The IEEE Style: Peculiarities of the Format and Application Prospects

Oksana Tur
Humanities, Culture and Art Department
Kremenchuk Mykhailo Ostrohradskyi National University
Kremenchuk, Ukraine
oktur@ukr.net

Anastasiia Tur
National Pirogov Memorial Medical University
Vinnytsya, Ukraine
anastasiatur@ukr.net

Viktoriia Shabunina
Humanities, Culture and Art Department
Kremenchuk Mykhailo Ostrohradskyi National University
Kremenchuk, Ukraine
shabuninaviktoria@gmail.com

Evgeniia Chernaia
Institute of Asian and African Studies
Lomonosov Moscow State University
Moscow, Russia
d.e.ch@ya.ru

Abstract—This article analyses a problematic issue related to the concept of academic integrity, i.e. keeping to the rules of citing references while writing scientific works. A number of professional editions, primarily in the field of technical sciences, have been examined as to the observance of these rules. A special attention is drawn to the style of citing references worked out by Institute of Electrical and Electronics Engineers – the IEEE Style. In particular the basic formats for citing both print and online books, translated books and books with a chapter title, periodicals, conferences and conference proceedings, courses, patents, standards, theses and dissertations, technical reports, software, manuals, video materials, datasets, etc. have been analysed in the article. Admitting that bibliographic activity determines the level of a scientist's culture, and proper citing references is an important indicator of the quality of a scientific work as well as guarantee that many scientists will learn it, we have proved importance of the issue in the context of integrating of Ukrainian science into the world scientific space and becoming a part of the scientific communication system.

Keywords—Institute of Electrical and Electronics Engineers, IEEE style, branch standard, scientific work, citation, reference, basic format, academic integrity.

I. INTRODUCTION

Institute of Electrical and Electronics Engineers (IEEE) is one of the most competent technical professional organization all over the world. It promotes innovative technologies and is intended to serve professionals who analyse all the problems of electrical, electronic and computer branches as well as related fields of science and technology.

IEEE was set up in 1884, when a small group of people met in New York and founded American Institute of Electrical Engineers, a modern organization to support specialists in their efforts to apply innovation. On January 1, 1963, Institute of Electrical and Electronics Engineers was established on that basis. The Institute's activity was focused on the electric power industry, but over time, the professional interests of its members were spread to the other fields of science. That favoured joining software developers, information technology specialists, physicists, physicians and the other specialists into IEEE. Over the next decades, IEEE activities kept spreading throughout the world.

Up to the beginning of the 21st century, IEEE had collaborated with 39 societies and 130 magazines, held more than 300 conferences annually. As technologies and branches of industry crossed national boundaries more often, IEEE had kept up its pace. Up to 2010, IEEE have had 395,000 members in 160 countries [1]. Nowadays it is a global institute that makes practical use of specialists' innovation.

IEEE Standards Association is a leading organization that develops and promotes global technologies through IEEE; brings together a great number of individuals and institutions aimed at working out standards. IEEE is a chief developer of branch standards of a wide range of technologies, with an active portfolio of nearly 1300 standards and projects [2].

IEEE sponsors more than 1900 annual conferences around the world and popularizes progressive methods primarily in the field of electrical and electronics [3].

EEE offers a wide range of opportunities for training and improvement in one's professional skill in engineering, research and other technologies. The purpose of these programs is to enhance the skills and knowledge of professionals and to assist IEEE's members, an engineering and scientific community as well as a general public in self-education [4].

II. METHOD OF RESEARCH

The style of Institute of Electrical and Electronics Engineers (the IEEE style) is a widespread format to write scientific works. It is actively used in technical fields, especially in computer science and electronics, and is based on the Chicago style.

The rules of this style are described in the guides IEEE-SA Standards Style [5], IEEE Editorial Style Manual for Authors [6], IEEE Reference Guide [7].

The IEEE style is widely used in Ukraine. It is recommended to be used for citing references in theses or dissertations [8]. Taking into consideration the mentioned above, we have analysed what scientific editions recommend the IEEE style for citing references. So, State Institution of Higher Education "University of Educational Management" advises its authors to follow the IEEE style although it does not specialize in scientific works on electrical engineering and electronics [9]. Another scientific edition of humanitarian field, "Ukrainian Educational Journal" (the founder – Institute of Pedagogy of the National Academy of Ukrainian Pedagogical Sciences), uses some IEEE style basic formats for citing references too [10].

In the scientific space of Ukraine there is a number of professional editions, especially technical ones, in which authors present their scientific achievements according to the requirements of the IEEE style (citations and references). These include "Visnyk of Vinnytsia Polytechnical Institute" [11], "Visnyk of Kherson National Technical University" [12], "Bulletin of Kharkiv National Automobile and Highway University" [13], the magazine "Energy: Economics, Technology, Ecology" (field of knowledge – energetics and energy efficiency; the founder –

National Technical University of Ukraine "Kyiv Polytechnic Institute") [14], "Electrical engineering & Electromechanics" (the co-founders – National Technical University "Kharkiv Polytechnic Institute" and State Institution "Institute of Technical Problems of Magnetism of Ukrainian National Academy of Sciences") [15] and the others. In some editions, for example, in Journal of Coal Chemistry of State Enterprise "The Ukrainian State Research Institute for Carbochemistry, the authors may choose the IEEE style among the others recommended by the Ministry of Education and Science of Ukraine [16].

At the same time, it is striking that APA style, the scope of application of which is social sciences (sociology, law, psychology, history, etc.), is recommended for citing references in articles published in International scientific and technical journal "Lighting Engineering and Power Engineering" of O. M. Beketov National University of Urban Economy (Kharkiv) [18].

Certainly, this being the situation can't underestimate the value of the materials presented by the edition, but it can cast doubt on efficiency of displaying in IEEEXplore as well as the ability to search articles in such databases as Compendex (it indexes scientific literature applied to engineering); INSPEC (it's the main database on indexing scientific and technical literature; it covers the fields of physics, computing, management); ProQuest (it's one of the world's leaders in the field of information products and technologies for science, education, and business, providing specialists with an easy access to relevant and authoritative information), etc.

Taking into consideration the importance of the issues outlined, and admitting that bibliographic activity is a mark of a scientist's culture, and proper citing references is an important indicator of the quality of a scientific work as well as guarantee that many scientists will learn it, we consider elucidating the basic demands of IEEE's editions to the scientific articles to be necessary.

Thus, in IEEE Editorial Style Manual for Authors (2020) the structure of scientific works, the recommendations concerning texts, titles, appendixes, references, citing (including figures and tables), notes, lists in texts, proof symbols are given among the basic demands for correcting and presenting information. Requirements for correspondence, comments and responses, book reviews, obituary notices, agreements as a type of documents are separately defined.

Particular attention is focused on the grammar rules, which are frequently violated: using a comma instead of a semicolon to separate two clauses within a compound sentence; using an apostrophe in abbreviations (FET's instead of FETs, 1980's instead of 1980s); double parentheses in text expressions, etc.

As stated above, some Ukrainian scientific professional editions use IEEE style for citing references. Moreover, the use of IEEE style for citing references in dissertations was approved at the legislative level [8]. Taking into consideration the above, we have analysed the features of the basic formats of presenting information in bibliographic descriptions in IEEE style.

References needn't be cited in the text. The reference numbers should be enclosed in square brackets, for example: as analysed by Carlton [46]; as noted above [76], [89]–[117], [129]; Miller [7] and Ivanov [5]; as demonstrated in [15]; according to [1], etc.

If there is a book in the list of sources used, the basic format for presenting this information is as follows: K. N. Author, *Book Title*, X[th] ed. Publisher City, (only U.S. State), Country: Abbrev. of Publisher, year. For example, B. D. Ching, *Computer Systems and Networks*. Glasgow: High energy, 1994. Or: A. Foliannini and R. Leuzzeli, *Nonlinear Microwave Motion and Its Parameters*. Paris: W. Windy and Sons, 2014. Or: R. A. Geliani, et al., *World Ecological Processes and Information Technologies in Science.* Cincinnati: South-Eastern/Johnson Learning, 2006.

The description of a translated book and a book with chapter title is submitted in the following way: K. L. Author, "Chapter Title in the book", in *Title of His Published Book*, X[th] ed. Publisher City, State (only USA), Country: Abbrev. of Publisher, year, ch. X, sec. X, pp. XX–XX. For example, A. Ivanov, «Economic progress», *Dokl. Akad. Nauk SSSR*, vol. 4, pp. 261–273, 1974 (Transl.: in I. Zgurovsky, Ed., *The Economic Theory and Practice of Management.* Baltimore, USA: Scientific search, 1974, ch. 3, sec. 2, pp. 134–142). Or: R. Shy, W. Bang, and N. Ling, «Restoration of camera resolution and reconstruction of color and black-and-white images», in *Practice of Image Restoration – the Latest Achievements and Prospects of Research*, D. History, Ed., Rudeka, Croatia: Subject, 2018, pp. 31–34.

Some basic form to cite courses looks as follows: University Name. (Year). Course title. [Online]. Available: URL. For example, Columbia University Online. (2014). Information policy and international communication. [Online]. Available: http://www.informationonline.com.

When citing standards, the basic form is to be used: *Standard Title*, number of Standard, Corporate author, location, and date. For example, *Some Parameters for High Definition Telecommunication Systems for the USA*, Rec. ITA-R BT. 2019-2, International Council on Telecommunications, London, Great Britain, Nov. 2016. The basic format to cite online standards is the following: *Standard Title*, number of Standard, Corporate author, location, and date. [Online]. Available: http://www.url.com. For example, *Linear Characteristics and Modifications*, NERC Reliability Standard VAL-004-0.3b, Mart 2019. [Online]. Available: http://www.new.com/files/VAL-004-0_3b.pdf.

If there is a periodical in the list of sources used, the main format of its presentation is as follows: K. L. Author, "Paper Name", *Abbrev. Periodical Title*, vol. X, no. X, pp. xx-xx, Abbrev. Month, year. For example, V. Kitto *et al*., "Application of nickel oxide for colour and black-and-white images reconstruction", *S. Cryst. Alloys,* vol.328, no. 16, pp. 1453–1467, Oct. 2012.

The basic format of a periodical with DOI is as follows: M. N. Author, "Paper Name", *Abbrev. Periodical Title*, vol. x, no. x, pp. xx–xx, Abbrev. month, year, and DOI: xx. DOIs are pointed out, when given by the author.

If an article is featured in a periodical online edition, its basic presentation format is as follows: M. N. Author, "Paper Name", *Abbrev. Periodical Title*, vol. x, no. x, pp. xx–xx, Abbrev. Month, year. Accessed: Month, Day, Year.

DOI: 10.1109.XXX.123456. [Online]. Available: site/path/file. There is some example of online periodicals: F. A. Pink, H. A. Long, and K. O. Shan, "Fiber optic cable", *Opt. Lett.*, vol. 7, no. 3, pp. 234–235, Oct. 2007. [Online]. Available: http://opt.org /newabstract.cfm?URI=ai-7-3-234.

The basic form to cite conference proceedings includes the authors, paper title, and the conference name *in italics*. One should use standard abbreviations.

Some of the standard abbreviations used for citing conference proceedings are given in Table 1.

TABLE I. Standard abbreviations used for citing conference proceedings

Word	Abbreviation
First	1st
Mexican, Mexico	Mex.
Polymer	Polym.
Proceedings	Proc.
Record	Rec.
Rehabilitation	Rehabil.
Semiconductor	Semicond.
Surface	Surf.
Technical Paper	Tech. Paper
Tutorials	Tut.
Vehicular	Veh.
Vibration	Vibr.

When citing conference proceedings, the basic form should be used: K. L. Author, "Paper Title", given at the Abbreviated Name of Conference, City of Conference, Abbrev. State, Country, Month and day(s), year, number of Paper. The published conference proceedings have the numbers of pages. For example, U. R. Jetten and S. R. Lazanella, "Detection and neutralization of radio noise streams", presented at the Congress of scientists-practitioners of the aerospace industry, Yellow Springs, OH, USA, Oct. 12–17, 1995, Paper 80 SM 730-0 PV.

There is some difference between the basic formats for citing conference proceedings online and a conference paper online. The basic form to cite conference proceedings online is like this one: K. L. Author, "Paper Title", in *Abbreviated Name of Conference*, year, pp. xxxxx. [Online]. Available: http://www.url.com. For example, D. Scarlet, "Problems of modern electricity and environmental protection", in *Proc. 10th Environmental Problems Conf. (EPC'13)*, Oct. 12–16, 2013. [Online]. Available: http://www.science.org/epc/ proceedings/2013/2431/01/2987001-ads.html.

According to the basic formats of IEEE style a conference paper online is to be cited as follows: K. L. Author. (Date). Title. Given at Abbreviated Conf. title. [Medium Type]. Available: site/path/file. For example, R. G. Baker. (Oct. 2014). Development of assessment strategy: involvement of first-year university students in the discussion. Presented at the student meeting: Qualification assessment in the higher education system (QAHE) Conf., Philadelphia, PA, USA. [Online]. Available: http://www.qahe/past_papers /2014/ Baker.pdf

When citing a patent, the day of the month is to be retained or requested. If in the patent several dates are given, the date of issue is to be used. In a reference list patents are submitted as follows: K. L. Author, "Patent Title," U.S. Patent x xxx xxx, Abbrev. Month, day, year. Or: K. L. Author, "Patent Title," Country Patent xxx, Abbrev. Month,

day, year. For example, A. May and K. Young, "Methodical recommendations for medium-current regulation of LEDs," U.S. Patent 6 838 234 A1, 2008, Oct. 1, 2009. The other example: D. Klymenko, "Accumulation of solar energy," (in Ukrainian), UA Patent 475268, Feb. 15, 2008.

The general form of a patent online is as follows: the invention name, by the name of the inventor. (year, month day). Number of a patent [Medium Type]. Available: site/path/file. For example, Mirror with areas of varying degrees of image magnification, by O. F. K. Bronks. (1987, May 12). Patent B 145 237 [Online]. Available: Athenium Library: LEXPAT File: DESIGN.

Dissertations and theses are considered to be the results of scientists' research work. The basic format for citing them is the following: K. L. Author, "Thesis Title," M.S. thesis, Abbrev. Dept., Abbrev. Univ., City of Univ., Abbrev. State, year (B.S., M.S.) or K. L. Author, "Dissertation Title," Ph.D. dissertation, Abbrev. Dept., Abbrev. Univ., City of Univ., Abbrev. State, year (Ph.D.). For example, W. Kowalski, "Step-by-step study of the effect of thermal protection of the nozzle," M.S. thesis, Dept. of Thermal Protect. and Eng., Cambridge Univ., Cambridge, U.K, 1995. The other example: R. A. Gamer, "Influence of magnetic fluxes on chemical composition of the atmosphere," Ph.D. dissertation, Chemical Lab., Clark Univ., Worcester, Tech. Rep. 34285, 1998.

In order to cite technical reports correctly, one should place the company's name and location after the author's name and the title. The number of the report and date are to be pointed at the end of the reference. The basic form to cite technical reports should be the following: K. L. Author, "Report Title," Abbrev. Name of Co., City of Co., Abbrev. State, Country, Rep. xxx, year. For example, A. F. Fisher, K. R. Meet, and S. A. Taylor, "Oxidative reactions in the upper layers of the earth's crust," Aerospace Corp., Baltimore, MD, USA, Tech. Rep. TR-2210 (8230-26)-2, Feb. 1996. The other example: K. L. Watson and H. D. Jobs, "Production, operation and verification of data of the ground surveillance system KMN", in "Characteristics of radio communication in the northern regions of Canada", Univ. of New Mexico, Albuquerque, NM, USA, Contract NOBSR-85328, Final Rep., Oct. 1982, vol. 2.

The basic format of an online report is as follows: K. L. Author, "Report Title," Company, City, State, Country, Rep. no., (unrequired: vol./issue), Date. Accessed: Date. [Online]. Available: site/path/file. For example: D. A. Fishman and A. Ester, "Using Raster Data for Geographic Analysis and Modelling," R Package Version 2.0-11, Feb. 11, 2012. [Online]. Available: http://RASTER.org/package= analysis. According to the basic format, a year should be included; the URL should be added to the end of the reference.

As for software, IEEE adheres to the Force 11 Citation Principles [look about it:18]. Among these principles are: importance (software is a legitimate and citable research product and should be cited like any other product of research); accessibility (citations of a software should alleviate access to it and to the metadata, which are associated with it); specificity (citations of a software should provide identification of the software specific version and access to it; software identification should be the most specific), compatibility and flexibility (methods of citing

data have to be flexible enough in order to provide accommodation for various practices amongst communities), etc. So, when citing software, you should follow the basic form. It includes such components as K. L. Author. *Software Title*. Date Repository / Archive. (version / year). Name of a Publisher. Accessed: Date (in case of being applicable). [Medium Type]. Global Persistent Identifier. Available: site/path/file. For example: A. B. Irving *et al. Exact Mode of Operation of the Level Simulator.* (2013). Wadsworth. Accessed: Feb. 13, 2018. [Online]. Available: http://wadsworth.net.

The basic format is to be used for citing manuals: K. L. Author (or Abbrev. Name of Co., City of Co. Abbrev. State, Country). Manual / Handbook Name, xx ed. (year). Accessed: Date. [Online]. Available: http://www.url.com. For example: H. Brant. *Guidelines on Making and Using Polyvinyl Chloride Wallpaper v4.0.* (2007). Accessed: Feb. 23, 2015. [Online]. Available: http://kdu.edu/ users/brant/Using_ wallpaper_v4.0.pdf *or Microsoft Office 2003 Visual Basic Programmer's Guide, Microsoft Professional Editions Series,* Microsoft, VCH (Publishers, Inc.), New York, NY, US, 2006.

It's very popular now to review online video, for example, on the YouTube channel, including for educational purposes. For citing online video, the basic format was worked out: Owner or Creator of a Video, Location (if it's available). *Video Title: In Initial Caps.* (Date of release). Accessed: Month Day, Year. [Online Video]. Available: http://URL.onlinevideo.org. For example: University of Texas, Austin, TX, USA. First Grade Daisy F. (Apr. 13, 2020). Accessed: Nov. 5, 2020. [Online Video]. Available: https://www.youtube.com/daisy-watch.

It should be mentioned that the main entry for some website includes the following data: name of the author, titles of a page and website, web address, and access date: First Name Initial(s) Last Name. "Title of Page." Title of Website. Web Address (retrieved Access Date). For example: A. April. "Trump on the road to victory." BBC.com. http://www.bbc.com/POLITIC/03/12/tramp/ index.html (accessed Oct. 2, 2019). If a page has two or more authors, they should be listed in order as they make their appearance on the website. Besides, their names should be separated by a comma. For example: A. April and R. Tree. "Trump on the road to victory." BBC.com. http://www.bbc.com/POLITIC/03/12/tramp/index.html (accessed Oct. 2, 2019).

For informal websites or websites without some formal titles one should use descriptive phrases in the citation instead of page / website titles.

The significant components of citation to datasets are the following: Author, Date, Year. "Dataset Title," distributed by Publisher or Distributor, http://url.com (in case of DOI used, one should end it with period). For example: W. Andersen, D. Pink, and K. Tom, October 10, 2017, "Election exit poll data. V1," distributed by Brooklyn election data archive, http://hdl.exit.net/1272.1/21239 UNF:4:5C6UfGjdLy34NVPtgr78qA==.

III. CONCLUSION

Issues of academic integrity are becoming extremely urgent today. In addition to the other issues, it implies the necessity of citing information sources (data, theories, ideas,

statements, etc.). Therefore, there is no doubt that the skills of citing references on scientific works are important for researchers.

Nowadays, Ukrainian science keeps integrating into the world scientific space. Ukrainian scientists have to cooperate actively with various editions, including foreign ones, in order to become a part of the scientific communication system and to inform researchers of the scientific work results. The value of their published scientific works depends on the quality of citing references as well. It is worth noting that the number of foreign scientists who publish their scientific works in fundamental Ukrainian journals, including those indexed in advanced scientometric databases, has also increased. Thus, electrical engineering professionals should explore the style of Institute of Electrical and Electronics Engineers (the IEEE style) to make proper use of the basic formats for citing different information sources.

REFERENCES

[1] IEEE – Advancing Technology for Humanity. History of IEEE. Available at https://www.ieee.org/about/ieee-history.html.

[2] IEEE – Advancing Technology for Humanity. IEEE Standards. Available at https://www.ieee.org/standards/index.html.

[3] IEEE – Advancing Technology for Humanity. Conferences. Available at https://www.ieee.org/conferences/index.html.

[4] IEEE – Advancing Technology for Humanity. Education. Available at https://www.ieee.org/education/index.html.

[5] 2014 IEEE Standards Style Manual. IEEE. 3 Park Avenue, New York, NY 10016-5997, USA. Available at: https://mentor.ieee.org/ myproject/Public/mytools/draft/styleman.pdf.

[6] IEEE Editorial Style Manual for Authors. IEEE Publishing Operations. 445 Hoes Lane. Available at: http://journals. ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/IEEE-Editorial-Style-Manual.pdf.

[7] IEEE Reference Guide. IEEE Publishing Operations. 445 Hoes Lane, Piscataway, NJ 08854, USA. Available at: http://journals.ieeeauthorcenter.ieee.org/wp-content/uploads/sites/7/ IEEE-Reference-Guide.pdf.

[8] Order of the Ministry of Education and Science of Ukraine "On approval of Requirements for the dissertation" of 12.01.2017: With alterations of 31.05.2019 No. 759. Available at: https://zakon.rada.gov.ua/laws/show/z0155-17. [in Ukrainian].

[9] State Institution of Higher Education. University of educational management. Academy of Educational Sciences of Ukraine. Available at: http://umo.edu.ua/images/content/nashi_vydanya/ visnyk_PO/new/inform/ВИМОГИ__оформ_библиографии.pdf. [in Ukrainian].

[10] Ukrainian Educational Journal. Requirements for articles of scientific periodical "Ukrainian Educational Journal". Available at: http://uej.undip.org.ua/Documents_for_Taras/Requirements_for_the_ articles_of_the_scientific_edition.pdf.

[11] Visnyk of Vinnytsia Polytechnical Institute. Author Guidelines. Available at: https://visnyk.vntu.edu.ua/index.php/visnyk/about/ submissions.

[12] Visnyk of Kherson national technical university. Requirements for the designation of articles. Available at: http://kntu.net.ua/index. php/eng/content/view/full/27411.

[13] Bulletin of Kharkov National Automobile and Highway University. Requirements for the designation of articles. Available at: http://bulletin.khadi.kharkov.ua/search/authors.

[14] Power engineering: economics, technique, ecology. Requirements for the designation of articles. Available at: http://energy.kpi.ua/pages /view/vymof.

[15] Electrical engineering & Electromechanics. For Authors. Requirements for article formatting and structure. Available at: http://eie.khpi.edu.ua/pages/view/2.

[16] Journal of Coal Chemistry. Requirements for articles. Available at: https://www.ukhin.org.ua/en/coal-chemistry-journal/instructions-for-authors.html.

[17] International Science and Technology Journal "Lighting and Electricity" Kharkiv O. M. Beketov National University of Urban Economy. Requirements for articles. Available at: https://science.kname.edu.ua/images/dok/journal/201816.11.18.pdf.

[18] FORCE11. Available at: https://www.force11.org/about/mission-and-guiding-principles.