



Technical Co-Sponsor



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17th IBCAST-2020

International Bhurban Conference on
Applied Sciences & Technology

14th – 18th January, 2020

IBCAST: An Introduction

Science and Technology are making advances at a fast pace and are undoubtedly the principal agents of progress in the modern world. The revolutionary improvements in the information and communication fields have opened great avenues of sharing scientific knowledge and experiences but still the most effective way is through conferences and through direct interactions. In this modern era, there is a realization of synchronization with the fast-growing technologies as well as the identification of allied areas. This led to the idea of holding a series of conferences, addressing the contemporary research areas – what is known as the International Bhurban Conference on Applied Sciences and Technology (IBCAST). This effort was not only to promote the latest trends in the research and applications but also to make them accessible to those in need for industrial and economic growth of the country.

Since 2002, the IBCAST is being held regularly in the vicinity of Islamabad, the capital of Pakistan. Until the year 2005, four technological areas namely; Advanced Materials, Control Engineering, Computational Fluid Dynamics and Wireless Communication & Radar were covered. Later, five more research areas – Biosciences, Medical Sciences, Cyber Security & Assurance Technologies, Underwater Technologies and Aerostructures were included. So far, more than 12000 scientists and engineers have participated from Pakistani and foreign universities as well as scientific organizations with around 2750 research papers having been presented. The proceedings of the conference are published by IEEE and catalogued in renowned international journals on yearly basis. So far, 16 conferences have been successfully organized by the CESAT, Islamabad, which is a setup of Centers of Excellence in Science and Applied Technologies of the country with diverse research activities.

To expand the horizon of this conference, IBCAST, has formed associations with universities from China since 8th IBCAST, namely; Beihang University (BUAA), Beijing Institute of Technology (BIT), Nanjing University of Aeronautics and Astronautics (NUAA), Northwestern Polytechnical University (NPU), Harbin Engineering University (HEU), Wuhan Institute of Virology, Chinese Academy of Sciences (WIV) and Shanghai Jiao Tong University (SJTU). Apart from these universities researchers from other countries also participate in the conference. More than 40 foreign scholars participate in the conference every year.

IMPORTANT DATES

Visit IBCAST website for latest updates

Abstract Submission

30th June, 2019

Abstract Acceptance

31st July, 2019

Paper Submission

30th August, 2019

Paper Acceptance

1st November, 2019

Participation Application

20th November, 2019

IBCAST SECRETARIAT:

Patron-in-Chief IBCAST

Dr. Nabeel Hayat Malik, HI, SI

Scientific Secretary IBCAST

Dr. Muhammad Zafar-uz-Zaman, SI

Executive Secretary IBCAST

Dr. Sajid Raza Chaudhary, SI

IEEE Publication Chair

Syed Ali Abbas

Coordinator IBCAST

Abdul Ahad Qureshi

Technical Coordinator IBCAST

Dr. Mohsin Raza

Summary of last 16 IBCAST Conferences

■ Invited Talks / Speakers	621
■ Contributed Talks	2774
■ Participants / Attendees	12200
■ Paper Published in IEEE Xplore	1001

REGISTRATION FEE

Organizations & Professionals

Rs. 5000/-

Local Pakistani Paper
Presenters & Students

Rs. 2000/-

Foreign Professors

US \$ 400/-

Foreign Students

(including CESAT scholars /
Paper presenters / other Pakistani)

US \$ 300/-

* Accommodation at the venue shall only be provided to the paper presenters and invited speakers coming from outside Islamabad. Other participants may make their own arrangements, IBCAST Secretariat may help them in this regard.

** IEEE members will be given 20% discount in Registration Fee.

** Fee once deposited is non-refundable and non transferable.

Note: Application Form is available at:
www.ibcast.org.pk

ABSTRACT SUBMISSION

Authors are invited to submit extended abstracts of a length of about 250-500 words in **MS Word Format**, including title, author's affiliation, email, phone number and mailing address.

Abstracts may be submitted online at the IBCAST website
www.ibcast.org.pk

This conference has successfully provided a platform for bringing together the researchers from the advanced and developing countries to share their research outcomes with reference to the development needs of this part of the world. Every year the IBCAST technical programme aims at appropriate selection of the topics both at the frontiers of knowledge and their applications.

The 17th IBCAST will consist of the following nine activities:

1. **Advanced Materials**
2. **Aerostructures**
3. **Biosciences**
4. **Control & Signal Processing**
5. **Cyber Security & Assurance Technologies**
6. **Fluid Dynamics**
7. **Medical Sciences**
8. **Underwater Technologies**
9. **Wireless Communication & Radar**

IBCAST ACTIVITIES

1- ADVANCED MATERIALS

Exceptional Scientific and Technological growth, observed in last few decades, was not possible without parallel development of the materials needed. Zealous efforts of the related research community are evident from innumerable publications appearing in related Journals every year. Research on polymers, plastics, polymer based composites, metals and their alloys, carbon materials and others has resulted in a broad spectrum of materials available for the diversified applications. Better understanding of the materials' properties and functionalities at nano-scale has also contributed to this growth, which is likely to be continued. The Advanced Material Chapter of 17th IBCAST Conference will provide opportunities to scientists and engineers to share their knowledge and ideas about materials, their properties, behavior and applications. The scope of the Advanced Materials Activity includes following areas:

- **Nanomaterials and Nanotechnology**
- **Polymers and Polymer Composites**
- **Fiber Reinforced Composites (FRPs)**
- **Advanced Alloys, Powder Metallurgy and Metal Metal Composites (MMC)**
- **Ceramics and their Composites**
- **Coating & Surface Technology**
- **Materials for Electromagnetic Radiation Protection**
- **Materials Processing Technologies**
- **Smart / Functional Materials**
- **Materials Characterization**
- **Energy Harvesting and energy storage Materials**
- **Photonic, Optical and Semiconductor Materials**

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2- AEROSTRUCTURES

Today's aerostructures require stringent conflicting technical certification as well as financial requirements compliances. These requirement can be met effectively only through extensive coordination of researchers from academia and industry. IBCAST is one such conference in Pakistan that provides a platform through its Aerostructures chapter for the researchers from within Pakistan and abroad to share their experiences and knowledge in this important field of science and technology. This forum encompass numerous challenges faced by the aerospace industry during the design, development and testing phases and which can only be met by the use of state of the art computational tools, e.g. finite element method, boundary element method, smooth particle hydrodynamics etc. coupled with powerful computing hardware. The research areas that will be discussed in the forum include, but not limited to;

- Aerospace structural design
- Static, Dynamic and thermal structural simulations
- Static and dynamic aeroelasticity
- Vibration, acoustics and model analysis
- High strain Rate impact simulations
- Fracture and damage tolerance
- Fatigue life assessment
- Structural Optimization
- Biomechanics
- Advanced manufacturing techniques
- Advanced testing techniques
- Structural Reliability Analysis
- Multiscale Modeling
- Joints / Interfaces
- SHM (Structural Health Monitoring)
- NDI for Composites
- Wave and Wind Loading
- Computer Aided Design
- Case Studies of Structural Failure
- Materials' Dynamics Properties
- Design of Thin Walled Structures

3- BIOSCIENCES

17th IBCAST Biosciences (BS) module aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results on all aspects of "Biosurveillance, Microbial Detection & Countermeasures". This may result in exploring collaborations and to spark new ideas, with the aim of developing new projects and exploiting new technologies.

The sub themes includes

- Components and tools of effective Biosurveillance program
- Biosurveillance utility, effectiveness and challenges
- Process of collection, analysis, interpretation, and dissemination of data
- Biological Risk Assessment
- Recent innovations, trends, concerns and practical challenges in lab and field based biodetection technologies
- Advancements made in the treatment, vaccine development, prevention / control of microbes and their vectors

4- CONTROL & SIGNAL PROCESSING

Control engineering is the science of manipulating engineering systems for optimal performance in real-operating environments. Control engineers are concerned with mathematical modeling, computer simulation, control design and its implementation. The field is, therefore, multi-disciplinary and covers a range of technologies. Control systems are seen at work in small and simple household appliances, large-scale industrial plants such as steel rolling mills and refineries, very sophisticated and complex systems such as aircraft, nuclear reactors and satellites. Control system technology has thus driven the engineers to operate their systems at the peak of their performance without compromising system stability or integrity. Furthermore, new developments in simulation techniques have helped in the application of innovative control algorithms. The advent of high performance microprocessors has significantly increases the capability of control systems. Efficient digital controllers have alleviated the need for expensive instrumentation and costly components, contributing towards low cost quality products with enhanced performance.

The importance of Signal Processing in the engineering domain cannot be over emphasized. With new generation computer technology and configurable integrated circuits, powerful algorithms can be implemented in real time and used in various contemporary fields such as telecommunication, image, video and audio processing, sonars, biomedicine, seismology and computer vision.

In this conference, research papers are sought on the latest developments in control and signal processing theory and technologies. Papers of interest include those that describe theory, analytical techniques, applications, and technological developments. Topics to be covered in this activity include, but not limited to:

Control:

- System Modeling & Analysis
- Instrumentation and Data Acquisition
- Multi-sensor Data Fusion, Tracking and Control
- Autonomous Control and Unmanned Systems
- Guidance, Mission Control and Operations
- System Identification and Linearization
- Automotive Parameter Estimation and Control
- Control Theory, Analysis and Design
- Fault Diagnostics, Detection and Isolation
- Fault-Tolerant Control
- Simulation as an Engineering Design Tool
- Distributed Simulation Technologies
- Hardware in the Loop Simulation
- Launch and Orbital Systems and Simulation
- AI Simulation Techniques and Applications
- Monte Carlo Simulation Techniques
- Nonlinear Control for Aircraft Systems
- Flight Formation and Control
- Aero Engine Modeling and Control

Signal Processing:

- Computer Vision & Graphics
- Statistical Methods and Learning Algorithms
- Pattern Recognition, Deep neural Networks, Bagging & Boosting Classifiers
- Remote Sensing
- Big Data and Image/Audio/Text/Analytics
- Image Recognition and tracking
- Multidimensional Signal Processing and Speech Recognition
- Medical Imaging
- Algorithmic Implementations on FPGA /ASIC / Embedded Systems
- DSP related RTOS Issues
- Sensor Networks
- Hyperspectral and Multispectral Imaging
- Robotic Perception
- 3D point cloud Sensing & Processing
- Video Processing and Compression

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5- CYBER SECURITY AND ASSURANCE TECHNOLOGIES

Digital information is revolutionizing all fields of technology with electronic infrastructure serving as the communication backbone. Cyber Security is a rapidly growing area encompassing IT systems, computer networks, software, communications, cryptography and various other disciplines. Due to recent technological developments, the dependence of economy and other public and private affairs on internet and digital infrastructure is on the rise. This reliance demands reliability and security of cyber space and information flow. Furthermore, cyber space attacks show a direct threat to banking institutions, energy, infrastructure, state agencies and even social affairs. Therefore, cyber security and reliability has become crucial.

The aim of the track is to bring together researchers working on different facets of cyber security to advance this particular body of knowledge and solve the real world security related problems. Particular focus is given to the research areas involving latest topics & emerging cyber security concepts, techniques, technologies and trends, e.g., Internet of Things(IoT), Cognitive Computing and Deep Learning, Fog Computing, Cloud Computing, Virtualization, Edge Computing, Artificial Intelligence and Machine Learning, Big Data Processing and Analytics, Software Defined Networks, Blockchain, Crypto Currency, etc.

Computing software requires specialized quality assurance and testing techniques like formal verification to confirm absence of bugs. Formal verification exposes the boundary conditions and worst case scenarios which are not possible using merely computer simulations. This part of the activity also invites researches in the fields like Software Quality, Theory of Automata, Logic and Formal verification, etc.

Topics of interest include, but are not limited to:-

- Emerging Cyber Threats and Defense
- System and Network Security
- Protocol Analysis and Security
- Virtualization Security
- Data Loss Prevention Techniques
- Digital Forensics
- Privacy and Risk Management
- Malicious Code Analysis
- Hardware Security
- Trojans Detection and Prevention
- Supply Chain Security
- Security of Cyber-Physical Systems
- Security of Industrial Control System (ICSs)
- Anonymity and Identity Management
- Software Quality Assurance
- Formal Methods and Theory of Automata
- Exploiting and Exploring Secure Mathematics (Cryptography)
- Artificial Intelligence applied on cyber security
- Internet of Things – Security in Smart Devices
- Blockchain and Crypto Currency
- Cryptographic Security and Evaluation Standards
- Machine Learning Techniques for Cyber Security
- Quantum Security and Legacy Security Solutions
- Mathematical Evaluation of Security Solutions
- Zero Trust - Handling Insider Attacks

The track also invites and warmly welcomes the proposals for “**Special Sessions**”, “**Tutorials**”, “**Technical workshops**”, “**Training sessions** (Including Hands-On)”, and “**Security Demos**” in allied areas of Cyber Security aligned with regular theme of the track.

6- FLUID DYNAMICS

Fluid dynamics (FD) activity encompasses principally all the spheres related with the applied fluid dynamics. The main theme is to encourage all the relevant novel ideas and research work carried out numerically and through experiments. The application areas include flows inspired from nature and flow analysis around various aerodynamic objects. It also covers the flow analysis carried out in automotive, civil, defense and process industries etc.

Information about the physics of the flow can be obtained from measurements in experimental test facilities or from flow visualization studies. However, there are some limitations and a full picture of flow fields is often hard to obtain from experimental studies. Computational fluid dynamics (CFD) is a core research front in fluid dynamics. It is a technique to model and analyze fluid flow using a computer simulation. CFD techniques can be applied to solve industrial flow problems especially in complex flow situations of aerodynamics and hydrodynamics.

The IBCAST will provide an opportunity to the local and foreign researchers to benefit from mutual exchange of ideas, discuss their queries and problems with the experts and to explore the new avenues in active research fronts.

The broader scope of the 17th IBCAST, FD – 2020, session is to cover the following areas:

- Gas Dynamics
- Aerodynamics
- Hydrodynamics
- Industrial and Environmental Fluid Dynamics
- Fluid Structure interactions
- Turbulence Modeling
- Experimental Fluid Dynamics
- Multiphase flows
- Reactive flows
- Heat Transfer

Special Topic on Wind Tunnel – Design, Testing and Visualization

- High and low Speed Wind Tunnel Design – Trends and Considerations
- Design and Calibration of String Balance and other instrumentation
- Latest Techniques in High and Low Speed Wind Tunnel Testing
- Scale Down Model – Challenges and Limitations
- Visualization Techniques (PIV, PSP etc)
- Captive Trajectory Simulation (CTS) - Challenges and latest Trends
- Wind Tunnel Vs Water Tunnel

7- MEDICAL SCIENCES

Accident & emergency

Ongoing war on terror has proven the fact that the trauma victim need not only be a young soldier. Swift in onset and slow in recovery, trauma is the most common cause of death worldwide. Trauma response protocols are ever changing, as are the ways and mechanics of trauma causation. Enormous strides have been made in recent years in the initial treatment and stabilization of trauma patients. Technological advances alone are not enough rather it is the medical responder's training which ensure that the trauma victim gets managed within the golden hour and adequately leading to optimal outcomes.

A hand-on training for the management of trauma, from minor injury to catastrophic disaster situations, including care for women, children, and the elderly, with the principal goal of improving quality of care and patient safety, would be organized for the 17th IBCAST 2020. It is designed to equip frontline health providers with basic trauma, anesthesia, and surgical skills. This session would address both junior and senior doctors, nursing staff, paramedics and resuscitation officers.

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Pediatrics

Early diagnosis and management of newborns and infants with inherited metabolic disorder is essential for the affected children's outcome. However, the quick and correct recognition of specific inherited metabolic disease in neonates is a challenge for neonatologists. It may be difficult, especially in critically ill neonates, to distinguish between the primary genetically encoded metabolic disorder and the secondary metabolic disturbances resulting in similar clinical picture.

This symposium shall make use of an experienced team of pediatricians and neonatologists, who are substantially experienced and have an excellent understanding of metabolic disorders in childhood. The course is aimed at pediatricians, medical officers and post graduate trainees.

8- UNDERWATER TECHNOLOGIES

Ocean is alive with noise and approximately 71% of the earth surface is covered by the ocean. The advancement and research in underwater technologies has direct impact on human endeavor to explore the nature. The field of underwater technologies spans over a wide range; which includes ocean vehicles, underwater communications, sonar systems, oceanography and has ever increasing role in defense applications. Research areas like marine life preservation, seafloor geological resources and marine pollution hazards etc are of significant importance for Pakistan which has more than 1000kms of coastline and an exclusive economic zone spread over an area of more than 2,35,000 square kilometers.

The Underwater Technologies chapter of IBCAST provides opportunities for spread of information, exchange of knowledge and novel ideas among the practitioners of various fields of underwater technologies.

The Underwater Technologies chapter of the 17th IBCAST - 2020 invites contributions in:

Underwater Communication

- Acoustic telemetry and communication
- Channel Physics and Ocean dynamics
- Radio Frequency Communications
- Optical Communications
- Network Models
- Adaptive/Smart modems
- Modem Architecture and Software Defined Modems
- Embedded System

Sonar Signal/Image Processing and Sensors

- Array Signal Processing and Array Design
- Detection, Classification and Localization
- High Resolution Spectral Analysis
- Synthetic Aperture Sonar (Active and Passive)
- Sonar Imaging and Displays
- Transducer Arrays & Materials
- Suspension System for Sonar Buoys
- Sonobuoy Dynamics and Control
- Sonar Test and Calibration

Ocean Vehicles

- Vehicle Design
- Vehicle Navigation and Positioning
- Unmanned Underwater Vehicles (UUVs)
- Remotely Operated Vehicles (ROVs)
- Naval Architecture
- Underwater Fittings and Installations

Marine Environment and Oceanography

- Marine Surveys
- Marine Renewable Energy
- Marine Pollution
- Marine Geology and Mineral Resources
- Hydrography and Seafloor mapping
- Mineral Resources

9- WIRELESS COMMUNICATION & RADAR

Microwave Engineering and Electromagnetics are key technology areas. Many of the modern day electronic gadgets and devices owe their existence to some derivative of electromagnetics and microwave engineering. Radio sets & radio broadcasting, televisions & real time video transmission through satellites, speed monitoring radars to space borne imaging radars, sophisticated avionics to what has become a necessity of contemporary times, cellular communications all stem from advancement in microwave engineering. Historically, it was the advancement in radar development during Second World War that substantiated the potential of microwave engineering. As the products evolved through the corridors of time, technologies associated with this sphere of engineering became pivotal in imparting cutting edge to number of military and civilian equipment. The Wireless Communications and Radar Activity of IBCAST offers a broad coverage of topics related to RF and microwave technology making it a premier event in this area for scientific and educational community in Pakistan. Our endeavor is to promote research in this key technology area and bring academia and industry closer to bridge this technology gap.

Topics related to technologies up to systems and applications are covered such as waveform generation; radar signal processing; antenna systems; radar imaging and object classification etc. In recent past electro medical devices has also been benefited by wireless technology and radar principles; therefore, this topic has been included in the scope of WCR activity. Another salient feature of this year's activity is a special session on "**Phased Array Radars & Characterization**".

Quality papers reporting on novel solutions on the following topics are invited for 17th IBCAST WC&R activity:

Radar Topics

- Synthetic Aperture Radars, ISAR
- MIMO Radars
- Ultra Wide Band Radar, GPR
- Radar Performance Modeling/Measurement
- Bistatic / Multi-static Radars
- Analog / Digital Beam Forming
- Near Field & Far Field Antenna Characterization
- Radar Signal Processing
- Phased Array Radar Calibration
- Multifunction Phased Array Radar
- Space Time Adaptive Processing (STAP)
- Radar DSP Hardware
- RF / Microwave Circuit Design, RFICs & MMICs
- Reconfigurable Front-ends
- Active / Passive Device Modeling
- Computational Electromagnetics
- Radio Imaging including mm-wave and THz
- Imaging systems
- RCS Reduction / Stealth Design
- High Resolution Range Profile (HRRP)

Wireless Communication Topics

- Software defined Radios
- Satellite & Space Communication
- Emerging Wireless Mobile Applications
- Network Centric Warfare
- Electromagnetic Scattering, Channel / Interference Modeling
- Adhoc Networks
- Wireless Technologies in Electro Medical Devices
- Metamaterials, FSSs and Electromagnetic Bandgap Structures
- Communication Systems Simulation
- Integrated Transceivers
- Wireless Power Transfer and Energy Harvesting
- Smart Antennas
- MIMO Systems
- Antenna Systems: Theory, Modeling and Measurement
- Internet of Things Near body communication



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International Bhurban Conference on
Applied Sciences & Technology

14th – 18th January, 2020

Paste Recent
Photograph
Size: (1.5" x 2")

Application for Participation

PLEASE USE BLOCK LETTERS OR TYPE

*First Name: _____ *Last Name: _____

*Nationality: _____ *CNIC / Passport No. _____

*Affiliation & Position: _____ DoB _____

Postal Address: _____

Phone: _____ Fax: _____

*Email _____ *Mobile: _____

*Residential Address: _____

Education (Highest Degree):

<u>Institution Attended</u>	<u>Period (years)</u>	<u>Degree Obtained</u>
_____	_____ to _____	_____

Current field of interest: _____

Number of publications during last five years: _____

17th IBCAST Activities of Interest: (Please indicate one activity only)

- | | |
|----------------------------------------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/> 1 Advanced Materials | <input type="checkbox"/> 6 Fluid Dynamics |
| <input type="checkbox"/> 2 Aerostructures | <input type="checkbox"/> 7 Medical Sciences |
| <input type="checkbox"/> 3 Biosciences | <input type="checkbox"/> 8 Underwater Technologies |
| <input type="checkbox"/> 4 Control & Signal Processing | <input type="checkbox"/> 9 Wireless Communication & Radar |
| <input type="checkbox"/> 5 Cyber Security and Assurance Technologies | |

Venue: National Centre for Physics, Quaid-e-Azam University, Islamabad

Organized by: Centres of Excellence in Science and Applied Technologies (CESAT) Islamabad, Pakistan

Mailing Address: Dr. Muhammad Zafar-uz-Zaman

Scientific Secretary (IBCAST)

International Bhurban Conference on Applied Sciences and Technology

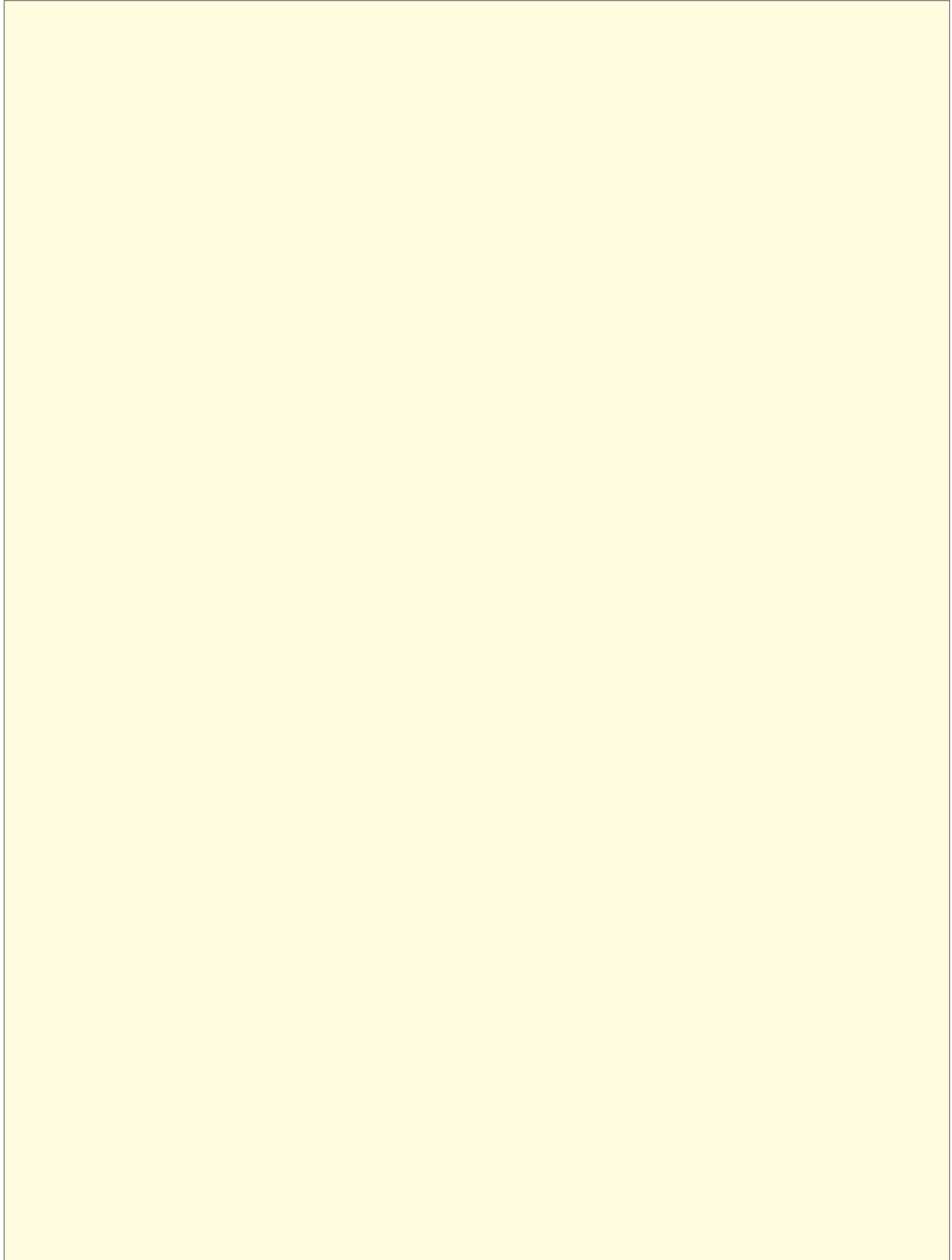
CESAT, H-11/4, Islamabad - Pakistan.

Secretariat Phone #: +92(051) 9257026, Fax #: +92(051) 2371025

Secretariat Email: secretary@ibcast.org.pk, info@ibcast.org.pk, Conference URL: <http://www.ibcast.org.pk>

Note: Fields with (*) are mandatory.

Last Date of Application for Participation is 20th November, 2019.



Notes

A sheet of white lined paper with horizontal dashed lines, placed on a yellow background. The top right corner of the paper is folded over, revealing a silver, reflective surface underneath. The word "Notes" is written in a blue cursive font at the top center of the page.

提交论文之通知

第17 IBCAST会议-2020

国际Bhurban应用科技会议



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2020年1月14~18日

主要日期

提交摘要

2019年6月30日

接受摘要

2019年7月31日

提交论文

2019年8月30日

接受论文

2019年11月1日

登记会议

2019年11月20日

IBCAST SECRETARIAT:

IBCAST 主任

Dr. Nabeel Hayat Malik, HI, SI

IBCAST 科技秘书

Dr. Muhammad Zafar-uz-Zaman, SI

IBCAST 行政秘书

Dr. Sajid Raza Chaudhary, SI

IEEE 出版长

Syed Ali Abbas

IBCAST 联系人

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IBCAST 简介

从2002年以来，IBCAST会议每年一次举行在巴基斯坦的首都伊斯兰堡。在开始的三年内，即到2005年，本会议仅包括4种技术：高级材料、控制工程、计算流体动力学以及无线电通讯与雷达。后来，又增加了电子计算机安全、生物医学、医学和水下技术等专业。在第17 IBCAST会议中，还打算增加飞机结构这种一个迅速发展和应用的专业。

从建立以来，在一共有16个会议中，已经有12000多名巴基斯坦、国外大学以及不同科学组织的科学家和工程师参加过本会议。在这些会议中，2750多本论文也被提出和讨论过，而且每年的会议论文集出版在国际性的著名期刊上。此会议由CESAT举办。

第17 IBCAST会议将讨论以下9种专业：

1. 先进材料；
2. 飞机结构学；
3. 生物科学；
4. 控制与信号处理；
5. 网络安全；
6. 流体动力学；
7. 医学；
8. 水下技术
9. 无线电通讯和雷达。

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Foreign Students

(including CESAT scholars / other Pakistani)

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提交摘要

作者应提交论文题目和长度为250~500英文词的摘要以及他大学名字、邮件、电话号码和地址等信息。

摘要可以通过IBCAST的网页提交。

注：作者可以在线登记。