

Editorial

THE IEEE JOURNAL OF EMERGING AND SELECTED TOPICS IN INDUSTRIAL ELECTRONICS (JESTIE) is an interdisciplinary journal that will provide a forum of interaction and dissemination of ideas/development on emerging technologies. This is sponsored by IEEE Industrial Electronics Society (IES) and co-sponsored by IEEE Power Electronics Society, IEEE Power and Energy Society, IEEE Industry Applications Society, and IEEE Dielectrics and Electrical Insulation Society. The scope of this journal encompasses applications of Industrial Electronics and Industrial Informatics to systems to enhance performance. The topics include emerging areas of advanced power processing, e-mobility, electro-mechanical systems, motion control and mechatronics, renewable energy systems, embedded systems and artificial intelligence applications, factory and building automation and advanced motion control, industrial applications of automatic control, industrial informatics, communication and cyber physical systems, human factors in industrial ecosystems and education in industrial electronics. For the complete list please visit the JESTIE website at <http://www.ieee-ies.org/pubs/jestie>

The world is facing today mega challenges in the form of a global pandemic, climate change and global warming, overpopulation, cybersecurity, etc. We hope that JESTIE will come up with emerging and overarching technology that is within the scope of the journal to combat the existential risk of the human race to the extent possible. Energy, Electronics, and Informatics when combined through brilliant technological innovation, will make us self-reliant and sustainable. JESTIE involving five IEEE societies is more equipped to address emerging and cross-disciplinary challenges.

JESTIE has an international advisory board (IAB) with ten members including one member from each of the cosponsoring societies. The role of IAB is to decide the emerging areas of JESTIE every six months. The Steering Committee (SC), having representation of the Presidents of all the sponsoring societies, forms the core management team of JESTIE. The SC has seven members and is led by Prof. Kamal Al-Haddad of École de technologie supérieure, Montreal, QC, Canada. The editorial board is a strong 45-member team having representation from all cosponsoring societies and also Technical Committees (TCs) of IES.

The articles published in the first issue is representative of what JESTIE will aim to cover in years to come. Thanks to Prof. Akshay K. Rathore of Concordia University, Canada, Prof. Pan Xuewei of Harbin Institute of Technology, China, Dr. Duleepa Thrimawithana of University of Auckland, New Zealand, and Prof. Hiroshi Fujimoto of University of Tokyo, Japan for organising the first Special Section on Transportation Electrification,

which is not only emerging but is a trans-disciplinary area that demands extensive investigation in order to practically make green-transportation possible. We have active special sections now in the areas of smart energy storage technologies, applications of sliding mode control, industrial agents, advanced power conversion for electric vehicles, high gain dc/dc converters, IoT for energy system sustainability, and many more are in reviewing stage. Every issue will bring out research/development on selected and emerging topics. We are also looking for high quality tutorial and review-articles from experts that will help and encourage our young student members and researchers.

We have created “Pioneering Work: Express Category” a new avenue for fast publication of the research results. Articles accepted through this category will not wait in the queue and will be published in the immediate next issue. A two-step review process is followed. The first review is to be completed in a very timely manner and if the reviewers agree that the work is *pioneering*, a minor second review will make a decision on the article. We encourage all outstanding researchers to use this new channel to get their work published in the shortest time. The criteria is that the work must be reporting for the first time something that is very new.

Despite the pandemic the world is facing today, it is good to note that JESTIE is receiving submissions from the authors at a regular interval. This inaugural issue is uniquely blended with eight articles from the special section and one each from post conference and regular category. Let us now have a brief overview of these articles. The first six articles are related to electric vehicles (EV) charging. Beddingfield *et al.* have proposed a contactless magnetic plug solution for fast charging. The system is designed for 150 kW rapid charging at a dc voltage level of 3.5 kV to 400 V. The plug facilitates arc-free, robust, safe, and efficient operation through galvanic isolation from the medium voltage side. A 20 kW, 1kV-dc to 50V-dc experimental prototype is made to verify the proposed concept. In the second article, Lin *et al.* have worked on inductive power transfer (IPT). A multicoil ground assembly to reduce the leakage flux is proposed without compromising the conversion dc–dc efficiency. The system is analyzed and main contributors to the leakage flux are identified. With proper design leakage flux is reduced up to 28%. This is an important step to achieve SAEJ2954 compliance. In the third article, Chen *et al.* investigated the interoperability of various secondaries for IPTs and proposed a two-phase meandering track primary. A 10 kW experimental prototype has demonstrated 83% efficiency. Next three articles are related to the converter topologies for EV charging applications. The fourth article authored by Wang and Thrimawithana is on a new topology termed as integrated boost multilevel converter suitable for EV charging applications. Operating principle and a modulation

scheme for balancing submodule voltages while regulating the power flow are reported. A 7.7 kW experimental IPT prototype that is compliant with SAEJ2954 has demonstrated up to 91.9% efficiency (with a coupling factor of 0.25) with only primary side control. In the next article, Pool-Mazun *et al.* reported an integrated solid-state transformer (I-SST) for EV charging applications. The I-SST is compact as the galvanic isolation is through a high frequency transformer and absence of dc-link eliminates the need of bulky capacitors. While it is proposed that the topology can be suitable for Level-3 charging stations, an experimental prototype of 1.5 kW has demonstrated its usefulness. The sixth article by Dixit *et al.* deals with a bridgeless topology suitable as a front end converter for on-board EV charging applications. Operation in discontinuous conduction mode offers power factor correction for wide input voltage variation. An experimental prototype of 1 kW has demonstrated a peak efficiency of 96%. It is well known that a battery-supercapacitor combination having high energy and high power density is suitable to drive EVs. The seventh article by Salari *et al.* dealt with the design of a digital low pass filter. Such filters will help in splitting the reference power command for battery and supercapacitor (SC). A fuzzy logic based protection scheme is also implemented to prevent over and undercharging of the SC. A comprehensive review of power converters used in EV is presented by Pahlevani and Jain in the next article. The review is presented in terms of three categories involving three main power converters (ac–dc on-board charger, dc–dc on-board charger, dc–ac inverter) used in EV. Soft switching technologies are highlighted. New research directions for power electronics technology used for EVs are also discussed. The ninth article by Marquez *et al.* is on extending the lifetime of a power converter by power routing technique for aging equalization of power modules. A dc/dc boost converter is taken as an example. Experimental results are compared using statistical analysis based on Monte Carlo method. The tenth and final article in this issue by Yan *et al.* is on distributed load shedding, attack detection, and protection for microgrids. Malicious data are detected by using an unknown input observer. An isolation mechanism is proposed to detect

the attack and compensate for the negative effects to make the microgrid operation robust.

Before I conclude, it is important to acknowledge support from many who made this journal possible. Exemplary leadership of Past IES Presidents including Prof. Kamal Al-Haddad, Prof. Xinghuo Yu, and past VP Publications (also current President-Elect) Prof. Mariusz Malinowski and present IES President Prof. Terry Martin, VP Publications Prof. Thilo Sauter, and VP Technical Activities Prof. Roberto Oboe are gratefully acknowledged. Continuous support received from Prof. Emil Levi, EIC of IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, Prof. Leopoldo G. Franquelo, EIC of IEEE Open Journal of the Industrial Electronics Society and Prof. Ren C. Luo, EIC of IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS. IEEE IES publication committee members, IES ADCOM members, and current IES officers have provided timely help on many issues. Thanks to Mr. Raul Roman for setting the website, developing the AE tool and providing many other software support that make handling JESTIE easier. Setting the JESTIE framework and launching the journal are possible due to great efforts from many IEEE Staff including Ms. Katie Sullivan, Ms. AndreAnna McLean, Ms. Christine Kurzawa, and Ms. Natalie Cicero. Thanks to all of them. Special mention to the effort of Ms. AndreAnna McLean for unparalleled support. Excellent support from the SC members, the International Advisory Board, Associate Editors, and the reviewers are most humbly acknowledged. Nevertheless, it is for the authors' good work that we are able to publish this issue. Therefore, Congratulations Authors!

“The journey of thousands miles starts with a single step,” says a Chinese proverb. JESTIE is putting her first step with this July issue and is all set to travel thousands of miles to serve our members. We believe that over time JESTIE will achieve a high impact factor and will become one of the top journals in the corresponding category.

CHANDAN CHAKRABORTY, *Editor-in-Chief*
DEPARTMENT OF ELECTRICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR, INDIA