, lung, and brain. MRI images are mostly used in this study to identify malignancies in the brain. An MRI scan collects so much data that manual classification of cancers vs. non-tumors is unfeasible at any given time. It does, however, have significant limitations due to the small quantity of pictures available (i.e., precise quantitative measurements). An automated classification system is necessary to avoid human fatalities. Because of the spatial and structural diversity of brain tumors, automatically identifying them in the tumor region is difficult. AlexNet, VGG16, GoogleNet, and RestNet50 were four deep learning models used to classify brain tumors in this study. RestNet50 was determined to become the most appropriate prediction, with a 95.7 percent accuracy, and AlexNet had the quickest performance, with a 1.2 second processing time. Using the k-fold approach for separating the data and a processing time of roughly 1 second for each fold calculation, we were possible to forecast the presence of tumors with a 79 percent accuracy.

Paper ID # 112223019

AN IoT-BASED INNOVUS HEALTH MONITORING SYSTEM

Khalid Mahmood, Nameerah Nafees, Waleed Haider, Hareem Shakeel, Tariq Javid, Tayyaba Khalid

In the recent days especially after the Covid-19 spread, the Internet of Things (IoT) is performing a significant part in healthcare systems where health related data of a patient can be monitored 24/7 remotely. IoT-enabled technologies develop the possibility of designing innovative and noninvasive clinical support systems as it is a very important part of telemedicine, particularly for COVID19 patients, where continuous monitoring of vital signs is required. This paper is about the design and prototype of An IoT based Innovus Health Monitoring System with an objective to facilitate sick and elderly people at home. For obtaining instant results, this system provides the facility to measure vital signs at home in a very less time. The proposed system consists of two devices Thermometer and Pulse Oximeter which are assembled and turned into a device. A heartbeat rate sensor and temperature sensor are used to measure the temperature and heartbeat rate. Initially, Proteus 8 Professional is used to simulate these two devices individually and measure the results. After the validation of the simulation, model is practically implemented by using different sensors with Arduino UNO board, LCD, WiFi module, Alarms and indicators. Finally, all the individual circuits are designed on the breadboard. In addition, two channels for the Heartbeat rate and temperature are created on the ThingSpeak cloud to visualize the real time transmitted data from the WiFi module. A WiFi connection is required to transmit the information to the ThingSpeak. This data is fetched from the cloud and stored in a spreadsheet. When any of the parameters from temperature and heartbeat rate goes out of normal ranges, an alarm begins to sound, and LED illuminates. This system also sends an emergency email in case of a sudden alarming situation. Thus, this IoT based innovus health monitoring system effectively monitors the patient vital signs and facilitate the both patient and healthcare system.

Paper ID # 112223020

SIMULATION OF SUITABLE CARBON NANOTUBE AS A DRUG DELIVERY SYSTEM: A MOLECULAR DYNAMICS STUDY

Muhammad Jawad Shafique, Muhammad Usman Baig, Mariam Raziq, Syed Faraz Jawed

A significant use of nanotechnology is preferred in drug delivery systems, especially in the case of targeted delivery of anti-cancer drugs using carbon nanotubes (CNTs). Molecular dynamics (MD) simulations have been used to study the anti-cancerous carbon nanotubes drug delivery system that supports single-walled carbon nanotubes (SWCNTs), including pristine SWCNTs. Important geometries and properties have also been identified. In contrast to complex states with SWCNT, however, no appreciable change in drug structure is seen in the free form. One promising strategy for achieving controlled drug release involves placing carboplatin within the pristine nanotubes at the tube's tip. When the drug moved outside of the pristine SWCNT, it typically moved down the end to about a third of the tube's length, but the group of carboxylics on the functionalized SWCNT held the drug in the tube's midline. It has also been found that the binding free energy of carboplatin in the SWCNT is the lowest of all the possible binding free energies due to van der Waals interactions. Thus, the molecular dynamics study supports, in contrast to earlier experimental findings, that pristine SWCNTs are the optimal CNT for an anticancer drug delivery system.

Paper ID # 112223021

COMPARATIVE ANALYSIS OF DIFFERENT NEURO MODALITIES ON REDUCTION IN HAND PAIN PERCEPTION

**Engr. Seemeen Nadir Shah Chagani, Engr. Osama Ejaz, Engr. Maham Hamad,
Dr. Muhammad Abul Hasan, Dr. Muhammad Danish Mujib**

Pain interference is a key factor in modulation of the quality of life. Hand pain has a cognitive and neurological effect. Therefore, a comparative analysis between anodal tDCS, cathodal tDCS, TENS and sham group will help to find optimum way to produce analgesic effect using non-pharmacological and non-invasive method. For the experiment, twenty-four subjects were included with six subjects in each group. Concurrent EEG was recorded ten times during the experiment i.e., EEG for eyes open (EO) and eyes closed state (EC) for pre-condition, during Stroop test (Stroop 1) and pain induction using cold pressor test (CPT 1), during stimulation and then again Stroop test (Stroop 2) and cold pressor test (CPT 2) and lastly re-induction of pain after 15 minutes of experiment (CPT 3) to observe lasting analgesic effect. Pain tolerance test showed no significant change between CPT 1 and CPT 2 and CPT 1 and CPT 3 conditions. Stroop test results showed that there was a significant change in anodal group i.e. correct responses increased in Stroop 2. Neurological analysis showed that post stimulation participants went into more relaxed state as evident by following findings. During Stroop 1 and CPT 1, theta, beta3 and gamma wave increases whereas alpha wave decreases. In post eyes open condition, theta wave decreases and alpha wave increases in TENS group as compared to pre eyes open condition. In Stroop 2 condition, theta, alpha and gamma wave goes to baseline. In CPT 2, theta wave goes to baseline and alpha wave is relatively high in TENS group. In CPT 3, long lasting training impact is visible in anodal and TENS groups. In Anodal group, theta wave returns to baseline and alpha wave further increases as compared to CPT 2. In TENS group, alpha wave returns to baseline and gamma wave relatively decreases as compared to other groups.

Paper ID # 112223022

DESIGN AND DEVELOPMENT OF ADJUSTABLE ARM SUPPORT FOR PATIENTS WITH NEUROMUSCULAR DISORDERS

Kulsoom Zaidi, Talia Murad, Zobia Nadeem, Dr. Ahmad Zahid Rao

Assistive technologies are prevalent throughout the globe. Assistive devices are exterior devices that are manufactured to aid individuals in performing a specific action. Many people with disabilities rely on assistive technology to perform everyday tasks and participate actively and effectively in community life. There are many neurological and muscle diseases in which the muscles that are involved in voluntary movements weakens due to which the patients face difficulty in performing their activities of daily living and as a result they become isolated and dependent on caregivers. To overcome this problem, we designed and developed an assistive device named as Adjustable Arm Support (AAS) which can provide mechanical support to lower arm and facilitates arm functions in activities of daily living.

Paper ID # 112223023

DESIGN AND DEVELOPMENT OF ADJUSTABLE ARM SUPPORT FOR PATIENTS WITH NEUROMUSCULAR DISORDERS

Hoor Abdul Ghani, Yumna Khan, Nisar Ahmed Shar, Amna Amin Sethi

Background: Breast cancer is the most common cancer in women worldwide, representing about 25 percent of all cancer types. It raises unique and complex issues related to young women, thereby making it worthy of consideration. Studies have been conducted on identifying the underlying causes, namely the germline mutations in BRCA1/BRCA2 genes that drastically increase the risk of breast cancer. It is known that germline pathogenic variants in the aforementioned genes predispose an individual to a lifetime risk of breast cancer. Along with females, BRCA1 and BRCA2 contribute to causing male breast cancer as well.

Materials and Methods: Mutations in BRCA1/BRCA2 genes cannot be the sole factor in determining the development of cancer in an individual. Therefore, to extend the current knowledge, the study focused on genomic as well as clinical data of existing breast cancer patients in order to recognize and shortlist additional genes and their pathogenic alleles that may possibly be playing a part in causing breast cancer. This research focuses on six different types of breast cancers, the genes unique to each type, and the genes contributing to more than one type. Multiple databases were used to assist the research, namely: NCBI, Clinical Variance, ENSEMBL, cBioPortal, DAVID, OMIM, and COSMIC.

Results and Conclusion: Although there is a huge overlap in the genes associated with various types of breast cancer, it is found that there are three common genes that possibly contribute to the development of the disease in all types. However, it is important to note that not all databases recognize the same list of genes, and breast cancer development is attributed to a mutation in multiple genes according to different sources. Furthermore, each gene is involved in more than one pathway, so it is not possible to target every single gene in order to diagnose breast cancer in its early stages.

Paper ID # 112223024

EVALUATING THE EFFECTIVENESS OF COMMONLY USED ANTIBIOTICS IN PAKISTAN

Amna Farrukh, Aena Rasheed, Eesha Adnan, Mohammad Abdullah Khan, Amna Amin Sethi

Antibiotic resistance and its consequences have now become a global crisis. The increasing resistance of bacteria combined with the misuse of drugs has led to an era of antibiotics that prove to be of no value to the affected individual. This raises the question of how to encounter AMR and what reason lies behind the increasing resistance of these bacteria. This research has shown the causes of resistance due to motif combinations, identified through the literature review. The method employed was of two types, the manual type and by automation through a designed code. It exhibits that the decreasing number of motifs has shown higher resistance of bacteria. This is one of the approaches that have not been studied in detail. This would help in identifying a mutation pattern that could encounter the antibiotic effectiveness problem. The obtained results can be further validated through experimental procedures to deduce a concrete hypothesis. As a result, alternatives to the existing ineffective antibiotic can be designed in the future.

Paper ID # 112223099

CRITICAL THINKING AND PROBLEM SOLVING INTELLIGENT AGENT FOR HIGH-PRECISION SIMULATED IMAGE-GUIDED CARDIAC INTERVENTIONS

Faisal Mujtaba, Sumaiya Aziz, Ayesha Hasany, Tariq Javid, Muhammad Faris, Jawwad Sami

This research is to incorporate an intelligent agent in cardiac coronary intervention simulator for critical thinking and problem solving. The simulator is an incorporated hardware and software program system. The learner makes use of a catheter wire to carry out the preferred intervention. The use of an embedded system records the catheter wire actions. The measured values are then communicated to the software program that animates the catheter function in the computer simulation. The problem solving agent identifies the problem in order to solve it and critical thinking agent determines how to solve the problem during a cardiac intervention procedure. The software program intervention module has different alternatives. These alternatives are both, to amplify the coronary artery or stent application. The animation suggests the entire coronary intervention's overall performance once the user selects the desired option.

LIST OF POSTER PRESENTATIONS

S.NO	Paper ID	Paper Title	Full Name (Presenter)	Mode of Presentation
1	02	Critical Thinking and Problem Solving Intelligent Agent For High-Precision Simulated Image-Guided Cardiac Interventions	Faisal Mujtaba	On Campus (Physical)
2	03	An IOT-Based Innovus Health Monitoring System	Khalid Mahmood	On Campus (Physical)
3	04	Adjustable Arm Support for Patients with Neuromuscular Disorders	Kulsoom Zaidi	On Campus (Physical)
4	05	The Impact of Lifting Heavy Load on the Human Posture	Myra Aslam Qureshi	On Campus (Physical)
5	06	Artificial Intelligence Assisted Foot Scan System for Diabetic Patients: (Optical Pedograph)	Shaneen Ali	On Campus (Physical)
6	07	Artificial Intelligence Assisted Self-Monitoring Glucometer	Warisha Nasir	On Campus (Physical)
7	08	Effectiveness Of TENS And tDCS on Cognitive Performance And Pain Reduction	Mustafa	On Campus (Physical)
8	09	Smart Operation Theatre Light Design with Camera Recursive Image Processing Technique Shadow Minimization	Tehreem Tariq Awan	On Campus (Physical)
9	10	Back Massager	Maheeb Jamal	On Campus (Physical)
10	11	Treatment of Osteoporosis using 5D Bioprinting	Muhammad Hassan Khanzada	On Campus (Physical)
11	12	Development and Characterization of Novel Bioceramic based Root Canal Sealer having potential in Dental Restoration	Nisma Rizwan	On Campus (Physical)

Poster ID # IBDC-2022-02

CRITICAL THINKING AND PROBLEM SOLVING INTELLIGENT AGENT FOR HIGH-PRECISION SIMULATED IMAGE-GUIDED CARDIAC INTERVENTIONS

Faisal Mujtaba, Sumaiya Aziz, Ayesha Hasany, Tariq Javid, Hina Iftikhar

Surgical simulators and artificial intelligence based intelligent agents are the topic of this research project. Cardiovascular diseases are the major cause of deaths in today's world. To treat or prevent such diseases, medical experts perform cardiac interventions. Performing cardiac interventions are difficult without proper practice, knowledge, and experience. Cardiac intervention simulators come in handy and serve as a tool for doctors to practice and train themselves prior to operating on a patient. The simulated images show the process of intervention procedures. High-precision ensures that readings are in accordance to the standard set and agreed upon protocol. The intelligent agents are involved in detection of the unknown problem as occurred during simulation session and utilizes the critical thinking process in order to solve the problem. This adds a new dimension to existing surgical simulators through cutting edge intelligent agent technology integrated with human expertise.

Poster ID # IBDC-2022-03

AN IoT-BASED INNOVUS HEALTH MONITORING SYSTEM

Khalid Mahmood, Nameerah Nafees, Waleed Haider, Hareem Shakeel, Tariq Javid, Tayyaba Khalid

In this research project, we design and implement an internet of things (IoT) based cost-effective and low-power patient health monitoring system for heart rate and temperature vital signs. The problems of medical self-diagnosis of human subjects remotely and to indicate early deterioration are addressed in this work. Biosensor network module is attached to human body and connected to a data acquisition unit – an embedded platform. The acquired analog signal is pre-amplified and converted into the digital form for processing by the microcontroller. The system transfers data through a WiFi module to cloud. Dynamic, real-time data stored on cloud and visualized in graphical form and accessible to physician from anywhere.

Poster ID # IBDC-2022-04

ADJUSTABLE ARM SUPPORT FOR PATIENTS WITH NEUROMUSCULAR DISORDERS

Kulsoom Zaidi, Talia Murad, Zobia Nadeem, Dr. Ahmad Zahid Rao

People suffering from neurological and muscle diseases often face difficulty in lifting and moving their arms against gravity while performing their daily routine tasks (like eating, writing, computer work etc.) and as a result become isolated, excluded and dependent. To overcome this problem, we have developed an adjustable arm support that assist patients with limited arm movements to perform their daily routine task freely and independently. It works on the principle of spring-based mechanical system. Initially, it was designed on CAD modelling software and then manufactured via CNC machining and 3D printing. It allows the user to perform two degree of freedom (2-DOFs).

Poster ID # IBDC-2022-05

THE IMPACT OF LIFTING HEAVY LOAD ON THE HUMAN POSTURE

Myra Aslam Qureshi, Moazzam Ali Khan, Saad Jawaid Khan, Sana Rehan

Shoulder pain is typically brought on by rotator cuff impingement syndrome. The study concluded that carrying loads for a prolonged period of time can cause rotator cuff injuries and shoulder pain. We hypothesize that there is a significant relationship between individual factors such as age, height, weight, gender type, and change in rotatory angle when a load is lifted. Analysis of the obtained data for both genders was conducted using statistical analysis. It was observed that the rotatory angles vary according to gender, age, height, and weight.

POSTER PRESENTATIONS

Poster ID # IBDC-2022-06

ARTIFICIAL INTELLIGENCE ASSISTED FOOT SCAN SYSTEM FOR DIABETIC PATIENTS: (OPTICAL PEDOGRAPH)

Shaneen Ali, Sameed Ullah Khan, Aneeqa Faisal, Mahin Nadeem, Syed Waqad Ali, Syed Fahad Akbar Ali

Plantar pressure distribution analysis is an increasingly popular research area in the study of foot diagnosis. The goal for the project is to design a low cost self-assisted and locally manufactured foot scan for early detection and diagnosis of ulcer in diabetic foot. It helps the clinician in early diagnosis, therapeutic decisions and prediction.

Poster ID # IBDC-2022-07

ARTIFICIAL INTELLIGENCE ASSISTED SELF-MONITORING GLUCOMETER

Warisha Nasir, Ramiyah Sarah Hasan, Sania Tanvir, Syed Waqad Ali

Diabetes Mellitus is a condition where body is unable to accommodate increased level of blood glucose, leading to complications such as blindness, heart diseases, stroke etc. Glucometer is a device used to determine glucose concentration in blood.

Poster ID # IBDC-2022-08

EFFECTIVENESS OF TENS AND TDCS ON COGNITIVE PERFORMANCE AND PAIN REDUCTION

Mustafa, Nasir Mehmood, Madiha Syed, Dr. Muhammad Danish Mujib

This study analyzed the effectiveness of tDCS (Transcranial Direct Current Stimulation) and TENS (transcutaneous electrical nerve stimulation) on the cognitive ability during pain condition. Data of 60 healthy subjects with no neurological disorders aged between 18 and 40 years were taken. EEG device was used to record brain activity. Advanced signal processing techniques were used for analyzing brain activity for evaluating the effectiveness of tDCS and TENS. We observed cathodal tDCS was more effective than TENS to reduce pain while TENS increased cognitive ability than tDCS. The result of our outcome suggest that the combined effect of two therapies can allow to better define treatment protocols for the treatment of pain and improve cognitive ability together.

Poster ID # IBDC-2022-09

SMART OPERATION THEATRE LIGHT DESIGN WITH CAMERA RECURSIVE IMAGE PROCESSING TECHNIQUE FOR SHADOW MINIMIZATION

Tehreem Tariq Awan, Muhammad Dilawar Khan, Hina Suleman, Muhammad Faris

The Operation Theater (OT) light is intended for optimal visualization during operation and provides prolonged periods of intense light without excessively heating the patient or personnel. It supports healthcare professionals during surgical procedures by illuminating a patient's local area or cavities. The control unit used the camera's live feed as an input for processing and by using of shadow detection, and then it used that information to operate the motor in a way that minimized shadow interruption. The objective of this project is to construct an OT light that can be both economical and easy for surgeons and paramedics to use during surgery. Features include not producing burning effects or eye strain, being cool and focused, and having fewer shadows. Since it is homogeneous, it is suitable for illuminating that restrained surface. Clinicians, surgeons, and proceduralists all use it.

Poster ID # IBDC-2022-10

BACK MASSAGER

Maheeb Jamal, Junaid Jamshed, Akasha Saleem, Usama Zia, Sunila Afroz, Bushra, Jabeen Mehdi

Back Problems have been common in people where the pain is developed without a cause and is identified by the doctors. Massage is used as supplementary to treat many diseases. A simple massage helps warm up muscles and increase blood and lymphatic circulations, which let the healthy nutrients to be passed around the body. The first vibrational belt had a simple structure based on the vibration. It was placed around waist and the shakes were produced by the vibration motor. Later on, with several new invention the method of massage changed.

Poster ID # IBDC-2022-11

TREATMENT OF OSTEOPOROSIS USING 5D BIOPRINTING

Muhammad Hassan Khanzada, Syeda Muskaan Zehra, Ariba Khan, Dr. Muhammad Danish Mujib

Osteoporosis is a bone disease that develops when bone mineral density and bone mass decrease, causes bones to become weak and brittle which increases the risk of fracture. It is being a global health epidemic increasing concerns of osteoporosis related fractures. About 50% of women and up to 25% of men are affected by it globally. 80-90% of patients having with osteoporotic bones go untreated as there is no cure for it. Researchers are working on bone regeneration using 3d bioprinting technology but the problem with 3D bioprinted bones which are not provided sufficient mechanical strength and stability, and cannot maintained curve structure, and are not good enough for biological system causing multiple surgeries. We are proposing a solution to resolve these issues using 5D bioprinters and biocompatible materials. Our proposed 5D bioprinted model provides potential to fabricate artificial bone for surgery, as we are using customized biomaterial which is biocompatible, bioactive, contains minerals naturally present in bones, and having bone regeneration properties; is strong enough to a level that the bone is able to acquire its desired shape, providing mechanical strength and stability needed, relief from pain, and with no danger of bone damage, resolving the problems of replacement, attachment, and movement of bones.

Poster ID # IBDC-2022-12

DEVELOPMENT AND CHARACTERIZATION OF NOVEL BIOCERAMIC BASED ROOT CANAL SEALER HAVING POTENTIAL IN DENTAL RESTORATION

Nisma Rizwan, Manal Naushad, Mirza E.H, Muhammad Rizwan, Samiha Imran, Sahar Amjad, Umair A. Khaliq

Root canal therapy is an essential part of endodontic treatments and at its core is the use of a dental sealer. Various dental sealers, such as resin-based, zinc eugenol, and silicate sealers, have been and continue to be widely used in dental restorative procedures, each with its own shortcomings in terms of the properties that a dental sealer should possess. We fabricated and characterized a carbonate apatite-based dental sealer with potential for use in dental restorative procedures. The usage of carbonate apatite is based on its superior properties, particularly bioactivity and biocompatibility, which increase root dentin bonding and produce a tighter seal. Furthermore, we incorporated 63S bioglass to enhance the properties and study the effects of its incorporation. The sol-gel method was used for the fabrication of 63S bioglass and dental sealers were obtained through a manual mixing technique. Fabricated samples were lab tested via XRD, TGA/DSC, FTIR, SEM and pH analysis. The findings from our tests validated our fabrication techniques, and verified the properties of the fabricated dental sealers

CLOSING PROGRAMME



The Institution of Engineers Pakistan

CLOSING SESSION

on Wednesday the 23rd November 2022
at (A/V Hall) Department of Civil Engineering
NED University of Engineering & Technology, Karachi





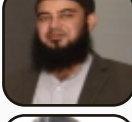
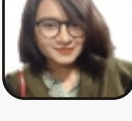
15:45 - 15:50	Recitation from the Holy Quran
15:50 - 15:55	National Anthem
15:55 - 16:00	Conference Highlights by Dr. Engr. Eraj Humayun Mirza Chairman, Department of Biomedical Engineering, NEDUET & Conference Co-Convener IBDC-2022
16:00 - 16:05	Address by Engr. Sohail Bashir Chairman, IEP, Karachi Centre
16:05 - 16:15	Keynote Address by Mr. Abdullah Butt, Digital Health Expert
16:15- 16:25	Keynote Address by Engr. Dr. Riazuddin, Haptics Lab & NCRA, NEDUET
16:25 - 16:30	Address by Engr. Prof. Dr. Sarosh Hashamt Lodi Vice-Chancellor, NEDUET & Patron in Chief IBDC-2022
16:30 - 16:40	Address by the Chief Guest
16:40 - 16:45	Conference Recommendations by Dr. Muhammad Abul Hassan, Conference Secretary, IBDC-2022
16:45 - 16:55	Chairman's Medal for Best Paper and Best Poster Award
16:55 - 17:05	Presentation of Conference Mementos
17:05 - 17:10	Vote of Thanks by Dr. Syed Faraz Jawed Program Secretary, IBDC-2022
17:10 - 17:45	Prayers & Refreshments

KEYNOTE SPEAKERS OF 1st INTERNATIONAL BIOMEDICAL & DIGITAL HEALTH CONFERENCE

CONFERENCE DAY 1

	Dr. Suhail Chughtai	Orthopaedic Surgeon Telehealth Strategist	Medical City Online
	Dr. Javed Ismail	Director Non-Communicable Diseases	Precision Health Consultant Global (PHC Global)
	Dr. Zahid Faheem (Ziauddin)	Chief Operating Officer	Dr. Ziauddin Hospital
	Dr. Shariq Khoja	Global CEO	Tech4Life Enterprises

CONFERENCE DAY 2

	Dr. Salman Haleem	Assistant Professor	School of Engineering University of Warwick
	Dr. Farhan Abdul Ghaffar	Assistant Professor	Electrical Engineering Lakehead University
	Dr. Darakshan Haleem	Meritorious Professor (Neuroscience)	PCMD, ICCBS University of Karachi
	Dr. Anila Kazmi	Group Head, Manager	Department of Quality Assurance, Ziauddin Hospital
	Dr. Atiq ur Rehman (IST)	Assistant Professor	Materials Science and Engineering Institute of Space Technology Islamabad
	Dr. Saad Jawaid Khan	Associate Professor, Chairman, Biomedical Engineering Department	Ziauddin University
	Dr. Eraj Humayun Mirza	Associate Professor, Chairman, Biomedical Engineering Department	NED University of Engineering and Technology
	Dr. Muhammad Abul Hasan	Associate Professor	NED University of Engineering and Technology
	Ms. Tajwar Sultana	Lecturer	NED University of Engineering and Technology

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10TH INTERNATIONAL CONFERENCE ON

OCCUPATIONAL HEALTH, SAFETY & ENVIRONMENT

Join us on

Theme for 2022
LIFE WITH SAFETY

Inaugural Session
9th December, 2022
at Karachi Marriott Hotel

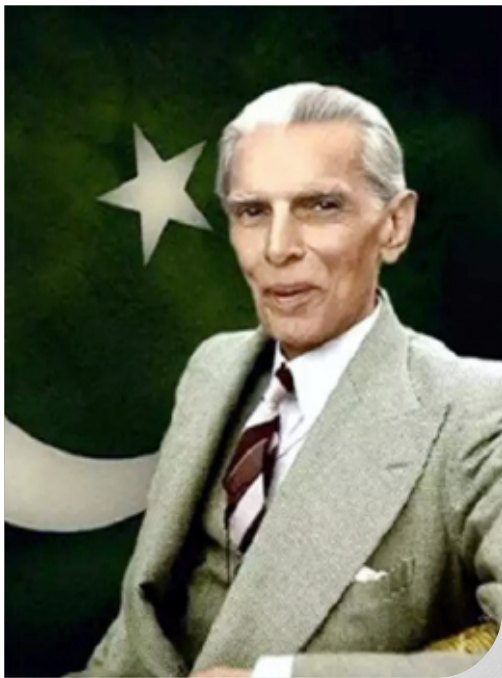
Technical Sessions
10th December, 2022
at NEDUET, Karachi



In collaboration with



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FATHER OF THE NATION

Quaid-e-Azam Muhammad Ali Jinnah

Message on the occasion of
Foundation Stone Laying Ceremony of the
Institute of Engineers Pakistan, Headquarters
at Dacca on 30th May, 1948

"If Pakistan is to take its proper place among the progressive nations of the world, it will have to take up a good deal of leeway in the realm of scientific and technical education which is so necessary for the proper development of the country and the utilization of its resources. The establishment of institution like the Institute of Engineers will greatly stimulate technical research and help in disseminating available information.

The Institute of Engineers will not only benefit the engineers themselves by improving their technical knowledge but also bring lasting benefits to public services which they are called upon to perform.

I wish the Institute every success"