



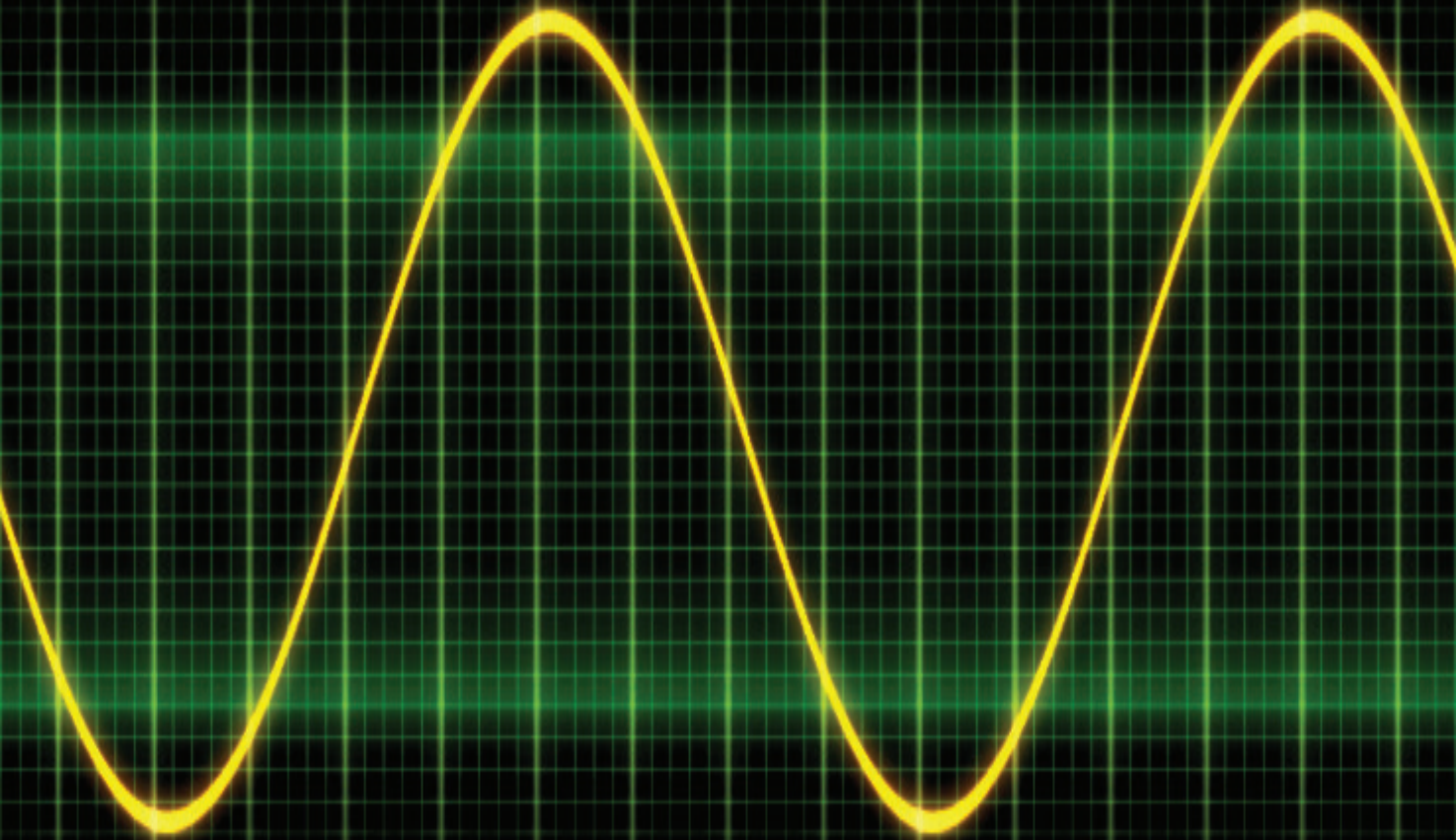
İSTANBUL UNIVERSITY
CERRAHPAŞA



ELECTRICA

electricajournal.org

Official journal of İstanbul University-Cerrahpaşa Faculty of Engineering



EISSN 2619-9831



VOLUME 20 » ISSUE 2 » JULY 2020

Editorial Board

Editor in Chief

Firat KAÇAR
Department of Electrical-
Electronics, Istanbul University
- Cerrahpasa Faculty of
Engineering, Istanbul, Turkey

Associate Editors

Aysel ERSOY YILMAZ
Department of Electrical-
Electronics, Istanbul University
- Cerrahpasa Faculty of
Engineering, Istanbul, Turkey

Cengiz Polat UZUNOĞLU
Department of Electrical-
Electronics, Istanbul University
- Cerrahpasa Faculty of
Engineering, Istanbul, Turkey

Assistant Editor

**Abdullahim
AKGÜNDOĞDU**
Department of Electrical-
Electronics, Istanbul
University - Cerrahpasa
Faculty of Engineering,
Istanbul, Turkey

Advisory Board

Aydın AKAN
Department of Electrical-
Electronics, İzmir Katip Çelebi
University Faculty of Engineering
and Architecture, İzmir, Turkey

Aysen B. ARSOY
Department of Electrical-Electronics,
Kocaeli University Faculty of
Engineering, Kocaeli, Turkey

Alinur BUYUKAKSOY
Department of Electrical-
Electronics, Okan University Faculty
of Engineering, İstanbul, Turkey

Luis F. CHAPARRLO
Department of Electrical
Engineering, University of Pittsburg,
Pittsburgh, USA

Oğuzhan ÇIÇEKOĞLU
Department of Electrical Engineering,
Boğaziçi University Faculty of
Engineering, İstanbul, Turkey

Gregory M. DIMIROVSKI
SSC. and Methodius University,
Skopje, Macedonia

Emrah DOKUR
Department of Electrical-Electronics,
Bilecik Şeyh Edebali University Faculty
of Engineering, Bilecik, Turkey

Alain FABRE
IMS-ENSEIRB, Bordeaux, France

I. Cem GÖKNAR
Department of Electrical and
Electronics Engineering, Doguş
University Faculty of Engineering,
Istanbul, Turkey

Rachid HARBA
LESI, France

Hüseyin HIZIROĞLU
Department of Electrical and
Electronics Engineering, Kattering
University Faculty of Engineering,
Michigan, USA

Nihat KABAOĞLU
Department of Electrical and
Electronics Engineering, İstanbul
Medeniyet University Faculty of
Engineering and Natural Sciences,
Istanbul, Turkey

Özcan KALENDERLİ
Department of Electrical and
Electronics Engineering, İstanbul
Technical University Faculty of
Electrical-Electronic, İstanbul, Turkey

Recai KILIÇ
Department of Electrical and
Electronics Engineering, Erciyes
University Faculty of Engineering,
Kayseri, Turkey

Hülya KIRKICI
Department of Electrical and
Computer Engineering, Auburn
University, Auburn, USA

Ayten KUNTMAN
Emeritus, İstanbul University-
Cerrahpaşa, Cerrahpaşa Faculty of
Medicine, İstanbul, Turkey

Hakan KUNTMAN
Emeritus, İstanbul, İstanbul
Technical University Faculty of
Electrical-Electronic, İstanbul,
Turkey

Mehmet KURBAN
Department of Electrical-
Electronics, Bilecik Şeyh Edebali
University, Faculty of Engineering,
Bilecik, Turkey

Bilgin METİN
Department of Electrical-
Electronics, Boğaziçi University
Faculty of Engineering, İstanbul,
Turkey

Onur OSMAN
Department of Electrical-
Electronics, İstanbul Arel University
Faculty of Engineering, İstanbul,
Turkey

Emel ÖNAL
Department of Electrical-
Electronics, İstanbul Technical
University Faculty of Electrical-
Electronic, İstanbul, Turkey

Raj, SENANI
Department of Electrical-
Electronics, NSIT University
Electronics and Communications
Engineering, Delhi, India

Ahmet SERTBAŞ
Department of Computer
Engineering, İstanbul University-
Cerrahpaşa, Cerrahpaşa Faculty of
Engineering, İstanbul, Turkey

Metin ŞENGÜL
Department of Electrical and
Electronics Engineering, Kadir Has
University Faculty of Engineering
and Natural Sciences, İstanbul,
Turkey

Vedat TAVSANOĞLU
Department of Electrical and
Electronics Engineering, Işık
University Faculty of Engineering,
Istanbul, Turkey

Michail TSATSANIS
Voya Technology Institute, USA

B. Emre TÜRKAY
Department of Electrical
Engineering, İstanbul Technical
University Faculty of Electrical-
Electronic, İstanbul, Turkey

Osman N. UÇAN
Department of Electrical and
Electronics Engineering, Altınbaş
University Faculty of Engineering
and Natural Sciences, İstanbul,
Turkey

Gökhan UZGÖREN
Department of Electrical and
Electronics Engineering, Gedik
University Faculty of Engineering,
Istanbul, Turkey

Reyat YILMAZ
Department of Electrical and
Electronics Engineering, Dokuz
Eylül University Faculty of
Engineering, İzmir, Turkey

Web Coordinator

Fatih ATALAR
Department of Electrical-
Electronics, İstanbul University -
Cerrahpasa School of Engineering,
Istanbul, Turkey



Publisher
İbrahim KARA

Publication Director
Ali ŞAHİN

Editorial Development
Gizem KAYAN TEKAÜT

Deputy Publication Director
Gökhan ÇİMEN

Publication Coordinators
İrem SOYSAL
Arzu YILDIRIM
Deniz KAYA
Gülnur MERCAN
Bahar ALBAYRAK

Finance and Administration
Zeynep YAKIŞIRER ÜREN
Betül ÇİMEN

Project Coordinators
Sinem KOZ
Doğan ORUÇ

Graphics Department
Ünal ÖZER
Deniz DURAN
Bezanur KARABULUT

Contact
Address: Buyukdere Street
No: 105/9 34394
Mecidiyekoy, Sisli, İstanbul,
TURKEY
Phone: +90 212 217 17 00
Fax: +90 212 217 22 92
E-mail: info@avesyayincilik.com

Aims and Scope

Electrica is an international, scientific, open access periodical published in accordance with independent, unbiased, and double-blinded peer-review principles. The journal is the official online-only publication of İstanbul University-Cerrahpaşa Faculty of Engineering, and it is published biannually on January and July. The publication language of the journal is English.

Electrica aims to contribute to the literature by publishing manuscripts at the highest scientific level on all fields of electrical and electronics engineering. The journal publishes original research and review articles that are prepared in accordance with ethical guidelines.

The scope of the journal includes but not limited to; electronics, microwave, transmission, control systems, electrical machines, energy transmission and high voltage.

The target audience of the journal includes specialists and professionals working and interested in all disciplines of electrical and electronics engineering.

The editorial and publication processes of the journal are shaped in accordance with the guidelines of the Institute of Electrical and Electronics Engineers (IEEE), the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), Council of Science Editors (CSE), Committee on Publication Ethics (COPE), European Association of Science Editors (EASE), and National Information Standards Organization (NISO). The journal is in conformity with the Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

The journal is currently indexed in Web of Science- Emerging Sources Citation Index, Scopus, Compendex, Gale and TUBITAK ULAKBIM TR Index.

All expenses of the journal are covered by İstanbul University-Cerrahpaşa. Processing and publication are free of charge with the journal. No fees are requested from the authors at any point throughout the evaluation and publication process. All manuscripts must be submitted via the online submission system, which is available at electricajournal.org. The journal guidelines, technical information, and the required forms are available on the journal's web page.

Statements or opinions expressed in the manuscripts published in the journal reflect the views of the author(s) and not the opinions of the Electrica editors, editorial board, and/or publisher; the editors, editorial board, and publisher disclaim any responsibility or liability for such materials.

Electrica is an open access publication and the journal's publication model is based on Budapest Open Access Initiative (BOAI) declaration. Journal's archive is available online, free of charge at electricajournal.org. Electrica's content is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.



Editor in Chief	: Fırat KAÇAR
Address	: İstanbul Üniversitesi Mühendislik Fakültesi Elektrik-Elektronik Mühendisliği Bölüm Başkanlığı Avcılar Kampüsü, Avcılar, İstanbul, Turkey
Phone	: +90 212 473 7070
Fax	: +90 212 473 7064
E-mail	: fkacar@istanbul.edu.tr
Publisher	: AVES
Address	: Büyükdere Cad. 105/9 34394 Mecidiyeköy, Şişli, İstanbul, Turkey
Phone	: +90 212 217 17 00
Fax	: +90 212 217 22 92
E-mail	: info@avesyayincilik.com
Web page	: www.avesyayincilik.com

Instructions for Authors

Context

Electrica is an international, scientific, open access periodical published in accordance with independent, unbiased, and double-blinded peer-review principles. The journal is the official online-only publication of İstanbul University-Cerrahpaşa Faculty of Engineering, and it is published biannually on January and July. The publication language of the journal is English.

Electrica aims to contribute to the literature by publishing manuscripts at the highest scientific level on all fields of electricity. The journal publishes original research and review articles that are prepared in accordance with ethical guidelines.

The scope of the journal includes but not limited to; electronics, microwave, transmission, control systems, electrical machines, energy transmission and high voltage.

The target audience of the journal includes specialists and professionals working and interested in all disciplines of electrical and electronics engineering.

Editorial and Publication Process

The editorial and publication processes of the journal are shaped in accordance with the guidelines of the Institute of Electrical and Electronics Engineers (IEEE), the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), Council of Science Editors (CSE), the Committee on Publication Ethics (COPE), the European Association of Science Editors (EASE), and National Information Standards Organization (NISO). The journal conforms to the Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

Originality, high scientific quality, and citation potential are the most important criteria for a manuscript to be accepted for publication. Manuscripts submitted for evaluation should not have been previously presented or already published in an electronic or printed medium. The journal should be informed of manuscripts that have been submitted to another journal for evaluation and rejected for publication. The submission of previous reviewer reports will expedite the evaluation process. Manuscripts that have been presented in a meeting should be submitted with detailed information on the organization, including the name, date, and location of the organization.

Peer-review Process

Manuscripts submitted to Electrica will go through a double-blind peer-review process. Each submission will be reviewed by at least two external, independent peer reviewers who are experts in their fields in order to ensure an unbiased evaluation process. The editorial board will invite an external and independent editor to manage the evaluation processes of manuscripts submitted by editors or by the editorial board members of the journal. The Editor in Chief is the final authority in the decision-making process for all submissions.

Ethical Principles and Plagiarism

Electrica is extremely sensitive about plagiarism. All submissions are screened by a similarity detection software (iThenticate by CrossCheck) at any point during the peer-review or production process. Even if you are the author of the phrases or sentences, the text should not have unacceptable similarity with the previously published data.

When you are discussing others' (or your own) previous work, please make sure that you cite the material correctly in every instance.

The authors are expected to submit researches that comply with the general ethical principles which include; scientific integrity, collegiality, data integrity, institutional integrity and social responsibility.

In the event of alleged or suspected research misconduct, e.g., plagiarism, citation manipulation, and data falsification/fabrication, the Editorial Board will follow and act in accordance with COPE guidelines.

The Editorial Board of the journal handles all appeal and complaint cases within the scope of COPE guidelines. In such cases, authors should get in direct contact with the editorial office regarding their appeals and complaints. When needed, an ombudsperson may be assigned to resolve cases that cannot be resolved internally. The Editor in Chief is the final authority in the decision-making process for all appeals and complaints.

Authorship

Being an author of a scientific article mainly indicates a person who has a significant contribution to the article and shares the responsibility and accountability of that article. To be defined as an author of a scientific article, researchers should fulfil below criteria:

- Making a significant contribution to the work in all or some of the following phases: Research conception or design, acquisition of data, analysis and interpretation.
- Drafting, writing or revising the manuscript
- Agreeing on the final version of the manuscript and the journal which it will be submitted
- Taking responsibility and accountability of the content of the article

Outside the above mentioned authorship criteria, any other form of specific contribution should be stated in the Acknowledgement section.

In addition to being accountable for the parts of the work he/she has done, an author should be able to identify which co-authors are responsible for specific other parts of the work. In addition, authors should have confidence in the integrity of the contributions of their co-authors.

If an article is written by more than one person, one of the co-authors should be chosen as the corresponding author for handling all the correspondences regarding the article. Before submission, all authors should agree on the order of the authors and provide their current affiliations and contact details. Corresponding author is responsible for ensuring the correctness of these information.

Electrica requires corresponding authors to submit a signed and scanned version of the authorship contribution form (available for download through <http://electricajournal.org>)

during the initial submission process in order to act appropriately on authorship rights and to prevent ghost or honorary authorship. If the editorial board suspects a case of "gift authorship," the submission will be rejected without further review. As part of the submission of the manuscript, the corresponding author should also send a short statement declaring that he/she accepts to undertake all the responsibility for authorship during the submission and review stages of the manuscript.

Conflict of Interest Declarations

Electrica requires and encourages the authors and the individuals involved in the evaluation process of submitted manuscripts to disclose any existing or potential conflicts of interests, including financial, consultant, and institutional, that might lead to potential bias or a conflict of interest. Any financial grants or other support received for a submitted study from individuals or institutions should be disclosed to the Editorial Board. Cases of a potential conflict of interest of the editors, authors, or reviewers are resolved by the journal's Editorial Board within the scope of COPE guidelines.

Copyright and Licencing

Electrica requires each submission to be accompanied by a Copyright Agreement and Acknowledgement of Authorship (available for download at <http://electricajournal.org>). When using previously published content, including figures, tables, or any other material in both print and electronic formats, authors must obtain permission from the copyright holder. Legal, financial and criminal liabilities in this regard belong to the author(s). By signing the Copyright Agreement and Acknowledgement of Authorship, authors agree that the article, if accepted for publication by Electrica, will be licensed under a Creative Commons Attribution-Non-Commercial 4.0 International License (CC-BY-NC).

By publishing their content in Electrica, authors retain copyright of their work.

Disclaimer

Statements or opinions expressed in the manuscripts published in *Electrica* reflect the views of the author(s) and not the opinions of the editors, the editorial board, or the publisher; the editors, the editorial board, and the publisher disclaim any responsibility or liability for such materials. The final responsibility in regard to the published content rests with the authors.

MANUSCRIPT PREPARATION

Manuscripts can only be submitted through the journal's online manuscript submission and evaluation system, available at <http://electricajournal.org>. Manuscripts submitted via any other medium will not be evaluated.

Manuscripts submitted to the journal will first go through a technical evaluation process where the editorial office staff will ensure that the manuscript has been prepared and submitted in accordance with the journal's guidelines. Submissions that do not conform to the journal's guidelines will be returned to the submitting author with technical correction requests.

Authors are required to submit the following:

- Copyright Agreement and Acknowledgement of Authorship, and during the initial submission. These forms are available for download at <http://electricajournal.org>

Preparation of the Manuscript

Title page: A separate title page should be submitted with all submissions and this page should include:

- The full title of the manuscript as well as a short title (running head) of no more than 50 characters,
- Name(s), affiliations highest academic degree(s) and ORCID iD's of the author(s),
- Grant information and detailed information on the other sources of support,
- Name, address, telephone (including the mobile phone number) and fax numbers, and email address of the corresponding author,
- Acknowledgment of the individuals who contributed to the preparation of the manuscript but who do not fulfill the authorship criteria.

Biography page: A separate page should be submitted providing short biographies of the contributing authors with their photographs included.

Abstract: An abstract should be submitted with all submissions except for Letters to the Editor. The abstract of articles should be structured without subheadings. Please check Table 1 below for word count specifications.

Keywords: Each submission must be accompanied by a minimum of three to a maximum of six keywords for subject indexing at the end of the abstract. The keywords should be listed in full without abbreviations.

Manuscript Types

Original Articles: This is the most important type of article since it provides new information based on original research. The main text of original articles should be begun with an Introduction section and finalized with a Conclusion section. The remaining parts can be named relevantly to the essence of the research. Please check Table 1 for the limitations for Original Articles.

Review Articles: Reviews prepared by authors who have extensive knowledge on a particular field and whose scientific background has been translated into a high volume of publications with a high citation potential are welcomed. These authors may even be invited by the journal. Reviews should describe, discuss, and evaluate the current level of knowledge of a topic in the field and should guide future studies. sections Please check Table 1 for the limitations for Review Articles.

Letters to the Editor: This type of manuscript discusses important parts, overlooked aspects, or lacking parts of a previously published article. Articles on subjects within the scope of the journal that might attract the readers' attention, may also be submitted in the form of a "Letter to the Editor." Readers can also present their comments on the published manuscripts in the form of a "Letter to the Editor." Abstract, Keywords, and Tables, Figures, Images, and other media should not be included. The text should be unstructured. The manuscript that is being commented on must be properly cited within this manuscript.

Table 1. Limitations for each manuscript type

Type of manuscript	Word limit	Abstract word limit	Reference limit	Table limit	Figure limit
Original Article	3500	250 (Structured)	30	6	7 or total of 15 images
Review Article	5000	250	50	6	10 or total of 20 images
Letter to the Editor	500	No abstract	5	No tables	No media

Tables

Tables should be included in the main document, presented after the reference list, and they should be numbered consecutively in the order they are referred to within the main text. A descriptive title must be placed above the tables. Abbreviations used in the tables should be defined below the tables by footnotes (even if they are defined within the main text). Tables should be created using the “insert table” command of the word processing software and they should be arranged clearly to provide easy reading. Data presented in the tables should not be a repetition of the data presented within the main text but should be supporting the main text.

Figures and Figure Legends

Figures, graphics, and photographs should be submitted as separate files (in TIFF or JPEG format) through the submission system. The files should not be embedded in a Word document or the main document. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. Images should not be labeled (a, b, c, etc.) to indicate figure subunits. Thick and thin arrows, arrowheads, stars, asterisks, and similar marks can be used on the images to support figure legends. Like the rest of the submission, the figures too should be blind. Any information within the images that may indicate an individual or institution should be blinded. The minimum resolution of each submitted figure should be 300 DPI. To prevent delays in the evaluation process, all submitted figures should be clear in resolution and large in size (minimum dimensions: 100 × 100 mm). Figure legends should be listed at the end of the main document.

Equations

The equations must be stated separated from the text by a blank line. They should be numbered consecutively in parenthesis at the right side of the equation. Symbols and variables as well as in the main text should be written in italics while vectors and matrices should be written in bold type.

All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and in the main text. The abbreviation should be provided in parentheses following the definition.

When a product, hardware, or software program is mentioned within the main text, product information, including the name of the product, the producer of the product, and city and the country of the company (including the state if in USA), should be provided in parentheses in the following format: “Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)”

All references, tables, and figures should be referred to within the main text, and they should be numbered consecutively in the order they are referred to within the main text.

References

While citing publications, preference should be given to the latest, most up-to-date publications. Authors are responsible for the accuracy of references. Both in-text citations and the references must be prepared according to IEEE Citation Style. In the main text of the manuscript, references should be cited using Arabic numbers in square brackets. The reference styles for different types of publications are presented in the following examples.

Journal Article: J.K. Author, “Name of the article”, *Abbrev. Title of Periodical*, vol. x, no. x, pp. xxx-xxx, Abbrev. Month, year.

Book Section: J. K. Author, “Title of chapter in the book,” in *Title of His Published Book*, xth ed. City of Publisher, Country: Abbrev. of Publisher, year, ch. x, sec. x, pp. xxx-xxx.

Books with a Single Author: J.K. Author, "Title of the Book", Abbrev. Of Publisher, City of Publisher, Country, Year.

Conference Proceedings: J. K. Author, "Title of paper," in Unabbreviated Name of Conf., City of Conf., Abbrev. State (if given), year, pp. xxx-xxx.

Report: J. K. Author, "Title of report," Abbrev. Name of Co., City of Co., Abbrev. State, Rep. xxx, year.

Thesis: J. K. Author, "Title of thesis," M.S. thesis, Abbrev. Dept., Abbrev. Univ., City of Univ., Abbrev. State, year.

Standards: *Title of Standard*, Standard number, date.

Manuscripts Accepted for Publication, Not Published Yet: J. K. Author, "Title of paper," unpublished.

Manuscripts Published in Electronic Format: J. K. Author. (year, month). Title. Journal [Type of medium]. volume(issue), page number. Available: site/path/file

REVISIONS

When submitting a revised version of a paper, the author must submit a detailed "Response to the reviewers" that states point by point how each issue raised by the reviewers has been covered and where it can be found (each reviewer's comment, followed by the author's reply and line numbers where the changes have been made) as well as an annotated copy of the main document. Revised manuscripts must be submitted within 30 days from the date of the decision letter. If the revised version of the manuscript is not submitted within the allocated time, the revision option may be cancelled. If the submitting author(s) believe that additional time is required, they should request this extension before the initial 30-day period is over.

Accepted manuscripts are copy-edited for grammar, punctuation, and format. Once the publication process of a manuscript is completed, it is published online on the journal's webpage as an ahead-of-print publication before it is included in its scheduled issue. A PDF proof of the accepted manuscript is sent to the corresponding author and their publication approval is requested within 2 days of their receipt of the proof.

Editor in Chief : Fırat KAÇAR
Address : İstanbul Üniversitesi Mühendislik Fakültesi Elektrik-Elektronik Mühendisliği Bölüm Başkanlığı
Avcılar Kampüsü, Avcılar, İstanbul, Turkey
Phone : +90 212 473 7070
Fax : +90 212 473 7064
E-mail : fkacar@istanbul.edu.tr

Publisher : AVES
Address : Büyükdere Cad. 105/9 34394 Mecidiyeköy, Şişli, İstanbul, Turkey
Phone : +90 212 217 17 00
Fax : +90 212 217 22 92
E-mail : info@avesyayincilik.com
Web page : www.avesyayincilik.com

Contents

RESEARCH ARTICLES

- 116 Investigating the Effectiveness of Adaptive Step Size LMS Algorithms for the Use with VOIP Applications**
Alaa Ali Hameed, Naim Ajlouni, Zeynep Orman, Adem Özyavaş
- 124 Analysis of Electrical Distribution Network Voltage Configuration with Mixed Integer Linear Programming Algorithm and Genetic Algorithm I Terms of Energy Cost**
Leyla Akbulut, Süleyman Sungur Tezcan, Ahmet Coşgun
- 133 An Open-Source User Interface Development for Widely Used Low-cost Spectrometer Designs**
Güray Gürkan
- 143 Touchless Authentication System Using Visual Fingertip Trajectories**
Vefak Murat Akman, Revna Acar Vural, Kemal Talha Koç
- 153 A 1GS/s, 9-bits DAC Interleaved (2+1)-bit Then 2-bit per Cycle SAR ADC**
Salma El-Sawy, Ahmet Tekin
- 159 Detection DDOS Attacks Using Machine Learning Methods**
Tuğba Aytaç, Muhammed Ali Aydın, Abdül Halim Zaim
- 168 A Lightweight Cryptography Algorithm for Secure Smart Cities and IOT**
Ahmed Mohsin Abed, Ali Boyacı
- 177 Development of 15-dB Gain Conical Horn Antenna Using 3D Printing Technology**
Murat Can Karakoç, Asaf Behzat Şahin
- 182 Multifractal Behaviour of Respiratory Signals**
Ertuğrul Saatçi, Esra Saatçi
- 189 A Neighbor Relation Whitelisting Method for Wireless Cellular Systems**
Ali Görçin
- 199 Design and Implementation of a Multi-Stage PID Controller for Non-inertial Referenced UAV**
Fady Alami, Abdulrahman Hussian, Naim Ajlouni
- 207 A DTMOS based Four-Quadrant Analog Multiplier**
Emre Özer