

# **ACADEMIC WRITING SKILLS FOR RESEARCH JOURNAL ARTICLE**

**Mamun Bin Ibne Reaz**

**Universiti Kebangsaan Malaysia**

# Why do you write research or review article?

- To let other people know about your invention
- To share your knowledge
- To promote yourselves and to fulfill the organization requirement
- Develop a good reputation



# General principles

- Scientific writing does not have to be boring
  - It is like a story book. Your writing should attract the reader to read it to the end.
- Learning to write is learning to edit yourself
  - Many students do a brain dump, edit it once and call it done, expecting the advisor to clean it up

# General principles

- Know the audience and the journal
  - One of the first things to think about as you write is who your audience will be
  - Go through the journal scope to know about the probable readers
  - For example, a journal is dominated by the medical related articles but they also publish biomedical engineering related articles OR your article is hardware dominated of an application and you are trying to publish it in a journal dominated on the application



# When to start?



# Type of articles

- Research paper
  - Long paper (more than 5 pages till 30 pages)
  - Letter (1 to 3 pages)
  - Short communication (3 to 5 pages)
- Review paper



# Structure

(Research Article)

- Title
- Author's name and affiliation
- Abstract
- Keywords
- Introduction
- Methodology
- Results and Discussion
- Conclusions
- Acknowledgement
- Reference

# Title

- Should perfectly highlight your principal work
- Avoid ornamental words

“Expert System for Power Quality Disturbance Classifier” - **OK**

“Design and Analysis of UHF Micropower CMOS DTMOST Rectifiers” - **OK**

“A Novel EMG Signal Analysis to Determine Muscle Fatigue” – **NOT OK**
- Reliable, scalable, high performance, robust, low-complexity



# Author's name and affiliation

- You should use the same abbreviated name in all articles that you are going to write
- Now a days, people use to communicate through email. Thus, be sure about your correct email address
- Put your affiliation and address correctly
- Each journal has different style thus follow the author's guide

# Abstract

- Abstract is the most important part of the article to attract the readers to go through the article
- Your readers are time-pressed academics...
- The abstract should be as concise as possible but tell the gist of whole story in one paragraph
  - So that reader feels to read the whole story



# Abstract

- As a summary of work done, it is always written in past tense
- An abstract should stand on its own, and **not refer to any other part** of the paper such as a figure or table
- Focus on summarizing results - **limit background information** to a sentence or two, if absolutely necessary
- What you report in an abstract must be consistent with what you reported in the paper

# Abstract

- I always write the abstract last
- No of words
  - 50 words (letter)
  - 50 – 100 words (short communication)
  - 150 – 250 words (long paper)
- Four sentences (for long paper)
  - State the problem
  - Say why it's an interesting problem
  - Say what your solution achieves
  - Say what follows from your solution



# Abstract

- It's a summery of the whole article without any references and any ornamental words
- Any sentences in abstract should not be repeated in the text
- Hints:
  - Introduction – 1 to 2 lines
  - Methodology – 2 to 3 lines
  - Results & Discussion – 1 to 2 lines
  - Conclusion – ½ to 1 line

# Abstract (long paper)

For achieving a photovoltaic penetration above one-third of the world demand for electricity in the first half of this century, the importance of a fast manufacturing learning curve that is linked to the capacity of developing cells of increasing efficiency is stressed. Progress in multi-junction cells is described as well as three novel concepts promising very high efficiency. It is explained why these concepts will probably be used in concentrator systems.

State the problem

Ok

Say why it's an interesting problem

Ok

Say what your solution achieves

Ok but better put some value

Say what follows from your solution

OK



# Abstract (long paper)

***Abstract***—Design and analysis of ultrahigh-frequency (UHF) micropower rectifiers based on a diode-connected dynamic threshold MOSFET (DTMOST) is discussed. An analytical design model for DTMOST rectifiers is derived based on curve-fitted diode equation parameters. Several DTMOST six-stage charge-pump rectifiers were designed and fabricated using a CMOS 0.18- $\mu\text{m}$  process with deep n-well isolation. Measured results verified the design model with average accuracy of 10.85% for an input power level between  $-4$  and  $0$  dBm. At the same time, three other rectifiers based on various types of transistors were fabricated on the same chip. The measured results are compared with a Schottky diode solution.

State the problem

Not Ok (no problem stated)

Say why it's an interesting problem

Not Ok

Say what your solution achieves

Ok

Say what follows from your solution

Not OK

# Abstract (long paper)

**Abstract:** *Electromyography gives an electrical representation of neuromuscular activation associated with a contracting muscle. The electromyography signal acquires noise while travelling through different media. The wavelet transform is employed for removing noise from surface electromyography (SEMG) and higher order statistics are applied for analysing the signal. With the appropriate choice of wavelet, it is possible to remove interference noise (denoise) effectively in order to analyse the SEMG. Daubechies wavelets (db2, db4, db5, db6, db8), symmlet (sym4, sym5) and the orthogonal Meyer (dmey) wavelet can efficiently remove noise from the recorded SEMG signals. However, the most effective wavelet for SEMG denoising is chosen by calculating the root mean square difference and signal-to-noise ratio values. Results for both root mean square difference and signal-to-noise ratio show that wavelet db2 performs denoising best out of the wavelets. Furthermore, the higher order statistics method is applied for SEMG signal analysis because of its unique properties when applied to random time series, such as parameter estimation, testing of Gaussianity and linearity, deterministic and non-deterministic signal detection etc. Gaussianity and linearity tests as part of higher order statistics are conducted to understand changes in muscle contraction and to quantify the effectiveness of the noise removal process. According to the results, the SEMG signal becomes less Gaussian and more linear with increased force.*

State the problem

Ok

Say why it's an interesting problem

Not Ok

Say what your solution achieves

Ok

Say what follows from your solution

OK



# Abstract (letter & short paper)

***Abstract***—Design and analysis of ultrahigh-frequency (UHF) micropower rectifiers based on a diode-connected dynamic threshold MOSFET (DTMOST) is discussed. An analytical design model for DTMOST rectifiers is derived based on curve-fitted diode equation parameters. Several DTMOST six-stage charge-pump rectifiers were designed and fabricated using a CMOS 0.18- $\mu\text{m}$  process with deep n-well isolation. Measured results verified the design model with average accuracy of 10.85% for an input power level between  $-4$  and  $0$  dBm. At the same time, three other rectifiers based on various types of transistors were fabricated on the same chip. The measured results are compared with a Schottky diode solution.

Say what you have done

Ok

# Abstract (letter & short paper)

**In this letter we show a fault localization system implemented by using policy-based thresholds for triggering alarms or self-healing mechanisms. Alarms are collected and organized within a codebook, which is a fundamental component of our fault management system. The relevant performance is analysed by using a real network deploying VoIP services.**

Say what you have done

Ok



# Abstract (letter & short paper)

We formulate the issue of joint image segmentation and recognition as an integrated statistical inference problem. A two-layer graphical model is proposed that supports the optimal segmentation and recognition in an unified Bayesian framework. Due to the explicit modelling of two tasks in the graphical model, an efficient non-iterative belief propagation algorithm is used for state estimation. The proposed approach is applied to automatic licence plate recognition (ALPR), and it outperforms traditional methods where the two tasks are implemented independently and sequentially.

Say what you have done

Ok

# Keywords

- Why keywords needed?
  - To search for a similar kind articles
- The most common generic words that focuses your work should be used
  - CMOS analog circuits, power quality, fuzzy logic, electromyography



# Introduction

- If 'Abstract' is interesting then the reader will go through the 'Introduction'
- If 'Introduction' fail to keep the readers interest then the paper is lost
- Nearly every reader will at least skim through the introduction

# Introduction

- The first paragraph should follow the inverted triangle principle
  - Start with a broad statement and become more detailed until finally identifying the specific problem
- The purpose of the first paragraph is to interest the reader in the paper
- The paragraph should end with the general problem addressed by the paper



# Introduction

- Describe the problem

**T**HE scarceness of power quality (PQ) experts in the electric power industry poses a problem in handling the huge amount of data gathered by the distributed PQ monitoring systems. Besides that, knowledge about PQ is dispersed and fragmented [1]. The disturbance waveforms contain serious imprecision of data and directly provides very little information on PQ, making conventional programs fail to identify any PQ problems. Existing recognition methods need much improvement in terms of their versatility, reliability and accuracy in order to process the disturbance waveforms. The measured data obtained are not self-explanatory and requires the intervention of human expertise to classify the type of PQ disturbance. Complex PQ disturbances are non-stationary and transient by nature and points of sharp variation such as singularities in transient signals usually carry the most important information about the disturbances and it is vital to efficiently extract and interpret this information from the disturbance waveforms.

# Introduction

- The remaining parts of the introduction is a series of paragraphs that traditionally function as a literature review
- The beginning of the literature review should cite the most important historical contributions
- For the research article, cite the seminal contributions that directly lead to the problem the article addresses
- The literature review should be based on refereed journal articles to the extent possible



# Introduction

- Describe the features and advantages of the methods that you are going to use

Discrete wavelet transform (DWT) have been proven to be very efficient in signal analysis [2]. Apart from filtering noise, it accurately detects sharp changes and discontinuities in PQ disturbance signals, and extracts their characteristic features for subsequent disturbance identification. Real-time identification and classification of different PQ events become one of the most important tasks for making a system decision to solve a PQ problem. Artificial neural network (ANN) can be used to solve power system protection problems, particularly those where traditional approaches have difficulty in achieving the desired speed, accuracy and selectivity.

# Introduction

- Describe the similar works with their disadvantages

Over the last ten years a number of different approaches to the PQ disturbance analysis using intelligent methods were suggested. In one of the research [3], DWT is employed to detect PQ disturbances. This approach unifies time and frequency information and provides an integral signal-processing paradigm, where its embedded wavelet basis serves as a window function to monitor the signal variations efficiently. The prototype is realized on an FPGA.

Is this paragraph following the rules of good introduction?



# Introduction

- Describe your work in brief with key achieved advantages i.e. state your contributions
- Instead of 'the author' use 'we', 'our'

In this paper, the authors present a similar classifier like Huang *et al.* [7] but with a different methodology combining the three individual technologies; DWT, univariate randomly optimized neural network (URONN) and FL resulting in a simpler classifier with a significant increase in speed, performance and accuracy.

# Introduction (letter)

- It will follow almost same structure like the 'Introduction' for long paper but in brief
- There will be no paragraph of describing the similar works with their disadvantages



# Introduction

- Never put the organizational structure of the article

This paper is organized as follows. The design methodology is described in Section II. Section III describes in detail the implementations of neural network, while Section IV is dedicated to presenting the implementation of fuzzy logic. Section V describes the results and discussion. Finally, Section VI draws the conclusion and discusses future works.

**This is an example of bad INTRODUCTION**

# Introduction (wrap up)

- Describe the problem so that readers know the context of the article
- Describe the features and advantages of the methods that you are going to use
- Describe the similar works with their disadvantages
- Describe your work in brief with key achieved advantages i.e. state your contributions



# Introduction

## (few things to note.....)

- All works should be properly referenced except yours (your early work also should be referenced)
- Failing to give credit to others can kill your paper
  - If you imply that an idea is yours, and the referee knows it is not, then either
    - You don't know that it's an old idea (bad)
    - You do know, but are pretending it's yours (very bad)
- There should have a flow from one paragraph to the next paragraph
- Be brief
- Do not leave the reader to guess what your contributions are!

# Methodology

- Describe the methodology that you are adopting in detail
- State the assumption clearly (if any)
- Justify all the stated assumptions
- Use diagrams, flowcharts and clear (high resolution) illustrations to make the description more understandable



# Methodology

- Use appropriate equations but avoid deriving the equation
  - Too many equations make the article less interesting
- Each equation must be numbered consecutively
- Avoid detail description of known algorithms such as ANN, FL, DWT etc
- Methodology is not a set of instructions thus avoid all explanatory information and background

# Methodology (letter)

- It will follow almost same structure like the 'Methodology' for long paper but in brief (avoid excessive words to describe)
- Usually there is a limitation of using certain numbers of figures and illustrations



# Results and discussion

- It is better to write the data source (if any) at the beginning of this section
- Summarize your findings in text and illustrate them, if appropriate, with figures and tables
- Presenting the results graphically or through table helps to understand
- Use past tense when you refer to your results

# Results and discussion

- Your introduction makes claims
  - Disadvantages of other works
  - Advantages of your work
- The methodology part of the paper provides evidence to support each claim
- Check each claim in the introduction, identify the evidence, and forward-reference it from the claim
- Evidence can be: analysis and comparison, theorems, measurements, case studies



# Results and discussion

- The most important part of the discussion is comparison among various methods
  - How do the results compare with earlier work?
  - What is new and significant?
- Comparison should be on apple to apple
  - The same data should be used with other methods to compare your results
- Never claim any sort of superiority of your work without any proof from your result and comparison

# Results and discussion

- In text, refer to each figure as "figure 1," "figure 2," ; same goes for table
- Place figures and tables, properly numbered
- Either place figures and tables within the text of the result, or include them in the back of the report
- For the same data, do not use both table or graph



# Results and discussion

- Each figure must be numbered consecutively and complete with caption (caption goes under the figure)
- Each table must be titled, numbered consecutively and complete with heading (title with description goes above the table)
- Each figure and table must be sufficiently complete that it could stand on its own, separate from text

# Results and discussion (letter)

- It will follow almost same structure like the 'Result and Discussion' for long paper
- There will be no comparison study



# Conclusions

- State the principal object of your work
- State the achieved results (only the final outcome)
- State the benefits that can be achieved from the acquired final outcome
- Suggest future research from the end point of your research
- Here you should not present any new information

# Conclusions

The advantages of a combination of WT, ANN, and FL are obvious. It therefore appears that a judicious integration of the was derived based on the diode equation with a nonideality factor curve fitted to experimentally obtained  $I-V$  data. Actual measurement from fabricated chips validated the proposed analytical model and proved the feasibility of the DTMOST solution. In conclusion, the DTMOST realized with a deep n-well process is a promising alternate solution for CMOS processes where the SBD is not available.

- Suggesting future research is not mandatory



# Conclusions

The advantages of a combination of WT, ANN, and FL are obvious. It therefore appears that a judicious integration of the merits of these three technologies can provide a more intelligent system in terms of generic advantages like parallelism, fault tolerance, adaptivity, and uncertainty management by evolving synergism between them, to handle real life ambiguous situations and recognition problems.

A new approach of PQ disturbance classifier utilizing WT, ANN, and FL is proposed. The initial research involved determining the functions of the system and designing the individual modules in VHDL to perform these functions. The functionality of the modules was successfully verified. Future work will include the detection and classification of composite/polyphase mining events.

- State the principal object of your work
- State the achieved results (only the final outcome)
- State the benefits that can be achieved from the acquired final outcome
- Suggest future research from the end point of your research

# Acknowledgement

- In this section, you can acknowledge those who helped conducting the research including financial support

## Example 1:

The authors wish to thank Tenaga Nasional Research and Development Centre, Malaysia, for providing valuable assistance in obtaining power disturbance field data from the various substations throughout the country.

## Example 2:

The authors would like to express sincere gratitude to the Ministry of Science, Technology, and Innovation of Malaysia for providing fund for the research under eScienceFund grant (project no. 01-01-08-SF0029).



# References

- Put here all the cited reference in the text chronologically (1, 2, ... or A, B, ...)
- There are two types of reference styles are being used
  - A numbered list of references

[1] Name, Title, Publisher name, Vol (if any), Issue (if any), Page no., Date (month and year for journal and date for conference, Place (for conference)

Note: the reference should be cited in the text in numbers i.e. [1], [2].....

# References

## – A author list of references

Same as above but chronologically on authors first/last name

Note: the reference should be cited in the text by author's name i.e. (Ali et. al., 2007)

- Usually journal citation is more stronger than citation from conference proceedings
- Avoid citing unpublished thesis, internal report and private correspondence
- Try to put webpage reference as little as possible



# Structure

## (Review Article)

- Title
- Author's name and affiliation
- Abstract
- Keywords
- Introduction
- ~~• No Methodology~~
- ~~• No Results~~
- Key researches on the topic
- Discussion
- Conclusions
- Acknowledgement
- Reference

# Title

- Should perfectly highlight your principal review work
- Usually review article cited more than research article
  - You need to make title such that it sounds like a review rather than technical article
- Techniques of EMG Signal Analysis: Detection, Processing, Classification and Applications.
- Detection and Processing Techniques of FECG Signal for Fetal Monitoring
- Image Compression System for Mobile Communication: Advancement in the Recent Years
- Advances in Signal Processing and Artificial Intelligence Technologies in the Classification of Power Quality Events: A Survey



# Abstract

- The abstract is almost like research article but it will rather give a guideline instead of result.

Electromyography (EMG) signals can be used for clinical/biomedical applications, Evolvable Hardware Chip (EHW) development, and modern human computer interaction. EMG signals acquired from muscles require advanced methods for detection, decomposition, processing, and classification. The purpose of this paper is to illustrate the various methodologies and algorithms for EMG signal analysis to provide efficient and effective ways of understanding the signal and its nature. We further point up some of the hardware implementations using EMG focusing on applications related to prosthetic hand control, grasp recognition, and human computer interaction. A comparison study is also given to show performance of various EMG signal analysis methods. This paper provides researchers a good understanding of EMG signal and its analysis procedures. This knowledge will help them develop more powerful, flexible, and efficient applications.

# Key Researches on the Topic

- Download at least 150 articles based on the keywords
- Scan each article and keep only which are related (at least 70 articles)
- Read each article and note down the following:
  - Citation of the article
  - Key research method and findings
  - Advantages
  - Disadvantages



# Key Researches on the Topic

- Complete the same for all 70 articles
- Then append all and make a complete story
- The review can be based on HISTORY or can be based on the popular BASIC METHODS

# Discussion

- The most important part of the review article is discussion
- Your discussion should be based on all the review that you have made
- From your expert analysis you will give a future direction on the review topic



# Structure

## (Conference Article)

- Title
- Author's name and affiliation
- Abstract
- Keywords
- Introduction
- Methodology
- Results and Discussion
- Conclusions
- Acknowledgement
- Reference

# Structure

## (Conference Article)

- Conference article can be an idea only
- Conference article is the preliminary results of a research
- Even if you have the complete result, please do not put all the results in the conference article to avoid the duplication in publishing to journal



# How to Make Responses

- Try to understand every single comments that has been given by the reviewer.
- Though the comments are presented in descriptive way but try to figure out the number of questions from every paragraph of the description.
- Once questions are figured out, give answer for every single question.
- Show your extreme politeness in your responses even though the questions are not appropriate.

# How to Make Responses

- Always try to give answer in detail rather than only YES or NO.
- Remember that the reviewer will feel comfortable to get the answer from the RESPONSE rather opening the manuscript again to understand your response.
- Your response should reflect in the manuscript thus you need to revise the article accordingly.



# How to Make Responses

## Reply to the Reviewers' Comments

1. **Title:** The title is quite general and could be improved by including the most significant detail that is unique to the authors' proposal.

**Reply:** The title is changed to "Learning Temporal Patterns of Residents' Activity interval in Smart Homes Using Normal Distribution" which was "Stochastic Analysis of Smart Home User Activities" previously. Now the title reflects that our proposal is a *temporal pattern learning algorithm* which learns *residents' activity interval* using *normal distribution* and applicable for *smart homes*. The current title is more compact, specific and represents unique contribution of proposed methodology and findings.

2. **Abstract:** The abstract can be improved by including a few specific data results for greater impact on the readers.

**Reply:** There are two specific contributions of this proposal. One is a temporal interval algorithm, which exhibits 88.3% to 95.3% prediction accuracies for different ranges of mean and standard deviations when tested with practical smart home data. Another finding is that smart homes residents' activity interval follows normal distribution, which was merely an assumption previously. Both findings are highlighted in the abstract for greater impact on the readers.

Thank You

