A Sample Article Using `quarto-ieee` for IEEE Journal and Transactions

David Folio, *Member, IEEE* and John Doe

***Abstract*—This document describes the most common article elements and how to use the `quarto-ieee` class with LaTeX to produce files that are suitable for submission to the IEEE. `quarto-ieee` can produce conference, journal, and technical note (correspondence) papers with a suitable choice of class options.**

***Index Terms*—IEEE, IEEEtran, journal, template**

I. Introduction

THIS file is intended to serve as a "sample article file" for IEEE journal papers produced under LaTeX using `IEEEtran.cls` version 1.8b and later. It is based on `bare_jrnl_new_sample4.tex` provided by IEEE Publication Technology, Staff and available from https://template-selector.ieee.org/. The most common elements are covered in the simplified and updated instructions in `New_IEEEtran_how-to.pdf`. For less common elements you can refer back to the original `IEEEtran_HOWTO.pdf`. It is assumed that the reader has a basic working knowledge of LaTeX [1] and of (Pandoc/Quarto)-markdown [2], [3] markup.

II. The Design, Intent, and Limitations of this Templates

The `quarto-ieee` templates are intended to **approximate the final look and page length of the articles/papers** either in PDF output or HTML output. **They are NOT intended to be the final produced work that is displayed in print or on IEEEXplore®**. They will help to give the authors an approximation of the number of pages and layout that will be in the final version.

Although most of the LaTeX and `IEEEtran.cls` commands and environment are supported, there are some limitations when trying to export to a format other than PDF (e.g. HTML output).

III. Some random text

For some of the remainder of this sample we will use dummy text to fill out paragraphs rather than use live text that may violate a copyright.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis cursus nisl eget tempor porta. Proin dapibus dictum quam a commodo. Mauris congue scelerisque eros a porta. Proin blandit nulla sapien, et pretium justo dictum non. Vivamus ultricies, elit eu posuere placerat, sapien est condimentum nisl, at tincidunt tortor dolor ac ligula. Suspendisse pulvinar libero quis eros finibus sodales. Vivamus mattis est eget imperdiet luctus. Morbi eget posuere metus. Nam egestas elit lectus, eu tincidunt odio viverra sed. Sed sit amet metus rutrum, ultricies elit in, finibus felis. Integer lobortis dui ante, eget placerat lorem laoreet eu.

Nullam mi ligula, luctus a orci ut, tincidunt varius augue. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia curae; Donec sed sem risus. Nam eleifend ultrices elit, vitae posuere tellus interdum et. Nam id nisl at elit malesuada malesuada. Suspendisse viverra ipsum libero, vel pharetra sem maximus sed. Nunc vel est fringilla, rutrum diam eu, egestas quam. Vivamus lobortis blandit velit, commodo finibus mauris. Quisque vel lacus ipsum. Pellentesque quis nulla ipsum.

Aenean in hendrerit quam. Orci varius natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt vehicula dignissim. In quis aliquet lectus, ac vestibulum elit. Quisque a magna viverra quam viverra faucibus. Nulla ornare tortor at mollis viverra. Curabitur vel porta dui. Etiam ipsum elit, egestas eget lacus nec, laoreet iaculis lacus. In iaculis risus ac tincidunt viverra. Maecenas tempor iaculis odio quis aliquet. Maecenas ac posuere turpis. Fusce est dui, dapibus sed odio eget, eleifend facilisis felis. Nam gravida varius enim, ornare tincidunt urna ullamcorper ut. Donec sit amet eros ac lacus placerat rutrum ut non dolor. Nulla tincidunt nunc massa, sed euismod dui feugiat vitae. Integer tempus risus rutrum tellus interdum, eu aliquet sapien rutrum. Nunc feugiat varius lacus sed laoreet. Integer euismod tellus nisi, id scelerisque sem sagittis eu. Suspendisse at orci vel neque varius tempor nec vitae odio. Integer elementum elementum fermentum. Morbi in turpis cursus, lacinia arcu et, semper orci.

Proin pharetra eros tellus, condimentum tempor ex commodo sit amet. Aliquam nec nisl mattis erat convallis semper. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nam suscipit metus at vehicula ultricies. Morbi quis ullamcorper sem. Nam gravida blandit lacus id imperdiet. Morbi lacinia libero risus, vel fringilla risus ullamcorper sed. Nulla in rutrum quam. Phasellus vitae ante eleifend, semper lorem faucibus, consectetur lorem. Proin sed urna quis nunc fringilla bibendum sed sed ipsum. Praesent et erat sed purus commodo blandit. Aliquam gravida consequat mi, a egestas tellus varius a. Donec eu nulla suscipit, feugiat eros commodo, euismod enim.

Ipsum habitant inceptos volutpat cras nostra, proin commodo eget varius. Volutpat arcu praesent, nisi vulputate convallis inceptos consequat. Aenean hendrerit sociis congue nulla

David Folio is with Laboratoire Prisme, INSA Centre Val de Loire, Bourges, 18800 France Corresponding author: david.folio@insa-cvl.fr
Unknown affiliation
John Doe is with Anonymous University
Template created June 23, 2023; revised October 17, 2023.

ultricies, at tempor sapien nullam ullamcorper.

IV. Some Common Elements

A. Sections and Subsections

As stated in the `IEEEtran` template enumeration of section headings is desirable, but not required. When numbered, it should be consistent throughout the article, that is, all headings and all levels of section headings in the article should be enumerated. Primary headings are designated with Roman numerals, secondary with capital letters, tertiary with Arabic numbers; and quaternary with lowercase letters. References and Acknowledgment headings are unlike all other section headings in text. They are never enumerated. They are simply primary headings without labels, regardless of whether the other headings in the article are enumerated.

The following Section IV-B shows some basic usage and capabilities of `quarto-ieee`.

B. Markdown basics

The reader can easily find many documentations on how to write using the Markdown syntax. The `quarto-ieee` template relies mainly on the Markdown markup supported by Quarto[1], which is build based on Pandoc [2], [3]. Below are some basic examples of usage of Markdown markup.

1) Display equations: To write equations use `$` delimiters for inline formula or `$$` for block one. To number the equations, it is recommended to use classic equation environments provided by LaTeX and to use `\eqref{}` (or `\ref{}`) for cross-referencing. For example:

$$\chi_a = \operatorname{diag}\left(\frac{\chi}{1+n_a\chi}, \frac{\chi}{1+n_b\chi}, \frac{\chi}{1+n_b\chi}\right), \tag{1}$$

$$a = b + c \tag{2}$$

$$c = d + e \tag{3}$$

$$\begin{cases} 1 &= n_a + 2n_b \\ n_a &= \dfrac{1-\varepsilon^2}{2\varepsilon^3}\left(\log\left(\dfrac{1+\varepsilon}{1-\varepsilon}\right) - 2\varepsilon\right) \end{cases} \tag{4}$$

The above equation is cross-referenced as (1), (2), (3) and (4).

For now, avoid using the Quarto cross-references that use of `$$ $$` with `#eq-` label. It works properly only for PDF output, but there are some issues with HTML[2] output.

Remark. `quarto-ieee` template also supports the `mhchem` (for chemical equation) and `physics` (for flexible macros for typesetting equations) LaTeX packages and Mathjax extensions.

[1] See Quarto markdown basics at https://quarto.org/docs/authoring/markdown-basics.html.

[2] https://github.com/quarto-dev/quarto-cli/issues/2275

2) Theorems, Proofs and Remarks: To include a reference-able theorem, create a div with a `#thm-` label. A theorem name is specified via the first heading in the block. For example:

Theorem IV.1 (Line)**.** *The equation of any straight line, called a linear equation, can be written as:*

$$y = mx + b$$

The theorem is cross-referenced as Theorem IV.1.

There are a number of theorem variations supported by Quarto, each with their own label prefix:

- `#thm-` for Theorem;
- `#lem-` for Lemma;
- `#cor-` for Corollary
- `#prp-` for Proposition;
- `#cnj-` for Conjecture;
- `#def-` for Definition;
- `#exm-` for Example;
- `#exr-` for Exercise.

The `proof`, `remark` and `solution` environments generally receive similar typesetting as theorems. However they are not numbered (and therefore cannot be cross-referenced). To create these environments just use them as the class name of a div such as:

Solution (The solution). An example of solution environment.

3) Figures: It is recommended to use div block with `#fig-` label to embed your Figures.

Fig. 1: An example of figure.

(a) (b)

Fig. 2: An example with sub-figure.

Table I: Main Caption

(a) First Table

Col1	Col2	Col3
A	B	C
E	F	G
A	G	G

(b) Second Table

Col1	Col2	Col3
A	B	C
E	F	G
A	G	G

Table II: A table

Col1	Col2	Col3
A	D	G
B	E	H
C	F	I

The figures is cross-referenced as Fig. 2 and even the sub-figures as Fig. 2b.

Remark. There is no markup for double-column floating figures. The only workaround is to change the environment of the `knitr` chunk option with `#| fig.env: figure*`.

4) Tables: For tables produced by executable code cells, include a label with a `#tbl-` prefix to make them cross-referenceable.
It is recommended to avoid using the commonly used single markdown table known as a 'pipe table'. In fact, Pandoc markdown uses the LaTeX `longtable` package, which does not support the two-column mode[3], which is required for most `IEEEtran` journals. `quarto-ieee` uses a hack to temporarily switch to one-column mode. However, this hack may break the page layout. To overcome this issue, a basic way is to use code cells (as for Table II). Quarto is a multi-language and it uses `Knitr` to execute `R` code and can execute Python code blocks within markdown.

The figures is cross-referenced as Table I for details, especially Table Ib. There is also Table II.

V. Conclusions

The conclusion goes here.

Acknowledgment

This should be a simple paragraph before the References to thank those individuals and institutions who have supported your work on this article.

Appendix
An Appendix

Use `[]{.appendix options="An Appendix"}` markup if you have a single appendix. `IEEEtran` state that to do not use `\section{}` anymore after `\appendix`.

[3] https://github.com/jgm/pandoc/issues/1023

References

[1] F. Mittelbach and U. Fischer, *The LaTeX companion*, 3rd ed. Addison Wesley Professional, 2023.

[2] J. MacFarlane, A. Krewinkel, and J. Rosenthal, "Pandoc." [Online]. Available: https://github.com/jgm/pandoc

[3] J. J. Allaire, C. Teague, C. Scheidegger, Y. Xie, and C. Dervieux, "Quarto." Jan-2022 [Online]. Available: https://github.com/quarto-dev/quarto-cli

David Folio Use `IEEEbiography` with figure as option and the author name as the argument followed by the biography text.

John Doe Use `IEEEbiographynophoto` and the author name as the argument followed by the biography text.

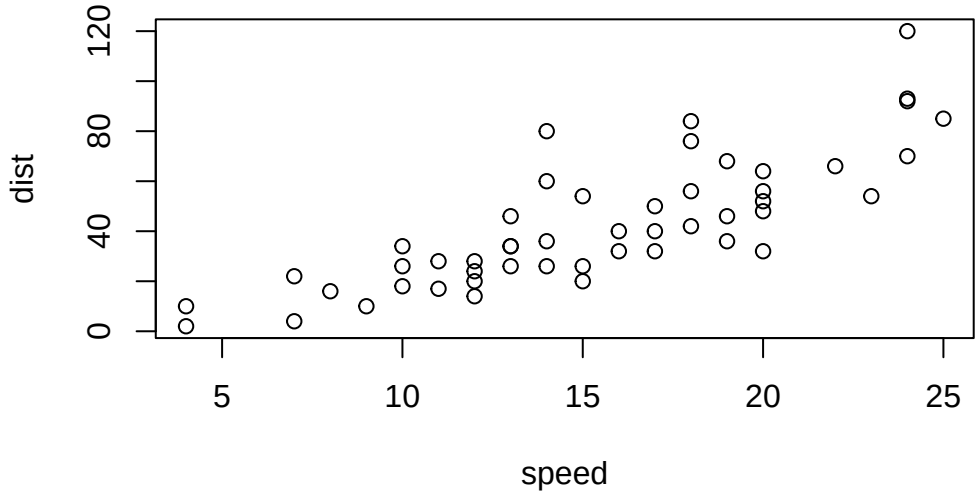

Fig. 3: Example of double column floating figures (in PDF).