Technical Paper Writing

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What is a Technical Paper?

- It is a research article published in the interest of scientific community to
  - Showcase NEW results in the area of interest
  - Gain the credit of carrying out this research for the first time – be a leader
  - To attract the attention of other researchers towards the results obtained and to develop a dialogue in scientific community

When do you Write Technical Paper?

As soon as you complete a valuable segment of research and

you have results that can be published

Contents of a Technical Paper

- Paper Title
- Author's whereabouts
- The Abstract
- The Introduction
- The Body
- Results and Discussions
- The Conclusions
- Future Work
- The Acknowledgements
- References
- Appendices
- Nomenclature

Title

Title must be specific to the work proposed and self-explanatory.

It should not be too long but must represent the complete work in abstract.

Examples of Titles of Technical Papers

- A Wideband Digital Receiver With Hard-Switching Mixers for Cognitive Radio
- Experimental Investigations of Heat Transfer Characteristics of a Miniature Heat Pipe
- Design of a WSN Platform for Long-Term Environmental Monitoring for IoT Applications
- VLSI Design of a Monolithic Compressive-Sensing Wideband Analog-to-Information Converter

Title

- Title should not be too general. (Avoid phrases such as: Studies on.. Etc)

- Title of a research paper cannot be same as that of a book

Author's whereabouts

- Author's whereabouts imply author's name and professional address and/or contact details.

- In the author's name, usually the title such as Mr., Mrs., or Dr. Etc will not be used.

Author's whereabouts

Examples:

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Abstract

- Abstract is like a summary of complete paper
- It includes
  - Importance of the paper
  - Gap in literature
  - Problem statement and /or Work carried out
  - Major Results and Conclusions

“Abstract”

- Usually the abstract will be framed only after the complete body of the paper is ready.
- Since abstract has to be very short and comprehensive and represents the entire paper, it must be carefully framed.

Example of an “abstract”

- DI diesel engines are well established today as the main powertrain solution for trucks and other relevant heavy duty vehicles. At the same time emission legislation (mainly for NOx and particulate matter) becomes stricter, reducing their limit to extremely low values.
- One efficient method to control NOx in order to achieve future emissions limits is the use of rather high exhaust gas recirculation (EGR) rates accompanied by increased boost pressure to avoid the negative impact on soot emissions.
- The method is based on the reduction of gas temperature level and O2 availability inside the combustion chamber, but unfortunately it has usually an adverse effect on soot emissions and brake specific fuel consumption (bsfc). The use of high EGR rates creates the need for EGR gas cooling in order to minimize its negative impact on soot emissions especially at high engine load were the EGR flow rate and exhaust temperature are high.
- For this reason in the present paper it is examined, using a multi-zone combustion model, the effect of cooled EGR gas temperature level for various EGR percentages on performance and emissions of a turbocharged DI heavy duty diesel engine operating at full load.
- Results reveal that the decrease of EGR gas temperature has a positive effect on bsfc, soot (lower values) while it has only a small positive effect on NO. As revealed, the effect of low EGR temperature is stronger at high EGR rates.

Example of an “abstract”

- This paper studies different methods proposed so far for segmentation evaluation. Most methods can be classified into three groups: the analytical, the empirical goodness and the empirical discrepancy groups. Each group has its own characteristics.
- After a brief description of each method in every group, some comparative discussions about different method groups are first carried out. An experimental comparison for some empirical (goodness and discrepancy) methods commonly used is then performed to provide a rank of their evaluation abilities. In addition, some special methods are also discussed.
- This study is helpful for an appropriate use of existing evaluation methods and for improving their performance as well as for systematically designing new evaluation methods

The "Introduction"

- This part includes:
  - The general introduction to the topic being addressed
  - The work carried out by other researchers in this area
  - The "Gap" in literature
  - The problem statement

The "Body" of the Programme

- This section is the major part of the paper in terms of length / volume.
- It depicts the work carried out with all details and descriptions.
- This section must be written with high clarity such that another researcher must be able to follow the procedure shown and must be able to repeat the work.

The "Body" of the Programme

- The Methodology followed must be explained in detail. No part must be skipped.
- All specifications of equipment/tools used, the experimental/numerical procedure must be clearly indicated
- The error analysis of experimental / numerical data is always desired and for a few journals, it is mandatory.

Tables

- Tables are drawn to showcase important statistical data derived from the work
- Tables are used to display a collection of data in any section of the paper. The tables must be prepared so that they are self explanatory with proper titles.
- Tables must be numbered sequentially and also cited in the text.
- Include the units of measurements in the table text wherever the variable list is used

Figures

- Figures must be self-explanatory and proper caption must be given at the bottom of the figure.
- A graph, picture, copy of photograph are all considered as figures.
- The graphs and contour plots are required in “black and white” mode and not in colour mode.
- The centred symbols, curves, values on the axes shown in the graph must be distinct, legible and readable in the size it is printed.

Figures

- Figures must be clear and the texts in the figures must be readable with minimum font
- All the symbols used in the graph must be labeled either within the frame of the picture or in the caption of the figure.
- The axes of the graph must be labeled and quantified. The units of the quantities used must be mentioned.
- All figures and tables must be cited in the text.
- Avoid snapshots of windows, poor images and big-in-size pictures. The text and numerals if any in the picture must be of readable size.

Equations

- All equations must be typed using Equation Editor/Math type and must be numbered sequentially
- Put the equation numbers right justified and within the brackets, for ex… (1)

Results and Discussions

- The major results must be discussed in the light of observed trends and thoroughly **compared with published data.**
- Showcase new results and thus highlight the importance of present paper.
- Result section without discussion on physics involved is considered as null and void.

Results and Discussions

- This section describes the output of your hardship.
- Record all important results derived and support them with proper scientific and technical notes.
- Use the graphs, tables and mathematical models to describe the results.
- Comparisons of the results obtained and bringing connectivity to the published literature would increase the gravity of the result.

Conclusions

Conclusion is not a summary of the work, but a listing of major outcomes derived from the study.

Therefore do not state as what has been done in your work, instead bring out the outcome of the results and discussions in terms of statements.

Many a time, the abstract and conclusions are referred for a quick assessment of the usefulness of the paper by the readers. Hence these sections must be written with upmost importance.

Conclusions

- Conclusions depict the outcome of your paper
- Conclusions should not be obvious. (for ex: heat flows from higher temperature to lower temperature, etc.,)
- Conclusions must be crisp and meaningful

References

- **References** must appear in the reference list in the order of appearance in the paper. Each reference must be cited at least once in the text of the paper. An example for citing a paper in the text is shown in the following example.

"….The independent research works carried out by many investigators [1, 4-8] have shown the impact of dynamic forces and couples on the stability of the vehicle…"

References (Contd..)

- Include references at the end of the paper. The referencing style for journal papers, conference papers, textbooks and websites are shown in the next slide.

References (Contd..)

[1] N. Dombrowski and W. R. Johns (1963), *The Aerodynamic Instability and Disintegration of Viscous Liquid Sheets*, Chem. Eng. Sci., vol. 18, pp. 203-220.

[2] N.A.Chigier (1991), *The Physics of Atomization*, Proceedings of Fifth International Conference on Liquid Atomization and Spray Systems, July 15-18, 1991.

[3] Whitfield A and Baines N C(1990), *Design of Radial Turbomachines*, Longman Scientific Technical, New York.

Cross Check

- http://www.crossref.org/crosscheck.html.

For plagiarism

A Few Good Sources for Technical Paper Writing

- http://infolab.stanford.edu/~widom/paper-writing.html
- http://www.cs.utexas.edu/~dahlin/professional/paper-writing.pdf
- http://www.macalester.edu/~bressoud/capstone/TechPaperHowTo.pdf
- http://www.uni-kassel.de/eecs/fileadmin/datas/fb16/Fachgebiete/VS/Documents/HowToWritePaper.pdf

A few Research Topics in Management Studies

- Social and human capital influences on opportunity recognition and resource mobilization in India's handloom industry
- Effect of Quality Management Systems and Total Quality Management on Productivity before and after: Empirical Evidence from the Indian Auto Component Industry