Making ACM \LaTeX\ styles

Boris Veytsman, George Mason University, USA

TUG’2016
ACM

The biggest publisher in computing: 50+ journals, hundreds of conferences...

Early adopters of \TeX.
The problem of early adopters

The code tends to be rather old...

\typeout{Document Class 'sig-alternate' <9th June '13>.}
    Modified by \url{cs.cmu.edu}/Boris Veytsman}
\typeout{Based in part upon document Style `acmconf' <22 May 89>.}
    Hacked 4/91 by}
\typeout{\url{cs.mcgill.ca}, 4/93 by \url{cs.mcgill.ca}}
\typeout{Excerpts were taken from (Journal Style) 'esub2acm.cls'.}
The code tends to contain too much copy and paste...

1. acm_proc_article-sp.cls
2. acmlarge.cls
3. acmsiggraph.cls
4. acmsmall-ec13.cls
5. acmsmall.cls
6. acmtog.cls
7. acmtrans2m.cls
8. sig-alternate-05-2015.cls
9. sig-alternate.cls
10. sigchi-ext.cls
11. sigchi.cls
12. sigplanconf.cls
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9. sig-alternate.cls
10. sigchi-ext.cls
11. sigchi.cls
12. sigplanconf.cls

BibTeX files:

1. ACM-Reference-Format-Journals.bst
2. SIGCHI-Reference-Format.bst
3. acmsiggraph.bst
4. acm-abbrev.bst
5. acm-alpha.bst
6. acm-plain.bst
7. acm-unsrt.bst

The code is almost identical...
The code tends to rot...

From the letter by a \TeXexpert\footnote{Name withheld by request}

...3 packages copied in with a comment (good!) that they are needed but without taking out `\endinput` that was in the code from the package copied in (bad :-) so after the first nothing else is ever used
The code tends to rot...
From the letter by a \TeX{}expert\textsuperscript{1}

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and it seems there is a redefinition of \texttt{startsection} inside that is broken—last night 30 min before my deadline I found 3 sections dangling at the bottom of columns

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and it seems there is a redefinition of `startsection` inside that is broken—last night 30 min before my deadline I found 3 sections dangling at the bottom of columns and the footnotes are horror and the fonts too and... 
...looks worse than your average Word document

\(^1\)Name withheld by request
Example

\DeclareOption{acmtopc}{
  \typeout{}
  \typeout{Using ACM, TOPC's option: 2013/01/18 by }
  \typeout{}
  \global@acmtopctrue
  \global@acmjacmfalsetrue
  \global@acmtissecfalse
  \global@acmtoclfalse
  \global@acmtocsfalse
  \global@acmtochifalse
  \global@acmtodaesfalse
  34 lines deleted
  \def\@journalName{ACM Transactions on Parallel Computing}
  \def\@journalNameShort{ACM Trans. Parallel Comput.}
  \def\@journalCode{topc}
  \def\@permissionCodeOne{1539-9087}
}

\DeclareOption{acmjacm}{
  \typeout{}
  \typeout{Using ACM, JACM's option: 2010/05/04 by }
  \typeout{}
  \global@acmjacmtrue
  \global@acmtissecfalse
  \global@acmtoclfalse
  \global@acmtocsfalse
  \global@acmtochifalse
  \global@acmtodaesfalse
  34 lines deleted
  \def@journalName{Journal of the ACM}
  \def@journalNameShort{J. ACM}
  \def@journalCode{jacm}
  \def@permissionCodeOne{0004-5411}
My role

I consulted ACM since 2011:

1. BibTeX updates
2. “Concepts system” (enhanced keywords)
3. New boilerplate copyright
My role

I consulted ACM since 2011:

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3. New boilerplate copyright

Problems:

1. How do you support and add new features to a dozen of slightly different styles?
2. If my name appears in the code (many times!), should I be responsible for the mess?
Solution

Full refactoring.
Fortunately, ACM wanted new design of all templates: new fonts, new sizes etc.
Solution

*Full refactoring.*

Fortunately, ACM wanted new design of all templates: new fonts, new sizes etc.

1. ACM senior editorial staff: typographic design
2. Aptara: typesetting process
3. Yours truly: \LaTeX{} code.
Principles for new \TeX code

No more forking! One code for all
Principles for new \TeX{} code

No more forking! One code for all

This means one \texttt{dtx} source. I decided to have one \texttt{cls} file as well—just to avoid temptation to rename and change a class file.
Same interface for all outputs

You should be able to change

\documentclass[acmsmall]{acmart}

to

\documentclass[sigconf]{acmart}

and everything “just works”...
Same interface for all outputs

You should be able to change

\documentclass[acmsmall]{acmart}

to

\documentclass[sigconf]{acmart}

and everything “just works”...

Important consequence: one Bib style.
As much standard \LaTeX{} and AMS\LaTeX{} as possible

Exception: authors’ information.
As much standard \LaTeX and AMS\LaTeX as possible

Exception: authors’ information.

Structured commands

\TeX file is to be analyzed to extract information for metadata.
As much standard \LaTeX{} and AMS\LaTeX{} as possible

Exception: authors’ information.

Structured commands

\LaTeX{} file is to be analyzed to extract information for metadata.

The work is supported by the \texttt{\grantsponsor{GS501100001809}{National Natural Science Foundation of China}{http://dx.doi.org/10.13039/501100001809} under Grant No.~\texttt{\grantnum{GS501100001809}{61273304}}.}
Some features of the new class

Variations as options

\documentclass[acmsmall]{acmart}
\documentclass[sigchi]{acmart}
\documentclass[manuscript]{acmart}
Some features of the new class

Variations as options

\documentclass[acmsmall]{acmart}
\documentclass[sigchi]{acmart}
\documentclass[manuscript]{acmart}

Some additional options

**review:** lines are numbered

**anonymous:** authors’ names, addresses and acknowledgements are suppressed.

**screen:** online version
Some other bells and whistles

Copyright system

\setcopyright{acmcopyright}
%\setcopyright{acmlicensed}
%\setcopyright{rightsretained}
%\setcopyright{usgov}
%\setcopyright{usgovmixed}
%\setcopyright{cagov}
%\setcopyright{cagovmixed}
Some other bells and whistles

Copyright system

\setcopyright{acmcopyright}
\setcopyright{acmlicensed}
\setcopyright{rightsretained}
\setcopyright{usgov}
\setcopyright{usgovmixed}
\setcopyright{cagov}
\setcopyright{cagovmixed}

CCS system

\ccsdesc[500]{Computer systems organization~Embedded systems}
\ccsdesc[300]{Computer systems organization~Redundancy}
\ccsdesc{Networks~Network reliability}
Conditional typesetting

\begin{printonly}
  See the supplementary materials in the online version
\end{printonly}

\begin{screenonly}
\begin{table}
\begin{table}
... \\
\end{table}
\end{table}
\end{screenonly}
Conditional typesetting

\begin{printonly}
  See the supplementary materials in the online version
\end{printonly}

\begin{screenonly}
\begin{table}
\begin{table}
...
\end{table}
\end{table}
\end{screenonly}

Additional floats

\textbf{teaserfigure}: a special non-float in the frontmatter

\textbf{marginfigure, margintable, sidebar}: marginalia (mostly for SIGCHI extended abstracts)
Organization

Code repository at https://github.com/borisveytsman/acmart/.

Github gives a number of nice features:

1. Bug tracking
2. Mechanism for contributions
3. Nice version control
A Multifrequency MAC Specially Designed for Wireless Sensor Network Applications

GANG ZHOU, College of William and Mary
YAFENG WU, University of Virginia
TING YAN, Eaton Innovation Center
TIAN HE, University of Minnesota
CHENGDU HUANG, JOHN A. STANKOVIC, and TAREK F. ABDELZAHER, University of Virginia

Multifrequency media access control has been well understood in general wireless ad hoc networks, while in wireless sensor networks, research still focus on single frequency solutions. In wireless sensor networks, each device is typically equipped with a single radio transceiver and applications adopt much smaller packet sizes compared to those in general wireless ad hoc networks. Hence, the multifrequency MAC protocols proposed for general wireless ad hoc networks are not suitable for wireless sensor network applications, which we further demonstrate through our simulation experiments. In this article, we propose MMSN, which takes advantage of multifrequency availability while, at the same time, takes into consideration the restrictions of wireless sensor networks. Through extensive experiments, MMSN exhibits the prominent ability to utilize parallel transmissions among neighboring nodes.

Additional Key Words and Phrases: Wireless sensor networks, media access control, multi-channel, radio interference, time synchronization

ACM Reference Format:

DOI: 0000001.0000001

1 INTRODUCTION

As a new technology, Wireless Sensor Networks (WSNs) has a wide range of applications [1, 5, 15], including environment monitoring, smart buildings, medical care, industrial and military applications. Among them, a recent trend is to develop commercial sensor networks that require multichannel access. There are two primary reasons (supported by the National Science Foundation, under grant CNS-0435060, grant CNS-0329609, and grant CNS-0325197) for this trend:

- Increasing network reliability;
- Decreasing energy efficiency, demonstrating the ability to work against radio interference and the tolerance to a wide range of measured parallel transmissions among neighboring nodes. When multiple physical frequencies are available, it also enhances increased energy efficiency demonstrating the ability to work against radio interference and the tolerance to a wide range of measured time synchronization errors.

Additional Key Words and Phrases: Wireless sensor networks, media access control, multi-channel, radio interference, time synchronization

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A Multifrequency MAC Specially Designed for Wireless Sensor Network Applications

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Abstract

Multifrequency media access control has been well understood in general wireless ad hoc networks, while in wireless sensor networks, researchers still focus on single-frequency solutions. In wireless sensor networks, each device is typically equipped with a single RF transceiver and the MAC layer packet size is very small. Instead of using pairwise RTS/CTS frequency negotiation in WSNs, in which each device is equipped with a single RF transceiver and the MAC layer packet size is very small. Instead of using pairwise RTS/CTS frequency negotiation, we propose lightweight frequency assignment, which preserves channel observability, avoids the non-negligible "race condition" with parallel frequency channels, and achieves good packet delivery ratios, which we further demonstrate through our simulation experiments.

Multifrequency MAC protocols for general wireless ad hoc networks are not suitable for wireless sensor network applications, which have the following restrictions.

1. Multifrequency availability.
2. Energy efficiency.
3. Interference handling.
5. Low-complexity implemented.

The main contributions of this work can be summarized as follows.

1. We develop a new frequency assignment technique that respects the restrictions of wireless sensor networks. An extension of our technique can utilize parallel transmissions among neighboring nodes.
2. Instead of using pairwise RTS/CTS frequency negotiation, we propose lightweight frequency assignment, which preserves channel observability, avoids the non-negligible "race condition" with parallel frequency channels, and achieves good packet delivery ratios, which we further demonstrate through our simulation experiments.

In this article, we propose MMSN, which takes advantage of multifrequency availability while, at the same time, takes into consideration the restrictions of wireless sensor networks.

MMSN: Multifrequency MAC Specially Designed for Wireless Sensor Network Applications

2 MMSN Protocol

2.1 Frequency Assignment

We propose a suboptimal distribution to be used by each node in the network. Each node chooses a fixed frequency channel and broadcasts a frequency declaration (FD) message to notify its neighbors of its frequency choice. Each node then transmits its own traffic on its chosen frequency channel. A natural candidate is an increasing geometric distribution (IGD), which has the following form:

\[
\Pr(\text{FD} = k) = \frac{\alpha}{k!} \quad k = 1, 2, 3, \ldots
\]

where \(\alpha = 1\). The parameter \(\alpha\) is greater than 1.

In this article, we use the suboptimal approach for simplicity and provability. We need to find the distribution of the selected back-off time slice at each node to conform to what is shown in Equation (1). It is implemented as follows: Each node chooses a fixed frequency channel and broadcasts a frequency declaration (FD) message to notify its neighbors of its frequency choice. Each node then transmits its own traffic on its chosen frequency channel. A natural candidate is an increasing geometric distribution (IGD), which has the following form:

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\[
T = \left( \frac{1}{\alpha} \right) + 1
\]

Then, the node chooses its frequency channel according to the random variable \(T\) and broadcasts a frequency declaration (FD) message to notify its neighbors of its frequency choice. Each node then transmits its own traffic on its chosen frequency channel. A natural candidate is an increasing geometric distribution (IGD), which has the following form:

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\]
2 THE BODY OF THE PAPER

2.1 Type Changes and Special Characters

We have already seen several typeface changes in this sample. You can indicate italicized words or phrases in your text with the command \textit{;} emboldening with the command \textbf{;} and typewriter-style (for instance, for computer code) with \texttt{.}

To do this, ACM has some rigid requirements for the format of the proceedings documents. There is a specified format (balanced double columns), a specified set of fonts (serif or Helvetica and Times Roman) in certain specified sizes, a specified line area, centered for the page, specified margins, specified column widths and gutter size.

Because the entire article is contained in the document environment, you can indicate the start of a new paragraph with a blank line in your input file, that is why this sentence forms a separate paragraph.

2.2 Structural Elements

The entire article is contained in the document environment, you can indicate the start of a new paragraph with a blank line in your input file, that is why this sentence forms a separate paragraph.

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Because the entire article is contained in the document environment, you can indicate the start of a new paragraph with a blank line in your input file, that is why this sentence forms a separate paragraph.
SIGCHI Extended Abstracts Sample File

First Author
University of Author
Authorstown, CA 94022, USA
author1@anotherco.edu

Second Author
VP, Authoring
Authorship Holdings, Ltd.
Authorstown, CA 8PP, UK
author2@authoror.ac.uk

Third Author
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Bengalaru 560 80, India
author3@another.com
author4@another.com

Fourth Author
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author5@anotherco.com

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author6@author.fr

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Pretoria, South Africa
author7@umbhali.ac.za

ABSTRACT
UPDATED—July 12, 2016. This sample paper describes the formatting requirements for SIGCHI Extended Abstract Format, and this sample file offers recommendations on writing for the worldwide SIGCHI readership. Please review this document even if you have submitted to SIGCHI conferences before, as some format details have changed relative to previous years. Abstracts should be about 150 words. Required.

WOODSTOCK’97, El Paso, Texas USA
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Plans

1. Accessibility support
2. Biblatex option
Acknowledgements

This could not be done without patience and help of many people:

1. ACM editors: Craig Rodkin, Bernard Rous.
4. Authors of the early versions of ACM TeX and BibTeX styles.

Many people contributed suggestions, bug reports and code!

THANKS!