

CNRE-2021

05th–07th August, 2021

2021 International Conference on
**COMPUTING,
NETWORKS &
RENEWABLE ENERGY**

Editors

Satvir Singh

Naveen Kumar Sharma



I.K. Gujral Punjab Technical University

Jalandhar-Kapurthala Highway, Kapurthala-144603 (Punjab) India

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Preface

Participation in national and international conferences presents opportunities to teachers, students, and industry personnel to learn state-of-the-art technology from each other. I. K. Gujral Punjab Technical University, Kapurthala is also putting efforts to uplift educational standards in the region since its establishment as first technical university of Punjab state established in 1997. University's well-qualified and experienced faculty is serving our nation by producing quality engineers and researchers.

I. K. Gujral Punjab Technical University, Kapurthala is organizing an International Conference on Computing, Networks & Renewable Energy (CNRE-2021) to bring together academicians, researchers, and industry professionals to exchange and share research on various aspects of contemporary computing, renewable energy, and their applications.

During planning phase of organizing this conference we set our target to publish only 50 research papers. Every paper has been reviewed by at least two reviews and in some cases, papers were reviewed by four experts. Based on their feedback and the quality of work presented by various researchers, we decided to publish 60 papers out of 126 received research papers.

This is a small step to promote the research in the university and the state. This conference proceedings involves full paper publications with an ISBN number. Further, organizing committee has collaborated with Scopus Indexed journals to recommend selected papers for publications. In continuity, IKGPTU Kapurthala has scheduled second conference CNRE-2022 during 9–11 June 2022, in collaboration with more Scopus & SCI listed journals.

Naveen Kumar Sharma
Organizing Chair

Satvir Singh
Conference Chair

Message from Chief Guest



Prof. Lalit Kumar Awasthi

Director, Dr B R Ambedkar NIT Jalandhar
Ph.D., M.Tech., B.Tech., LMISTE, LMCSI, FIE

It's a matter of great pleasure to be a part of International Conference on Computing, Networks & Renewable Energy (CNRE-2021) being organized that I. K. Gujral Punjab Technical University, Kapurthala.

Renewable energy sources are expanding quickly but not enough to satisfy a strong global electricity demand, which resulted in a sharp rise in the use of coal power that has risks of increasing carbon dioxide emissions from the electricity to record levels in next few years. The electricity demand is set to grow by close to 5% in 2021 and 4% in 2022 according to a report. The majority of the increase is expected to come from the Asia Pacific region, primarily China and India. Therefore, emphasis has to be on new technics for generation and storage of renewable energy.

Similarly, in Computing and Networks the main emphasis has been on new technologies such as Artificial Intelligence (AI) and Machine Learning, Robotic Process Automation (RPA), Edge Computing, Quantum Computing, Virtual Reality and Augmented Reality, Blockchain, Internet of Things (IoT), 5G and Cyber Security.

It is my believe that such conferences are organized to provide a platform to researchers to present their work, interact, to learn and get motivated from each other when they come in contact with each other.

I, Professor Lalit Kumar Awasthi, Director of Dr B R Ambedkar National Institute of Technology, Jalandhar, Punjab extend my best wishes for the grand success of CNRE-2021 and hope everyone stays safe during COVID-19 pandemic.

Jai Hind!
Jai Bharat!



(Lalit Kumar Awasthi)

Message from Chairman Board of Governors



Dr. S.K. Salwan

Chairman- Board of Governor (BOG)
I.K. Gujral Punjab Technical University

It's a matter of pride that I K Gujral Punjab Technical University, Kapurthala is organizing an International Conference on the theme of "Computing, Networks & Renewable Energy" (CNRE-2021) during August 05-07, 2021. Its goal is to provide a unified platform for academicians, professionals, students, and researchers to publish their expert theoretical, technological, and multi-disciplinary studies of intelligent computing methods for various applications in the field of Electrical, Electronic Engineering, and Energy Systems. In addition, the emphasis is placed on interdisciplinary research to assist modern societies. The renowned speakers will share their research knowledge with participants, motivating and enlightening other researchers' study directions.

I, as Chairman BOG of I K Gujral Punjab Technical University extend my best wishes to the Organizing Team, delegates and participants present in the Conference CNRE-2021.



(S.K. Salwan)

Message from Vice-Chancellor



Professor Ajay Kumar Sharma

Vice-Chancellor, IKGPTU Kapurthala

Ph.D., LMISTE, LMOSA, LACSI, LMSPIE, FIETE

Former Director NIT Delhi, NIT Hamirpur & Mentor Director IIIT Una

It's a matter of proud privilege that I. K. Gujral Punjab Technical University, Kapurthala is organizing an International Conference on the theme of "Computing, Networks & Renewable Energy" (CNRE-2021) during August 05-07, 2021. This conference will provide platform to researchers, faculty members, and industry persons to present and publish their original research work in the conference proceedings. The eminent speakers will share their state-of-the-art research knowledge with participants that will further motivate and enlighten the research directions of other researchers.

I, Professor Ajay Kumar Sharma, Vice Chancellor of I. K. Gujral Punjab Technical University, Kapurthala, Punjab extend my best wishes to the organizers and participants for the grand success of CNRE-2021.



Ajay Kumar Sharma

Message from Director



Professor Vikas Chawla

Dean Academics, IKGPTU Kapurthala

Director, Main Campus Kapurthala

Ph.D., M.E., B.E., LMISTE, LMEMS, IAENG, LMPAS

I. K. Gujral Punjab Technical University, Kapurthala is organizing an International Conference on the theme of “Computing, Networks & Renewable Energy” (CNRE-2021) during August 05-07, 2021. The researchers, academicians and people from Industry will present their original research work and will share their experience in the said area of research using this platform.

I, Prof. (Dr.) Vikas Chawla, Dean (Academics) and Director (Main Campus) of I K Gujral Punjab Technical University, Kapurthala, Punjab extend my best wishes to the organizers and participants for the grand success of the CNRE-2021.

A handwritten signature in blue ink, appearing to read 'Vikas Chawla', with a horizontal line underneath.

Vikas Chawla
Director-cum-Dean Academics
IKGPTU Kapurthala

Message from Conference Chair



Dr Satvir Singh

Ph.D., M.Tech., B.Tech.
LMISTE, FIE, FIETE, IAENG

On behalf of the organizing committee of CNRE-2021, I am honored and delighted to welcome you to the 1st International Conference on Computing, Networks and Renewable Energy being organized by IKGPTU Kapurthala during August 5-7, 2021. Due to global pandemic COVID-19, we have to conduct this event in online-mode.

Originally, we had decided to publish only 50 full research papers in the conference proceeding with ISBN. After rigorous reviews by our Technical Committee recommended to publish 60 full papers in the conference proceeding out of total 126 papers received. I hereby apologize for not considering most of paper for publishing in conference proceeding; although many of them were good, but we must restrict ourselves somewhere. Every paper had been reviewed by at least two experts of the domain and in some case, there were four reviews also to ensure quality of the papers. All 60 paper have been divided into five sessions that will be chaired by eminent researchers. Most of the papers in the conference are submitted by PG and Doctoral research scholars, therefore, to encourage and guide them each technical session involves a brief talk and interactive session by a relevant domain expert.

As a conference chair of CNRE-2021, I know that the success of the conference depends ultimately on many people who have worked with us in organizing the event. We thank the Technical Committee for support and timely review of papers. Most importantly we are thankful to the GOD who energized all of us to work together in a team.



Satvir Singh
Conference Chair, CNRE-2021

Message from Organizing Chair



Dr Naveen Kumar Sharma

Ph.D., M.Tech., B.Tech.
SMIEEE, IAENG, IACSIT

It is my immense pleasure to welcome all to the International Conference on Computing, Networks & Renewable Energy (CNRE-2021) during August 05-07, 2021. Due to global pandemic COVID-19, we have to replan organization of CNRE-2021 in online virtual mode for the safety of all delegates.

Eminent speakers from India and abroad will talk about ongoing research in computational innovations and sustainable energy sources from different perspectives during various sessions of the conference. I am thankful to the university, my worthy parents, my respective teachers, my seniors, and my friends whose unconditional support helped us in making this event a grand success.

My association with CNRE-2021 as Organizing Chair is a matter of great pleasure for me and I extend my best wishes to speakers and participants for their contributions.

Naveen

Naveen Kumar Sharma
Organizing Chair, CNRE-2021

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