HOW TO WRITE FOR
TECHNICAL PERIODICALS
& CONFERENCES

IEEE
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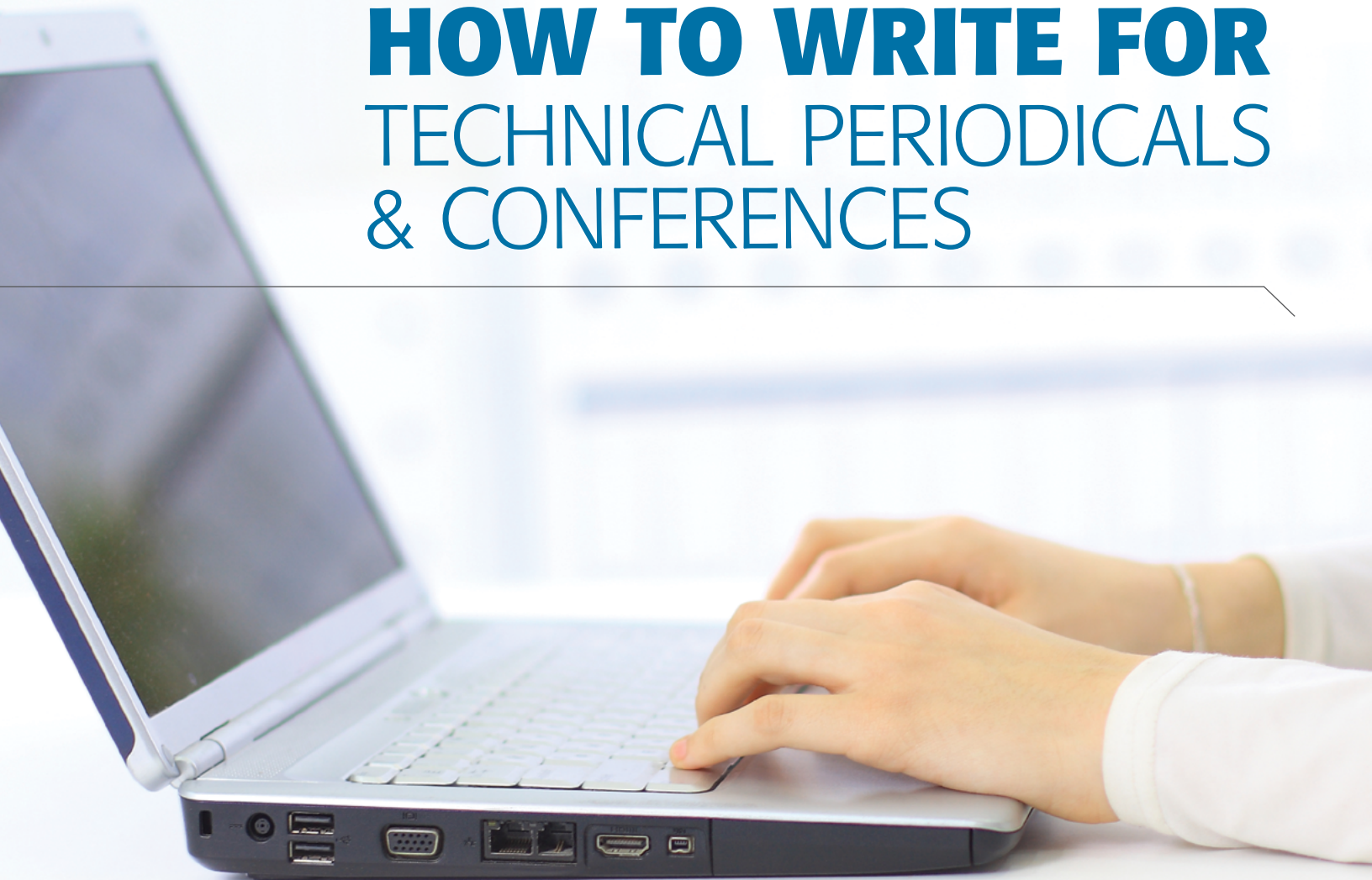
As a researcher or practicing engineer, you know how important it is to publish the results of your work. It is not just about career advancement or getting recognition. Publication is a critical step in the scientific process. Your discoveries will foster innovation and help advance technology for public good.

But that can only happen if your research can be read, understood, and built upon by your fellow researchers and engineers.

This guide is designed to help you succeed as an author.

CONTENTS

KEY: ⬀ appears beside links to online resources

SECTION 1
INTRODUCTION

You will learn how to prepare, write, and submit your manuscript for peer review by an IEEE conference, journal, or magazine. We will show you how successful authors structure quality work to improve their chances of being accepted. You will find practical tips on how to select an appropriate periodical or conference, organize your manuscript, write in a clear and grammatically correct style, and work through peer review. You will also learn how to avoid common mistakes and ethical lapses that will prevent your manuscript from being accepted and may damage your reputation.

Publishing is central to the mission of IEEE: to foster technological innovation and excellence for the benefit of humanity. IEEE provides high quality, innovative information by attracting the best authors and supporting them through the publishing process. A Web-based workflow and tools such as reference validation, graphics checking, and templates streamline the submission process.

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If you have solved a new and important problem in your field or you have gathered and analyzed data about an important engineering process, it is time to share your results with your colleagues. You want to publish your best work in the right periodical to advance progress in your field. This guide will help you get there.

Good luck.

BEFORE YOU BEGIN

The development of your manuscript will begin long before you begin to actually write your first draft. You should not write just for the sake of publishing or to accumulate citations for your curriculum vitae. If you do, surviving peer review will be a challenge. As you plan your research project, think about how your work will be received and evaluated by your peers.

Ask yourself these questions:

▸ Is this an important problem, or, is the data collected and analyzed of interest to the wider community?

▸ What has been done in the past?

▸ Does this research significantly advance the state of the field?

To answer these questions, you need a solid understanding of the relevant literature.

Conducting Your Literature Search

Your research problem must contribute new and important knowledge to your field. A thorough review of the published literature will help you determine if this is the case. You must be able to show reviewers and readers that you understand what work has been done before, and that your research adds some new understanding to the field.

Some, although not all, of the resources you identify in the literature review will become references in your work. They will be used in the introduction and the discussion sections to show how you are making an important contribution to your field. Finally, a thorough review of the literature will help you select the publication or conference to which you will submit your work, a task you will read more about in Section 5.

The Internet has made it easy—perhaps too easy—to find information. You need a solid search strategy to find the literature that is most relevant to your work. Your first instinct may be to start your search in Google or one of the other general search engines. This approach is likely to generate tens of thousands of results. Some results will be from reliable, citable resources, but many will not. Resist the temptation to "Google it" until after you have used databases of peer-reviewed literature that are more trustworthy and targeted to scientific investigation.

IEEE *Xplore®* Digital Library

IEEE *Xplore* offers a robust interface to help you discover and access scientific content from IEEE and its publishing partners. It provides online access to more than three million full-text documents published in some of the world's most highly cited publications in electrical engineering, computer science, and electronics.

Bibliographic Databases

There are a number of databases experienced engineering writers use to conduct literature searches, including Compendex® and Inspec®. These databases will help you identify references from a broad selection of literature.

Your Institution's Library

If you are affiliated with an academic or government institution, you are in luck. Your library has invested heavily in resources specifically to help you conduct your research and publish your results. Librarians at your institution are trained to conduct precise searches to answer your questions. They can help you access resources that are available in your library and they will find external documents for you as well. Corporate libraries can also provide excellent resources.

References and Citations

Once you identify a major document that is relevant to your research, check the references. They will lead you to the research that laid the basis for your area of study. Use tools available in platforms such as IEEE *Xplore* to find works that cite the documents you have identified. These will highlight more recent research results.

Citation Map from IEEE Xplore

Taking Notes and Keeping Track

As you search, scan the abstracts and key words. There is no need to read through every document. For each reference you want to include in your bibliography, make note of the original publication source and, if appropriate, the URL location. As you scan the article, take notes in your own words. Keep track of where you got ideas [2]. Even if you do not directly quote a source in your article, you will need to give attribution to the original source material. Making detailed notes now will help you avoid the danger of accidentally plagiarizing someone else's work. See Section 3 for a complete discussion of plagiarism.

Next Steps

Once you are confident that you have solved an important problem or completed a set of experiments and analyzed the results, and done a thorough literature search, it is time to decide what to include in your manuscript and how to present it. Spend some time brainstorming about your research. What are the three or four fundamental points you want readers to understand and remember once they have finished reading your work [3, 4]? Decide which methods and what data support each of those messages. Which references help you make the case that your work is new and significant? What conclusions can you draw from your research? This exercise will help you decide what information to include.

Draft an Outline

An outline will organize your writing and keep you from going off on tangents. It will help you develop a logical, structured manuscript that will be easily understood by reviewers and readers. It will show the order of topics you will discuss, the relative importance of each, and how they relate to each other.

Most word processing programs have a tool that makes it easy to create and edit an outline. Your outline may use phrases, complete sentences, or a combination of both. Scientific articles follow a standard structure: Introduction, Problem Formulation, Previous Research Relevant to the Problem, Methods or Model and Results, Conclusion (see Section 6). This can provide a useful structure for organizing your outline. Start by brainstorming about all of the ideas and data you want to include. Then group related ideas together. Arrange your information into subsections. Begin with general information and then move to more specific ideas. Then create headings and subheadings for each section.

If you are working with coauthors, the outline can be a useful tool to get agreement on the content and organization of the article [3].

ETHICS IN SCIENTIFIC PUBLISHING

Of the many steps you will take to successfully publish your work, none is more important than following the highest ethical standards while you conduct and write about your research. You must understand what is and is not acceptable in writing your article. Cutting corners could negatively impact your reputation.

IEEE, and other reputable publishers with whom you will work, do not tolerate fraudulent research and publication. Your submission will be screened, and if you have violated any standards of publication, the consequences can be severe. Depending on the nature of the violation, corrective actions at IEEE can range from a three-year to lifetime suspension of publication privileges, public notice of the violation in the publishing journal and in IEEE *Xplore*, and referral to IEEE Ethics and Membership Committees.

Follow the guidelines below to ensure that your work is beyond reproach. If you have any questions or doubt about whether information you are including in your article is acceptable, speak with an advisor or an experienced colleague.

Who is an Author?

Authors have very clear roles and responsibilities. IEEE guidelines state that authorship and coauthorship should be based on a substantial intellectual contribution. The list of authors on a work indicates who is responsible. When you and your colleagues are evaluated for employment, promotions, or grants, the quality and quantity of your publications will be a consideration. Therefore, it is critical that the list of authors on your work includes all of those—and only those—who had a significant role in its development.

It can be considered an ethical breach if you omit an author who contributed to your work, or if you include a person who did not have much to do with it. It may be tempting to remove a colleague who is not cooperative, or who has not contributed much. But the colleague could very well file an authorship dispute with the journal. IEEE guidelines require a coauthor's permission to withdraw their name.

Adding an author who did not contribute significantly to an article is also a violation of ethics. Do not add authors simply to build up credibility. A person who made minor contributions, such as reading and giving feedback, or conducting statistical analysis, should not be on the list of authors. It may be appropriate to include this person in the acknowledgements section of your work (refer to Section 6).

Develop a list of authors that includes a description of each person's contribution to the project and the writing of the manuscript, then document the reasons for any additions or deletions of authors along the way [5].

Proper Citation of Original Work

Plagiarism

Here is an example: As you are reviewing the literature, you come across a passage that makes a point far better than you have done. You copy it and paste it into your notes. Later, when you are writing your article, you include it verbatim in your text.

Do not do it!

Copying word-for-word what another author has written, or even paraphrasing someone's original text without proper attribution is plagiarism, and plagiarism can quickly derail your career.

IEEE defines plagiarism as the reuse of someone else's prior ideas, processes, results, or words without explicitly acknowledging the original author or source. Plagiarism in any form, at any level, is unacceptable and is considered a serious breach of professional conduct, with potentially severe legal and ethical consequences. IEEE guidelines against plagiarism apply equally to periodical articles and conference proceedings.

IEEE Recognizes Five Degrees of Plagiarism:

1. Copying someone else's entire article, or a major portion of the article (more than 50%) verbatim, without credit to the original author(s) or copying your own previously published work (see Redundant Publication, below).

2. Copying a large proportion (20-50%) of someone else's work, or your own previous work, without credit.

3. Copying without credit individual elements such as paragraphs, sentences, or illustrations, resulting in a significant portion (up to 20%) of an article.

4. Uncredited paraphrasing of pages or paragraphs from another source.

5. Credited verbatim copying of a major portion of an article without clear delineation, such as quotes or indents.

All sources of information, even those in the public domain, need to be properly cited.

Any ideas you have discovered elsewhere should be cited. It is rare to quote verbatim in scientific literature, but if you must, use quotation marks [3]. Experts recommend that you annotate and paraphrase to avoid plagiarism. Put what you have read into your own words, but even then you must include a citation.

Redundant Publication

Never submit work for review to more than one publication at the same time. Doing so risks being accepted by both publications and, consequently, multiple publications. Multiple publication wastes funds and space, reduces the value of periodicals to readers and libraries, and creates problems with indexing and citation. Submit to your first choice. If the article is rejected, then submit it to your second choice.

IEEE uses plagiarism detection software to screen every submitted article.

It is common in technical publishing for material to be presented at various stages of evolution. For example, early ideas may be published in a workshop; more developed work in conference proceedings; and the fully developed study may be published in a journal. However, IEEE guidelines require that authors fully cite their prior work. Authors must be able to demonstrate significant advances from prior publications. Penalties can include suspension of publication privileges in the journal or the next volume of the conference proceedings.

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▸ Authors of open access articles are permitted to post the final, published version on their personal Web sites, their employers' sites, or those of their funding agencies.

▸ Authors are encouraged to check IEEE Copyright Policies ⬈ for updates.

Fabrication of Data

Research misconduct undermines the scientific record, destroys the trust that scientists need to verify and build on each other's results, and may even lead to serious public harm [6].

Of course, honest errors can occur and there can be legitimate differences of opinion about findings. But if you are discovered falsifying results, fabricating data, manipulating images, or engaging in other activity that misrepresents your work, you can expect serious consequences. Your job and your professional standing will be at risk.

Take these steps to protect yourself:

▸ Keep meticulous records of your experiments.

▸ Retain data records after your work is published.

▸ Read the Instructions for Authors for your publication or conference to understand how images should be handled. While it is usually acceptable to resize an image, enhancing an image or altering it digitally rarely is [3].

SELECT AN APPROPRIATE FORMAT

There are several different categories of publications. Depending on the stage of your research or the level of information you are presenting, one may be more appropriate than another for your work. Evaluate the message you want to communicate, and then select your format.

Conference or Periodical?

Your first decision will be whether to submit your article to a journal, magazine, or other periodical, or if you should present it at a conference instead. A journal article will be a fully developed presentation of your work and its final findings. In a journal article clear conclusions can be made, firmly supported by the data available. A conference article may be written while you are still in the process of conducting your research. This may be a practical route for disseminating information about your research. Or you may want to obtain informal feedback on your ideas from your peers that you will use to inform your research project. The structure of your article will be similar whether it is a conference or journal article, however, a conference article will be shorter, it may include fewer references, and it is written in less detail.

Full Length, Original Research

Original research results are most commonly reported in a full-length journal article. A journal article will be a fully developed presentation of your work and its final findings. It presents a hypothesis, and then presents evidence to support it. Clear conclusions are made. It tries to persuade the reader of the validity of its arguments [2].

Conference Articles

A conference article may present preliminary results, or highlight recent work. The article is presented at a scientific conference and then published in the conference proceedings. The purpose of a conference article is to obtain feedback on a particular idea, and the writer uses that feedback to inform further research. IEEE guidelines require presentation at the conference.

Typically a student will write and present several conference articles before attempting an original research article.

Reviews

Review articles provide a broad analysis of the research that has been published in a particular area. Although the research is not new per se, the authors will provide new insights or introduce new theories based on their interpretations of a wide body of work.

Letters

IEEE Letters journals provide rapid turnaround for short reports on high impact new results. They provide full experimental detail and references, but are generally four or five typeset pages long.

SELECTING WHERE TO SUBMIT

Selecting a Periodical

Do not wait until your article is finished to select your target journals. Make your decision early, while you are still conducting your research or during the early stages of writing. If you know what the journal is looking for, what types of articles it publishes, and who reads it, you will be more likely to develop an article that is appropriate for publication in that journal [7].

It can be overwhelming to select a journal for article submission. You are looking for a journal that will give your article the attention it deserves, by attracting readers who are likely to refer to it in their own work [4]. You want a journal that has a good reputation, so your work will have credibility. And you want a journal that supports you as an author, with an expedient process and tools to help you through the steps of publication. If you do not match your article with an appropriate journal, months may be wasted on a review that does not lead to publication [3].

There are hundreds of engineering periodicals, and probably a dozen or more with some relevance to your research. There are a number of ways to narrow your selection and find the publication most likely to be a good fit for your work. Begin by reviewing the results of your literature search. Which journals publish articles most like yours? Are there journals that came up frequently? These will likely be most closely related to your research topic.

Once you have identified four or five solid target journals, go to their Web sites. The Aims and Scope will provide a description of the types of articles the journal is looking for. Who is the editor, and who serves on the editorial board? Are these people you recognize as leaders in your field? Scan a few articles from each journal. What audience do they seem to be speaking to?

A number of metrics evaluate the influence of a journal. The Thomson Reuters Journal Citation Reports® (JCR) measure various citation factors of journals, including the important Impact Factor. Impact Factor is the average number of times articles from a journal published in the past two years have been cited in the JCR year. Another measure is Source-Normalized Impact per Paper (SNIP), which uses data from the SCOPUS database to measure contextual citation impact based on total citations in a scientific discipline.

It accounts for the fact that fields such as mathematics and engineering tend to have lower impact values than the life sciences. SCImago Journal Rank (SJR) also uses the SCOPUS data and accounts for both the number of citations an article receives and the prestige of the journals that cite it. While all these metrics are valuable, remember that journals with higher metrics may not necessarily have the right audience for your article.

Determine the length of time it takes for a journal to publish articles. On IEEE *Xplore*, most journals show the date an article was received, revised, accepted, and published. Consider whether the journal has page charges, or charges for certain types of illustrations. If your targeted journal has these charges, you should have a plan to pay for them, either through your grant, your institution, or with personal funds.

Your goal is to find the journal with the broadest readership, highest impact, and greatest likelihood of publishing your work [7]. The journal with the highest impact factor or the most noteworthy editor may not deliver the best readership for your article. The truth is that high profile journals reject as many as 90% of the manuscripts submitted [2]. Making an inappropriate choice will only mean a substantial delay in getting your research to the audience that needs to hear about it.

Selecting a Conference

There are thousands of conferences held around the world every year. You can search a **database of Calls for Articles** ⤢ for IEEE-affiliated conferences. Be sure that your research is a good match for a conference before you submit your article. Pay careful attention to the dates. You must be available to present your findings in person at the conference. According to IEEE Guidelines, articles that are not presented at conferences may be suppressed in IEEE *Xplore* and therefore are not indexed by or included in Thomson Reuters or Elsevier databases.

Open Access Journals

Another relatively recent option for authors is to choose open access publication for their articles. Open access provides free access to your article online to anyone who may be interested.

Open Access Models

There are several different models:

▶ **Green open access**
Authors publish in a journal and then self-archive a copy of their publication on their own Web site, their institutional repository, or some other central repository. Depending upon the journal publisher's policies, the version of the article that is archived is either the final manuscript as submitted to the publisher after revisions, or the final published article. IEEE is considered a "green" publisher by SHERPA-RoMEO (**www.sherpa.ac.uk/romeo/**) ⬀, a not-for-profit group that tracks publisher policies.

▶ **Gold open access**
The final published article is made immediately available online by the publisher to anyone who is interested in reading it. The costs of publication are usually supported by fees paid by the author. The author's funders or institution may support the fee. Some journals waive fees for authors from developing countries.

▶ **Hybrid open access**
In a hybrid open access journal, an author can choose to make an article freely available online by paying the article processing fee. If an article processing fee is not paid, the article is available to subscribers only.

Open Access Publishing at IEEE

IEEE open access policy ⬀ supports the principle of providing open access as one way to enhance the dissemination of publicly funded research to strengthen science and engineering, encourage innovation, and serve the greater interests of society. To help researchers gain maximum exposure for their ground-breaking research, IEEE offers a number of options to authors.

IEEE Hybrid Journals: Most IEEE transactions, journals, and letters offer a hybrid open access option, with traditional subscription-based content as well as open access, author-supported content. Most of these journals have an established impact factor and are well-respected. The quality of the review process is the same for open access and traditional articles. Open access articles are published in any format offered by the journal, including print and online.

Fully Open Access Journals: IEEE publishes several fully open access journals. They are dedicated to specific subject areas, publish author-pays articles, and are delivered online only.

IEEE Photonics Journal, The IEEE Photonics Society Publication, launched in 2009, became first fully open access IEEE journal in 2012. The second, launched in 2012, is *IEEE Journal on Translational Engineering in Health and Medicine*, by the IEEE Engineering in Medicine and Biology Society. Other fully open access journals in development include *IEEE Journal of the Electron Devices Society*, produced by the IEEE Electron Devices Society, and *IEEE Transactions on Emerging Topics in Computing*, produced by the IEEE Computer Society.

IEEE Access™: In 2013, IEEE will launch a rapid publication, open access megajournal. This journal is aimed at a broad audience across all IEEE fields of interest, including general readers, specialists, and practitioners. There will be practical articles, as well as research articles. By adopting acceptance criteria of technical relevance and accuracy, rather than scientific importance, *IEEE Access* will create a publishing home for new authors and will engage readers among the vast number of electrical, electronics, and computer engineers who work in corporations, as opposed to universities. Dr. Michael Pecht, founder and director of the Center for Advanced Life Cycle Engineering at the University of Maryland, is the journal's inaugural editor-in-chief.

DEVELOPING YOUR MANUSCRIPT

Author Responsibilities

As discussed in Section 3, there are very clear guidelines about who to include as an author. Disputes about authorship can lead to ethical inquires. You should decide who will be an author on the work as soon as possible, perhaps even before you begin your research project. Each author has a responsibility not only for the final article, but also for the design and execution of the research [3].

IEEE Publication Services and Products Board Operations Manual (PDF, 1.2 MB) ⧉ states that authorship credit must be reserved for individuals who have made a significant contribution to the theoretical development, system or experimental design, prototype development, and/or the analysis and interpretation of data associated with the work reported in the article. An author must contribute to drafting the article and reviewing or revising it. Each individual named as an author must approve the final version of the article as accepted for publication, including the references.

One individual must be named as corresponding author. The corresponding author is responsible for submitting the manuscript and managing it through the review and revision process with the publisher. The corresponding author makes sure that all authors are kept apprised of the current status of the work.

Divide responsibilities among authors. Designate the best writer to draft the more textual parts of the work, such as the introduction, summary, and conclusions [2]. Other authors can take responsibility for the problem formulation and results.

IEEE leaves the order of authors to the discretion of the authors. Typically, the first author listed is the person who has taken the most responsibility for the work. Other authors are listed in order of the level of their contribution. Sometimes, the senior author is the head of the department and is listed last. Colleagues who have contributed in a non-significant way, by reviewing the article and providing feedback, for example, can be thanked in the acknowledgements section.

The First Draft

The hardest part of writing can be simply getting started. Experts recommend that you set aside time in your calendar for writing and set deadlines to stay on track. Find a quiet place and avoid interruptions. If you cannot think of the right word or you have forgotten some detail you need, do not stop to look it up. Type a placeholder such as "xxxx" or make a note using the comments feature of your word processing program. Later you can search your document for your placeholders to fix them. To maintain your momentum, do as Ernest Hemingway did: he wrote the first paragraph of the next chapter before he would stop for the day. It will give you a jump start in your next writing session.

When you are writing the first draft, do not focus so much about style or grammar. You will revise your work several times after you have written the first draft. In Section 7 you will find tips and guidance for making sure your writing is clear and grammatically correct. Follow your outline, but be open to revising it as you go along. Some ideas may become less relevant to you or your coauthors once you begin putting your article together, and new ideas will emerge.

Where to Begin Writing

Scientific and technical articles typically follow this format: Abstract; Introduction; Previous Research; Problem Formulation; Model or Methods and Results; Conclusion; References; Acknowledgements. Each section plays a different role in explaining why your research presents a new and important problem, what has been done before, and how your research substantially advances your field, as discussed in Section 2.

Many inexperienced writers start writing with the abstract. Then they move on to the introduction, the methods and results, and the conclusion. But the core of your article is the problem formulation and the methods you used to solve it. This is where you describe your unique approach to the problem and how you developed it. Because this is the material that is most familiar to you, it makes sense to start your writing with this section [8]. You can then move on to your results. Most experienced writers recommend that you write the introduction next, and then your conclusions. The abstract should be written last. After you have drafted all of the sections, you should revisit your working title to be sure it accurately represents your final work. Acknowledgements and references can be completed after the article is written.

Sections

Title and Index Terms

The purpose of your title is to grab the attention of your readers and help them decide if your work is relevant to them. As you write, develop a list of keywords that will attract your intended readers. Use these keywords towards the beginning of your title [2]. Use words that help the reader understand why your work is different from previous studies [8]. Keep your title concise. Some journals set a limit on the number of words in a title. Avoid unnecessary words. You may want to develop a list of possible titles as you develop your article, then select the best one [2].

For IEEE journals, you must provide a list of index terms or keywords that reflect the content of your article. You can select your terms from the **IEEE taxonomy (PDF, 375 KB)** ⬈. Abstracting and indexing services and search engines use the article title and index terms to help readers find your article. Think about how you would search for your article. What search terms would you use [7]? Let these terms guide your selection of index terms and the development of your title.

It is important to get your title and index terms right so that your article appears when engineers and researchers are conducting searches in your area of expertise.

Abstracts

The abstract is the last section of your article to be written because it is a condensed version of the entire article. It includes the key points of the introduction, methods and results, and conclusions. An abstract is generally 100–250 words long. It is written in the past tense. An abstract should not include references; use the background and conclusions to help frame the context of your work [9].

Readers will use the abstract to decide if your article is relevant to them. Use keywords and index terms in your abstract to capture reader interest and improve the likelihood of your article appearing in relevant searches [3]. Readers who find your article through an abstracting service may never see the rest of your article. Be sure the abstract conveys why your research problem is important and how your work moves the field forward. Reviewers also look at the abstract first. Strive to make a good impression with your abstract to engage their attention.

Introduction and Published Research

The Introduction serves to help the reader understand our three key questions: Why is this a new and important problem? What has been done before? How does your research bring significant new understanding to the field? The reader should find enough information to understand why your research was necessary, without having to refer to other source material or published works [7]. The introduction should be concise, no more than one or two pages. It is written in the present tense.

Your introductory paragraph should start with what is generally known about your subject. Then move step by step through more detailed information, ending with a description of the specific problem or hypothesis your article will discuss. Try to use an attention-grabbing statement to hook the reader [10] while being careful not to sensationalize your results.

In the next few paragraphs, refer to the published research to show what is already known about your subject and why your work is needed. Do not try to include everything from your literature review. Your goal is to orient the reader to the most relevant studies. Explain how each earlier study relates to your own approach to the problem. Does it have limitations? Does it make different assumptions [11]? Show your readers how your study builds upon or is different from this existing work. If you have published an earlier version of your work, for example as a conference or journal article, you must explain how the current study builds upon your own prior work [3].

After you have explained the historical context of your work, introduce your hypothesis and provide a general description of the results you have obtained. You will flesh these out more fully later in the article, but providing an overview here motivates your audience to read on. At the end of your introduction, tell the reader how the article is organized. This will allow readers to move to sections of particular interest, if they wish.

Problem Formulation and Results

The Problem Formulation, or Methods, section should be the first part of your article that you write. In this section, you describe the methods that you used to solve the problem, or prove or disprove your hypothesis. It includes a detailed description of the problem, defines all the terminology and the notations used, and develops the equations you used for reaching a solution. In some fields, for example, biomedical engineering, you may have to describe the materials and methods you used in your experiments.

The section should be written objectively, without analysis or interpretation. The level of detail should be enough to allow a reader to replicate your work. Reviewers and readers will evaluate this section to determine if your methods were appropriate to obtain the data you report in the results section of your article. Include only the most significant equations in the body of your article; detailed derivations can be described in the appendices [12]. Equations are numbered sequentially, and referred to in the text by their reference number.

Write the Results section of your article next. Here is where the reader or reviewer will determine if you have in fact found a better solution than previously published work. If your work is analytical, you will show results obtained from your equations; if it is experimental, then you will show experimental measurements [13]. The results will demonstrate that you have developed a new solution to a problem, and that your work is a significant advance over what has come before. The results should be clear and concise, and figures or tables will typically be used to illustrate your findings.

In some journals and disciplines, the results are presented as raw data, without interpretation. In others, results and discussion are combined. You should review representative articles in your targeted periodicals to determine which approach is preferred. In the discussion, you will interpret your results.

You should acknowledge any limitations of your study, and be absolutely certain about your conclusions.

Conclusion

This section should explain what your research has achieved, as well as the benefits and shortcomings of your solution. It is similar to the abstract, but it can provide more detail. Remind readers of the key points of each section of your article. Then provide a summary of the main findings you have reported, the important conclusions that can be drawn, and the implications for the field. You should also discuss the benefits and shortcomings of your approach, and suggest future areas for research [11]. A well-written conclusion can also help when writing the abstract.

Illustrations

Tables, graphs, and figures in your article will help clarify your ideas and support your conclusions. A figure can quickly show ideas or conclusions that would require a lot of explanation in the body of your work [12]. Because readers frequently scan the illustrations in an article without first reading the text, they should be self-explanatory. Table titles and graphic captions should help the reader understand the data. While illustrations can appear anywhere in the article, they are typically used in the results section.

Preparing your illustrations can help clarify your ideas and support your arguments. The process can make writing easier, and for that reason, you should begin thinking about your illustrations early in the process [2]. Decide which ideas or methods would be effectively presented by illustration and what format best conveys the information. A table is effective for presenting repetitive data or when it is important for the reader to see the exact values. A graph can show the relationship between data points or trends in your data.

Think carefully about how you want the illustrations to look. Be sure they are readable and easy to understand. Use thick lines and be sure that your labels are large enough to be read. Most journals charge for the use of color in printed journals, so think about how the illustration will look in black and white or greyscale. A poor image cannot be improved in the production process, so be sure that the image you submit is of high quality. Design your table or graphic to fit in the column format used by your target periodical.

Resist the temptation to include too many illustrations. Each figure should be essential to your story. A good piece of advice is to ask someone who is not directly involved in your field of research to review your illustrations to see how well they communicate your message [2].

IEEE provides a number of tools, guidelines, and frequently asked questions to help you prepare your artwork for submission to IEEE *Xplore*. You can find them in the **IEEE Author Digital Toolbox** ⬈ under "Preparing Your Graphics or Multimedia Materials." You will also find a tool to check that your artwork meets **IEEE publication standards** ⬈.

References

References demonstrate to the reader that you have done your homework. They show that you have researched the work that has been done. They support your argument that you have found a new and significant approach to a problem. They help you make a case for the importance of your research question.

Experts say that there are more mistakes in the reference section of an article than any other section [7, 3]. It is meticulous work, but keeping your references accurate and complete will help demonstrate the quality of your work when it goes through peer review. It will also allow your research to be more effectively used by those who come after you.

Cite only those references that directly support your work. Do not include references from "big names" just to build credibility. Try not to cite material that has not been vetted by peer review, such as theses, abstracts, and dissertations. After you have drafted your article, be sure that every reference that appears in the text has a citation in the reference section, and that every citation in the reference section is used in the text. Check your reference list against the original source material. Be sure that each part—authors' names, the article, the name of the journal or book, the page numbers, etc.—is correct.

There are a number of different formats used by journals for references. Check the Instructions for Authors for your journal and be sure you follow the style it requires. If you do not, it is likely that your submission will be returned to you. IEEE journals generally follow a citation number system.

The first source cited is assigned number 1; the second source is assigned number 2; and so on. Later citations to a source use the original number no matter where they appear in the text. The **IEEE citation reference style (PDF, 319 KB)** ⬈ is supported by a number of reference manager software tools. These tools can help you easily record and use citations.

If you do not have access to a reference management tool, use the author's name and year of publication in parentheses as your in-text citation while you work on your article. As you make revisions and move text around, it will be easier to keep track of your references than using a numbering system. When you are working on your final revision, replace the in-text citations with numbers.

The **IEEE Reference Preparation Assistant** ⬈ is an automated tool that validates references against both the IEEE *Xplore* and CrossRef databases to ensure successful online linking. You should use the Assistant before submitting an article to IEEE.

Authorship Footnote, Acknowledgements, and Author Bibliography

In most IEEE journals, an unnumbered footnote appears on the first page of the article. It includes the date you submit your article (the date of revision and acceptance will be filled in later). This is also where you should disclose any financial support. The affiliations of all authors are included here.

In the Acknowledgements section, recognize individuals who provided technical or other assistance to your work but who do not qualify to be included as authors, as discussed above. Examples are a statistician who helped with analysis or a graphic artist who created images. You might also include colleagues who reviewed your article prior to submission or who gave you other feedback on your research.

Most IEEE journals provide space for author biographies at the end of an article. The biography includes a photograph of each author and his or her educational and work background..

Formatting Your Article

Follow the Instructions for Authors

Every journal has guidelines or instructions for authors published in the journal or on the journal's Web site. You can usually find the document in the first issue of a volume year. Follow these guidelines closely or your article may be returned to you. The guidelines include technical specifications for preparing your article, including the format (e.g., type size, font, headings, column width), article length, instructions for handling figures and tables, and reference format.

LaTeX vs. Word

LaTeX is a document preparation system designed for technical and scientific communication. It produces professionally typeset documents. With LaTeX, you do not format as you type. Instead, you write in a plain text file and enter commands to indicate where text needs to be styled in a particular way (e.g., title, section heads, figures, and captions). The software creates a final typeset output.

LaTeX handles equations particularly well. In Word, you must use the mouse to insert mathematical symbols. In LaTeX, you type the equations on the keyboard using commands to indicate the correct formatting. Because you are entering plain text, editing a LaTeX document can be easier. Figures are correctly placed. LaTeX can automatically generate references and indexes. Another benefit is that it is available free of charge.

LaTeX has a learning curve and is highly customizable, but it is recommended that authors avoid customization as much as possible in order to minimize errors in the production process that can be caused in the conversion of a file from a custom to standard version of LaTeX.

Word can produce a reasonably professional document with very little training. You can see how your document will look as you are writing it. It also includes features that can help in editing your article, such as spell check and grammar check.

IEEE Templates

IEEE Author Digital Toolbox ⬈ includes a number of tools and information to assist with article preparation, including the IEEE Style Manual (PDF, 319 KB) ⬈, with editorial guidelines for publishing in transactions, journals, and letters. You will also find the IEEE taxonomy, a reference preparation assistant, and a tool to check your PDF to ensure it complies with IEEE *Xplore* requirements.

Use the Templates for preparing your articles ⬈ for submission in either LaTeX or Word. Most, but not all, IEEE journals use these templates. Check the home page of your individual journal for any special requirements.

Guidelines for conference articles can vary depending on the organizer. IEEE offers a number of templates for conference organizers ⬈. However, you should refer to the conference Web site for specific instructions.

Whether you use Word or LaTeX to prepare your work, you should follow the instructions you will find in TRANS-JOUR. DOC or TRANS-JOUR.PDF in the toolbox. If you are using Word, you should use the .doc version of the template to prepare your article. Either type directly into the template, or cut and paste from another document. Your text will automatically appear in the IEEE double column format. The template and instructions will show you how to properly format section headings, import and size your artwork, and check that your graphics are suitable for an IEEE publication. Depending on the publication, artwork can either be placed within in the text, or at the end of the article. IEEE will do the final formatting of your article. The template also includes information on formatting for references and equations, units, and IEEE editorial policies. You should delete the instructions text before you save the final version of your article.

IMPROVING AND REVISING

When you write the first draft of your article, do not be overly concerned with grammar and format. No one writes a perfect first draft. You will go through a number of revisions to make your article clear, concise, and readable.

It helps to read a lot of articles in your discipline. After a while, you will begin to understand what makes a good article stand out. Every discipline has a unique way of expressing ideas or concepts, and you will learn how to write in the language of your field [4].

Good science is what is most important in your article. But if your article is poorly written, then the Editor and reviewers may not be able to appreciate the full impact of your work. An article with serious grammar, language, or spelling problems may be returned for editing before it is even thoroughly reviewed. Revise your article, and then revise it again. Do not let your writing detract from the science.

How to Revise

Set your article aside for a few days after you have completed the first draft, so you can return to it with a fresh eye. Read all the way through it first, without changing anything. Some people prefer to read a printed version. You may find it helpful to read the article aloud during a later revision cycle. This will help you spot missing words, incorrect use of words that sound the same but have different meanings, and other grammatical errors that can be overlooked in print. Keep an original copy of your first and all subsequent drafts. As you go through many rounds of revisions, it may be useful to refer back to your earlier work.

On your first pass, identify areas where there are obvious problems with the scientific content. Take notes but do not correct anything. Then go through and resolve each problem you have found. Then review your work again. Once the science in order, move on to editing the structure and language[4].

Does the order of your presentation make sense? Try rearranging some sections to improve the flow. Be a strict editor. Remove any information that does not support your key messages. Is every table and graph you have included necessary? Remove any that are redundant or that do not communicate an important result. Would an additional illustration clarify a result? Finally, review for usage, spelling, and grammar. Do not rely solely on the spell checker in your word processing program.

Polishing

Outlined below are some common best practices and errors typically found in engineering articles. However, there are many outstanding references for editing guidance. See the IEEE Style Manual (PDF, 319 KB) ⬈ for specific editorial guidelines for IEEE journals, transactions, and proceedings. For spelling, IEEE uses Webster's College Dictionary, and for additional grammar and usage help, refer to The Chicago Manual of Style, published by the University of Chicago Press.

Making Your Article Interesting to Read

Write in paragraphs, not long blocks of text [12]. Every paragraph should have a topic sentence, supporting sentences that build on that key message, and a summary sentence. Vary the length of your paragraphs to make your article easier to read. Think about the transition from one paragraph to the next. Is there a logical progression?

Write clear, simple sentences in the form of noun-verb-object. Varying sentence length can make an article more engaging. Compound sentences add variety and are useful for comparing ideas [12]. Every word in a sentence should contribute something; eliminate unnecessary words.

Avoid the passive voice, in which the subject is acted upon. In the active voice, the subject performs the action. "It was hypothesized," is passive; "We hypothesized," is active. The active voice is more interesting and less ambiguous. Edit passive sentences to active sentences as much as possible.

Write in the first person ("I," "we") to make it clear who has done the work and the writing. It is particularly helpful when you are comparing your work to someone else's work [3].

The abstract and the methods section will be written in the past tense, because they describe work that you have already done. The Introduction and Discussion section are usually written in the present tense, because they describe knowledge that currently exists.

Syntax

Syntax refers to how words are arranged in a sentence, and how they relate to each other. Many of the problems found in scientific articles relate to syntax.

These errors can be particularly confusing:

▶ **Introductory phrases**
Avoid unnecessary phrases such as "Obviously," or "As previously mentioned." Don't use "This" at the beginning of a sentence. It can be ambiguous.

▶ **Subjects and verbs must agree**
Singular nouns require singular verbs and plural nouns require plural verbs: "The engineer says," "The engineers say."

▶ **Misplaced and dangling modifiers**
Modifiers are words or phrases that provide a description in a sentence, but when they appear in the wrong place they can be confusing. A misplaced modifier is incorrectly separated from the word it modifies. Do not say "Reading the Aims and Scope, the journal would be a good fit for my article." Say "Reading the Aims and Scope, I realized the journal would be a good fit for my article." A dangling modifier modifies an unintended word because it is in the wrong place in the sentence. Do not say "The engineer wanted a cold glass of water;" say "The engineer wanted a glass of cold water."

Use Words Carefully and Correctly

▶ Do not use slang in your article. Be cautious about using technical jargon that may not be understood by an international audience outside of your immediate subspecialty.

▶ The words "that" and "which" are often confused. Restrictive clauses are essential to the meaning of the sentence, and use "that." "The article that was written by Prof. Smith was accepted by the journal." If you take out the words "that was written by Prof. Smith," you are no longer referring to a specific article. Use "which" when the phrase can be left out. It is usually set off with commas: "The article, which was accepted by the journal, was written by Prof. Smith."

▶ Avoid abbreviations if possible. If you do use one, define it in parentheses after the first use of the phrase.

▶ Use simple, common words: "start" instead of "initiate." "Use" instead of "utilize."

▶ Try to avoid "lazy" verbs such as demonstrate, exhibit, present, observe, occur, report, and show. Use your word processing program to find these words in your document and find a different way to express your idea [2].

▶ The **IEEE Style Manual (PDF, 319 KB)** ⤤, section VI, details some mistakes common to articles in engineering. "Data" is plural, not singular. Use the word "alternatively" to present an option, not "alternately," unless you are actually discussing something that alternates. Do not use the word "issue" when you mean "problem."

Punctuation

▶ Semicolons, colons, and dashes should be used sparingly in scientific articles.

▶ Use commas to add clarity and emphasis.

▶ The possessive singular of nouns is formed by adding an apostrophe: engineer's article.

▶ Use a series comma after each term except the last.

▶ Do not use double parentheses in text, but do keep them in math.

Measurements and Numbers

Refer to the IEEE Style Manual (PDF, 319 KB) ⬀.

Tips for Non-English Speakers

Editors want their journals to reflect the global contributions of science and are generally receptive to reviewing contributions from non-English speakers. They will be interested in your article if it presents a good and important problem that significantly advances the field. The rules are the same for all writers: submit an organized, interesting, and clearly written article. If your article is poorly organized, or if the science is not good, publication is less likely [7].

Write in a clear, matter-of-fact style. Avoid a narrative or story-telling approach. Include the most relevant published research, but do not provide a lengthy historical overview.

Pay attention to structural differences that might make your meaning hard to understand. As discussed earlier, you should write in the first person ("I" or "we"). The first sentence in a paragraph states the main point, and the remaining sentences present information related to that point. In English, the subject comes at the beginning of the sentence, followed by the noun and the object. Other languages may, for example, place the verb at the end of the sentence. There are also differences in the use of punctuation such as commas and quotation marks.

It is not acceptable to copy someone else's writing in English language journals. Put other people's ideas into your own words, and use a citation to show where the idea came from. If you are quoting someone word for word, you should use quotation marks. Do not cut and paste someone else's writing into your article.

If possible, ask an English-speaking colleague to review your article for language and grammar. Never use an online tool such as Google Translator to translate your writing into English. Such tools do not translate accurately. In general IEEE editorial staff will work with you to correct or question grammatical errors, obvious inconsistencies or omissions, spelling, and punctuation. But they will not edit technical content or writing style. For a fee, the IEEE English-language editing service ⬀ will work with you to improve the clarity and organization of your article.

Internal Review

Your coauthors should review drafts and revisions because they have equal responsibility for the article. When you are confident that your article is grammatically clean and well-structured, it is time to ask internal colleagues and/or your department head to review your article. Ask these reviewers to check that your methodology is appropriate and that you have interpreted the data correctly. In addition to asking colleagues who are very familiar with your field of study, consider getting a review from someone outside your discipline. An outsider will be able to tell you if your article is coherent and easily understood.

SECTION 8
SUBMISSIONS

Before you submit your article to a journal or conference, you should do one last, thorough review of your work.

Review the Instructions for Authors, found on the journal or conference Web site or in an issue of the journal (typically in the first issue of the year). Check that your article adheres to the guidelines for reference style, headings, and illustrations. Proofread one last time. Check again that every citation in the reference section is cited in the text, and that every text citation is included in the list of references. Check that every figure and table is accurately cited in the text.

Cover Letter

Your cover letter is your first chance to make a good impression on the journal editor (conference article submissions do not require a cover letter). Help make the editor's job easier by explaining how your article fits the scope of the journal [4]. Discuss how your article addresses a new and important problem, and how it advances the field. Confirm that the work is original and that it has not been submitted to any other publication. It should be brief and business like. Check the journal Web site to be sure you have the name of the current editor, and use it in the salutation.

Your cover letter should include:

▸ The name of the journal you are submitting to, because editorial offices may handle more than one journal.

▸ The title of your article.

▸ The name and current place of employment of each contributing author.

▸ The corresponding author's full contact information, including address, fax number, phone number, and e-mail address.

▸ An explanation of any special requirements, such as special features or unusual length.

Journal Submissions

Many journals now require electronic article submission. Most, but not all, IEEE journals use the ScholarOne Manuscripts system. Electronic submission saves time, money, and effort for everyone. Authors do not have to submit multiple copies of the article and artwork, and the system automates the review process to make it more efficient.

It can take an hour or so to enter all the data about your article and upload your files. You can pause and save the work you have already done. Have all the information you will need at hand: cover letter and article file, the names and affiliations of your co-authors, the illustrations, and the names and contact information for your preferred reviewers (see Section 9).

To access the ScholarOne site for your journal, go to the journal's homepage in IEEE *Xplore* and click on the "Submit a Manuscript" button.

If you have not done so, you will be prompted to establish an account. You will first enter the title and abstract for your article. Next you will enter the keywords or index terms you selected when you were writing your article. You will enter the names and affiliations of all of your coauthors, and then the names and contact information for at least two preferred reviewers. You can upload your cover letter, or type it directly into ScholarOne Manuscripts. Then you will upload all documents for your article: the manuscript and, if relevant, separate files for the images and any ancillary documents. Upon completion of the submission process in ScholarOne Manuscripts, you will be asked to electronically transfer copyright to the IEEE though the use of the **IEEE eCopyright Form** ⤤.

ScholarOne Manuscripts allows you to track the progress of your article through the peer review process. After your article has been reviewed and accepted for publication, and after you have made any necessary revisions, in most cases you will be instructed to return to your ScholarOne Author Center to upload your final article for production.

ScholarOne Manuscripts ⤤ provides training and trouble-shooting information for IEEE authors.

Conference Submissions

Guidelines for submission of an abstract and/or article to a conference for peer review vary widely depending upon the conference organizer. Follow the instructions on the organizer's Web site.

IEEE works with the organizers of the more than 1,200 sponsored and affiliated conferences to ensure that all articles submitted for publication on IEEE *Xplore* and the Computer Society Digital Library meet a minimum standard for print and electronic publishing. IEEE eXpress Conference Publishing and IEEE Computer Society Conference Publishing Services provide tools and templates ⊠ so that authors can correctly format their PDF documents for publication and properly assign copyright. You will receive instructions from your conference organizer.

Remember that your article may be excluded from IEEE *Xplore* and the Computer Society Digital Library if you do not appear at the conference to present your article.

PEER REVIEW

In the peer review process, qualified individuals evaluate the quality, relevance, and appropriateness of an article for a particular journal. Peer review improves science. It confirms that published work has been tested and validated.

Peer review offers an opportunity for your work to be evaluated by your peers. The peer review process will almost certainly provide feedback that will improve your work and make your article stronger. Although some feedback can be disheartening, be open to the reviewers' comments and consider how you can construct a more valid and convincing argument as a result.

All scientific articles and communications published in regular IEEE periodicals are reviewed by at least two referees who have experience in the area of the subject matter of the article. IEEE also requests that conference organizers implement a process for review by independent referees who are knowledgeable in the subject area.

How Peer Review Works

While the journal editor-in-chief is responsible for the content of the journal, many journals have associate editors who handle the peer review process for certain subject areas. After you submit your article, a first pass will be done to determine if it is within the scope of the journal, readable, and that the quality of the science presented is acceptable. A very poorly written article, or one that is simply not relevant to the journal, is likely to be rejected at this point.

As part of the submission process, you will be offered the opportunity to recommend potential peer reviewers for your article. You should nominate individuals who you know will understand your research and the related literature. The associate editor may select one or both of your recommendations for review or may choose other reviewers from the journal's network. At least two reviewers will be assigned. Reviewers maintain anonymity from the authors.

A reviewer will evaluate your article to determine:

▸ Does it address a new and important problem?

▸ Is the material original?

▸ Are the methods and rationale valid?

▸ Do the conclusions make sense?

▸ Is it clearly written?

▸ Do the illustrations, tables, and charts support the text?

▸ Are the references current and relevant to the subject?

▸ Is the content appropriate, in scope and level, for the journal [9]?

The reviewers will recommend whether the article should be published as is, or if changes would improve the science as it is presented. The editor-in-chief will weigh the comments from the reviewers before making a final decision. If the reviews are mixed, the editor-in-chief decides whether to publish the article, and decides which revisions recommended by the reviewers will be passed back to the author.

A word about the timing of reviews: Most editors-in-chief, and all reviewers, are volunteers. When reviewers are approached to do a review, they are asked if they have adequate time in their schedule to meet the deadline. Despite this, a reviewer may miss a deadline if his or her own work interferes. Some delay is not unusual.

Review Outcomes

Most articles that are submitted for publication are rejected. The top journals can reject 90 to 95% of all submissions. Just because your article is rejected does not mean that you should consider abandoning your research or discontinuing your efforts to publish. The review process may give you some guidance about how to improve your writing, or additional experimental work to do, to improve the likelihood of acceptance in the future.

There are three possible outcomes to the review. You should read the communication from the journal carefully to be sure you fully understand the status of your publication:

ACCEPT AS IS: This is extremely rare. Very few articles will be accepted without the need for any editing or revision.

MODIFY YOUR ARTICLE: This can take a few different forms. Your article may be "accepted with modifications." This means that if you make the changes recommended, your article will be accepted and published. You may be asked to make some editing changes, add additional references, or check some calculations, for example. Alternatively, you might be informed that you should "modify and resubmit" your article. The science in your article may have been interesting, but there are some shortcomings that need to be addressed. If you address these concerns, you are encouraged to resubmit your article to the journal. It may or may not undergo additional review.

REJECTED: If there is no encouragement to revise your article and resubmit it, then it was deemed unsuitable for the journal. This does not necessarily mean that your article is flawed. Remember, some journals reject up to 95% of the articles submitted. It is possible that your article just has not met a particularly stringent set of requirements.

Here are some reasons for rejection:

▶ The content is not a good fit.

▶ There are serious scientific flaws—inconclusive results, incorrect interpretation.

▶ It is poorly written.

▶ It does not address a big enough problem or advance the scientific field.

▶ The work was previously published.

▶ The quality is not good enough for the journal.

▶ Reviewers have misunderstood the article.

Response Letter and Article Revision

If the journal recommends that you revise your article, you will receive a list of the specific concerns and issues from the reviewers. Do not let this discourage you, and do not take the criticisms personally. Remember, editors-in-chief and reviewers want to help you publish good science. When you receive the reviewers' comments, do not respond immediately. Put them aside for a few days, while you think about what your response should be and what you may need to change.

Evaluate the feedback you receive. No author is right 100% of the time, and neither is any reviewer [4]. It is possible that a reviewer misunderstood something in your article. There may be conflicting comments from different reviewers. However, if all reviewers agree on a particular point, there probably is a valid concern. Some comments may be relatively minor.

Go through your article, point by point, to address the issues raised in the reviews. Keep detailed notes about the changes you have made or additional work you have done. Your response letter should be polite, respectful, and detailed. Be sure to address every reviewer comment. It does not make sense to pick fights over minor edits. But if you believe a criticism is not valid, provide a strong, assertive rebuttal and support your comments with a literature reference, if possible [3]. Remember, the editor and the reviewers are volunteering their time—thank them for their comments.

If Your Article is Rejected

If your article is rejected, try to understand the reasons. Was it out of scope? Then you should go back to your original list of target journals and find one that is better suited to the content and level of your work. If there were serious flaws in the science, or if you did not provide enough new information to warrant publication, then you have additional work to do before you can rewrite and submit the article to another journal.

Peer Review—An Editor's Perspective

In an editorial in *IEEE Signal Processing Magazine* [14], 2012–2013 Signal Processing Society President K.J. Ray Liu asks, "Some say that peer review is not perfect, but it is the best system our journals have. Is that so?" An associate editor, who selects the reviewers and then must make an informed, fair decision based on their feedback, has a difficult job since every reviewer has a different viewpoint. Prof. Liu notes that an explosion in article submissions, leading to a shortage of qualified reviewers, has made the associate editor's job even more challenging. In response, the IEEE Signal Processing Society has introduced systematic training for associate editors. Associate editors must be senior enough, with technical authority, to be able to make timely and informed judgments. They must be well connected with a wide network of potential reviewers who can conduct a fair review. "Qualified and trained associate editors are essential to the success of the peer review process," says Prof. Liu. He concludes that "peer review is the best system our journals can have, only if we do it right!"

SECTION 10
THE FINAL STEPS

You have revised your article and returned it to the editorial office. In the near future it will appear on IEEE *Xplore* alongside the most significant articles published in your area of research. There are a few final steps you will take, however, before your article can be published in print and online. And the appearance of your article in print and online is not the end of the story.

Reviewing Page Proofs

When you submit the final version of your article to the journal, it may be copy edited. A copy editor will correct any grammatical and spelling errors. The copy editor will also question anything that is inconsistent or doesn't make sense. These questions are referred to as author queries.

At some point before the publication of your article in most IEEE journals, you will receive notification that the proof of your article is ready for your review. A proof is the article formatted as it will appear in the journal and on IEEE *Xplore*. The margins of the proof will include notations to indicate where the copy editor had questions or made changes. For most IEEE journals you will receive an e-mail that will include a unique Web link, a login ID, and password. Once you log in, you will have access to a high-resolution PDF of your article to download and review. You will also find a list of author queries raised by the copy editor. Instructions will be provided on how to mark your corrections and responses to author queries, either on the PDF using Adobe Reader or directly through the Web site used to facilitate author proof review

This is not the time to add new information or make any substantive changes to your article. Any material you add now has not gone through peer review and cannot be published except in the most extraordinary circumstances. You should review the proof to correct the rare error that you missed when you prepared the final version of your article, and any errors that were introduced in the formatting of your article. You will also have to respond to each author query. Finally, you will review the tables, charts, and illustrations and the citations and references.

You are responsible for the quality control of your article [7]. Check your proofs carefully. Even though the process is largely electronic, errors can creep in. So review the proof word by word. Pay careful attention to numbers. As suggested in Section 7, it is good to read the text out loud, or to have someone else read it out loud while you follow along. If you can, ask someone who has not been involved in the article to review it.

Check to see that your illustrations are placed properly within the text and are not upside down or sideways and that the reproduction is acceptable. Is the quality of the photographs satisfactory? Are they too light or too dark? Review the captions, headings, and labels.

Take the time to review your proofs carefully, but do it promptly. Most journals request that proofs be returned within 48 hours. Your article may be slated to appear in a specific issue of the journal, and adhering to the deadline set by the publisher will prevent any delays in publishing your article.

Page Charges, Reprints, Open Access Fees

Some business issues are usually handled during this phase of publication. When you receive your proofs, you will also receive an invoice for any page or color charges you have incurred. You will also get a form to order reprints. Article reprints are used less frequently now that articles are widely available in electronic format. You may want to order 100 or so to send to countries where Internet service is less reliable, or to include in presentation packets. Note that open access fees are collected upon acceptance of the article.

Publication

Once you have returned your proofs, the publisher will make corrections. Depending on the journal, your article may appear online in advance of publication in the print journal. Some journals post articles to IEEE *Xplore* as preprints, within one to three days of acceptance. Others post final articles in an Early Access section of the journal or directly into the issue in which the article will appear in print. E-mail trans@ieee.org or your staff editor to find out when your article will appear. You may receive a printed, bound copy of the issue in which your article is published. Some journals provide printed copies for coauthors as well; check the Instructions for Authors to find out if your journal does so.

Discoverability of Your Article

Your article is now available to be read and cited by your peers. But to do so, readers must be able to find it. IEEE uses different approaches to make your article "findable." There are also some things you can do to help improve your article's visibility.

Abstracting and Indexing Services

IEEE partners with the major abstracting and indexing providers such as Google, CrossRef, Elsevier, Thomson Reuters, ProQuest, IET, and NLM. These tools are very important for helping researchers discover relevant scientific literature. They are frequently where authors begin their literature review.

Your Article on IEEE *Xplore*

IEEE *Xplore* is designed to help researchers quickly and consistently find high quality articles in their field. Your article will appear in search results fast, and in the right context. IEEE *Xplore* is one of the world's largest collections of high quality technical literature in engineering and technology.

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What You Can Do

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SECTION 11
APPENDIX

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