

L^AT_EX Author Guidelines for ICCV Proceedings

Anonymous ICCV submission

Paper ID *****

Abstract

001 *The ABSTRACT is to be in fully justified italicized text, at*
002 *the top of the left-hand column, below the author and affil-*
003 *iation information. Use the word “Abstract” as the title, in*
004 *12-point Times, boldface type, centered relative to the col-*
005 *umn, initially capitalized. The abstract is to be in 10-point,*
006 *single-spaced type. Leave two blank lines after the Abstract,*
007 *then begin the main text. Look at previous ICCVabstracts to*
008 *get a feel for style and length.*

009 **1. Introduction**

010 Please follow the steps outlined below when submitting
011 your manuscript to the IEEE Computer Society Press. This
012 style guide now has several important modifications (for ex-
013 ample, you are no longer warned against the use of sticky
014 tape to attach your artwork to the paper), so all authors
015 should read this new version.

016 **1.1. Language**

017 All manuscripts must be in English.

018 **1.2. Dual submission**

019 Please refer to the author guidelines on the ICCV 2025 web
020 page for a discussion of the policy on dual submissions.

021 **1.3. Paper length**

022 Papers, excluding the references section, must be no longer
023 than eight pages in length. The references section will not
024 be included in the page count, and there is no limit on the
025 length of the references section. For example, a paper of
026 eight pages with two pages of references would have a total
027 length of 10 pages. **There will be no extra page charges**
028 **for ICCV 2025.**

029 Overlength papers will simply not be reviewed. This in-
030 cludes papers where the margins and formatting are deemed
031 to have been significantly altered from those laid down by
032 this style guide. Note that this L^AT_EX guide already sets fig-
033 ure captions and references in a smaller font. The reason

such papers will not be reviewed is that there is no provi-
sion for supervised revisions of manuscripts. The review-
ing process cannot determine the suitability of the paper for
presentation in eight pages if it is reviewed in eleven.

1.4. The ruler

The L^AT_EX style defines a printed ruler which should be
present in the version submitted for review. The ruler is
provided in order that reviewers may comment on partic-
ular lines in the paper without circumlocution. If you are
preparing a document using a non-L^AT_EX document prepara-
tion system, please arrange for an equivalent ruler to appear
on the final output pages. The presence or absence of the
ruler should not change the appearance of any other content
on the page. The camera-ready copy should not contain a
ruler. (L^AT_EX users may use options of `iccv.sty` to switch
between different versions.)

Reviewers: note that the ruler measurements do not align
well with lines in the paper — this turns out to be very dif-
ficult to do well when the paper contains many figures and
equations, and, when done, looks ugly. Just use fractional
references (e.g., this line is 087.5), although in most cases
one would expect that the approximate location will be ad-
equate.

1.5. Paper ID

Make sure that the Paper ID from the submission system
is visible in the version submitted for review (replacing the
“*****” you see in this document). If you are using the
L^AT_EX template, **make sure to update paper ID in the ap-
propriate place in the tex file.**

1.6. Mathematics

Please number all of your sections and displayed equations
as in these examples:

$$E = m \cdot c^2 \quad (1)$$

and

$$v = a \cdot t. \quad (2)$$

It is important for readers to be able to refer to any particu-
lar equation. Just because you did not refer to it in the text

071	does not mean some future reader might not need to refer to	[1] Authors. “The frobnicatable foo filter”, F&G	119
072	it. It is cumbersome to have to use circumlocutions like “the	2014 Submission ID 324, Supplied as supplement-	120
073	equation second from the top of page 3 column 1”. (Note	tal material fg324.pdf.	121
074	that the ruler will not be present in the final copy, so is not		
075	an alternative to equation numbers). All authors will benefit	Finally, you may feel you need to tell the reader that	122
076	from reading Mermin’s description of how to write math-	more details can be found elsewhere, and refer them to	123
077	ematics: http://www.pamitc.org/documents/	a technical report. For conference submissions, the pa-	124
078	mermin.pdf .	per must stand on its own, and not <i>require</i> the reviewer	125
079	1.7. Blind review	to go to a tech report for further details. Thus, you may	126
080	Many authors misunderstand the concept of anonymizing	say in the body of the paper “further details may be found	127
081	for blind review. Blind review does not mean that one must	in [6]”. Then submit the tech report as supplemental	128
082	remove citations to one’s own work—in fact it is often im-	material. Again, you may not assume the reviewers will read	129
083	possible to review a paper unless the previous citations are	this material.	130
084	known and available.	Sometimes your paper is about a problem which you	131
085	Blind review means that you do not use the words “my”	tested using a tool that is widely known to be restricted to a	132
086	or “our” when citing previous work. That is all. (But see	single institution. For example, let’s say it’s 1969, you have	133
087	below for tech reports.)	solved a key problem on the Apollo lander, and you believe	134
088	Saying “this builds on the work of Lucy Smith [1]” does	that the 1970 audience would like to hear about your solu-	135
089	not say that you are Lucy Smith; it says that you are building	tion. The work is a development of your celebrated 1968	136
090	on her work. If you are Smith and Jones, do not say “as we	paper entitled “Zero-g frobnication: How being the only	137
091	show in [7]”, say “as Smith and Jones show in [7]” and at	people in the world with access to the Apollo lander source	138
092	the end of the paper, include reference 7 as you would any	code makes us a wow at parties”, by Zeus <i>et al.</i>	139
093	other cited work.	You can handle this paper like any other. Do not write	140
094	An example of a bad paper just asking to be rejected:	“We show how to improve our previous work [Anonymous,	141
095	An analysis of the frobnicatable foo filter.	1968]. This time we tested the algorithm on a lunar lander	142
096	In this paper we present a performance analysis	[name of lander removed for blind review]”. That would be	143
097	of our previous paper [1], and show it to be in-	silly, and would immediately identify the authors. Instead	144
098	ferior to all previously known methods. Why the	write the following:	145
099	previous paper was accepted without this analysis	We describe a system for zero-g frobnication.	146
100	is beyond me.	This system is new because it handles the fol-	147
101	[1] Removed for blind review	lowing cases: A, B. Previous systems [Zeus et al.	148
102	An example of an acceptable paper:	1968] did not handle case B properly. Ours han-	149
103	An analysis of the frobnicatable foo filter.	dles it by including a foo term in the bar integral.	150
104	In this paper we present a performance analysis of	...	151
105	the paper of Smith <i>et al.</i> [1], and show it to be in-	The proposed system was integrated with the	152
106	ferior to all previously known methods. Why the	Apollo lunar lander, and went all the way to the	153
107	previous paper was accepted without this analysis	moon, don’t you know. It displayed the follow-	154
108	is beyond me.	ing behaviours, which show how well we solved	155
109	[1] Smith, L and Jones, C. “The frobnicatable	cases A and B: ...	156
110	foo filter, a fundamental contribution to human	As you can see, the above text follows standard scientific	157
111	knowledge”. Nature 381(12), 1-213.	convention, reads better than the first version, and does not	158
112	If you are making a submission to another conference at	explicitly name you as the authors. A reviewer might think	159
113	the same time, which covers similar or overlapping mate-	it likely that the new paper was written by Zeus <i>et al.</i> , but	160
114	rial, you may need to refer to that submission in order to	cannot make any decision based on that guess. He or she	161
115	explain the differences, just as you would if you had pre-	would have to be sure that no other authors could have been	162
116	viously published related work. In such cases, include the	contracted to solve problem B.	163
117	anonymized parallel submission [5] as supplemental ma-	FAQ	164
118	terial and cite it as	Q: Are acknowledgements OK?	165
		A: No. Leave them for the final copy.	166
		Q: How do I cite my results reported in open challenges?	167
		A: To conform with the double-blind review policy, you	168

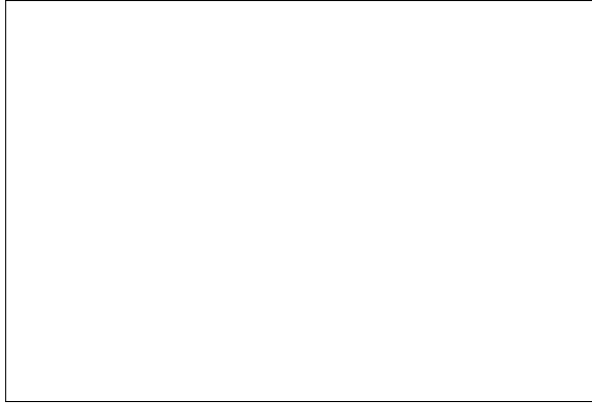


Figure 1. Example of caption. It is set in Roman so that mathematics (always set in Roman: $B \sin A = A \sin B$) may be included without an ugly clash.

can report results of other challenge participants together with your results in your paper. For your results, however, you should not identify yourself and should not mention your participation in the challenge. Instead present your results referring to the method proposed in your paper and draw conclusions based on the experimental comparison to other results.

1.8. Miscellaneous

Compare the following:

$\text{\texttt{\$conf_a\$}}$ $\text{\texttt{conf_a}}$
 $\text{\texttt{\$ \mathit{conf} _a \$}}$ $\text{\texttt{conf_a}}$

See The $\text{\texttt{\TeX}}$ book, p165.

The space after *e.g.*, meaning “for example”, should not be a sentence-ending space. So *e.g.* is correct, *e.g.* is not. The provided $\text{\texttt{\eg}}$ macro takes care of this.

When citing a multi-author paper, you may save space by using “et alia”, shortened to “*et al.*” (not “*et. al.*” as “*et*” is a complete word). If you use the $\text{\texttt{\etal}}$ macro provided, then you need not worry about double periods when used at the end of a sentence as in Alpher *et al.* However, use it only when there are three or more authors. Thus, the following is correct: “Frobnication has been trendy lately. It was introduced by Alpher [1], and subsequently developed by Alpher and Fotheringham-Smythe [2], and Alpher *et al.* [4].”

This is incorrect: “... subsequently developed by Alpher *et al.* [2] ...” because reference [2] has just two authors.

2. Related Work

We have summarized research work on different aspects of DT.

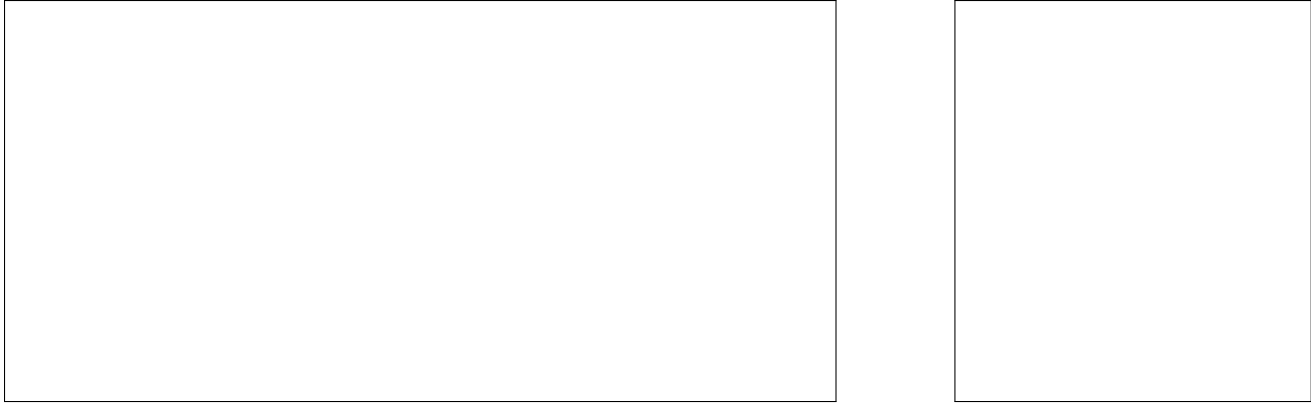
2.1. Vehicle Detection

DT mainly uses LiDAR and cameras for vehicle object detection. Several recent studies have explored the fusion of LiDAR and camera data for vehicle detection, demonstrating significant improvements in both accuracy and robustness. For instance, MVDNet (2018) utilizes a multi-view fusion approach, where LiDAR point clouds are projected to different views (such as bird’s-eye view and front view) and matched with camera images, combining depth information from LiDAR and texture information from the camera. This method improves detection performance, especially in complex environments. Building on this, PointPillars (2019) introduces a fast encoder for LiDAR data, using a grid-based encoding approach that could potentially be integrated with camera data in future fusion methods to enhance detection speed and efficiency. Another study (2020) combines LiDAR and camera data by feeding them into separate convolutional neural networks, where the features extracted from both modalities are fused to perform object detection. This approach has shown significant improvements in detection performance, particularly in dynamic environments with occlusions or sparse LiDAR data. Lastly, ST-MVDNet (2021) introduces a self-training framework using a teacher-student mutual learning mechanism, where the teacher network is trained on the fused LiDAR and camera data, while the student network is exposed to strong data augmentation simulating missing sensor modalities.

This approach enhances the model’s robustness against sensor failures by ensuring consistency between the teacher and student models, allowing the system to better handle missing or noisy data during inference. These methods collectively highlight the importance of sensor fusion and advanced learning techniques in achieving robust and accurate vehicle detection, even in challenging conditions. We use the PointPillars deep learning method which has shown good performance.

2.2. Data association

Most existing algorithms, with a few exceptions, can be seen as special cases of the multi-modal fusion problem. These methods organize the input data using a graph structure, where edges represent relationships between modalities, and nodes represent different targets or states. Algorithms that can be solved in polynomial time typically handle specific modalities or time-continuous edges, with some also utilizing maximum flow or matching algorithms. Methods that leverage global information (beyond just time continuity or modality constraints) can significantly improve performance, but they are usually NP-hard due to the involvement of combinatorial optimization. In some cases, marginal terms or local constraints are added to ensure completeness. To enhance model expressiveness, some studies



(a) An example of a subfigure.

(b) Another example of a subfigure.

Figure 2. Example of a short caption, which should be centered.

have employed higher-order relations, although the gains diminish significantly as complexity increases. Joint optimization and iterative optimization strategies have also been widely used to improve performance. We use Joint Integrated Probabilistic Data Association (JIPDA), which combines data from multiple sensors and optimizes probabilistic associations to effectively handle data uncertainty and missing information in target tracking, improving tracking accuracy and robustness in complex environments.

2.3. appearance

The appearance of vehicles can be described through color, texture, and shape features. While color and texture features are commonly used for identifying the vehicle’s appearance, shape features provide important information about the vehicle’s structure. The impact of lighting changes is typically adjusted through color normalization, sample-based techniques, or luminance transfer functions, which can be optimized via supervised or unsupervised learning. To enhance distinguishability, salient information about the vehicle or features related to specific body parts are often leveraged. These features can be extracted directly from images or mapped onto 3D vehicle models for improved identification accuracy. Shape features, particularly the contours and structure of the vehicle body, can effectively differentiate between different types of vehicles and provide additional distinguishing information, especially in cases of significant viewpoint variation.

The most advanced technologies in the field of vehicle re-identification currently include the combination of deep convolutional neural networks (CNN) for feature extraction and metric learning, particularly with the integration of cross-view and cross-domain learning techniques, the use of Generative Adversarial Networks (GAN) for image enhancement, and the fusion of multi-sensor data (such as cameras, radar, and LiDAR) to improve the model’s robust-

ness and accuracy in complex environments.

We designed a ResNet-50 network for vehicle re-identification by drawing inspiration from Re-ID. The network is capable of performing this task effectively.

2.4. Cross-references

For the benefit of author(s) and readers, please use the

`\cref{...}`

command for cross-referencing to figures, tables, equations, or sections. This will automatically insert the appropriate label alongside the cross-reference as in this example:

To see how our method outperforms previous work, please see Fig. 1 and Tab. 1. It is also possible to refer to multiple targets as once, *e.g.* to Figs. 1 and 2a. You may also return to Sec. 2 or look at Eq. (2).

If you do not wish to abbreviate the label, for example at the beginning of the sentence, you can use the

`\Cref{...}`

command. Here is an example:

Figure 1 is also quite important.

2.5. References

List and number all bibliographical references in 9-point Times, single-spaced, at the end of your paper. When referenced in the text, enclose the citation number in square brackets, for example [5]. Where appropriate, include page numbers and the name(s) of editors of referenced books. When you cite multiple papers at once, please make sure that you cite them in numerical order like this [1–3, 5, 6]. If you use the template as advised, this will be taken care of automatically.

Method	Frobnability
Theirs	Frumpy
Yours	Frobbly
Ours	Makes one's heart Frob

Table 1. Results. Ours is better.

2.6. Illustrations, graphs, and photographs

All graphics should be centered. In \LaTeX , avoid using the center environment for this purpose, as this adds potentially unwanted whitespace. Instead use

```
\centering
```

at the beginning of your figure. Please ensure that any point you wish to make is resolvable in a printed copy of the paper. Resize fonts in figures to match the font in the body text, and choose line widths that render effectively in print. Readers (and reviewers), even of an electronic copy, may choose to print your paper in order to read it. You cannot insist that they do otherwise, and therefore must not assume that they can zoom in to see tiny details on a graphic.

When placing figures in \LaTeX , it's almost always best to use `\includegraphics`, and to specify the figure width as a multiple of the line width as in the example below

```
\usepackage{graphicx} ...
\includegraphics[width=0.8\linewidth]
{myfile.pdf}
```

2.7. Color

Please refer to the author guidelines on the ICCV 2025 web page for a discussion of the use of color in your document.

If you use color in your plots, please keep in mind that a significant subset of reviewers and readers may have a color vision deficiency; red-green blindness is the most frequent kind. Hence avoid relying only on color as the discriminative feature in plots (such as red vs. green lines), but add a second discriminative feature to ease disambiguation.

3. Final copy

You must include your signed IEEE copyright release form when you submit your finished paper. We MUST have this form before your paper can be published in the proceedings.

Please direct any questions to the production editor in charge of these proceedings at the IEEE Computer Society Press: <https://www.computer.org/about/contact>.

References

[1] FirstName Alpher. Frobnication. *IEEE TPAMI*, 12(1):234–778, 2002. 3, 4

[2] FirstName Alpher and FirstName Fotheringham-Smythe. Frobnication revisited. *Journal of Foo*, 13(1):234–778, 2003. 354
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[3] FirstName Alpher and FirstName Gamow. Can a computer frobnicate? In *ICCV*, pages 234–778, 2005. 4 357
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[4] FirstName Alpher, FirstName Fotheringham-Smythe, and FirstName Gamow. Can a machine frobnicate? *Journal of Foo*, 14(1):234–778, 2004. 3 359
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361
[5] FirstName LastName. The frobnicable foo filter, 2014. Face and Gesture submission ID 324. Supplied as supplemental material `fg324.pdf`. 2, 4 362
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[6] FirstName LastName. Frobnication tutorial, 2014. Supplied as supplemental material `tr.pdf`. 2, 4 365
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