How to write a technical paper (and get it published)

Speaker: Prof. Luca Perregrini

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Location: University of Pavia

Abstract:

The talk will focus on the various aspects related to the writing of a technical paper. In particular, the preparation phase, the organization of the manuscript, the appropriate referencing, and some stylistic aspects will be discussed.
Moreover, the peer review process will be presented in details, with specific reference to the IEEE journals, and, in particular, to the hands-on experience of the speaker.
Last but not least, ethical issues related to the scientific research are also addressed.

Short bio:

Luca Perregrini received the "Laurea" degree in Electronic Engineering and the Ph.D. in Electronics and Computer Science in 1989 and 1993, respectively. In 1992 he joined the Faculty of Engineering of the University of Pavia, he is currently full professor of electromagnetic fields and responsible of the Microwave Laboratory. He authored or co-authored more than 100 journal papers and more than 300 conference papers, six book chapters, two textbooks, and co-edited the book Periodic Structures, (Research Signpost, 2006).
Prof. Perregrini has been an invited speaker at many conferences and has delivered invited seminar talks in Universities and research centers worldwide.
In 2016 he has been elevated Fellow of the Institute of Electrical and Electronics Engineers (IEEE) "for contributions to numerical techniques for electromagnetic modelling". He was the co-recipient of several best paper awards at international conferences.
He has been Editor in Chief of the IEEE Transactions on Microwave Theory and Techniques for the term 2017-2019. He was Associate Editor of the IEEE Microwave and Wireless Components Letters from 2010 to 2013, of IEEE Transactions on Microwave Theory and Techniques from 2013 to 2016, of the International Journal of Microwave and Wireless Technologies from 2011 to 2016, and of IET Electronic Letters from 2015 to 2016. He was Guest Editor of the IEEE Transactions on Microwave Theory and Techniques in 2015 and of the International Journal of Microwave and Wireless Technologies in 2015.

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Why to write a paper?

- Publish new scientific results, spread the knowledge
- Allow other researchers to confirm your results
- Allow other researchers to extend your results
- Clarify difficult concepts for other scientists and general public
- Establish priority
- Publicize (advertise) new technology capability
- Career advancement
- …

What do you need to write a good paper?

- An open problem and a good new idea to solve it!

Therefore, a careful and comprehensive bibliographic search is mandatory to avoid reinventing the wheel.

Bibliographic search

- Do your best to identify the key papers, i.e., the ones where a particular theory/technique/technology was proposed for the first time, and give credits to them.
- Also identify the paper proposing state-of-the-art development/results on the topic of interest, and use them as reference to compare your results.
- At the end of the day, in the paper you must claim (and demonstrate!) some advancement over the existing literature.

The hard work before the paper…

- The topic has been identified
- The state-of-the-art has been investigated (bibliographic search)
- You found a good idea to overcome some issue/drawback/limitation of the previous works
- Develop your idea, converting it into a new theory/ technique/technology
- Write the paper!

Select the venue to publish your study

Conference

- Perfect venue to present preliminary results
- The idea is not fully exploited, the verification is ongoing
- Set priority (quick publication)
- Light review process (accept/reject)
- Discuss with pairs and collect suggestions to improve your work
- Networking (and tourism…)

Journal

- The work is mature: the theory/technique is fully developed. The verification was successful
- A more accurate preparation is needed
- Longer and tougher review process: subsequent revisions may be required
- More authoritative publication

Journal Selection criteria

- Reach out the proper target audience
- International coverage
- Habit/previous publication
- Reputation or quality/prestige (rankings, Impact Factor)
- Overall editorial standard
- Publication speed
- Open Access
- …

Wrong decision: failure to publish, time lost

Organization of the paper

- Title
- Authors
- Abstract

- Keywords
- Introduction
- Technical content
- Conclusion
- References

Title

- Specific and brief description of contents
- Catchy, in a scientific way. Well… if possible
- Precise: the reader shall catch what the paper is about (remember, 900+ competitors in 10 years…)

Authors

- According to IEEE rules, authors:
- made a significant contribution: theoretical, experimental, analysis/interpretation of data
- contributed to drafting/reviewing/revising the article
- approved the final version for publication
- Contributors who do not meet all of the above criteria may be included in the Acknowledgment
- Omitting an author or including a person who did not contribute is a breach of publishing ethics

Abstract

- Overview of facts, results, conclusions
- Very important: it is read more widely than the article
- Placed at beginning of article, just below the title
- Written in third person, passive voice commonly used
- Should be self-contained. Don't include footnotes, references, …
- < 10/15 rows

Keywords

- Select few (<6) keywords that better describe the content
- Search engines/indexing databases depend on the accuracy of the keywords (and of the title). Again remember, 900+ competitors in 10 years…
- Try to use standard words as much as possible (an acronym invented by you is useless)

Introduction

- Defines problem, scope, and purpose/objective of the study
- Provides theoretical and historical background. References are mandatory here! Paraphrase, do not steal other people's wording…
- Outline the adopted methodology (in a descriptive way, no tiny technical details)
- Gives an overview of the organization of the paper

Technical content

- Typically split into several sections
- Methodology: explain the proposed theory/technique/technology in details. It must be reproducible and verifiable by other researchers
- Results: the goal is to show how your findings satisfy your objectives. Give illustrative examples by using tables and figures, and compare with theoretical/experimental/published results
- Validation of the results is mandatory!

Conclusion

- Briefly remind the addressed problem and the methodology adopted to overcome limitations/drawbacks of existing solutions
- Explain how results confirm the goodness of the proposed approach (do not repeat the results), thus highlighting the significance of your work
- Should be self-contained: no citations, no cross-references to formulas/figures/tables
- < 20 rows

References

- A comprehensive literature review enhances the credibility of your work, as your contribution extends from a solid foundation
- Makes possible for readers to retrace your steps
- Only list resources cited in paper, not general references
- Properly format each biblioitem, providing the needed details to easily find it (see template)

Small details matter!

If multiple mistakes in spelling and syntax, reviewer suspects similar sloppiness in the lab

Only one idea in a sentence. Keep short: <20 words. Long sentences: greater risk of grammatical errors

Measurement units: there are rules, follow them!

Figures and tables are the most efficient way to present results. Proper formatting significantly improves readability

Dimension the figures to be included without resizing. Use the same size of the text

The symbols in the figures shall have the same appearance as in the text and formulas.

Captions are descriptions of tables/figures: explain clearly what is shown, and include the details necessary to understand the item

Ethics of scientific writing

Avoid double publication of the same matter

Avoid contemporary submission of the same matter to different journals and/or conferences

Don't use the work of others without appropriate attribution (plagiarism may lead to ban the authors)

List only those co-authors who contributed substantially to the work

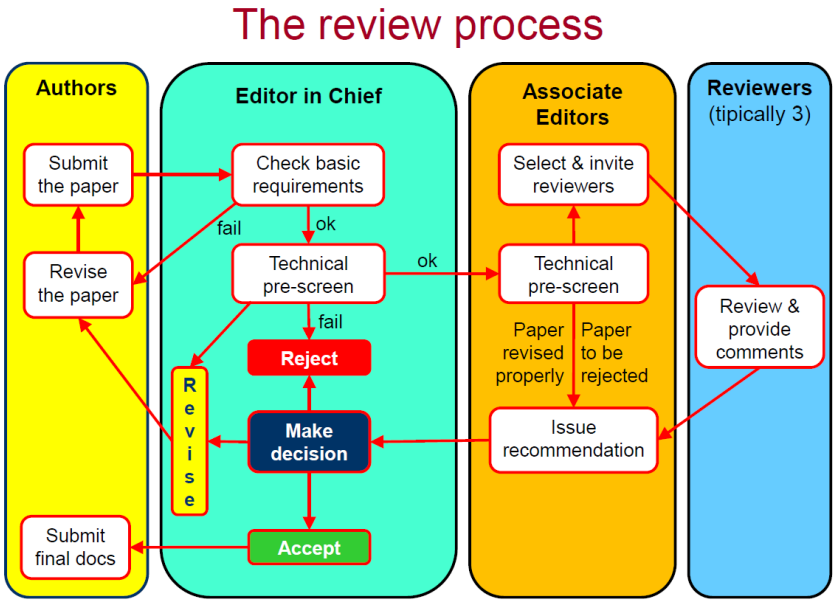
The review process

Science depends on the peer review process to assess paper technical correctness, novelty, significance

The review process is an important step to further improve your work

Keep in mind that reviewers are the first readers of your paper. If they believe something is unclear, do your best to make it understandable

Do not fight with reviewers, use their comments to improve your work



Prepare the revised manuscript

Return the revised manuscript to the editor with a point-by-point response to the reviewers' comments and a version with all the changes duly highlighted (e.g., by color)

Keep in mind that reviewers are the first readers of your paper. If they believe something is unclear, do your best to make it understandable

Do not only reply to the reviewers. Modify the manuscript to clarify their doubts

Production and publication

Upload the required documents (read carefully the instructions to avoid delays)

Complete the copyright form (e-copyright for IEEE)

Read the proof sent by the production and ensure that everything is okay

Return the proof back approved/commented before the deadline

Wait to see the article posted online and/or printed

What if the paper is rejected?

IEEE policy allows resubmission of rejected manuscripts

If the manuscript was rejected for technical reasons(e.g., missing validation, errors in the theory, …) you can revise and resubmit to the same journal. However, if the EiC judges the revision not satisfactory, the paper is rejected upfront

If the manuscript was rejected for lack of novelty, you should try to re-orient your research activity to address a more hot topic

Personal view of the review process

The review process is not a matter of accepting/rejecting papers

It is a fundamental contribution of the whole scientific community to elevate the quality of any research study

If properly conducted by editors and reviewers, and correctly perceived by the authors, it will help tuning the study to make it worth publishing

Useful links

Link to the seminar slides and recording:

mwv@www-9.unipv.it/pages/advanced_topics/2020-21/2020_Pavia_How_to_write_a_paper_v0.pdf

mwv@www-9.unipv.it/pages/advanced_topics/2020-21/Seminar_Perregrini_29-10-2020_How_to_write_a_technical_paper.mp4

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