



# Conference Report

## ***Pakistan's First International Conference on Microwave, Antennas & Circuits***

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The Research Institute for Microwave and Millimeter-Wave Studies (RIMMS) at the National University of Sciences and Technology (NUST), Islamabad, Pakistan, and the National Institute of Electronics, Islamabad, organized Pakistan's first dedicated International Conference on Microwave, Antennas & Circuits (ICMAC 2021) on 21–22 December 2021 at the NUST H-12 Campus, Islamabad (Figure 1). The conference was the culmination of a vision that started four years ago with the establishment of Pakistan's first IEEE Antennas and Propagation Society (AP-S); IEEE Microwave Theory and Technology Society (MTT-S); IEEE Electromagnetic Compatibility Society (EMC-S); and IEEE Circuits and Systems Society (CAS) Joint Technical Chapter at NUST-RIMMS, Islamabad. While holding international work-



**Figure 1.** *The ICMAC 2021 official logo.*

shops and seminars in 2017, 2018, and 2019, the Chapter has organized more than 100 events and webinars by eminent local and international speakers since its inception. ICMAC brings together this experience to organize the first-ever conference in Pakistan focused on three thematic areas of antennas, microwaves, and circuits.

ICMAC 2021, presented in hybrid mode, provided a unique platform to bring together a large number of local participants for face-to-face interaction as well as online participants from around the globe. The conference was free for students and IEEE

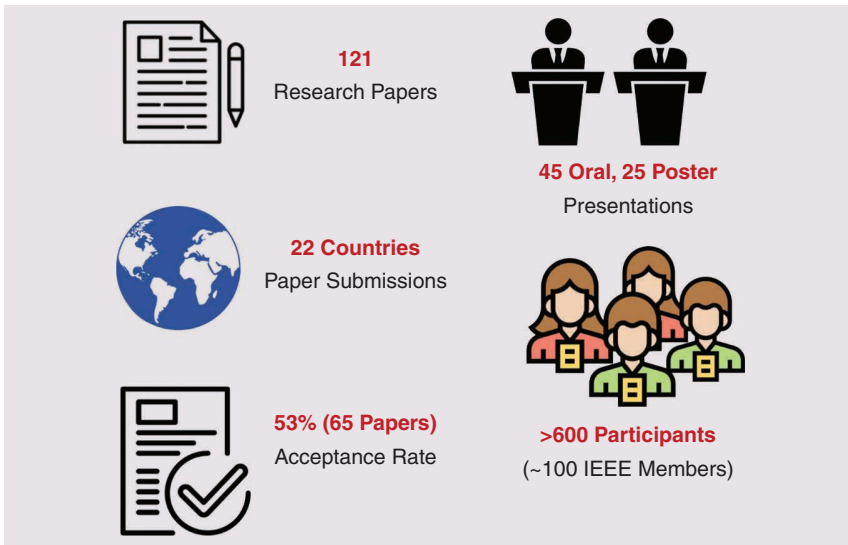
members. The conference received an encouraging response from the local and international community. The key statistics of the conference are shown in Figure 2.

ICMAC 2021 featured five keynotes from world-renowned professors, including Prof. Ke Wu from the University of Montreal, Canada; Prof. Behzad Razavi and Prof. Mona Jarrahi from the University of California, USA; Prof. Tei Jun Cui from Southeast University, China; and Prof. Atif Shamim from the King Abdullah University of Science and Technology (KAUST), Saudi Arabia. There were nine technical sessions on a variety of research topics, including antenna design and applications; microwave sensing and imaging; beamforming; radar; metasurfaces and CMOS; and gallium nitride (GaN) integrated circuits (ICs) and RF amplifiers. In addition, there was an interactive poster session; three panel discussion sessions; an industrial talk; and an exhibition. Special sessions on women in microwave engineering and humanitarian activities being conducted under the IEEE AP-S were also a part of the program. A gala dinner,

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**Figure 2.** Key statistics of the conference.



**Figure 3.** The Pro-Rector for Research, Innovation & Commercialisation–NUST, Dr. Rizwan Riaz, inaugurating the conference.



**Figure 4.** Dr. Atif Shamim from KAUST delivering the inaugural technical talk.

providing an excellent networking opportunity, was held at the end of the first day of the conference. The conference also housed an industrial exhibit by leading original equipment manufacturers and private companies.

The first day started with the inaugural speeches by the conference chair, Dr. Noshawan Shoaib, and the pro-rector for Research, Innovation & Commercialisation – NUST, Dr. Rizwan Riaz (Figure 3). Dr. Shoaib welcomed the participants and highlighted the key features of the conference technical program. Dr. Riaz emphasized the importance of such conferences for the betterment of the community. Afterward, Dr. Atif Shamim from KAUST, Saudi Arabia, delivered the inaugural technical talk on “Microwave Water-Cut Sensors for Oil Industry: From Design to Field Deployment” (Figure 4). He presented the key design challenges for the development of water-cut sensors based on RF and microwave and their importance for the oil industry (Figure 5).

After the inaugural session, two keynote talks were delivered. The first keynote talk was delivered by Prof. Mona Jarrahi from the University of California, Los Angeles, USA. The talk title was “New Frontiers in Terahertz Technology.” She shared her research activities in the terahertz domain and highlighted new advancements in terahertz technology. Prof. Ke Wu from the University of Montreal, Canada, delivered the second keynote talk on battery-less Internet of Things (IoT) sensors in which he discussed far-field wireless power transfer and harmonic backscattering techniques to power IoT devices (Figure 6).

Six technical sessions were held on the first day that were based on a variety of research topics, including antenna design and applications; microwave sensing and imaging; beamforming; radar; metasurfaces; and CMOS and GaN ICs. Afterward, a dedicated panel session on humanitarian activities was held that was organized by the IEEE APS SIGHT/COPE committee. The panelists



**Figure 5.** A group photo of conference participants after the conference’s inaugural ceremony.

included Prof. Yahia Antar (president of the APS) from the Royal Military College of Canada; Dr. Lwanga Herbert, IEEE SIGHT chair, USA; Dr. Ajay Poddar, Synergy Microwave Inc., USA (chair of the AP-S Chapter Activities Committee) (Figure 7); Dr. Jawad Siddiqui, the University of Alberta, Canada (chair of the AP-S SIGHT Committee); and Camila Rodrigues, Federal University of Campina Grande-UFPG, Brazil. The panelists highlighted the success stories of IEEE APS/COPE activities for the betterment of the community. In addition, different funding opportunities were shared with the participants to maximize humanitarian activities for the sustainable development of the underserved community. The gala dinner, providing an excellent networking opportunity, concluded the first day of the conference (Figure 8).

The second day started with two keynote talks by Prof. Behzad Razavi, the University of California, Los Angeles, USA, and Prof. Tei Jun Cui, Southeast University, Nanjing, China. Prof. Razavi presented the past and the future prospects of microelectronics (Figure 9), while Prof. Cui delivered a talk on new architecture information systems based on information metamaterials.

The second day also featured a panel discussion on “Challenges and opportunities in Radio Frequency (RF) and Integrated Circuit (IC) Design in Pakistan” (Figure 10). The panel

**Figure 6.** Prof. Ke Wu, the University of Montreal, delivering an online talk.

**Figure 7.** Dr. Ajay Poddar presenting during the IEEE APS SIGHT/COPE event.

was moderated by Dr. Hammad M. Cheema from NUST-RIMMS, while the panelists included Dr. Rashid Ramzan, Foundation for Advancement of Science and Technology-National University of Computer and Emerging

Sciences, Islamabad, Pakistan; Dr. M. Faeyz Karim, Nanyang Technological University, Singapore; Dr. Sajid Baloch, NECOP, Pakistan; Dr. Atif Shamim, KAUST, Kingdom of Saudi Arabia; Tahir Abbas, Islamabad, Pakistan;

Bcube Pvt. Ltd.; and Ammar Ahmad Khan, Islamabad, Pakistan; Nexus Telecom Pvt. Ltd. The panelists highlighted the importance of the RF and IC design research domain and provided

recommendations to ensure a sustainable ecosystem for RF and IC design R&D in Pakistan. In addition, three technical sessions were held on day two in which authors presented research

papers on 5G antennas; metasurfaces; and microwave devices and amplifiers (Figure 11).

A panel discussion titled “Challenges and Opportunities for Women in Microwave Engineering and the Role of Young Professionals for the Betterment of the Community” was conducted in which female professionals from four different countries shared their experiences (Figure 12). The panelists included Sherry Hess, IEEE MTT-S AdCom 2020–2022, MGA Women in Microwave (WiM) chair, USA; Dominique Schreurs, chair of the Strategic Planning Committee and member of Standing Committees and WiM, Belgium; Sara Barros, Operational Committee, and Young Professionals (YPs) chair for MTT-S, USA; Ines Inacio, young professional, MTT-S YP team member, The Netherlands; and Aqeela Saghir, Links Foundation, Italy. The panelists highlighted the role and importance of women in microwave engineering and encouraged young women to join this domain. A healthy Q&A session was held at the end of the session in which young female students asked interesting questions from the panelists.

The closing ceremony was followed by the poster session at the end of the conference’s second day. The closing ceremony was graced by the president of the Islamic Republic of Pakistan, His Excellency Dr. Arif Alvi (Figures 13 and 14). He appreciated the efforts of NUST in taking a lead role in the specialized areas of chip design and RF technologies. He asserted that the unprecedented growth in global markets of cellular phones, IoT, electronics, and Industry 4.0 necessitates the need of developing trained human resources who could contribute to meeting the domestic requirements of the country. Citing the United States–China trade war revolving around semiconductors, the president emphasized the need to develop an end-to-end ecosystem for ensuring the nation’s digital sovereignty and attaining a share in the burgeoning US\$500 billion



Figure 8. The ICMAC 2021 gala dinner.

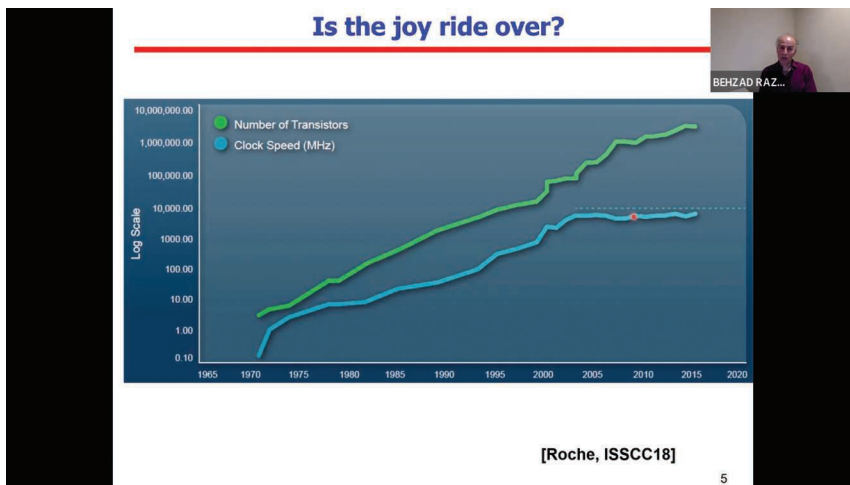


Figure 9. Prof. Behzad Razavi, the University of California, Los Angeles, delivering an online talk.

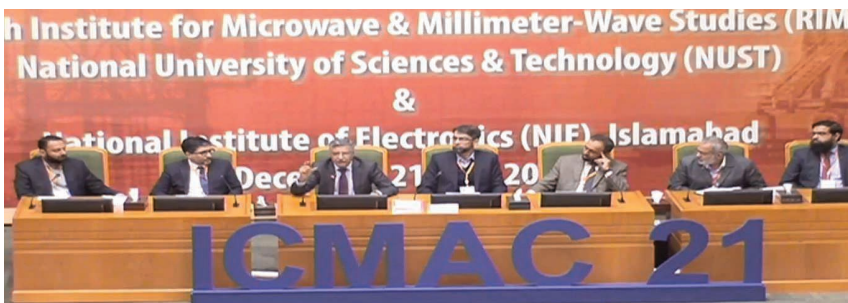


Figure 10. A panel discussion session on the challenges and opportunities in RF and IC design in Pakistan.

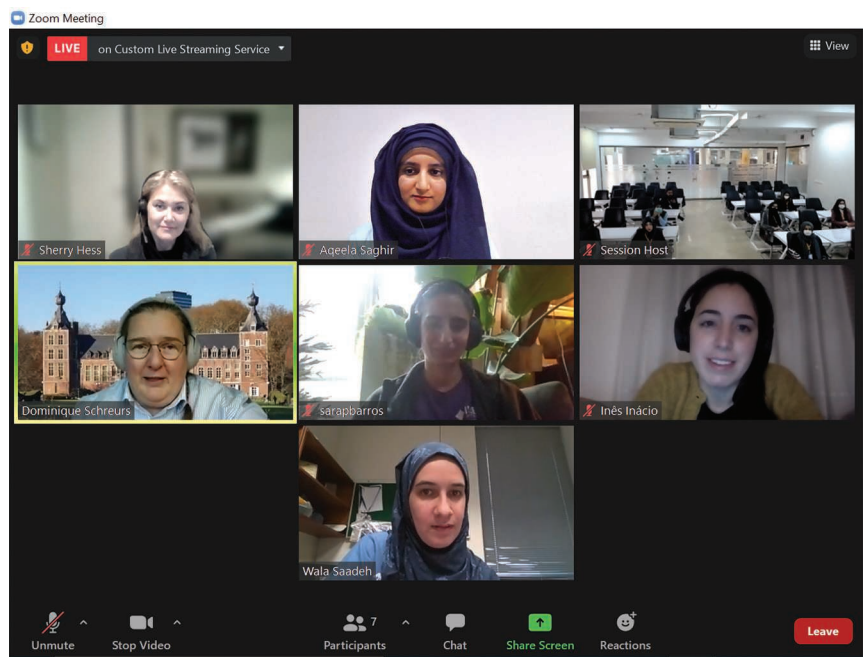


**Figure 11.** A few glimpses of ICMAC 2021 technical sessions.

semiconductor market. He commended the efforts of NUST-RIMMS for its strenuous efforts in arranging the conference and bringing together world-renowned professors, academicians, and researchers on a single platform.

In his address, the rector of NUST, Engr Javed Mahmood Bukhari, highlighted the importance of conferences as an avenue for academic and scientific discourse. Furthermore, he added that such platforms are essential for bridging the gap between industry-academia collaborations. He mentioned that NUST has always focused on specialized scientific fields that provide indigenous solutions for local technology requirements and save foreign exchequer. He also shared the efforts underway to promote chip design R&D at NUST, including the introduction of focused academic programs; research on digital and analog ICs; and the plans for a fabless chip design center on the NUST premises.

The conference general chair and principal of RIMMS, Dr. Hammad M.



**Figure 12.** A panel discussion session on women in microwave engineering.

Cheema (Figure 15), emphasized the need for a national-level policy discourse to set the direction of the chip design ecosystem in Pakistan. As this was the first-ever conference to be held

on these specialized topics in Pakistan, he lauded the excellent participation of more than 600 students, researchers, and industry representatives from the public and private sectors. The conference



**Figure 13.** His Excellency Dr. Arif Alvi, the president of the Islamic Republic of Pakistan, addressing attendees at the closing ceremony.

proceedings were published on IEEE Xplore and can be accessed via the following link: <https://ieeexplore.ieee.org/xpl/conhome/9678193/proceeding>.

In conclusion, we would like to thank all the national and international members of the TPC and the international advisors for their guidance and support. We also thank and appreciate all the students, researchers, and academicians who submitted their research work to the inaugural ICMAC 2021 and gave it a true flavor of a high-quality international conference. Stay tuned for the next edition of the ICMAC, which will be held in 2023 in a vibrant and lively city of Pakistan, i.e., Lahore. We hope to see you all there.

### Acknowledgment

The conference organizers would like to thank the financial sponsors, including Keysight Technologies as the platinum sponsor; Rohde & Schwarz as the gold sponsor; and the National Radio & Telecommunication Corporation and Anritsu as silver sponsors for their generous support. Thanks to the MTT-S for the conference technical cosponsorship. A very special thanks to the IEEE SEECs Student Branch and ICMAC 2021 student body who have volunteered for this conference and made it a great success (Figure 16).



**Figure 14.** A group photo of conference organizers and best paper award winners with His Excellency Dr. Arif Alvi, the president of the Islamic Republic of Pakistan.



**Figure 15.** Dr. Hammad M. Cheema, the conference general chair.



**Figure 16.** The ICMAC 2021 student volunteer team.