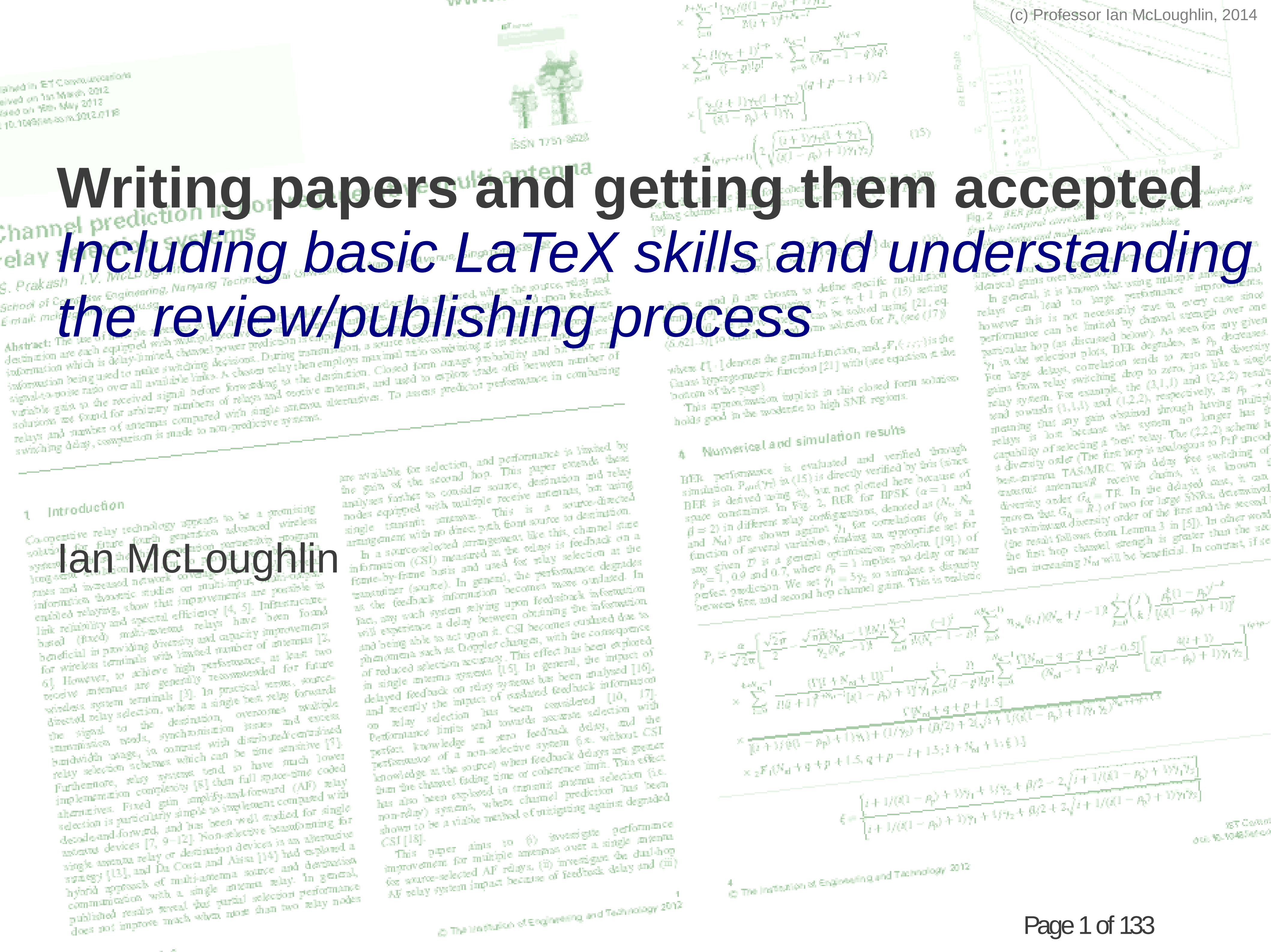


Writing papers and getting them accepted

Including basic LaTeX skills and understanding the review/publishing process

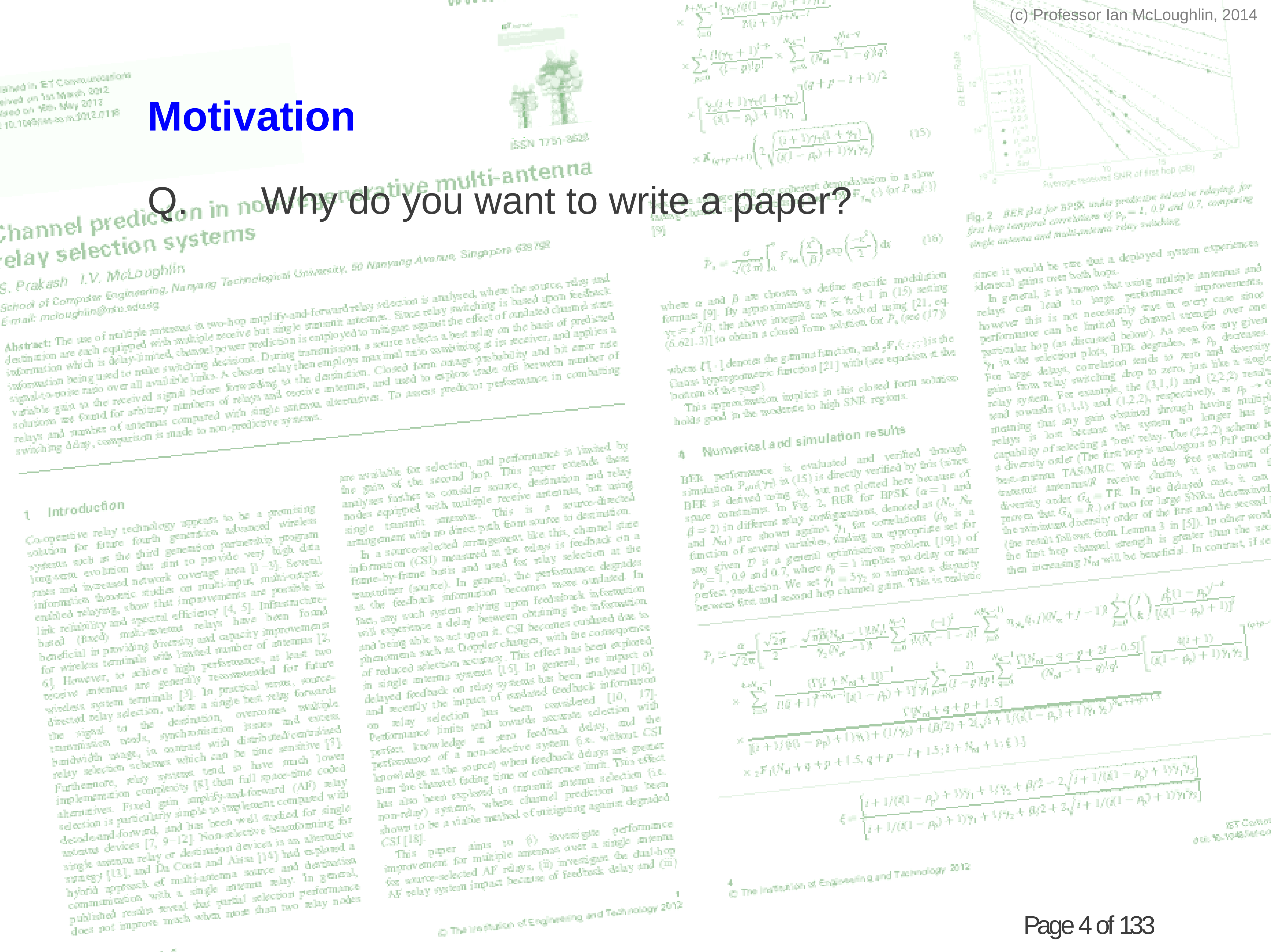
Ian McLoughlin

Course contents		Hands-on
1	Introduction to the course	
2	Introduction to LaTeX	
3	Getting started	Install and test LaTeX
4	About academic papers	
5	Paper structure and format	
6	Templates	Write an IEEE journal paper
7	The problem of plagiarism	
8	LaTeX tables	
9	LaTeX figures	Tables and figures, MATLAB
10	LaTeX equations	
11	Code listings	
12	Bibliographies	Practice writing equations
13	Useful packages	
14	Debugging	
15	The review process	
16	Getting cited	Write and submit your paper
17	Extra info: figures	
18	Extra information: academic writing	

Part A

Introduction to the course
Introduction to LaTeX
Getting started

Motivation



Q. Why do you want to write a paper?

Motivation

Q. Why do you want to write a paper?

A. To inform the word community about significant new advances, to disseminate useful ideas and contribute to the world body-of-knowledge....

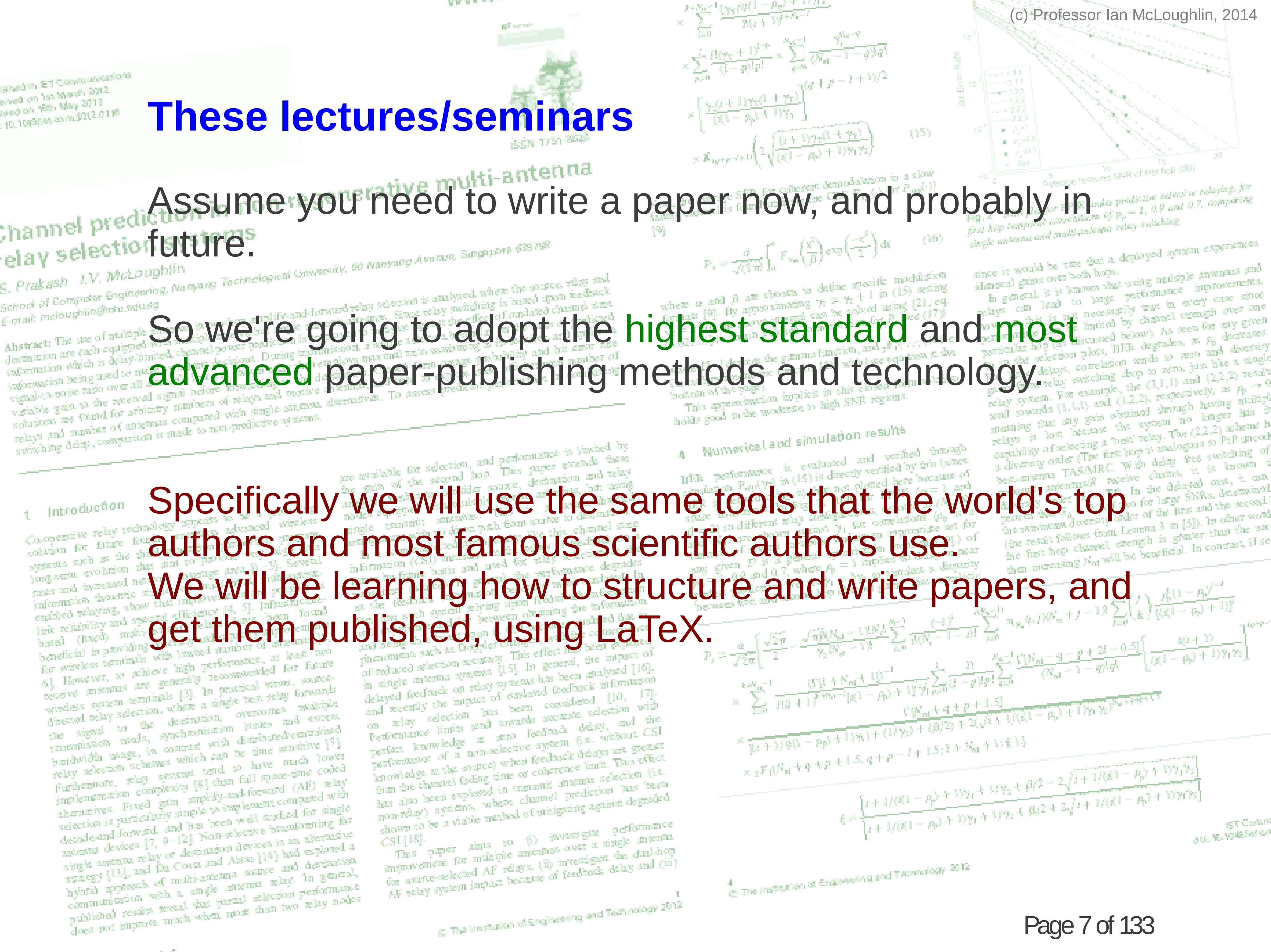
Motivation

Q. Why do you want to write a paper?

That's the OFFICIAL ANSWER...

The ACTUAL answer might be:

1. I need to publish a paper to graduate.
2. My supervisor told me to.
3. I need several papers to get a good job.
4. One day I want to be a famous professor.
5. My Mum/Dad/girlfriend/boyfriend will be proud of me.



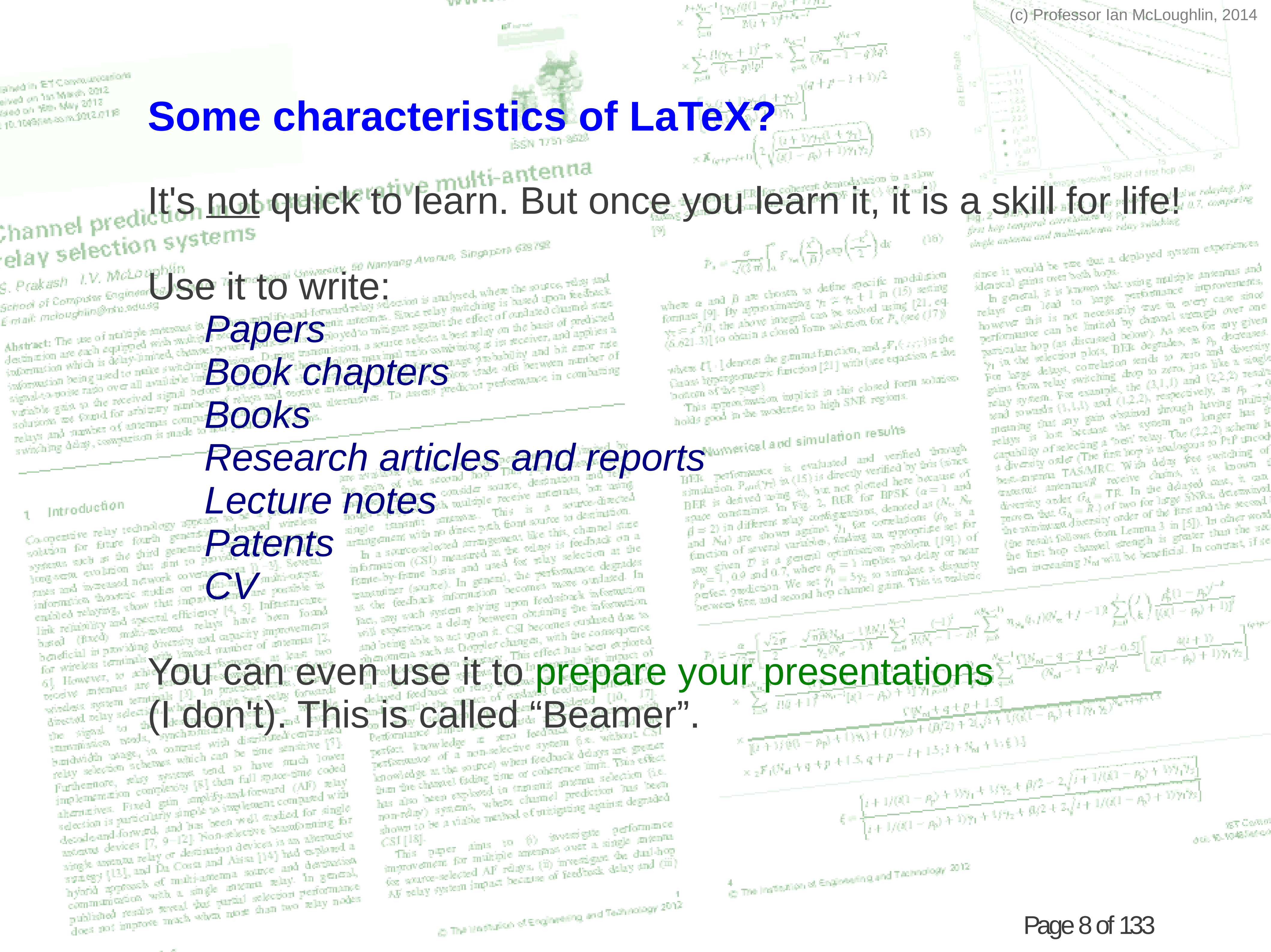
These lectures/seminars

Assume you need to write a paper now, and probably in future.

So we're going to adopt the highest standard and most advanced paper-publishing methods and technology.

Specifically we will use the same tools that the world's top authors and most famous scientific authors use.

We will be learning how to structure and write papers, and get them published, using LaTeX.



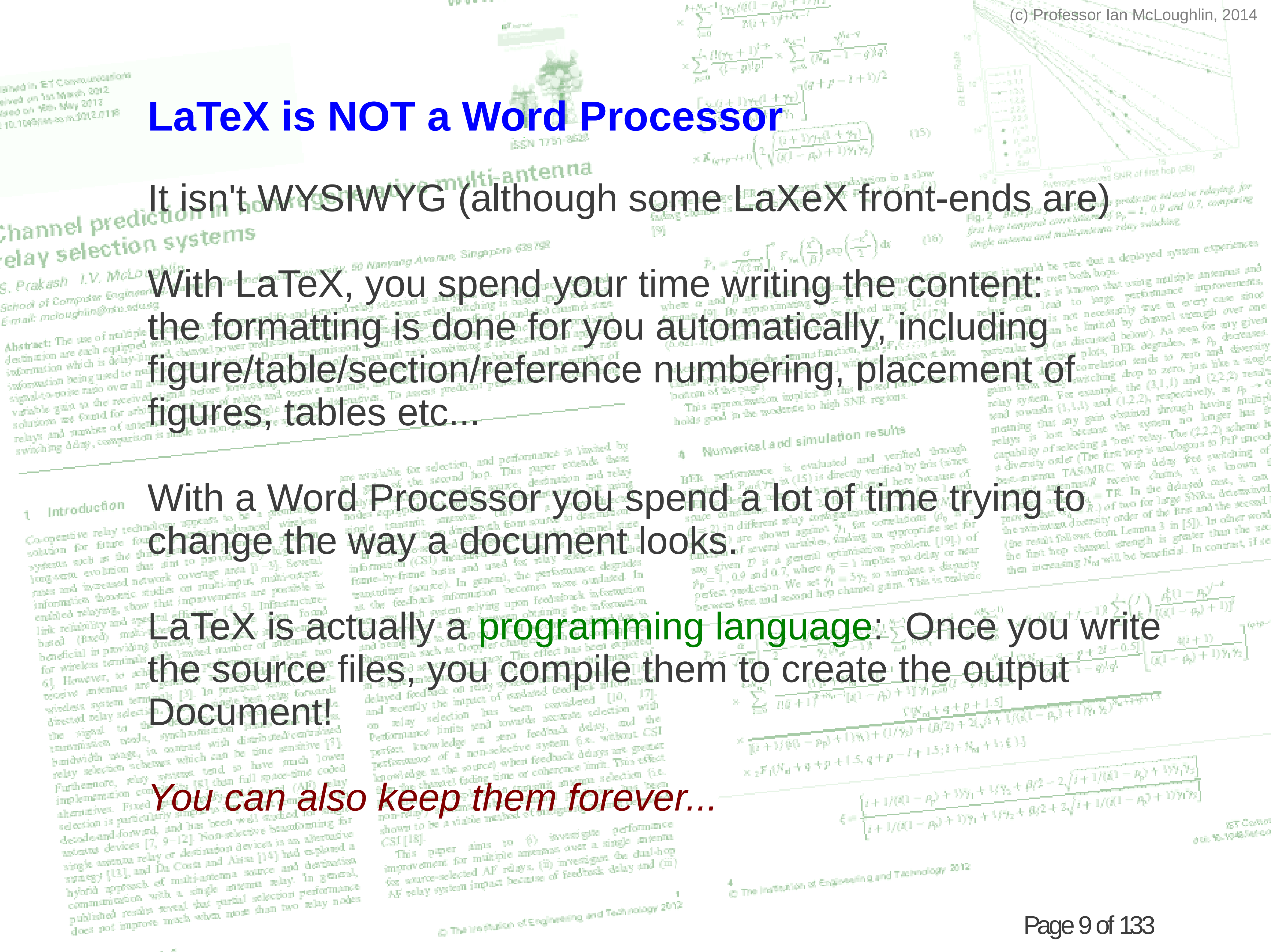
Some characteristics of LaTeX?

It's not quick to learn. But once you learn it, it is a skill for life!

Use it to write:

- *Papers*
- *Book chapters*
- *Books*
- *Research articles and reports*
- *Lecture notes*
- *Patents*
- *CV*

You can even use it to prepare your presentations (I don't). This is called “Beamer”.



LaTeX is NOT a Word Processor

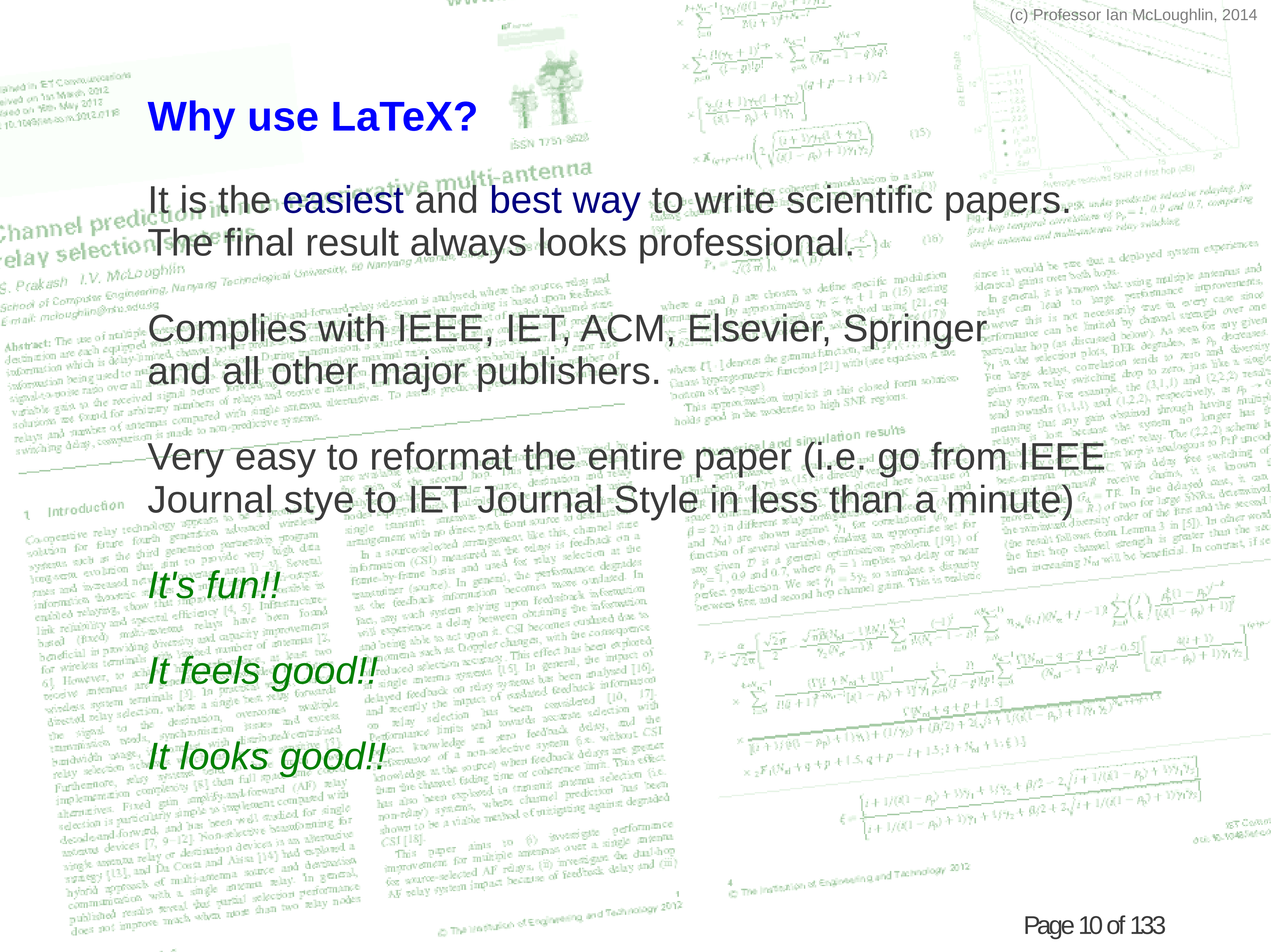
It isn't WYSIWYG (although some LaXeX front-ends are)

With LaTeX, you spend your time writing the content: the formatting is done for you automatically, including figure/table/section/reference numbering, placement of figures, tables etc...

With a Word Processor you spend a lot of time trying to change the way a document looks.

LaTeX is actually a programming language: Once you write the source files, you compile them to create the output Document!

You can also keep them forever...



Why use LaTeX?

It is the easiest and best way to write scientific papers. The final result always looks professional.

Complies with IEEE, IET, ACM, Elsevier, Springer and all other major publishers.

Very easy to reformat the entire paper (i.e. go from IEEE Journal stye to IET Journal Style in less than a minute)

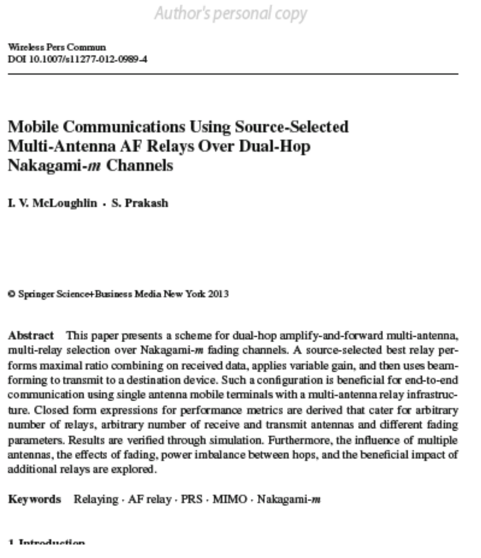
It's fun!!

It feels good!!

It looks good!!

LaTeX formatting

This is the same paper, only the title and the *documentclass* changed.



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Wireless Pers Commun
DOI 10.1007/s11277-012-0989-4

Mobile Communications Using Source-Selected Multi-Antenna AF Relays Over Dual-Hop Nakagami-*m* Channels

I. V. McLoughlin · S. Prakash

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Abstract This paper presents a scheme for dual-hop amplify-and-forward multi-antenna, multi-relay selection over Nakagami-*m* fading channels. A source-selected best relay performs maximal ratio combining on received data, applies variable gain, and then uses beamforming to transmit to a destination device. Such a configuration is beneficial for end-to-end communication using single antenna mobile terminals with a multi-antenna relay infrastructure. Closed form expressions for performance metrics are derived that cater for arbitrary number of relays, arbitrary number of receive and transmit antennas and different fading parameters. Results are verified through simulation. Furthermore, the influence of multiple antennas, the effects of fading, power imbalance between hops, and the beneficial impact of additional relays are explored.

Keywords Relaying · AF relay · PRS · MIMO · Nakagami-*m*

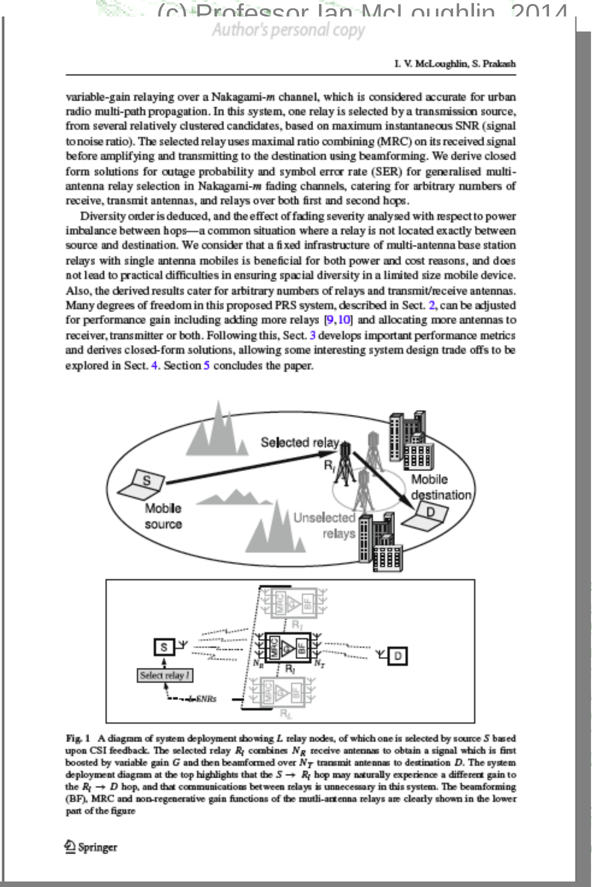
1 Introduction

put) cooperative relays, prompted by stan-
PP LTE Advanced systems, demonstrate
ciency [4,6,11,12]. Partial relay selection
issues and onerous beaconing requirements
ultiple antenna PRS [2,14,15] is less well
mance in relation to fading severity over
the analysis to multi-antenna relays, with

sity of Science and Technology

EcoSpace Bellandur Village,

Springer



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I. V. McLoughlin, S. Prakash

variable-gain relaying over a Nakagami-*m* channel, which is considered accurate for urban radio multi-path propagation. In this system, one relay is selected by a transmission source, from several relatively clustered candidates, based on maximum instantaneous SNR (signal to noise ratio). The selected relay uses maximal ratio combining (MRC) on its received signal before amplifying and transmitting to the destination using beamforming. We derive closed form solutions for outage probability and symbol error rate (SER) for generalised multi-antenna relay selection in Nakagami-*m* fading channels, catering for arbitrary numbers of receive, transmit antennas, and relays over both first and second hops.

Diversity order is deduced, and the effect of fading severity analysed with respect to power imbalance between hops—a common situation where a relay is not located exactly between source and destination. We consider that a fixed infrastructure of multi-antenna base station relays with single antenna mobiles is beneficial for both power and cost reasons, and does not lead to practical difficulties in ensuring spacial diversity in a limited size mobile device. Also, the derived results cater for arbitrary numbers of relays and transmit/receive antennas. Many degrees of freedom in this proposed PRS system, described in Sect. 2, can be adjusted for performance gain including adding more relays [9,10] and allocating more antennas to receiver, transmitter or both. Following this, Sect. 3 develops important performance metrics and derives closed-form solutions, allowing some interesting system design trade offs to be explored in Sect. 4. Section 5 concludes the paper.

Fig. 1 A diagram of system deployment showing L relay nodes, of which one is selected by source S based upon CSI feedback. The selected relay R_l combines N_R receive antennas to obtain a signal which is first boosted by variable gain G and then beamformed over N_T transmit antennas to destination D. The system deployment diagram at the top highlights that the $S \rightarrow R_l$ hop may naturally experience a different gain to the $R_l \rightarrow D$ hop, and that communications between relays is unnecessary in this system. The beamforming (BF), MRC and non-regenerative gain functions of the mutli-antenna relays are clearly shown in the lower part of the figure

Springer

A Springer journal

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\documentclass
[smallextended]
{svjour3}
```

You can reformat the paper for a different journal in just a few minutes by changing just this line.

WIRELESS COMMUNICATIONS AND MOBILE COMPUTING
Wirel. Commun. Mob. Comput. 2012; 00:1–8
DOI: 10.1002/wcm

RESEARCH ARTICLE

Cooperative Multi-Antenna Relay Selection over Dual-Hop Nakagami-*m* Channels

Shiva Prakash and Ian Vince McLoughlin*

Broadcom Corp., India and Nanyang Technological University, Singapore

ABSTRACT

This paper presents a scheme for dual-hop amplify-and-forward multi-antenna, multi-relay selection over Nakagami-*m* channels. A source-selected best relay performs maximal ratio combining on received data, applies variable gain, and then uses beamforming to transmit to a destination device. Such a configuration is beneficial for end-to-end communication using single antenna mobile terminals and multi-antenna relay infrastructure. Closed form expressions for performance metrics are derived that cater for arbitrary number of relays, arbitrary number of receive and transmit antennas and different fading parameters. Results are verified through simulation. Furthermore, the influence of multiple antennas in such system is explored, as are the effect of fading, power imbalance between hops, and the impact of additional antennas, at different locations. Copyright © 2012 John Wiley & Sons, Ltd.

KEYWORDS

Relay selection; Multi-antenna; Wireless relays

*Correspondence

School of Computer Engineering, Nanyang Technological University, Block N4, Nanyang Avenue, Singapore 639798

1. INTRODUCTION

Recent studies on MIMO cooperative relays, prompted by standardization discussions for IEEE802.16j and 3GPP LTE Advanced systems, demonstrate improvements in link reliability and spectral efficiency [1, 2, 3, 4]. Partial relay selection (PRS) [5, 6] overcomes synchronisation, latency issues and onerous beaconing requirements in many alternative schemes [7, 8, 9]. However multiple antenna PRS [10] is yet to be fully explored in the literature, particularly its performance in relation to fading severity over both hops: this paper explores this, and extends the analysis to multi-antenna relays, with variable-gain relaying. In addition, we adopt a Nakagami-*m* fading model, which is considered accurate for urban radio multi-path propagation. In this system, one relay is selected by a transmission source, from several relatively clustered candidates, based on maximum instantaneous SNR (signal to noise ratio). The selected relay uses maximal ratio combining (MRC) on its received signal before amplifying and transmitting to the destination using beamforming. We derive closed form solutions for outage probability and symbol error rate (SER) for generalised multi-antenna relay selection in Nakagami-*m* fading channels, catering for arbitrary numbers of receive, transmit antennas, and relays over both first and second hops. Diversity order is deduced, and the effect of fading severity analysed with respect to power imbalance between hops – a common urban scenario, which we will see can describe scenarios such as long distance communications into an urban area using relay transmission for last-mile linking. We also cater for arbitrary numbers of relays and antennas (both transmit and receive). Many degrees of freedom in this proposed PRS system, described in Section 2, can be

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Cooperative Multi-Antenna Relay Selection over Dual-Hop Nakagami-*m* Channels S. Prakash and I. V. McLoughlin

adjusted for performance gain over such schemes as [5, 6], which report performance saturation with increasing number of relays. Once Section 3 has developed important performance metrics, such trade offs will be explored in Section 4. Section 5 will conclude the paper.

2. SYSTEM MODEL AND ASSUMPTIONS

Consider a relay network in a flat fading Nakagami-*m* channel, comprising single antenna source S, destination D, and L intermediate relay nodes $R_1, R_2, \ldots, R_L$ each equipped with N_R receive and N_T transmit antennas. This arrangement is shown in Fig. 1. The channel matrix $\mathbf{H} = [\mathbf{h}_{i,j}]_{N_R \times L}$, assumed correctly estimated at the relays, contains the gains of individual channel entries characterised by a Nakagami-m fading distribution $\mathcal{M}(m_1, \Omega)$. Shape and spread parameters are m_1 and $\Omega = \mathbf{E}[|h_{ij}|^2] = 1$, where $\mathbf{E}[\cdot]$ denotes expectation.

Based on SNR feedback information from the relays, S selects best relay R_l, l: $1 \leq l \leq L$, which forwards amplified, but not regenerated, messages to D. Half-duplex transmission occurs in two phases as $S \rightarrow R_l \rightarrow D$ over orthogonal channels, with no direct link between S and D. In this system, there is also no need to synchronise or communicate between relays. The first transmission hop from S to the selected relay is denoted as $S \rightarrow R_l$. This is represented by channel vector; $[\mathbf{h}_{SR_l}]_{N_R \times 1}$. Let $\mathcal{E}_1$ and $\mathcal{E}_2$ be the power of the transmitted signal at S and R_l and N_0 the power of the additive white Gaussian noise at R_l and D. The selected relay performs signal combining using the optimal MRC vector

$$[\mathbf{w}_{SR_l}]_{1 \times N_R} = \frac{\mathbf{h}^H_{SR_l}}{\sqrt{\mathbf{h}^H_{SR_l}\mathbf{h}_{SR_l}}} \qquad (1)$$

Before transmitting the received signal to D, it is amplified by variable gain;

$$G = \sqrt{\frac{\mathcal{E}_2}{N_0 + \mathcal{E}_1 \mathbf{h}^H_{SR_l}\mathbf{h}_{SR_l}}} \qquad (2)$$

chosen so as to invert the fading effect of the first hop while limiting the output power [11]. R_l obtains the $R_l \rightarrow D$ channel vector $[\mathbf{h}_{R_lD}]_{N_T \times 1}$ through monitoring transmissions or beacons from D. The entries of this vector are distributed as $\mathcal{M}(m_2, 1)$. To perform transmit diversity beamforming over the second hop, R_l computes an optimal beamforming vector;

$$[\mathbf{w}_{R_lD}]_{N_{rd} \times 1} = \frac{\mathbf{h}^H_{R_lD}}{\sqrt{\mathbf{h}^H_{R_lD}\mathbf{h}_{R_lD}}} \qquad (3)$$

after which data is transmitted to D. With s as the transmitted symbol from S, the received signal at D is then

$$y_{SD} = G\mathbf{w}_{R_lD}\mathbf{h}_{R_lD}(\mathbf{w}_{SR_l}(\mathbf{h}_{SR_l}s + \mathbf{n}_{R_l})) + n_D \qquad (4)$$

where n_D is the noise sample at D, characterised as $\mathcal{CN}(0, N_0)$ and $\mathbf{n}_{R_l}$ is the noise vector at the selected relay modelled as $\mathcal{CN}(0, N_0\mathbf{I}_{N_R})$. The equivalent SNR at the destination can be derived as $\gamma_{eq} = \frac{\gamma_1\gamma_2}{\gamma_1+\gamma_2+1}$ [11], where

$$\gamma_1 = \frac{\mathcal{E}_1\mathbf{h}^H_{SR_l}\mathbf{h}_{SR_l}}{N_0} \qquad (5)$$

and

$$\gamma_2 = \frac{\mathcal{E}_2\mathbf{h}^H_{R_lD}\mathbf{h}_{R_lD}}{N_0} \qquad (6)$$

are the instantaneous SNRs of the first and second hops respectively.

3. PERFORMANCE METRICS

3.1. Outage Probability

An important quality of service measure in such systems is outage probability P_{out}: the probability that the instantaneous output SNR drops below a threshold γ_T, i.e, $P_{out}(\gamma_T) = P_{out}(\gamma_{eq} < \gamma_T)$. From [11] we have:

$$P_{out}(\gamma_T) = \int_0^\infty Pr\left[\frac{\gamma_1\gamma_2}{\gamma_1+\gamma_2+1} < \gamma_T|\gamma_2\right] f_{\gamma_2}(\gamma_2)\, d\gamma_2$$

With some rearrangement, the above integral can be expressed more conveniently in complementary form as:

$$1 - \int_{\gamma_T}^\infty \left\{1 - F_{\gamma_1}\left[\frac{\gamma_T(\gamma_2+1)}{\gamma_2-\gamma_T}\right]\right\} f_{\gamma_2}(\gamma_2) d\gamma_2 \qquad (7)$$

where $F_{\gamma_1}(.)$ is the CDF (cumulative distribution function) of the random variable γ_1, namely the instantaneous SNR at the best relay. To first calculate $F_{\gamma_1}(.)$, let ζ_l be the

2 *Wirel. Commun. Mob. Comput.* 2012; 00:1–8 © 2012 John Wiley & Sons, Ltd.
DOI: 10.1002/wcm
Prepared using wcmauth.cls

A Wiley journal

```
\documentclass[times, doublespace]{wcmauth}
```

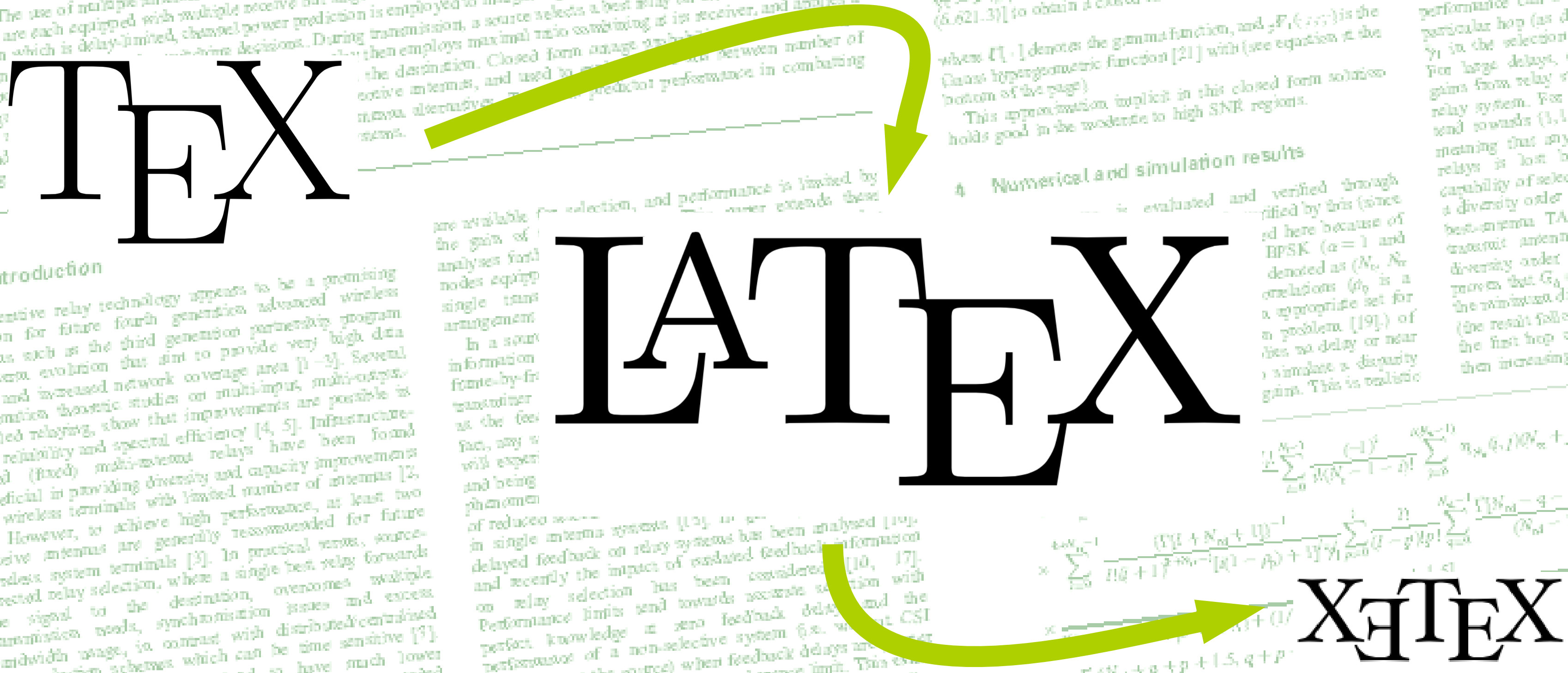
Getting started – what you need

There are many ways to get hold of LaTeX. Since it's Open Source, you can download it for free.

But normally we choose a LaTeX distribution. When we download and install this it will give us all the files and tools we need.

LaTeX

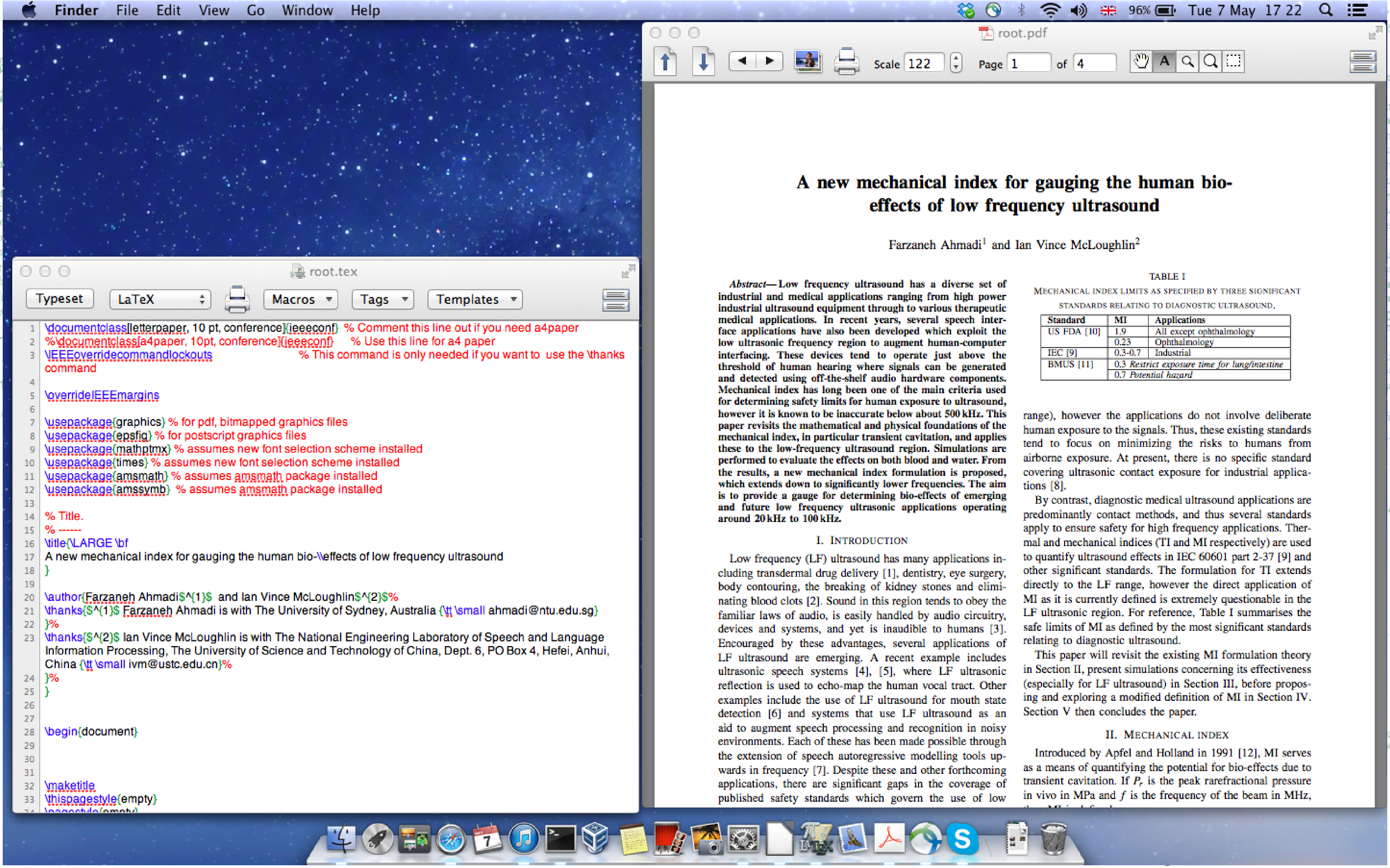
Note:
It all started in 1978 with TeX, then LaTeX in the 1980s, then TeTex to 2006, XeTeX, etc... now there are many variants...



*We refer to them all as **LaTeX**. This is the “engine” that does the typesetting. Normally you would also use a front-end to control the engine, and various additional packages.*

LaTeX on Mac OS-X

Personally, I use TeXShop as a front-end on the Mac:



```
\documentclass[letterpaper, 10 pt, conference]{ieeeconf}  % Comment this line out if you need a4paper
%\documentclass[a4paper, 10pt, conference]{ieeeconf}      % Use this line for a4 paper
\IEEEoverridecommandlockouts                              % This command is only needed if you want to  use the \thanks command

\overrideIEEEmargins

\usepackage{graphics} % for pdf, bitmapped graphics files
\usepackage{epsfig} % for postscript graphics files
\usepackage{mathptmx} % assumes new font selection scheme installed
\usepackage{times} % assumes new font selection scheme installed
\usepackage{amsmath} % assumes amsmath package installed
\usepackage{amssymb}  % assumes amsmath package installed

% Title.
% ------
\title{\LARGE \bf
A new mechanical index for gauging the human bio-\\effects of low frequency ultrasound
}

\author{Farzaneh Ahmadi$^{1}$  and Ian Vince McLoughlin$^{2}$%
\thanks{$^{1}$ Farzaneh Ahmadi is with The University of Sydney, Australia {\tt \small ahmadi@ntu.edu.sg}
}%
\thanks{$^{2}$ Ian Vince McLoughlin is with The National Engineering Laboratory of Speech and Language Information Processing, The University of Science and Technology of China, Dept. 6, PO Box 4, Hefei, Anhui, China {\tt \small ivm@ustc.edu.cn}%
}%
}



\begin{document}



\maketitle
\thispagestyle{empty}
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A new mechanical index for gauging the human bio-effects of low frequency ultrasound

Farzaneh Ahmadi[1] and Ian Vince McLoughlin[2]

***Abstract*— Low frequency ultrasound has a diverse set of industrial and medical applications ranging from high power industrial ultrasound equipment through to various therapeutic medical applications. In recent years, several speech interface applications have also been developed which exploit the low ultrasonic frequency region to augment human-computer interfacing. These devices tend to operate just above the threshold of human hearing where signals can be generated and detected using off-the-shelf audio hardware components. Mechanical index has long been one of the main criteria used for determining safety limits for human exposure to ultrasound, however it is known to be inaccurate below about 500 kHz. This paper revisits the mathematical and physical foundations of the mechanical index, in particular transient cavitation, and applies these to the low-frequency ultrasound region. Simulations are performed to evaluate the effects on both blood and water. From the results, a new mechanical index formulation is proposed, which extends down to significantly lower frequencies. The aim is to provide a gauge for determining bio-effects of emerging and future low frequency ultrasonic applications operating around 20 kHz to 100 kHz.**

I. INTRODUCTION

Low frequency (LF) ultrasound has many applications including transdermal drug delivery [1], dentistry, eye surgery, body contouring, the breaking of kidney stones and eliminating blood clots [2]. Sound in this region tends to obey the familiar laws of audio, is easily handled by audio circuitry, devices and systems, and yet is inaudible to humans [3]. Encouraged by these advantages, several applications of LF ultrasound are emerging. A recent example includes ultrasonic speech systems [4], [5], where LF ultrasonic reflection is used to echo-map the human vocal tract. Other examples include the use of LF ultrasound for mouth state detection [6] and systems that use LF ultrasound as an aid to augment speech processing and recognition in noisy environments. Each of these has been made possible through the extension of speech autoregressive modelling tools upwards in frequency [7]. Despite these and other forthcoming applications, there are significant gaps in the coverage of published safety standards which govern the use of low

TABLE I
MECHANICAL INDEX LIMITS AS SPECIFIED BY THREE SIGNIFICANT STANDARDS RELATING TO DIAGNOSTIC ULTRASOUND.

Standard	MI	Applications
US FDA [10]	1.9	All except ophthalmology
	0.23	Ophthalmology
IEC [9]	0.3-0.7	Industrial
BMUS [11]	0.3	*Restrict exposure time for lung/intestine*
	0.7	*Potential hazard*

range), however the applications do not involve deliberate human exposure to the signals. Thus, these existing standards tend to focus on minimizing the risks to humans from airborne exposure. At present, there is no specific standard covering ultrasonic contact exposure for industrial applications [8].

By contrast, diagnostic medical ultrasound applications are predominantly contact methods, and thus several standards apply to ensure safety for high frequency applications. Thermal and mechanical indices (TI and MI respectively) are used to quantify ultrasound effects in IEC 60601 part 2-37 [9] and other significant standards. The formulation for TI extends directly to the LF range, however the direct application of MI as it is currently defined is extremely questionable in the LF ultrasonic region. For reference, Table I summarises the safe limits of MI as defined by the most significant standards relating to diagnostic ultrasound.

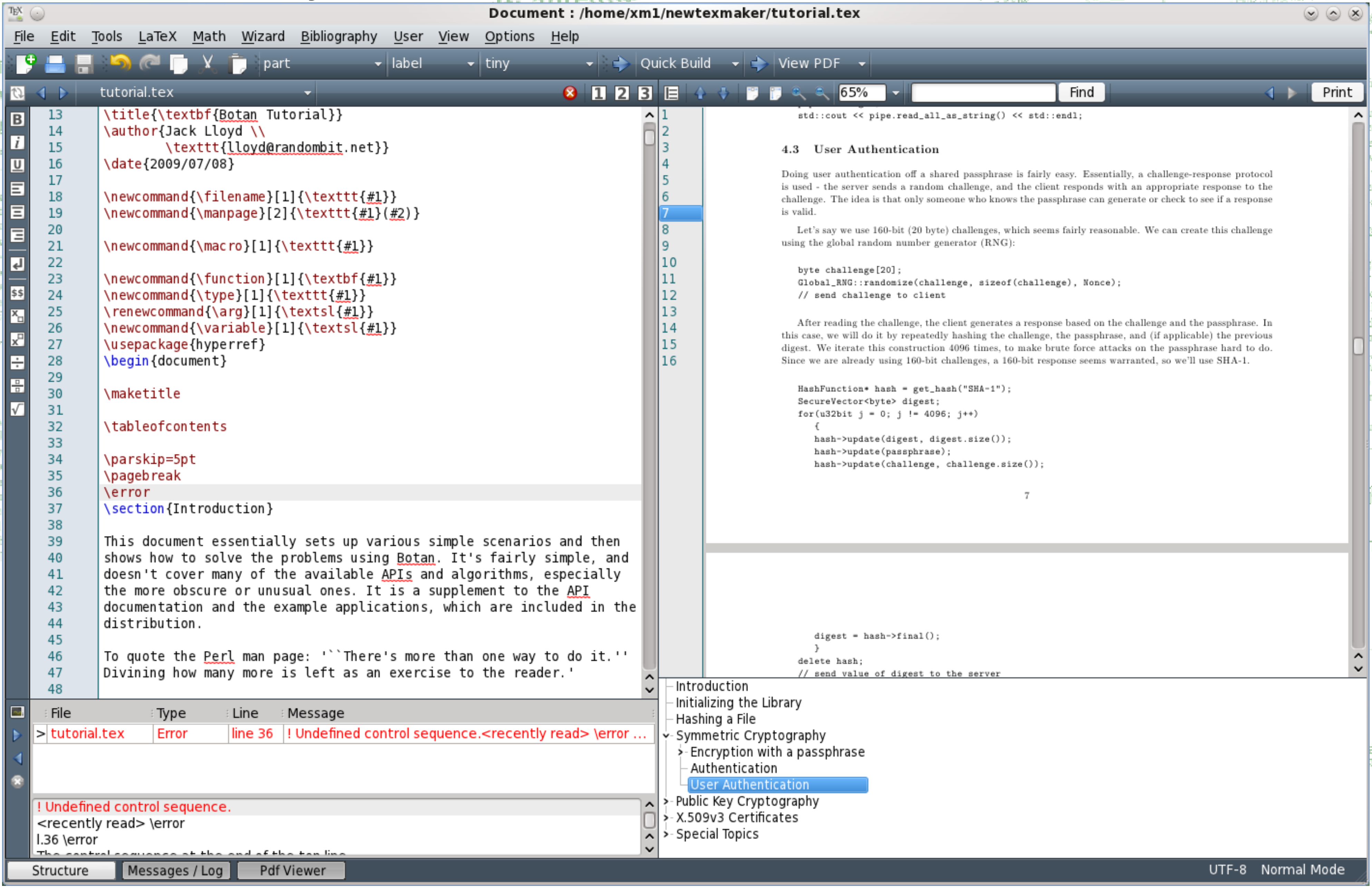
This paper will revisit the existing MI formulation theory in Section II, present simulations concerning its effectiveness (especially for LF ultrasound) in Section III, before proposing and exploring a modified definition of MI in Section IV. Section V then concludes the paper.

II. MECHANICAL INDEX

Introduced by Apfel and Holland in 1991 [12], MI serves as a means of quantifying the potential for bio-effects due to transient cavitation. If P_r is the peak rarefractional pressure in vivo in MPa and f is the frequency of the beam in MHz,

LaTeX on Linux

Previously I used TeXMaker on Ubuntu:



```
13  \title{\textbf{Botan Tutorial}}
14  \author{Jack Lloyd \\
15          \texttt{lloyd@randombit.net}}
16  \date{2009/07/08}
17
18  \newcommand{\filename}[1]{\texttt{#1}}
19  \newcommand{\manpage}[2]{\texttt{#1}(#2)}
20
21  \newcommand{\macro}[1]{\texttt{#1}}
22
23  \newcommand{\function}[1]{\textbf{#1}}
24  \newcommand{\type}[1]{\texttt{#1}}
25  \renewcommand{\arg}[1]{\textsl{#1}}
26  \newcommand{\variable}[1]{\textsl{#1}}
27  \usepackage{hyperref}
28  \begin{document}
29
30  \maketitle
31
32  \tableofcontents
33
34  \parskip=5pt
35  \pagebreak
36  \error
37  \section{Introduction}
38
39  This document essentially sets up various simple scenarios and then
40  shows how to solve the problems using Botan. It's fairly simple, and
41  doesn't cover many of the available APIs and algorithms, especially
42  the more obscure or unusual ones. It is a supplement to the API
43  documentation and the example applications, which are included in the
44  distribution.
45
46  To quote the Perl man page: '``There's more than one way to do it.''
47  Divining how many more is left as an exercise to the reader.'
48
```

File	Type	Line	Message
> tutorial.tex	Error	line 36	! Undefined control sequence.<recently read> \error ...

```
! Undefined control sequence.
<recently read> \error
l.36 \error
```

```
    std::cout << pipe.read_all_as_string() << std::endl;
```

4.3 User Authentication

Doing user authentication off a shared passphrase is fairly easy. Essentially, a challenge-response protocol is used - the server sends a random challenge, and the client responds with an appropriate response to the challenge. The idea is that only someone who knows the passphrase can generate or check to see if a response is valid.

Let's say we use 160-bit (20 byte) challenges, which seems fairly reasonable. We can create this challenge using the global random number generator (RNG):

```
byte challenge[20];
Global_RNG::randomize(challenge, sizeof(challenge), Nonce);
// send challenge to client
```

After reading the challenge, the client generates a response based on the challenge and the passphrase. In this case, we will do it by repeatedly hashing the challenge, the passphrase, and (if applicable) the previous digest. We iterate this construction 4096 times, to make brute force attacks on the passphrase hard to do. Since we are already using 160-bit challenges, a 160-bit response seems warranted, so we'll use SHA-1.

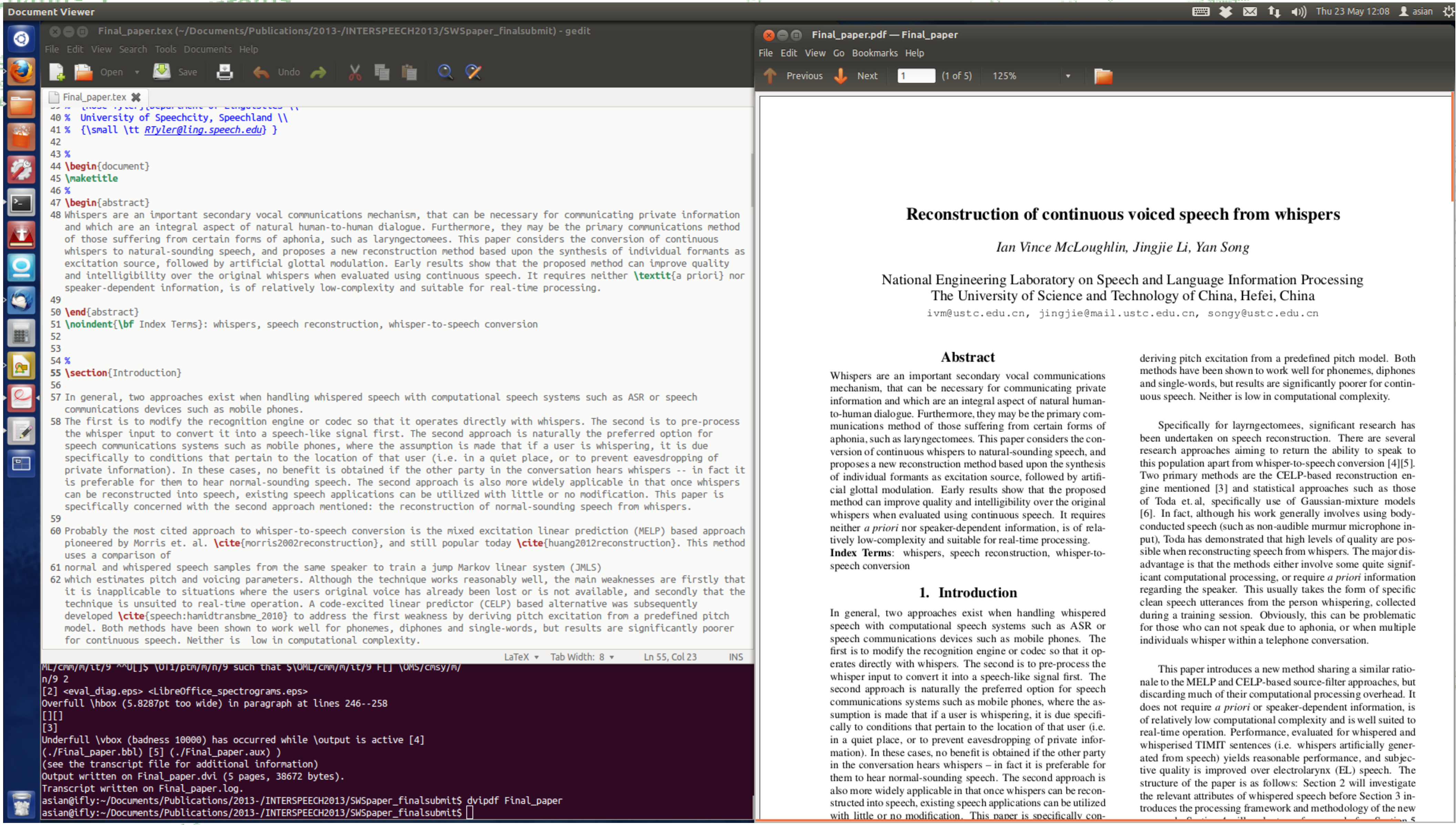
```
HashFunction* hash = get_hash("SHA-1");
SecureVector<byte> digest;
for(u32bit j = 0; j != 4096; j++)
   {
   hash->update(digest, digest.size());
   hash->update(passphrase);
   hash->update(challenge, challenge.size());
```

7

```
   digest = hash->final();
   }
delete hash;
// send value of digest to the server
```

LaTeX on Linux

Now I often just run LaTeX on the command line....



```
%  University of Speechcity, Speechland \\
%  {\small \tt RTyler@ling.speech.edu} }

%
\begin{document}
\maketitle
%
\begin{abstract}
Whispers are an important secondary vocal communications mechanism, that can be necessary for communicating private information and which are an integral aspect of natural human-to-human dialogue. Furthermore, they may be the primary communications method of those suffering from certain forms of aphonia, such as laryngectomees. This paper considers the conversion of continuous whispers to natural-sounding speech, and proposes a new reconstruction method based upon the synthesis of individual formants as excitation source, followed by artificial glottal modulation. Early results show that the proposed method can improve quality and intelligibility over the original whispers when evaluated using continuous speech. It requires neither \textit{a priori} nor speaker-dependent information, is of relatively low-complexity and suitable for real-time processing.

\end{abstract}
\noindent{\bf Index Terms}: whispers, speech reconstruction, whisper-to-speech conversion


%
\section{Introduction}

In general, two approaches exist when handling whispered speech with computational speech systems such as ASR or speech communications devices such as mobile phones.
The first is to modify the recognition engine or codec so that it operates directly with whispers. The second is to pre-process the whisper input to convert it into a speech-like signal first. The second approach is naturally the preferred option for speech communications systems such as mobile phones, where the assumption is made that if a user is whispering, it is due specifically to conditions that pertain to the location of that user (i.e. in a quiet place, or to prevent eavesdropping of private information). In these cases, no benefit is obtained if the other party in the conversation hears whispers -- in fact it is preferable for them to hear normal-sounding speech. The second approach is also more widely applicable in that once whispers can be reconstructed into speech, existing speech applications can be utilized with little or no modification. This paper is specifically concerned with the second approach mentioned: the reconstruction of normal-sounding speech from whispers.

Probably the most cited approach to whisper-to-speech conversion is the mixed excitation linear prediction (MELP) based approach pioneered by Morris et. al. \cite{morris2002reconstruction}, and still popular today \cite{huang2012reconstruction}. This method uses a comparison of
normal and whispered speech samples from the same speaker to train a jump Markov linear system (JMLS)
which estimates pitch and voicing parameters. Although the technique works reasonably well, the main weaknesses are firstly that it is inapplicable to situations where the users original voice has already been lost or is not available, and secondly that the technique is unsuited to real-time operation. A code-excited linear predictor (CELP) based alternative was subsequently developed \cite{speech:hamidtransbme_2010} to address the first weakness by deriving pitch excitation from a predefined pitch model. Both methods have been shown to work well for phonemes, diphones and single-words, but results are significantly poorer for continuous speech. Neither is  low in computational complexity.
```

```
ML/cmm/m/it/9 ^^U[]$ \OT1/ptm/m/n/9 such that $\OML/cmm/m/it/9 F[] \OMS/cmsy/m/
n/9 2
[2] <eval_diag.eps> <LibreOffice_spectrograms.eps>
Overfull \hbox (5.8287pt too wide) in paragraph at lines 246--258
[][]
[3]
Underfull \vbox (badness 10000) has occurred while \output is active [4]
(./Final_paper.bbl) [5] (./Final_paper.aux) )
(see the transcript file for additional information)
Output written on Final_paper.dvi (5 pages, 38672 bytes).
Transcript written on Final_paper.log.
asian@ifly:~/Documents/Publications/2013-/INTERSPEECH2013/SWSpaper_finalsubmit$ dvipdf Final_paper
asian@ifly:~/Documents/Publications/2013-/INTERSPEECH2013/SWSpaper_finalsubmit$ 
```

Reconstruction of continuous voiced speech from whispers

Ian Vince McLoughlin, Jingjie Li, Yan Song

National Engineering Laboratory on Speech and Language Information Processing
The University of Science and Technology of China, Hefei, China
ivm@ustc.edu.cn, jingjie@mail.ustc.edu.cn, songy@ustc.edu.cn

Abstract

Whispers are an important secondary vocal communications mechanism, that can be necessary for communicating private information and which are an integral aspect of natural human-to-human dialogue. Furthermore, they may be the primary communications method of those suffering from certain forms of aphonia, such as laryngectomees. This paper considers the conversion of continuous whispers to natural-sounding speech, and proposes a new reconstruction method based upon the synthesis of individual formants as excitation source, followed by artificial glottal modulation. Early results show that the proposed method can improve quality and intelligibility over the original whispers when evaluated using continuous speech. It requires neither *a priori* nor speaker-dependent information, is of relatively low-complexity and suitable for real-time processing.

Index Terms: whispers, speech reconstruction, whisper-to-speech conversion

1. Introduction

In general, two approaches exist when handling whispered speech with computational speech systems such as ASR or speech communications devices such as mobile phones. The first is to modify the recognition engine or codec so that it operates directly with whispers. The second is to pre-process the whisper input to convert it into a speech-like signal first. The second approach is naturally the preferred option for speech communications systems such as mobile phones, where the assumption is made that if a user is whispering, it is due specifically to conditions that pertain to the location of that user (i.e. in a quiet place, or to prevent eavesdropping of private information). In these cases, no benefit is obtained if the other party in the conversation hears whispers – in fact it is preferable for them to hear normal-sounding speech. The second approach is also more widely applicable in that once whispers can be reconstructed into speech, existing speech applications can be utilized with little or no modification. This paper is specifically con-

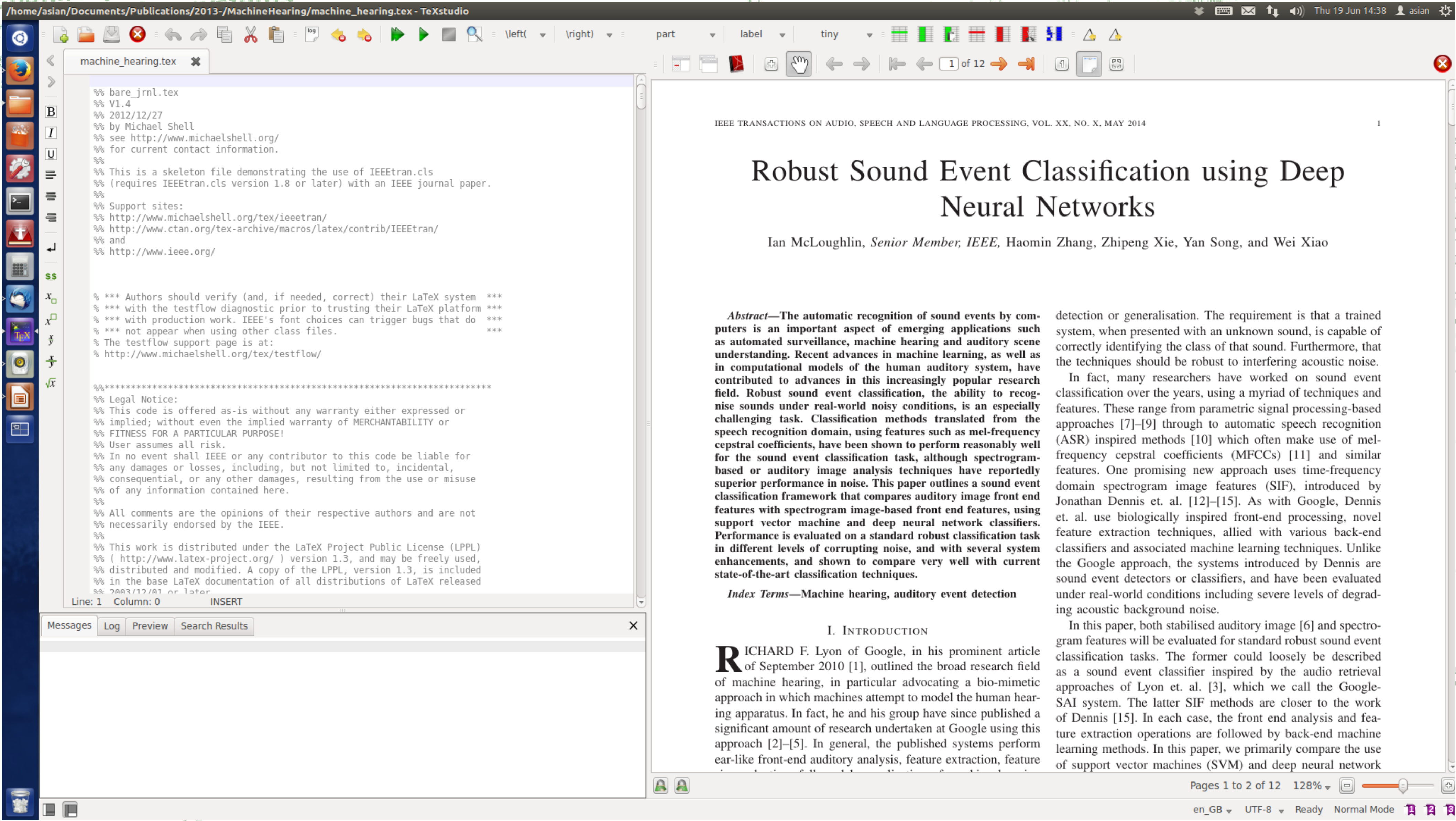
deriving pitch excitation from a predefined pitch model. Both methods have been shown to work well for phonemes, diphones and single-words, but results are significantly poorer for continuous speech. Neither is low in computational complexity.

Specifically for layrngectomees, significant research has been undertaken on speech reconstruction. There are several research approaches aiming to return the ability to speak to this population apart from whisper-to-speech conversion [4][5]. Two primary methods are the CELP-based reconstruction engine mentioned [3] and statistical approaches such as those of Toda et. al, specifically use of Gaussian-mixture models [6]. In fact, although his work generally involves using body-conducted speech (such as non-audible murmur microphone input), Toda has demonstrated that high levels of quality are possible when reconstructing speech from whispers. The major disadvantage is that the methods either involve some quite significant computational processing, or require *a priori* information regarding the speaker. This usually takes the form of specific clean speech utterances from the person whispering, collected during a training session. Obviously, this can be problematic for those who can not speak due to aphonia, or when multiple individuals whisper within a telephone conversation.

This paper introduces a new method sharing a similar rationale to the MELP and CELP-based source-filter approaches, but discarding much of their computational processing overhead. It does not require *a priori* or speaker-dependent information, is of relatively low computational complexity and is well suited to real-time operation. Performance, evaluated for whispered and whisperised TIMIT sentences (i.e. whispers artificially generated from speech) yields reasonable performance, and subjective quality is improved over electrolarynx (EL) speech. The structure of the paper is as follows: Section 2 will investigate the relevant attributes of whispered speech before Section 3 introduces the processing framework and methodology of the new

LaTeX on Linux

Or I use the TeXstudio package...



```
%% bare_jrnl.tex
%% V1.4
%% 2012/12/27
%% by Michael Shell
%% see http://www.michaelshell.org/
%% for current contact information.
%%
%% This is a skeleton file demonstrating the use of IEEEtran.cls
%% (requires IEEEtran.cls version 1.8 or later) with an IEEE journal paper.
%%
%% Support sites:
%% http://www.michaelshell.org/tex/ieeetran/
%% http://www.ctan.org/tex-archive/macros/latex/contrib/IEEEtran/
%% and
%% http://www.ieee.org/



% *** Authors should verify (and, if needed, correct) their LaTeX system  ***
% *** with the testflow diagnostic prior to trusting their LaTeX platform ***
% *** with production work. IEEE's font choices can trigger bugs that do  ***
% *** not appear when using other class files.                            ***
% The testflow support page is at:
% http://www.michaelshell.org/tex/testflow/


%%*************************************************************************
%% Legal Notice:
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%%
%% All comments are the opinions of their respective authors and are not
%% necessarily endorsed by the IEEE.
%%
%% This work is distributed under the LaTeX Project Public License (LPPL)
%% ( http://www.latex-project.org/ ) version 1.3, and may be freely used,
%% distributed and modified. A copy of the LPPL, version 1.3, is included
%% in the base LaTeX documentation of all distributions of LaTeX released
%% 2003/12/01 or later
```

IEEE TRANSACTIONS ON AUDIO, SPEECH AND LANGUAGE PROCESSING, VOL. XX, NO. X, MAY 2014 1

Robust Sound Event Classification using Deep Neural Networks

Ian McLoughlin, *Senior Member, IEEE,* Haomin Zhang, Zhipeng Xie, Yan Song, and Wei Xiao

***Abstract*—The automatic recognition of sound events by computers is an important aspect of emerging applications such as automated surveillance, machine hearing and auditory scene understanding. Recent advances in machine learning, as well as in computational models of the human auditory system, have contributed to advances in this increasingly popular research field. Robust sound event classification, the ability to recognise sounds under real-world noisy conditions, is an especially challenging task. Classification methods translated from the speech recognition domain, using features such as mel-frequency cepstral coefficients, have been shown to perform reasonably well for the sound event classification task, although spectrogram-based or auditory image analysis techniques have reportedly superior performance in noise. This paper outlines a sound event classification framework that compares auditory image front end features with spectrogram image-based front end features, using support vector machine and deep neural network classifiers. Performance is evaluated on a standard robust classification task in different levels of corrupting noise, and with several system enhancements, and shown to compare very well with current state-of-the-art classification techniques.**

***Index Terms*—Machine hearing, auditory event detection**

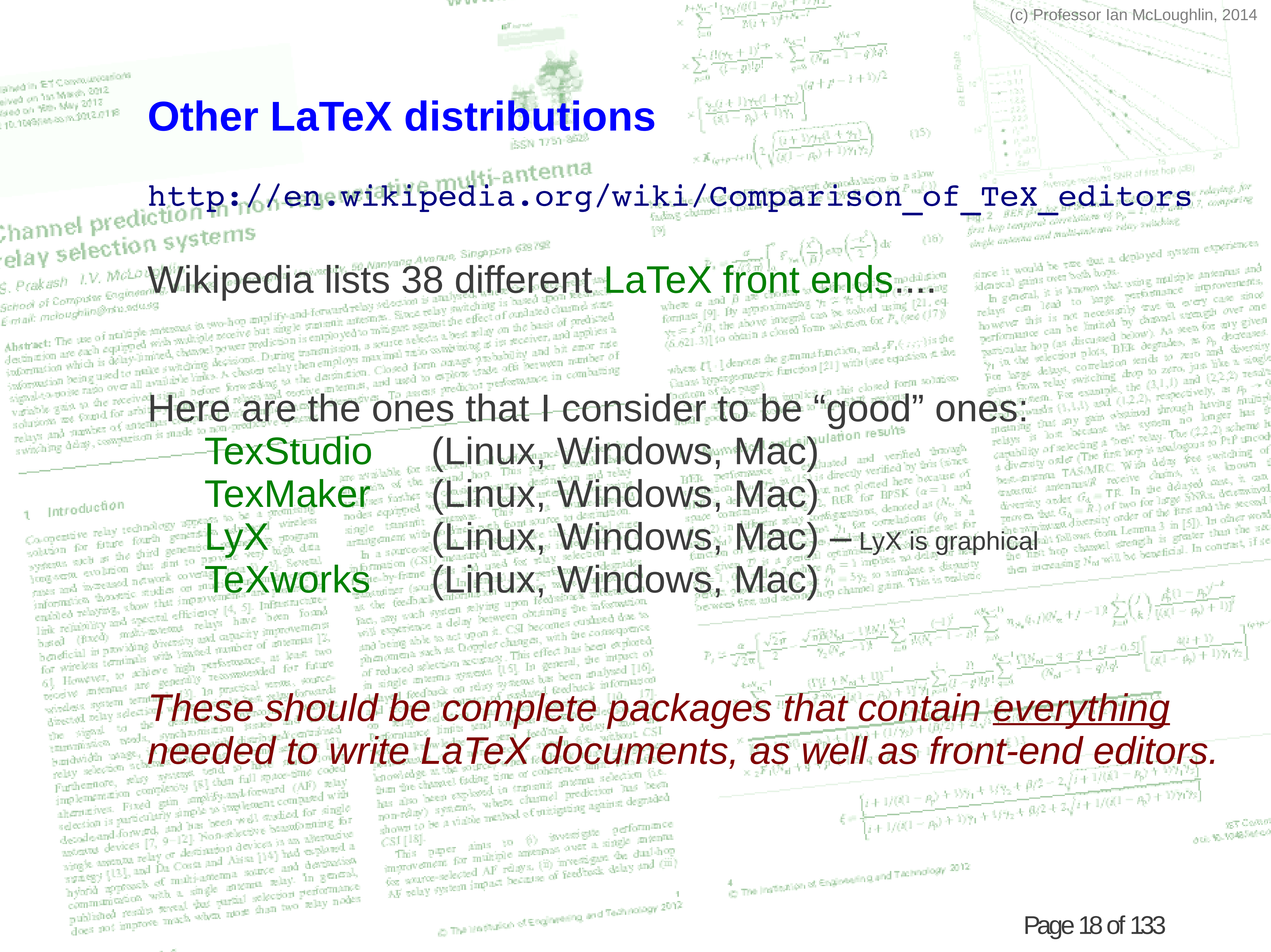
I. INTRODUCTION

RICHARD F. Lyon of Google, in his prominent article of September 2010 [1], outlined the broad research field of machine hearing, in particular advocating a bio-mimetic approach in which machines attempt to model the human hearing apparatus. In fact, he and his group have since published a significant amount of research undertaken at Google using this approach [2]–[5]. In general, the published systems perform ear-like front-end auditory analysis, feature extraction, feature

detection or generalisation. The requirement is that a trained system, when presented with an unknown sound, is capable of correctly identifying the class of that sound. Furthermore, that the techniques should be robust to interfering acoustic noise.

In fact, many researchers have worked on sound event classification over the years, using a myriad of techniques and features. These range from parametric signal processing-based approaches [7]–[9] through to automatic speech recognition (ASR) inspired methods [10] which often make use of mel-frequency cepstral coefficients (MFCCs) [11] and similar features. One promising new approach uses time-frequency domain spectrogram image features (SIF), introduced by Jonathan Dennis et. al. [12]–[15]. As with Google, Dennis et. al. use biologically inspired front-end processing, novel feature extraction techniques, allied with various back-end classifiers and associated machine learning techniques. Unlike the Google approach, the systems introduced by Dennis are sound event detectors or classifiers, and have been evaluated under real-world conditions including severe levels of degrading acoustic background noise.

In this paper, both stabilised auditory image [6] and spectrogram features will be evaluated for standard robust sound event classification tasks. The former could loosely be described as a sound event classifier inspired by the audio retrieval approaches of Lyon et. al. [3], which we call the Google-SAI system. The latter SIF methods are closer to the work of Dennis [15]. In each case, the front end analysis and feature extraction operations are followed by back-end machine learning methods. In this paper, we primarily compare the use of support vector machines (SVM) and deep neural network



Other LaTeX distributions

`http://en.wikipedia.org/wiki/Comparison_of_TeX_editors`

Wikipedia lists 38 different LaTeX front ends....

Here are the ones that I consider to be “good” ones:

TexStudio	(Linux, Windows, Mac)
TexMaker	(Linux, Windows, Mac)
LyX	(Linux, Windows, Mac) – LyX is graphical
TeXworks	(Linux, Windows, Mac)

These should be complete packages that contain everything needed to write LaTeX documents, as well as front-end editors.

Useful programs and files

.tex file	- the “source code” of a LaTeX document
latex	- the program used to “compile” a .tex file to dvi
dvi	- device independent image file (like an object file)
dvips	- creates a PS output from a dvi file
dvipdf	- creates a PDF output from a dvi file
PS	- postscript (laser printer language from Adobe)
PDF	- portable document format (from Adobe)
pdflatex	- produces a PDF output directly from the .tex
pslatex	- produces a PS output directly from the .tex
bibtex	- this file creates a bibliography (see later)

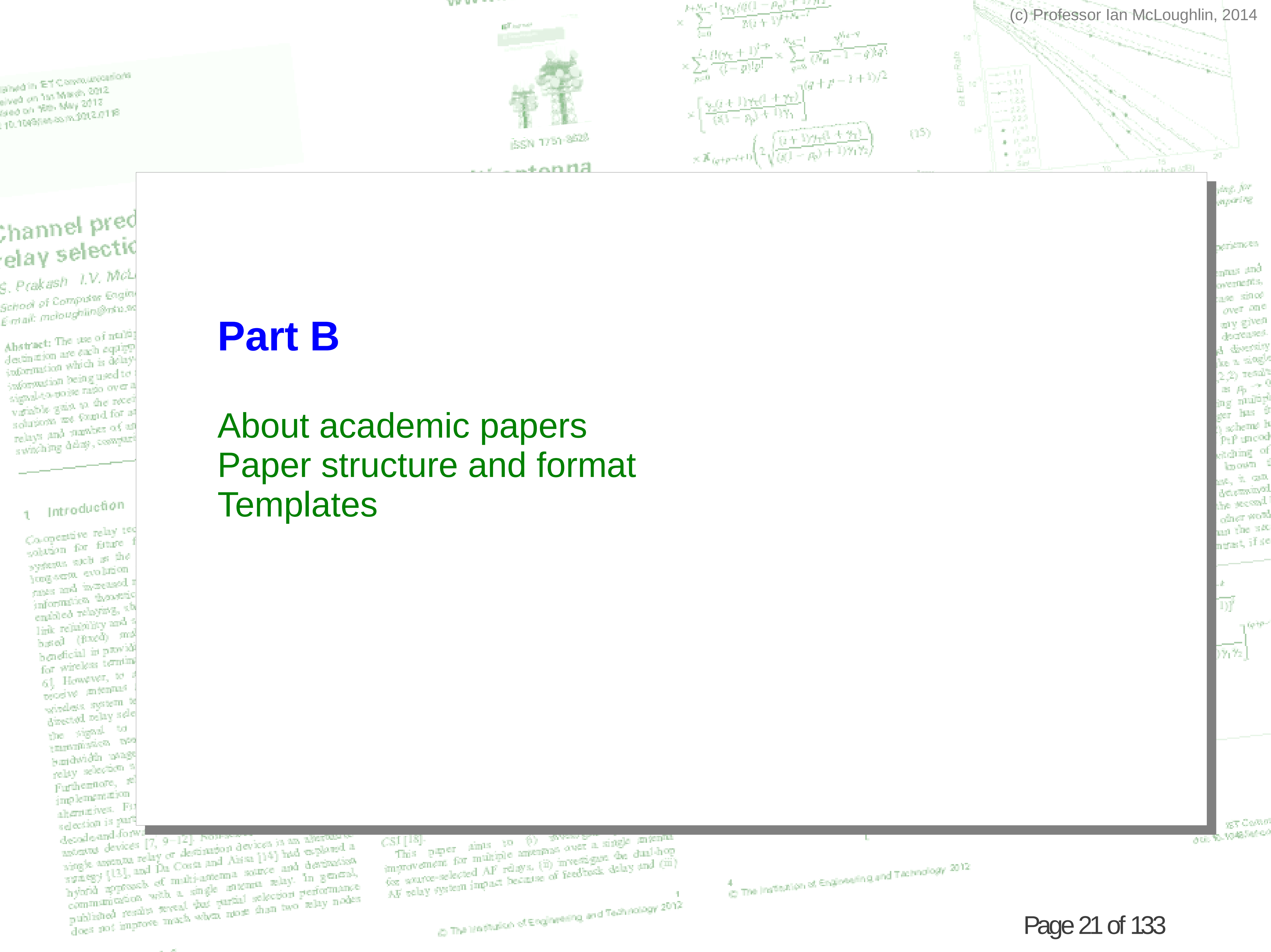
Some other useful programs (Linux)

Conversion programs:

pstopdf & ps2pdf
pdftops & pdf2ps

Note: on Apple OS-X, just click on an EPS file or a PS file and then when it opens in Preview, “save as” a PDF.

“latex” uses EPS graphics files
“pslatex” uses PS graphics files
“pdflatex” uses PDF graphics files
All can use TIFF or JPEG files (but you should NOT use these as we will see later)



Part B

About academic papers
Paper structure and format
Templates

Academic Papers: requirements for the paper

A full journal paper

You have an idea that 'fits' and extends on previous work.
You test the idea.
You present results show that it is good <u>compared</u> to others work.
The idea or results are <u>relevant</u>, <u>useful</u>, & <u>novel.</u>
You are able to explain the idea, the motivation and the results.

A survey paper

An <u>exhaustive</u> and <u>complete</u> explanation of the field from a senior and experienced author.
Usually requires a huge list of references!

Academic Papers: requirements for the paper

A correspondence or letter

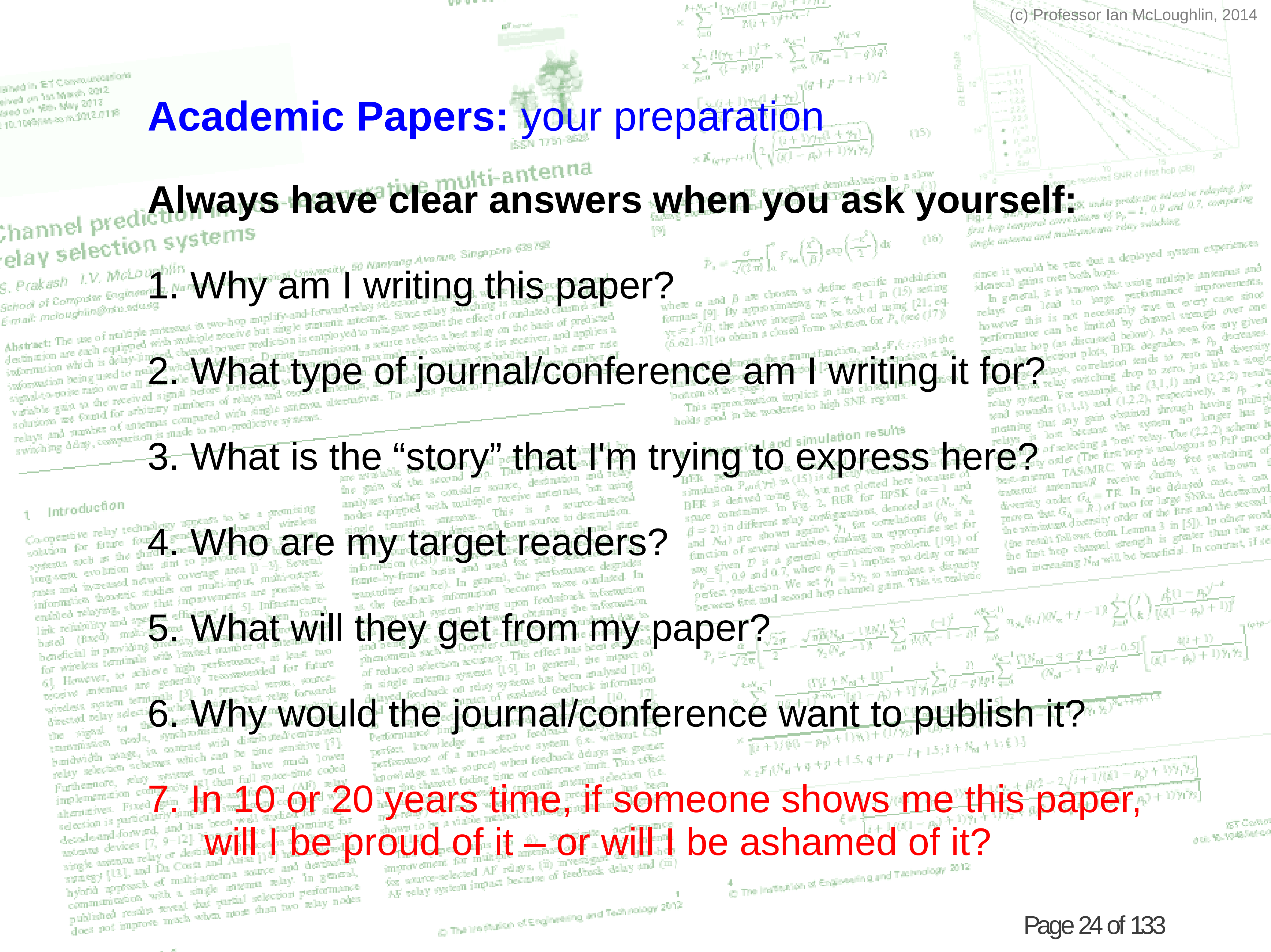
A short paper describing a recent advance.
The degree of novelty is often slightly less than a full paper.
Not much space to explain things, so normally used for incremental improvements.
Usually reviewed and then published quickly.

A top-tier conference paper

A recent advance, or a good idea with interesting results.
The standard of novelty is slightly lower than for a journal paper.

A second-tier conference paper

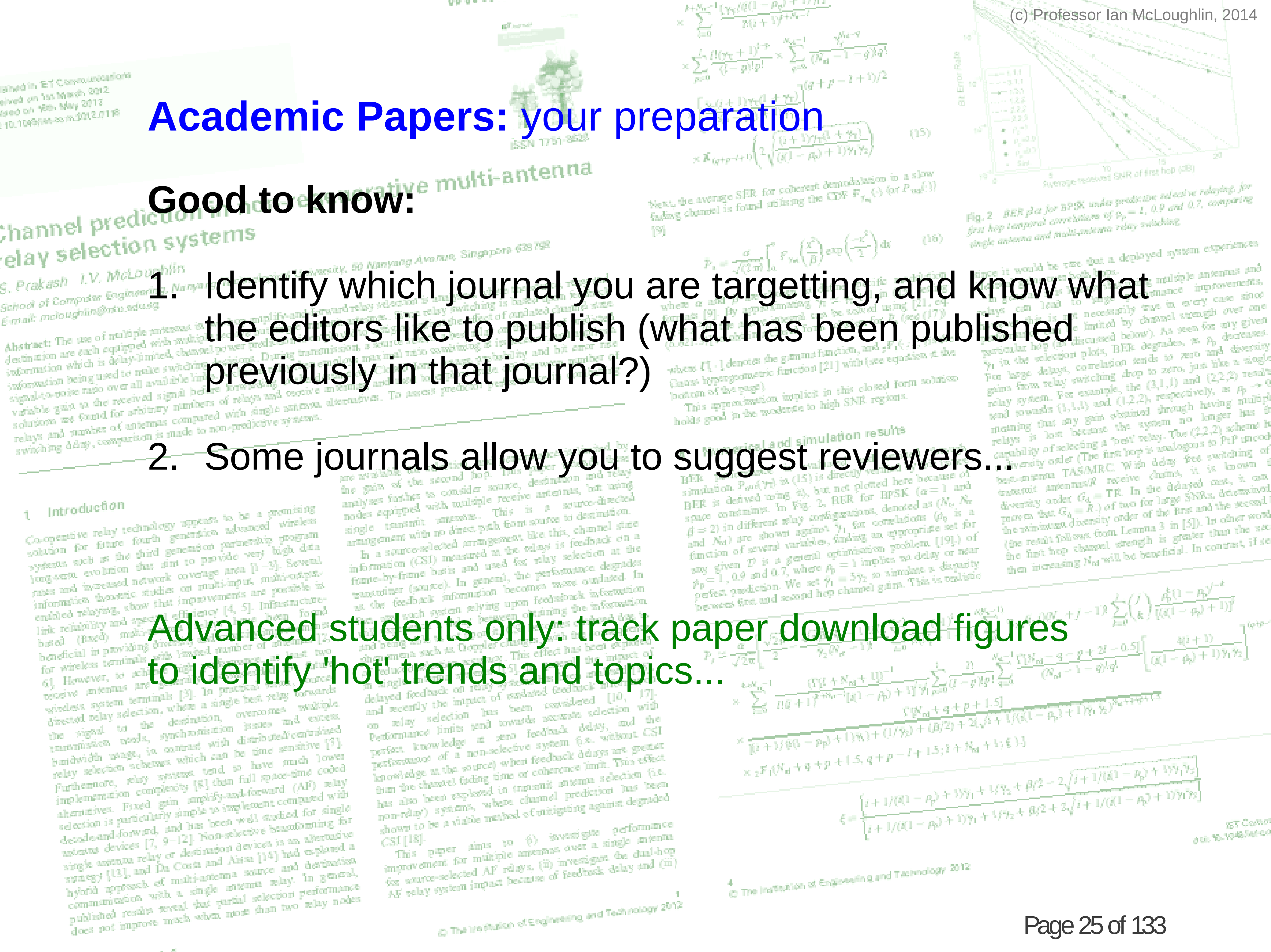
A convincing paper presenting a slightly novel idea, or some test/evaluation results that might be useful to others.



Academic Papers: your preparation

Always have clear answers when you ask yourself:

1. Why am I writing this paper?
2. What type of journal/conference am I writing it for?
3. What is the “story” that I'm trying to express here?
4. Who are my target readers?
5. What will they get from my paper?
6. Why would the journal/conference want to publish it?
7. In 10 or 20 years time, if someone shows me this paper, will I be proud of it – or will I be ashamed of it?



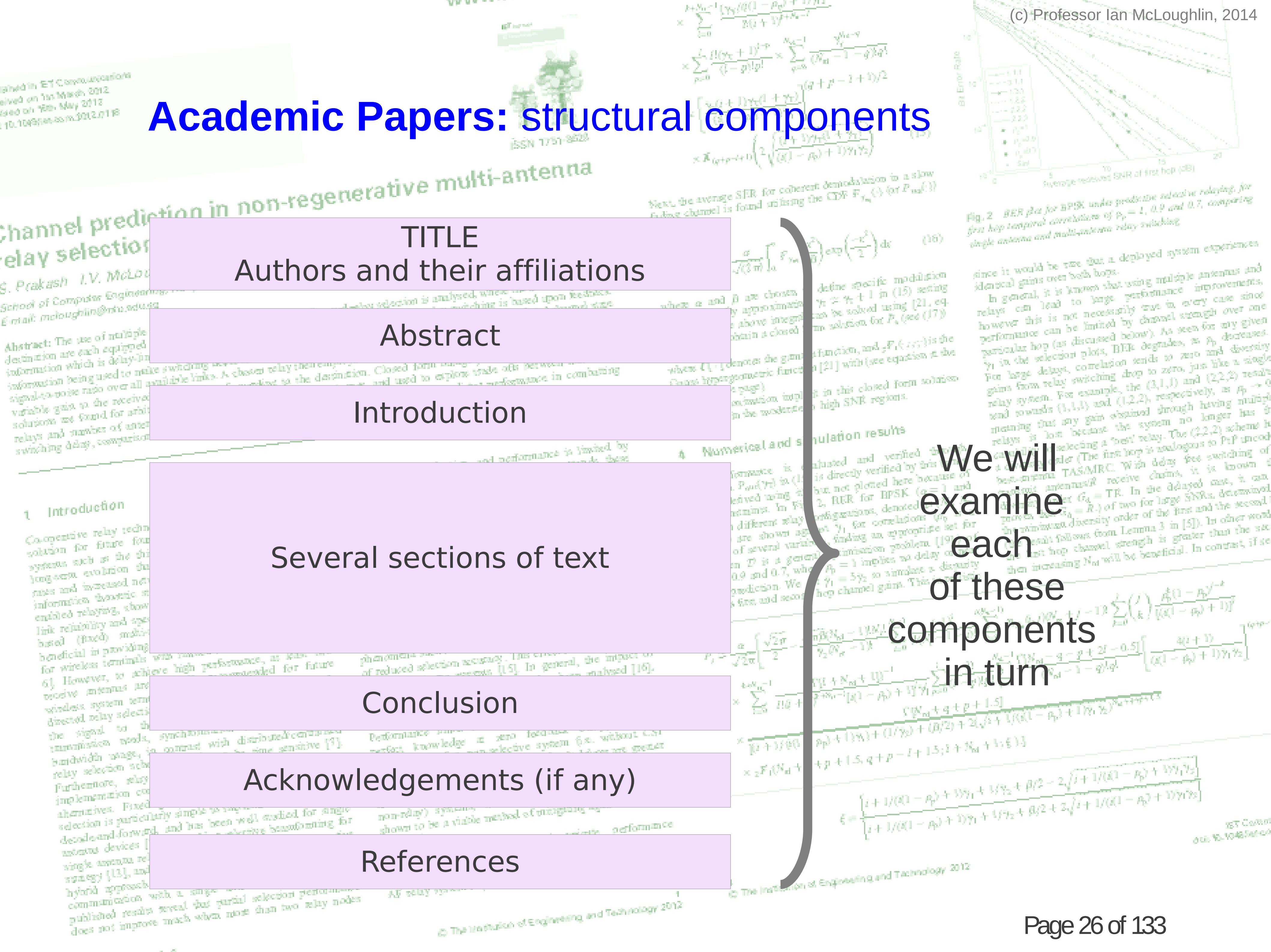
Academic Papers: your preparation

Good to know:

1. Identify which journal you are targetting, and know what the editors like to publish (what has been published previously in that journal?)

2. Some journals allow you to suggest reviewers...

Advanced students only: track paper download figures to identify 'hot' trends and topics...



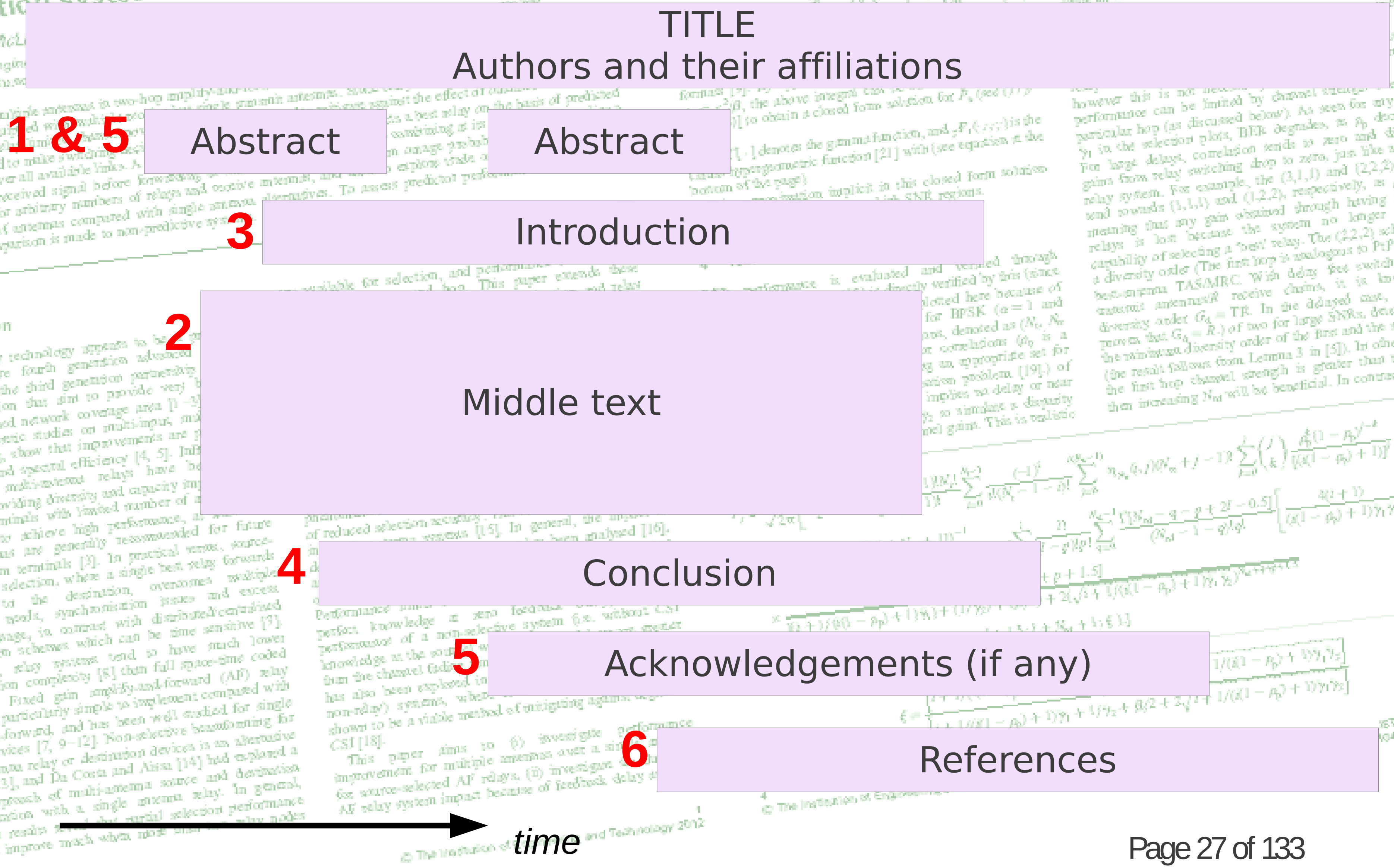
Academic Papers: structural components

- TITLE
Authors and their affiliations
- Abstract
- Introduction
- Several sections of text
- Conclusion
- Acknowledgements (if any)
- References

We will examine each of these components in turn

Academic Papers: structural components

You don't write the paper in a linear sequence!!!



TITLE
Authors and their affiliations

1 & 5 Abstract

Abstract

3 Introduction

2 Middle text

4 Conclusion

5 Acknowledgements (if any)

6 References

time

Paper structure: abstract

Abstract

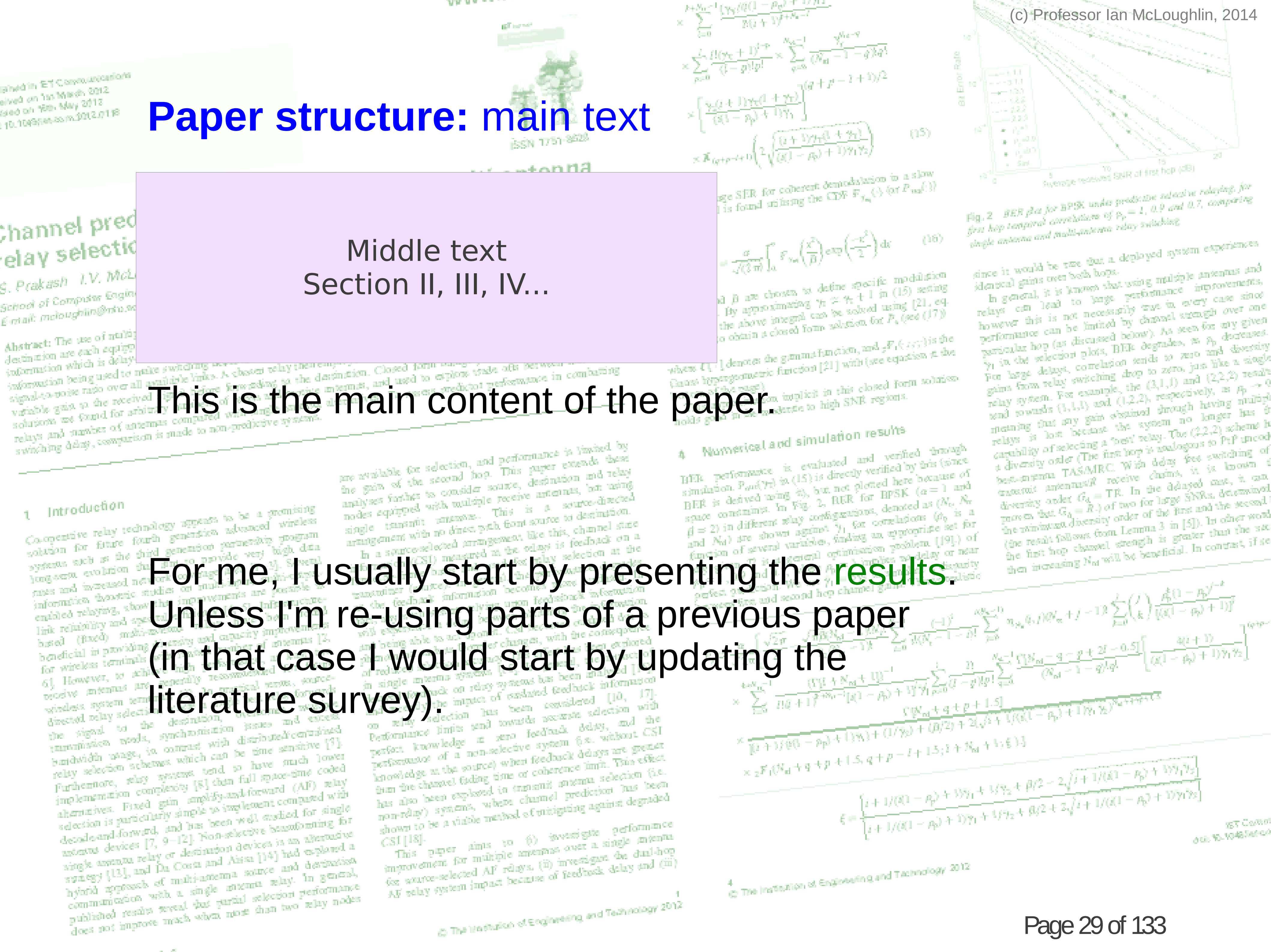
I like to start by writing a draft abstract.

- what am I writing about (what is the subject area)
- what am I trying to do/prove/accomplish
- did it work out?
- the two or three impact areas of the work

After writing the paper, we can revisit the abstract & update it.

In the final paper, the abstract & conclusion should match!

Paper structure: main text



Middle text
Section II, III, IV...

This is the main content of the paper.

For me, I usually start by presenting the results. Unless I'm re-using parts of a previous paper (in that case I would start by updating the literature survey).

Paper structure: main text

Several sections of text

Literature survey:
What did other people do

My approach:
Describe the theory

My approach:
How did I validate it

My results:
Present the findings

The findings:
What does this show?

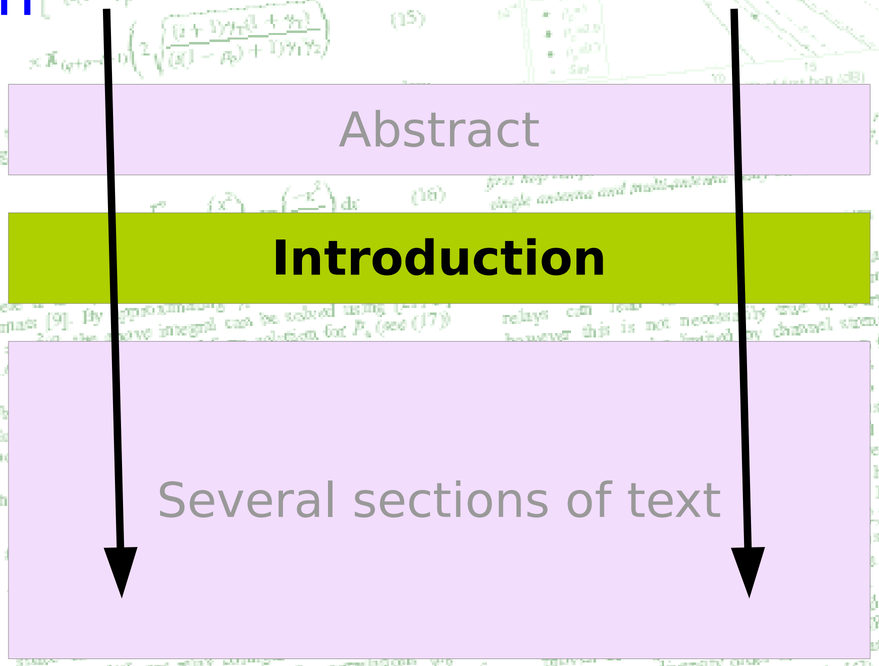
Note: often the literature survey will be part of the paper introduction, but it if gets long, then it needs to be in a separate section.

You are writing a story!
It needs to flow, to have a beginning, a middle and an end

Paper structure: introduction

Most people will download a paper after <u>reading the abstract</u>.

Then they will rely on the introduction to decide if they should <u>read the paper</u>.



Abstract

Introduction

Several sections of text

What is this paper going to describe/establish/present?
What is the purpose of the paper?
What exactly will it show? *If there's a performance score, mention it here*
Why is this important?
What is the structure of this paper?

Sometimes: *What is the notation used in the paper?*

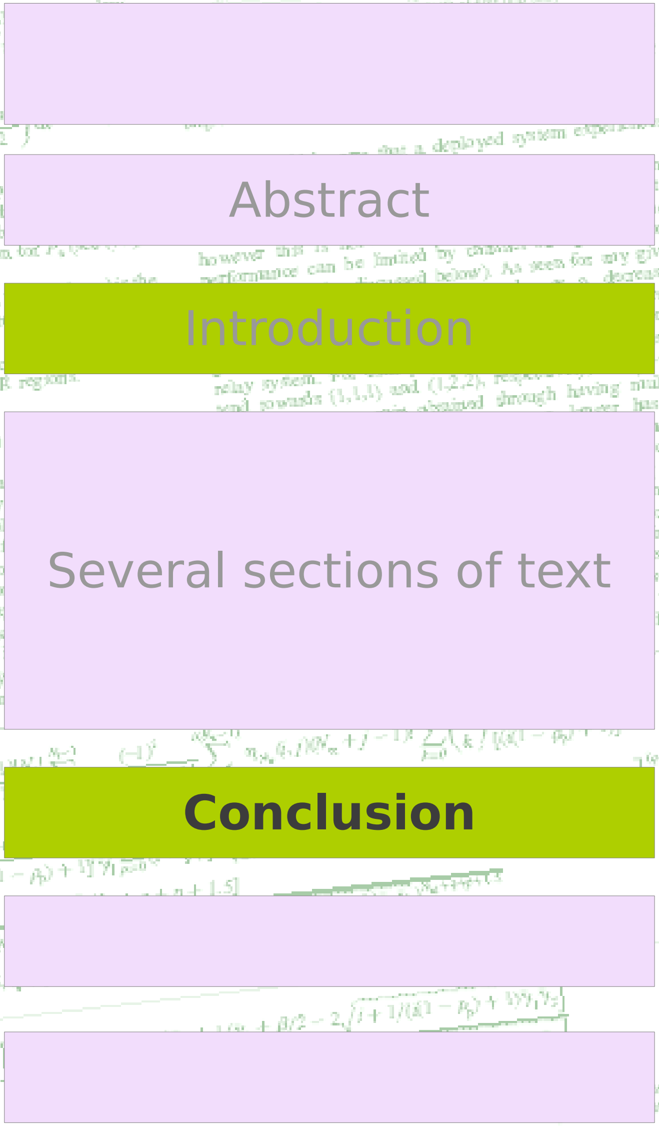
Paper structure: conclusion

The introduction described what the paper will show. Now the conclusion should match this:
What the paper did show.

The conclusion contains **nothing new**!!
It just repeats things for emphasis:

What did the paper show?
Why did we write this?
What is the importance of this?
Are there any other useful points?

If the paper has a performance score, repeat that in the conclusion...


Abstract
Introduction
Several sections of text
Conclusion

Paper structure: other parts

TITLE
Authors and their affiliations

The title is your “claim”. Use it to attract attention. It's also very important in getting citations!! Some examples:

“MIMO Systems with Antenna Selection”

Short & simple & a wide 'claim' area. Doesn't say what the paper contains!

“Virtual branch analysis of symbol error probability for hybrid selection/maximal-ratio combining in Rayleigh fading”

Lots of keywords, but very specific. Describes exactly what the paper contains and what it analyses.

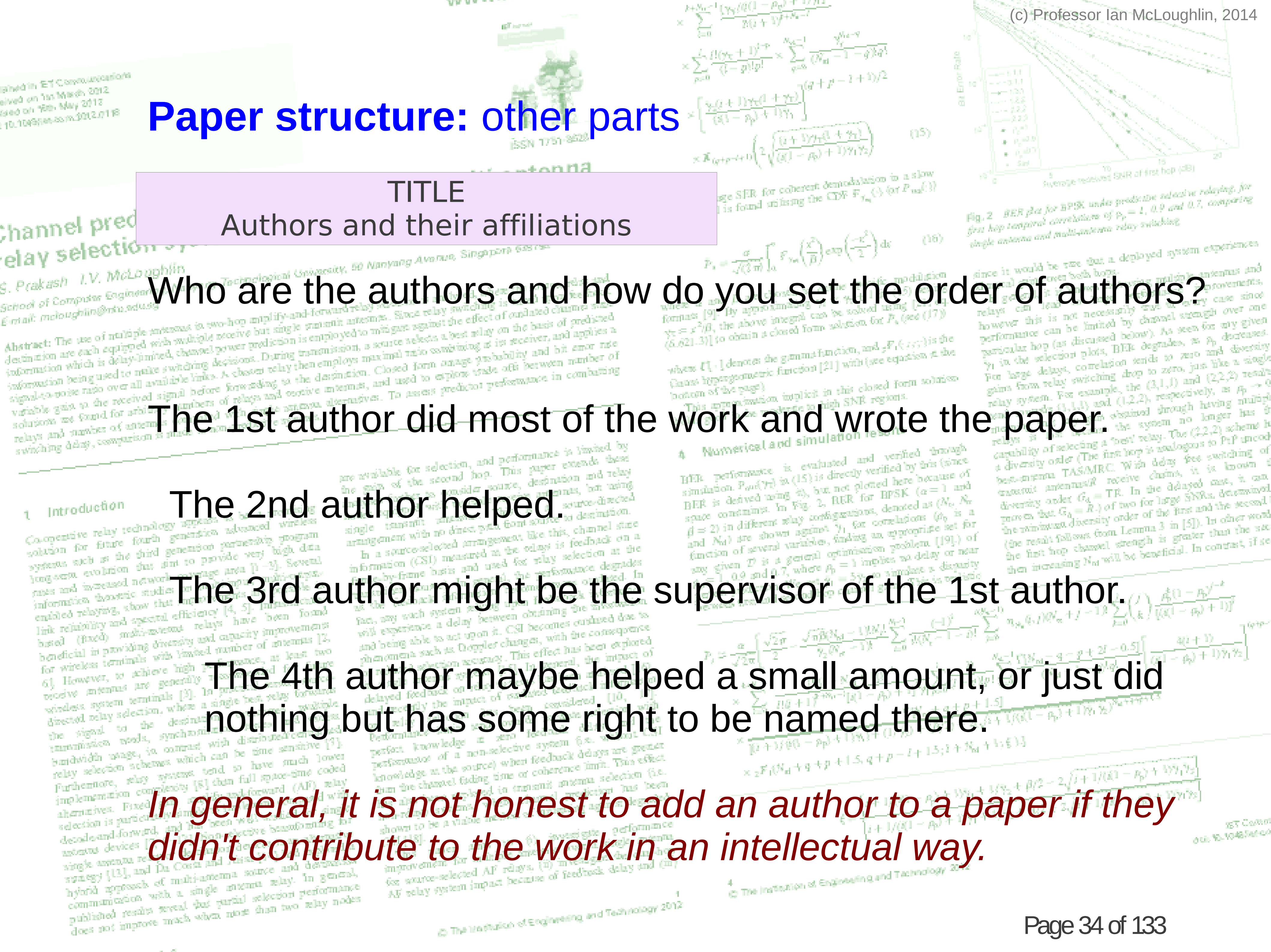
“A simple transmit diversity technique for wireless communications”

Students like the word “simple”. Doesn't talk about analysis.

“Space-Time Coding”

This is a book (quite famous). The title 'claims' it describes everything about STC. It's probably true!

Paper structure: other parts



TITLE
Authors and their affiliations

Who are the authors and how do you set the order of authors?

The 1st author did most of the work and wrote the paper.

The 2nd author helped.

The 3rd author might be the supervisor of the 1st author.

The 4th author maybe helped a small amount, or just did nothing but has some right to be named there.

In general, it is not honest to add an author to a paper if they didn't contribute to the work in an intellectual way.

Paper structure: other parts

Acknowledgements (if any)

Be generous in acknowledging help.
You also have to acknowledge funding sources.

References

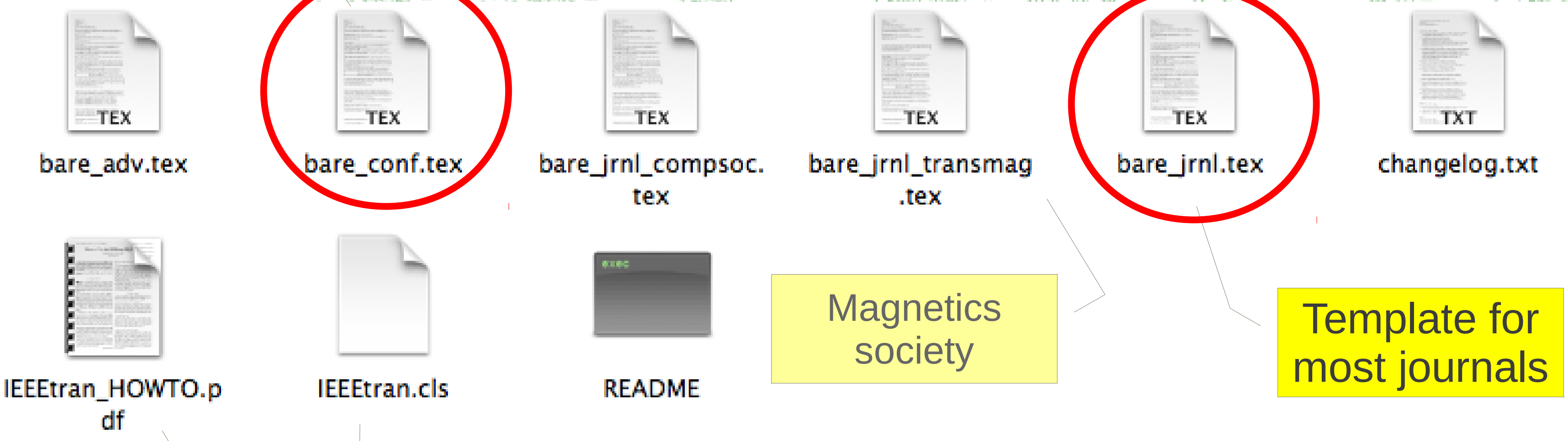
Some authoritative papers – i.e. famous authors
Representative papers – don't miss the main papers
Same journal papers – editors like this...
If you used a paper you MUST be honest and include it in the reference list.

In LaTeX, a tool called Bibtex will create and format the reference list automatically.

Paper writing: the writing process

You always start with a paper template...

Almost all journals and conferences have their own paper template. One of the most popular is the IEEEtran one used for all IEEE Journals and Conferences. This is IEEETran.zip:



Template for most conferences

Computer society

Magnetics society

Template for most journals

Instructions

LaTeX class file

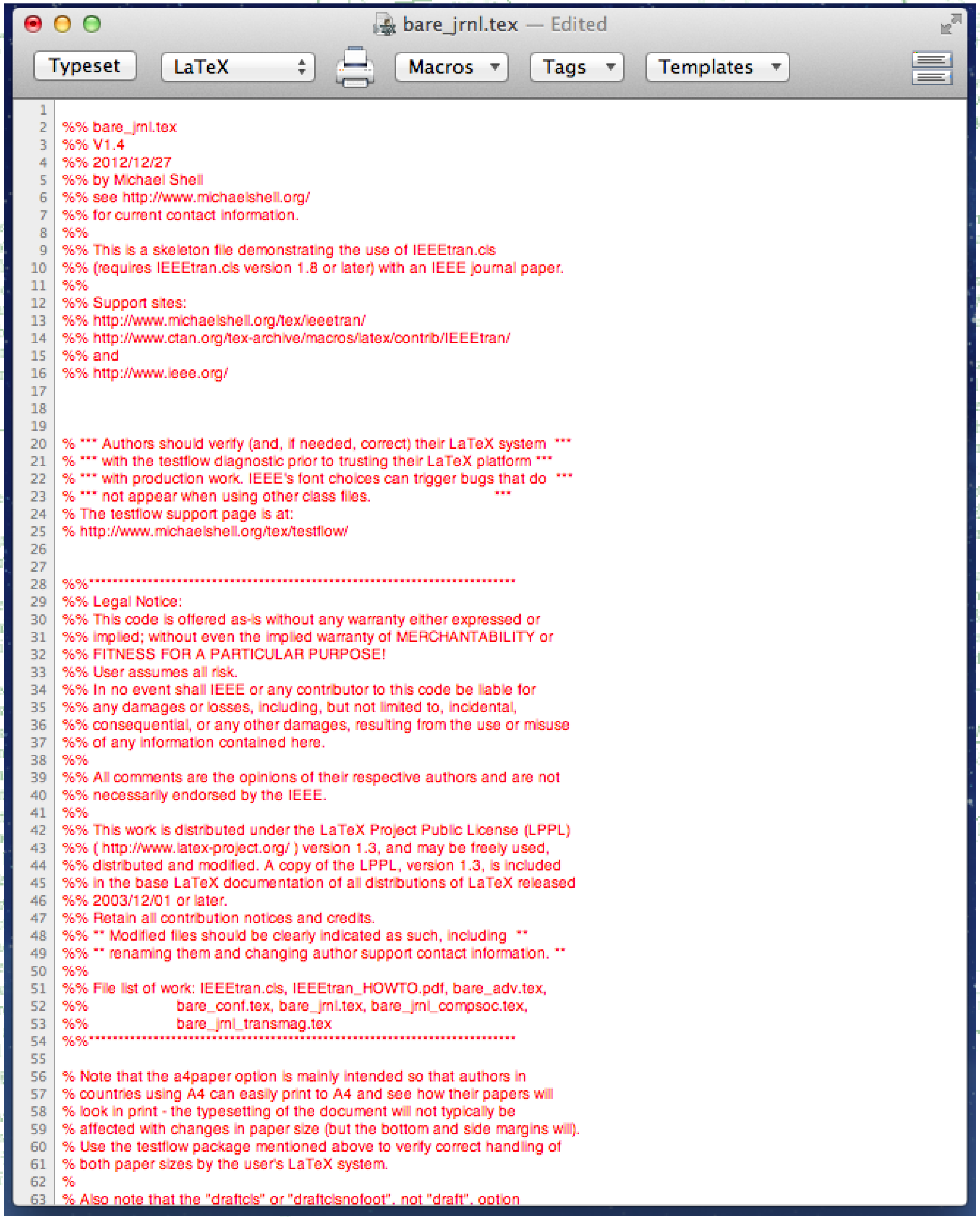
bare_jrnl.tex

On my system, the commands are shown in black, the comments are shown in red...

> 90% of the template is comments!

Generally, we only read the comments when:

1) there's a problem
2) you have no other things you need to do



```

%% bare_jrnl.tex
%% V1.4
%% 2012/12/27
%% by Michael Shell
%% see http://www.michaelshell.org/
%% for current contact information.
%%
%% This is a skeleton file demonstrating the use of IEEEtran.cls
%% (requires IEEEtran.cls version 1.8 or later) with an IEEE journal paper.
%%
%% Support sites:
%% http://www.michaelshell.org/tex/ieeetran/
%% http://www.ctan.org/tex-archive/macros/latex/contrib/IEEEtran/
%% and
%% http://www.ieee.org/



% *** Authors should verify (and, if needed, correct) their LaTeX system  ***
% *** with the testflow diagnostic prior to trusting their LaTeX platform ***
% *** with production work. IEEE's font choices can trigger bugs that do  ***
% *** not appear when using other class files.                            ***
% The testflow support page is at:
% http://www.michaelshell.org/tex/testflow/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%% ( http://www.latex-project.org/ ) version 1.3, and may be freely used,
%% distributed and modified. A copy of the LPPL, version 1.3, is included
%% in the base LaTeX documentation of all distributions of LaTeX released
%% 2003/12/01 or later.
%% Retain all contribution notices and credits.
%% ** Modified files should be clearly indicated as such, including  **
%% ** renaming them and changing author support contact information. **
%%
%% File list of work: IEEEtran.cls, IEEEtran_HOWTO.pdf, bare_adv.tex,
%%                    bare_conf.tex, bare_jrnl.tex, bare_jrnl_compsoc.tex,
%%                    bare_jrnl_transmag.tex
%%*************************************************************************

% Note that the a4paper option is mainly intended so that authors in
% countries using A4 can easily print to A4 and see how their papers will
% look in print - the typesetting of the document will not typically be
% affected with changes in paper size (but the bottom and side margins will).
% Use the testflow package mentioned above to verify correct handling of
% both paper sizes by the user's LaTeX system.
%
% Also note that the "draftcls" or "draftclsnofoot", not "draft", option
```

bare_jrnl.tex

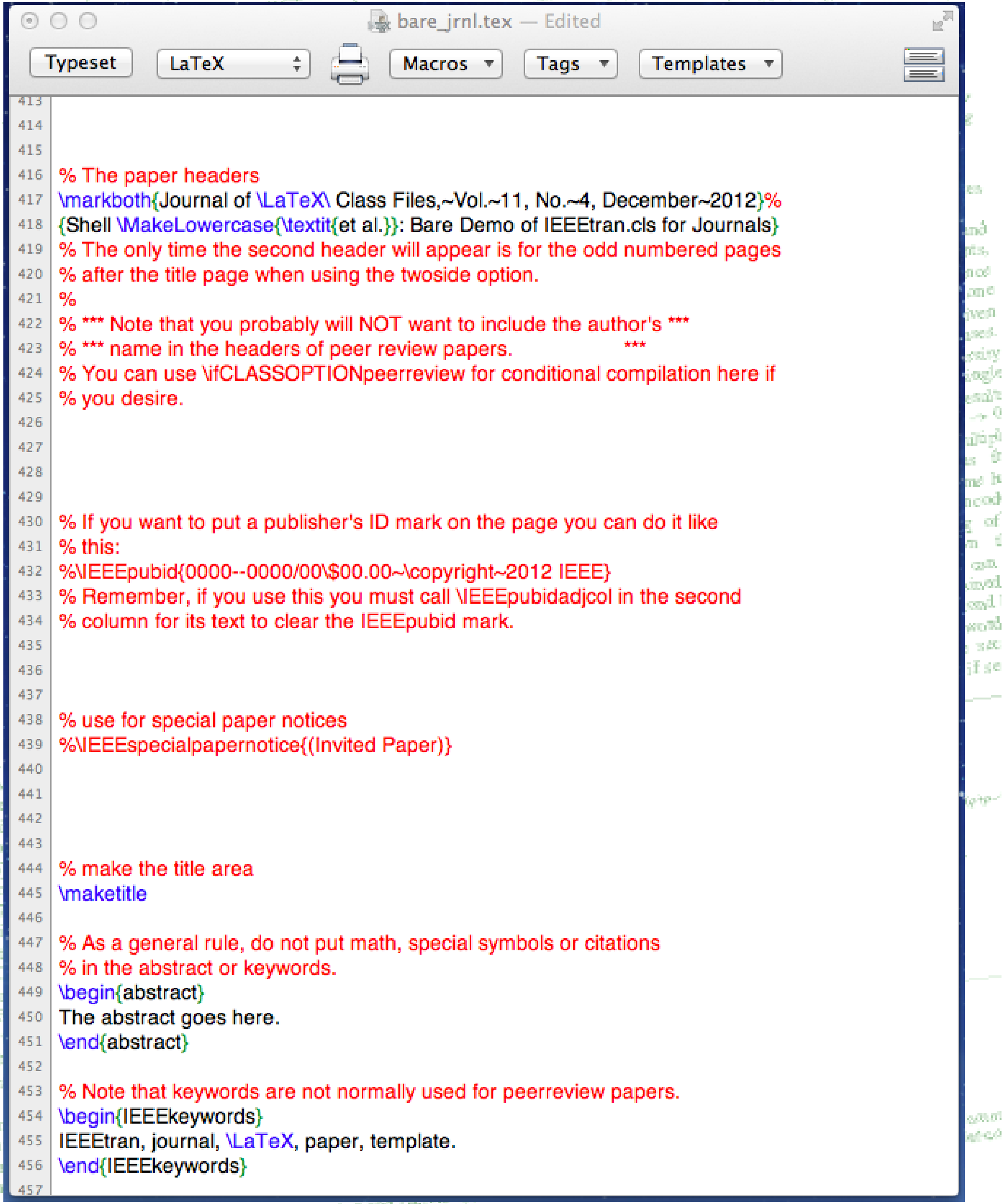
The way you write your paper is by adding your material directly into this file, or by adding a command to include the material.

- Text
- Equations
- Tables

Add directly

- Listings
- Figures
- Bibliography

Have them in a separate file, add a command to include them.



```


% The paper headers
\markboth{Journal of \LaTeX\ Class Files,~Vol.~11, No.~4, December~2012}%
{Shell \MakeLowercase{\textit{et al.}}: Bare Demo of IEEEtran.cls for Journals}
% The only time the second header will appear is for the odd numbered pages
% after the title page when using the twoside option.
%
% *** Note that you probably will NOT want to include the author's ***
% *** name in the headers of peer review papers.                   ***
% You can use \ifCLASSOPTIONpeerreview for conditional compilation here if
% you desire.




% If you want to put a publisher's ID mark on the page you can do it like
% this:
%\IEEEpubid{0000--0000/00\$00.00~\copyright~2012 IEEE}
% Remember, if you use this you must call \IEEEpubidadjcol in the second
% column for its text to clear the IEEEpubid mark.



% use for special paper notices
%\IEEEspecialpapernotice{(Invited Paper)}




% make the title area
\maketitle

% As a general rule, do not put math, special symbols or citations
% in the abstract or keywords.
\begin{abstract}
The abstract goes here.
\end{abstract}

% Note that keywords are not normally used for peerreview papers.
\begin{IEEEkeywords}
IEEEtran, journal, \LaTeX, paper, template.
\end{IEEEkeywords}
```

bare_jrnl.tex

We will scan through bare_jrnl.tex to discuss the important commands and structure.

But first you need to know that these are special characters:

& # $ % ^ ~ { }

If you want to type a $ or a % you need to "escape" the character first using the \ symbol. It means you write \$ or \% in the .tex file to get a $ or % in your paper.

There are also some characters you can <u>only use in maths mode</u>, not in normal text:

+ = | < > \

To use these, we switch to maths mode first (explained later)!

bare_jrnl.tex

New lines and spaces in text are not really important because LaTeX does all the typesetting for you. It means that these two Examples of paragraphs will be <u>identical</u> in the final paper:

```
This
is
a complete
sentence.
Note that          spaces
don't matter.
```

```
This is a complete sentence.
Note that spaces don't matter.
```

But 2 newlines together signals a new paragraph:

```
This is a complete sentence.
Note that spaces don't matter.


This is a new paragraph.
```

bare_jrnl.tex

% any text following a % is a comment (except \%)
\ is used to indicate the start of a command

Here is our first command:

```
\documentclass[journal]{IEEEtran}
```

This is always needed to tell LaTeX what type of document we are writing (it's called a class).

Inbuilt classes are: *book, report, article, slides, letter*

IEEETran is not built in. So LaTeX will look for the file called **IEEETran.cls** which defines the class "IEEETran"

[journal] is an argument to the IEEETran class

bare_jrnl.tex

```
\documentclass[ … ]{IEEEtran}
```

journal	Formats the paper for a journal
conference	Formats the paper for a conference
compsoc	For IEEE Computer Society
12pt	For bigger text (the default is 10pt)
draftcls	Does double spacing (for review, sometimes)
a4paper	Uses standard A4 paper (instead of US paper)
onecolumn	Instead of two column

You can combine some of these, i.e.:

```
\documentclass[journal,a4paper,12pt]{IEEEtran}
```

bare_jrnl.tex

After `\documentclass` we would define any special packages that we want to use in the document (see later).
The next important command starts the document text:

```
\begin{document}
```

All of your paper text goes inside here!

```
\end{document}
```

Two things to remember in LaTeX:

1. every \begin{} needs to match to a \end{}
2. every start bracket { needs to match an end bracket }

bare_jrnl.tex

Let's continue scanning down after the `\begin{document}`

The next command is the title. You don't need worry about using upper or lower case or formatting it:

```
\title{Bare Demo of IEEEtran.cls for Journals}
```

bare_jrnl.tex

After that is the author list. Let's examine the structure of one:

```
\author{Michael~Shell,~\IEEEmembership{Member,~IEEE,}
        John~Doe,~\IEEEmembership{Fellow,~OSA,}
        and~Jane~Doe,~\IEEEmembership{Life~Fellow,~IEEE}%
\thanks{M. Shell is with the Department
of Electrical and Computer Engineering,
Georgia Institute of Technology, Atlanta, GA, 30332 USA
e-mail: (see http://www.michaelshell.org/contact.html).}%
\thanks{J. Doe and J. Doe are with Anonymous University.}%
\thanks{Manuscript received April 19, 2005;
revised December 27, 2012.}}
```

The ~ means a non-breaking space. That's a space that won't become a newline (i.e. if you have *A*~*B*, then *A* and *B* will be on the same line).

We can force a newline with `\\` or `\newline`

bare_jrnl.tex

The command `\maketitle` creates the text block that contains the title text – don't change it. Let's continue looking inside the document...

```
\begin{abstract}

The abstract text else goes inside here

\end{abstract}
```

Note on abstract:

1. different journals have different maximum lengths!
2. you should not include citations in the abstract
   e.g. Antenna selection technologies [1] are well known...
3. you normally don't expand abbreviations in the abstract
   e.g. as in maximal ratio combining (MRC)

bare_jrnl.tex

You might list keywords after the abstract (and different journals have different policies on keywords).

```
\begin{IEEEkeywords}
```

```
\end{IEEEkeywords}
```

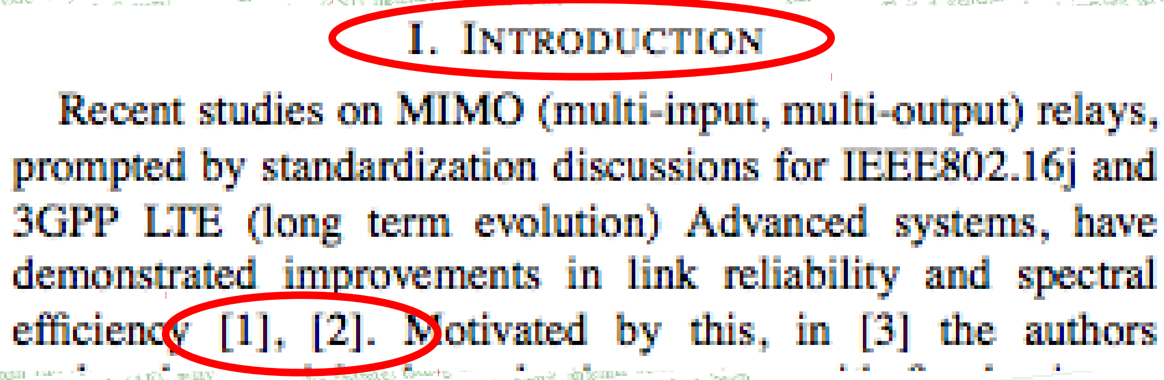
One way to find good keywords is to look at the keywords used in other papers – especially the ones in your reference list.

```
\IEEEpeerreviewmaketitle
```

This is for submitting papers to a journal – don't change it.

Some examples – section heading

```
\section{Introduction}
Recent studies on MIMO (multi-input,
multi-output) relays, prompted by standardization
discussions for IEEE802.16j  and 3GPP LTE (long term
evolution) Advanced systems, have demonstrated
improvements in  link   reliability and spectral
efficiency \cite{fan,pabst}.
Motivated by this,.................
```

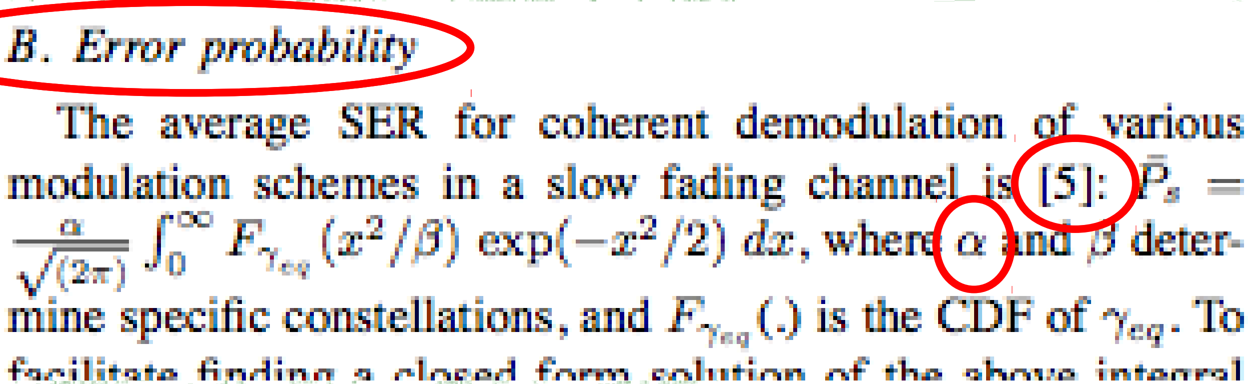


I. INTRODUCTION

Recent studies on MIMO (multi-input, multi-output) relays, prompted by standardization discussions for IEEE802.16j and 3GPP LTE (long term evolution) Advanced systems, have demonstrated improvements in link reliability and spectral efficiency [1], [2]. Motivated by this, in [3] the authors

Some examples – subsection heading

```
\subsection{ERROR probability}
The average SER for coherent demodulation of various
modulation schemes in a  slow fading channel is
\cite{Yizhao}:
$\bar{P_{s}}= \frac{\alpha}{\sqrt{(2\pi)}}
\int_{0}^{\infty} F_{\gamma_{_{eq}}}(x^2/\beta)
\exp(-x^2/2) dx$,
where $\alpha$ and $\beta$ determine\ specific
Constellations, and $F_{\gamma_{eq}}$(.) is the CDF of
$\gamma_{eq}$.
…….
```



B. Error probability

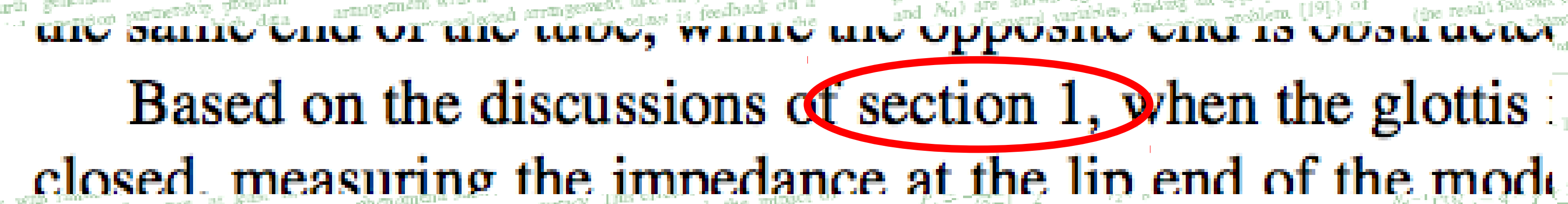
The average SER for coherent demodulation of various modulation schemes in a slow fading channel is [5]: $\bar{P}_s = \frac{\alpha}{\sqrt{(2\pi)}} \int_0^\infty F_{\gamma_{eq}}(x^2/\beta) \exp(-x^2/2)\, dx$, where α and β determine specific constellations, and $F_{\gamma_{eq}}(.)$ is the CDF of γ_{eq}. To facilitate finding a closed form solution of the above integral

Some examples – internal references

```
\section{Introduction}
\label{sec:intro}

Formant frequencies are....
```

```
Based on the discussions of
section \ref{sec:intro}, when the...
```



Based on the discussions of section 1, when the glottis

closed, measuring the impedance at the lip end of the mod

Note: if you run from the command line, have to run the latex program TWICE to resolve internal references...

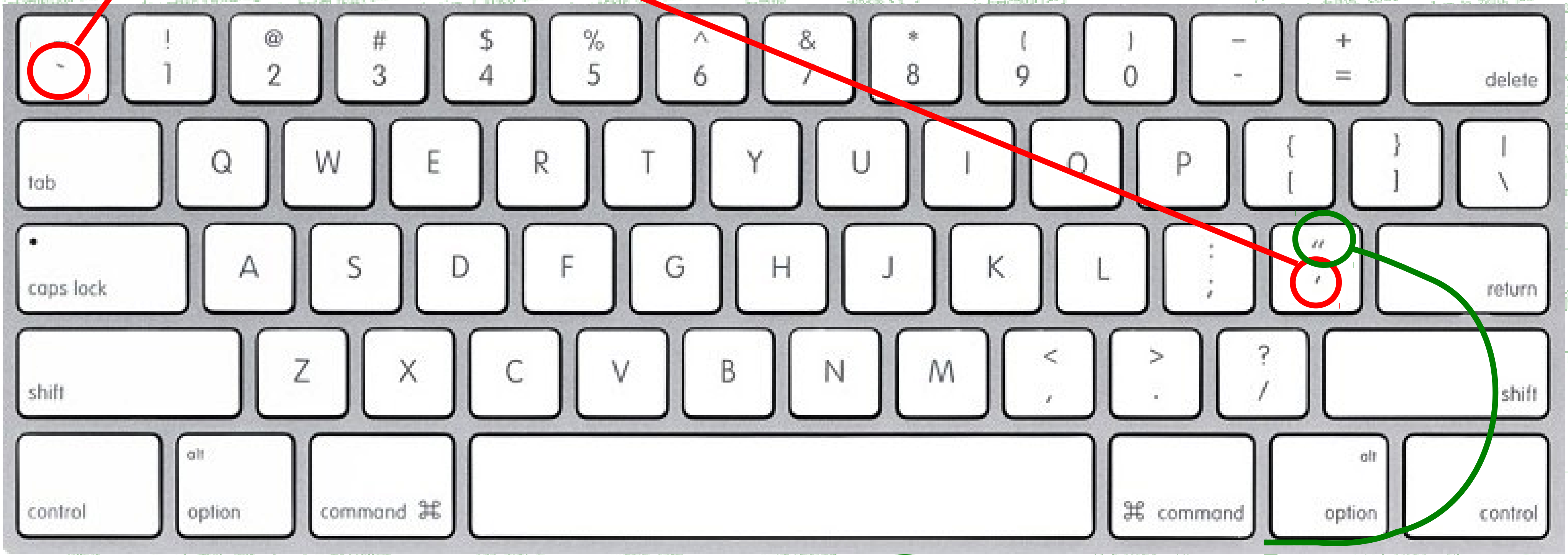
If you only run it ONCE then you might see `?` Instead of `1`.

More LaTeX peculiarities

Latex will convert these characters to “proper” quotes:

`` `hello' `` → 'hello'

``` ``hello world'' ``` → “hello world”



Note: don't use double quotes " in your .tex file!!!
```

More LaTeX peculiarities

Latex will also convert the following dashes:

`semi-precious` → semi-precious

`From 4--5pm` → From 4 – 5pm

`and continuing---` → and continuing —

Here are some useful formatting commands:

`This is \textit{italic}` → This is *italic*

`This is \textbf{bold}` → This is **bold**

`This is \texttt{computer}` → This is `computer`

To write an entire section of text in computer type do this:

```
{\tt your text goes here}
```

Note: we normally don't use colour text in academic papers

More LaTeX peculiarities

DROPCAPS is where the first letter of a paragraph is made bigger (and the rest of the word is in capitals). Some IEEE Journals use dropcaps, some don't.

```
\IEEEPARstart{D}{ropcaps} is
where the first letter...
```

Most journals that we will write papers for don't use this!

But it's useful in writing reports, CVs and other documents that need to look good...

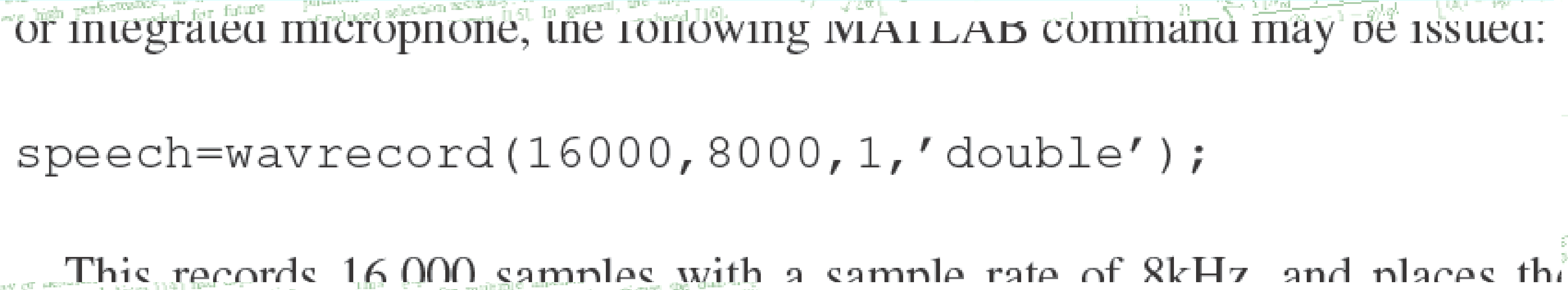
More LaTeX peculiarities

When you quote small pieces of code in a paper, or the steps of an algorithm, you can use the `\verbatim` command:

```
following MATLAB command may be issued:


{\tt  \begin{verbatim}
speech=wavrecord(16000,8000,1,'double');
\end{verbatim}  }


This records 16,000 samples with a...
```



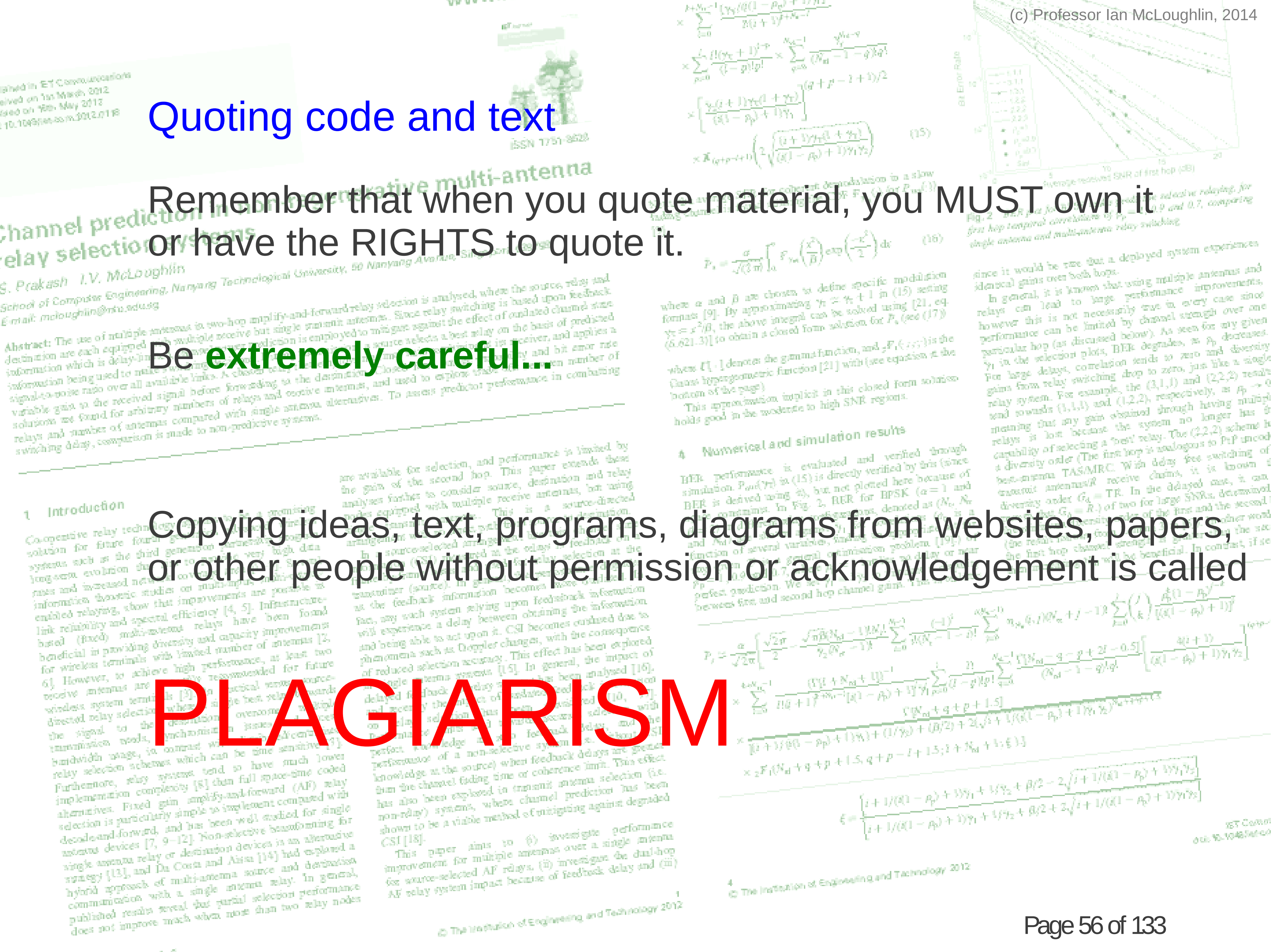
of integrated microphone, the following MATLAB command may be issued:

```
speech=wavrecord(16000,8000,1,'double');
```

This records 16,000 samples with a sample rate of 8kHz, and places th

Part C

The problem of plagiarism
LaTeX tables
LaTeX figures



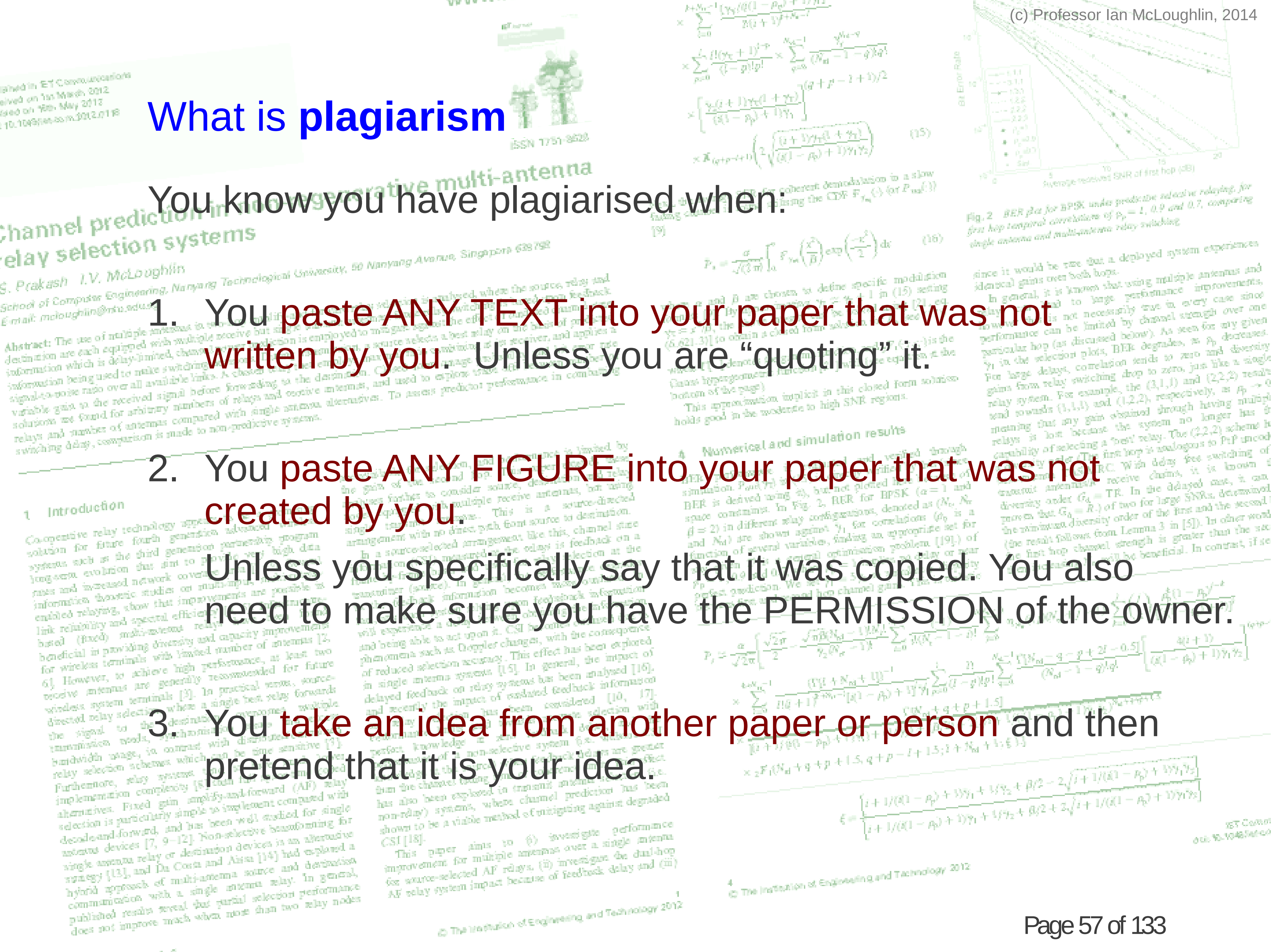
Quoting code and text

Remember that when you quote material, you MUST own it or have the RIGHTS to quote it.

Be **extremely careful...**

Copying ideas, text, programs, diagrams from websites, papers, or other people without permission or acknowledgement is called

PLAGIARISM



What is **plagiarism**

You know you have plagiarised when:

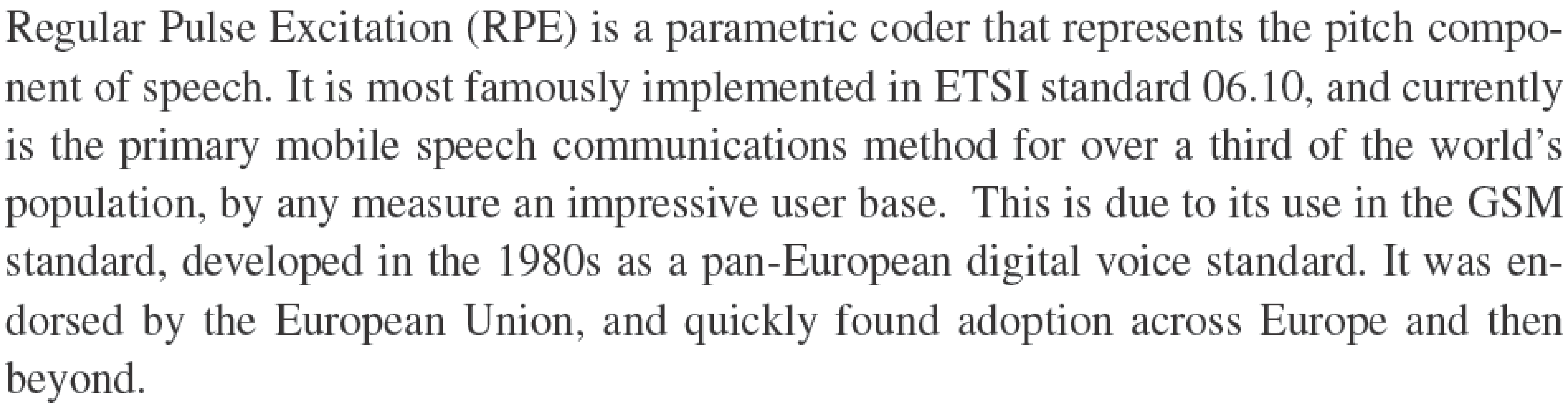
1. You paste ANY TEXT into your paper that was not written by you. Unless you are “quoting” it.

2. You paste ANY FIGURE into your paper that was not created by you.

   Unless you specifically say that it was copied. You also need to make sure you have the PERMISSION of the owner.

3. You take an idea from another paper or person and then pretend that it is your idea.

What is **plagiarism**



Regular Pulse Excitation (RPE) is a parametric coder that represents the pitch component of speech. It is most famously implemented in ETSI standard 06.10, and currently is the primary mobile speech communications method for over a third of the world's population, by any measure an impressive user base. This is due to its use in the GSM standard, developed in the 1980s as a pan-European digital voice standard. It was endorsed by the European Union, and quickly found adoption across Europe and then beyond.

Maybe you need to describe RPE in your paper. So you search online and find this text in a book. You cut, paste and edit to:

RPE (Regular Pulse Excitation) is a type of coder that is used to describe the pitch signal in speech. RPE is part of ETSI standard 06.10. This is used in the GSM algorithm that started in the 1980s as a European Union digital voice standard. Now it is used by more than a third of the world's population.

What do you think?

What is **plagiarism**

Regular Pulse Excitation (RPE) is a parametric coder that represents the pitch component of speech. It is most famously implemented in ETSI standard 06.10, and currently is the primary mobile speech communications method for over a third of the world's population, by any measure an impressive user base. This is due to its use in the GSM standard, developed in the 1980s as a pan-European digital voice standard. It was endorsed by the European Union, and quickly found adoption across Europe and then beyond.

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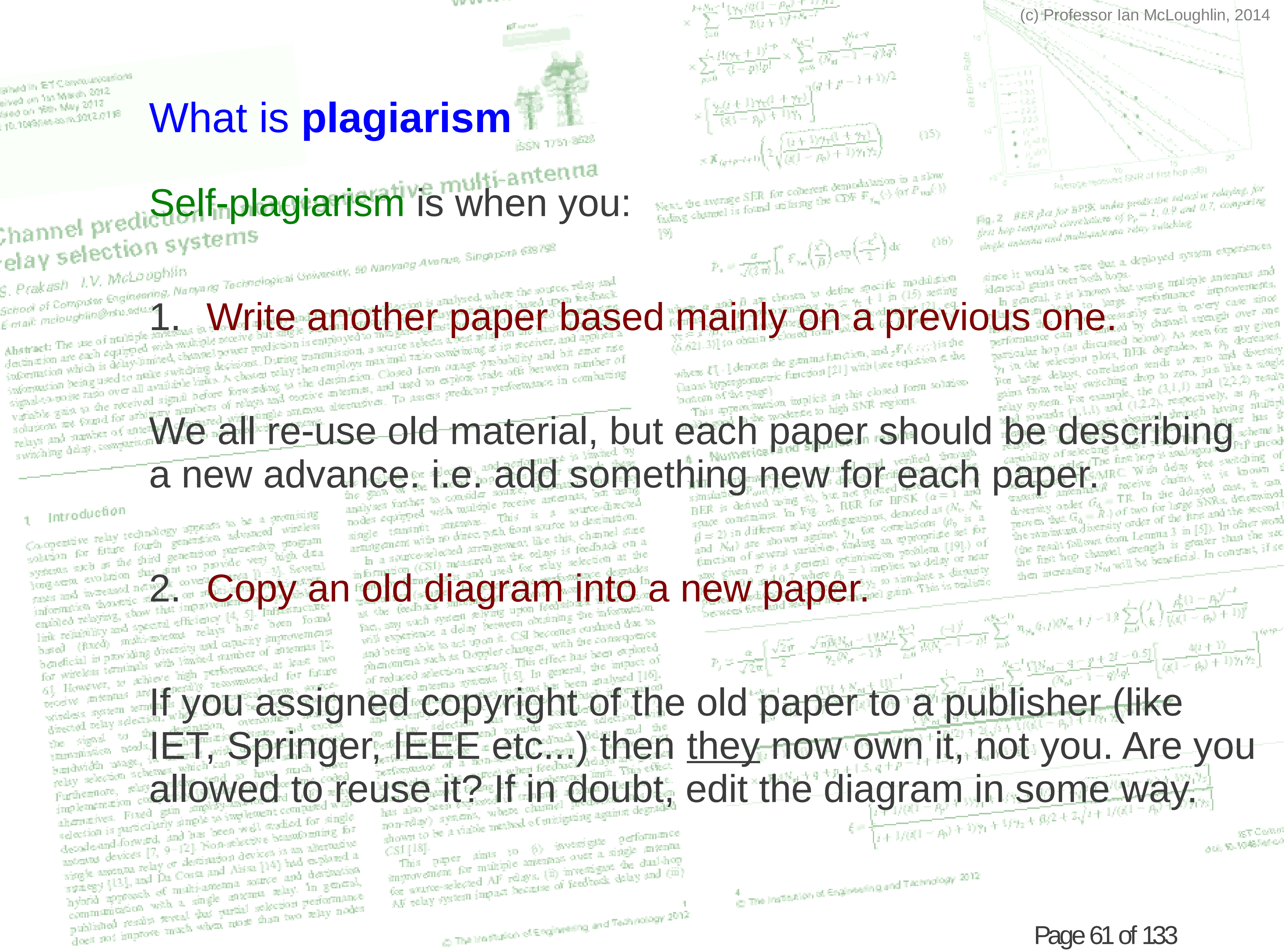
PLAGIARISED

What is **plagiarism**

Regular Pulse Excitation (RPE) is a parametric coder that represents the pitch component of speech. It is most famously implemented in ETSI standard 06.10, and currently is the primary mobile speech communications method for over a third of the world's population, by any measure an impressive user base. This is due to its use in the GSM standard, developed in the 1980s as a pan-European digital voice standard. It was endorsed by the European Union, and quickly found adoption across Europe and then beyond.

Here is a better way of dealing with it:

Regular Pulse Excitation (RPE) was developed in Europe to encode speech pitch signals. McLoughlin describes it as being "most famously implemented in ETSI standard 06.10, and currently is the primary mobile speech communications method for over a third of the world's population, by any measure an impressive user base" [1]. He goes on to describe how it was used in GSM which was "developed in the 1980s as a pan-European digital voice standard. It was endorsed by the European Union, and quickly found adoption across Europe and then beyond" [1].



What is **plagiarism**

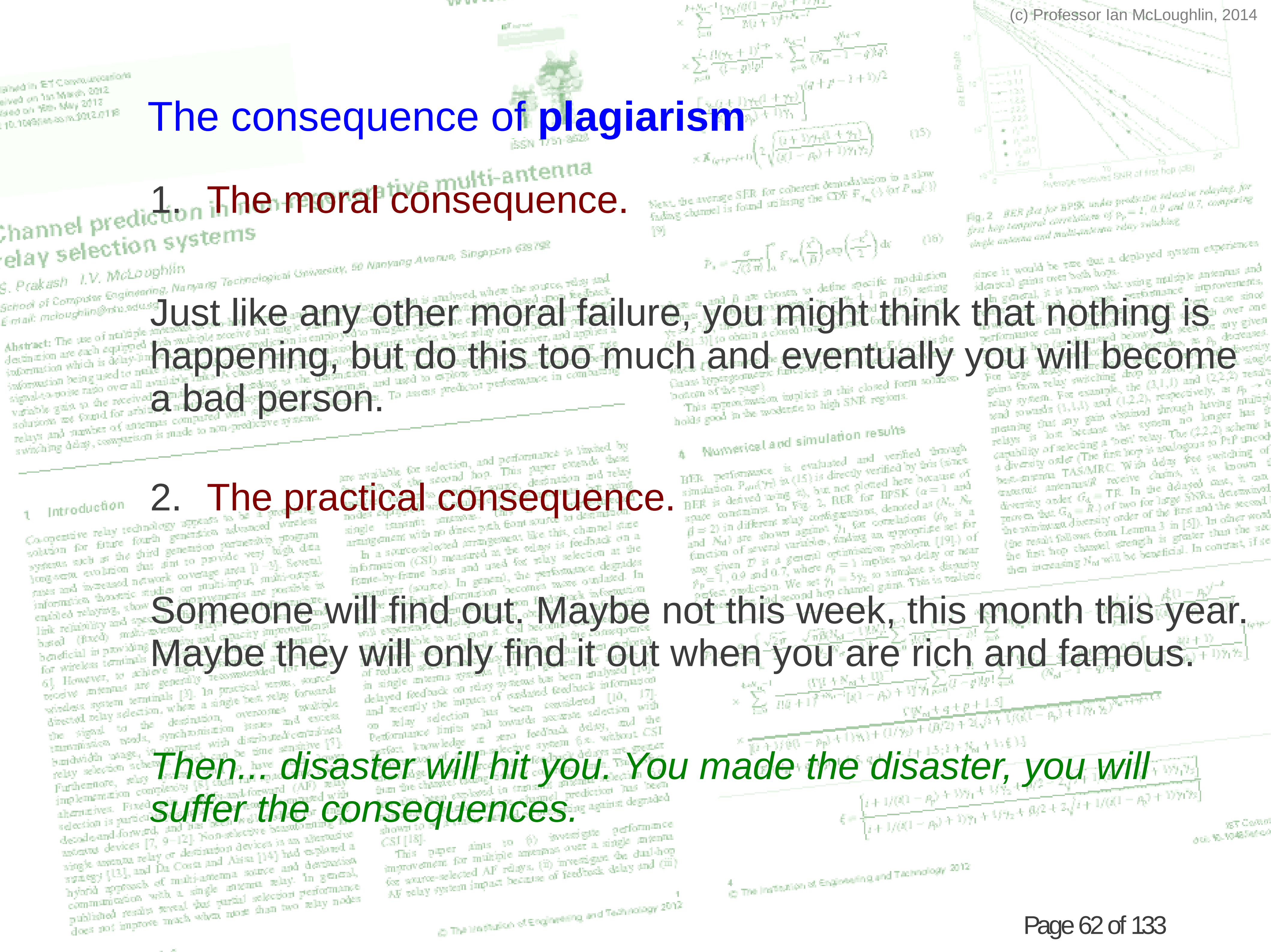
Self-plagiarism is when you:

1. Write another paper based mainly on a previous one.

We all re-use old material, but each paper should be describing a new advance. i.e. add something new for each paper.

2. Copy an old diagram into a new paper.

If you assigned copyright of the old paper to a publisher (like IET, Springer, IEEE etc...) then <u>they</u> now own it, not you. Are you allowed to reuse it? If in doubt, edit the diagram in some way.



The consequence of **plagiarism**

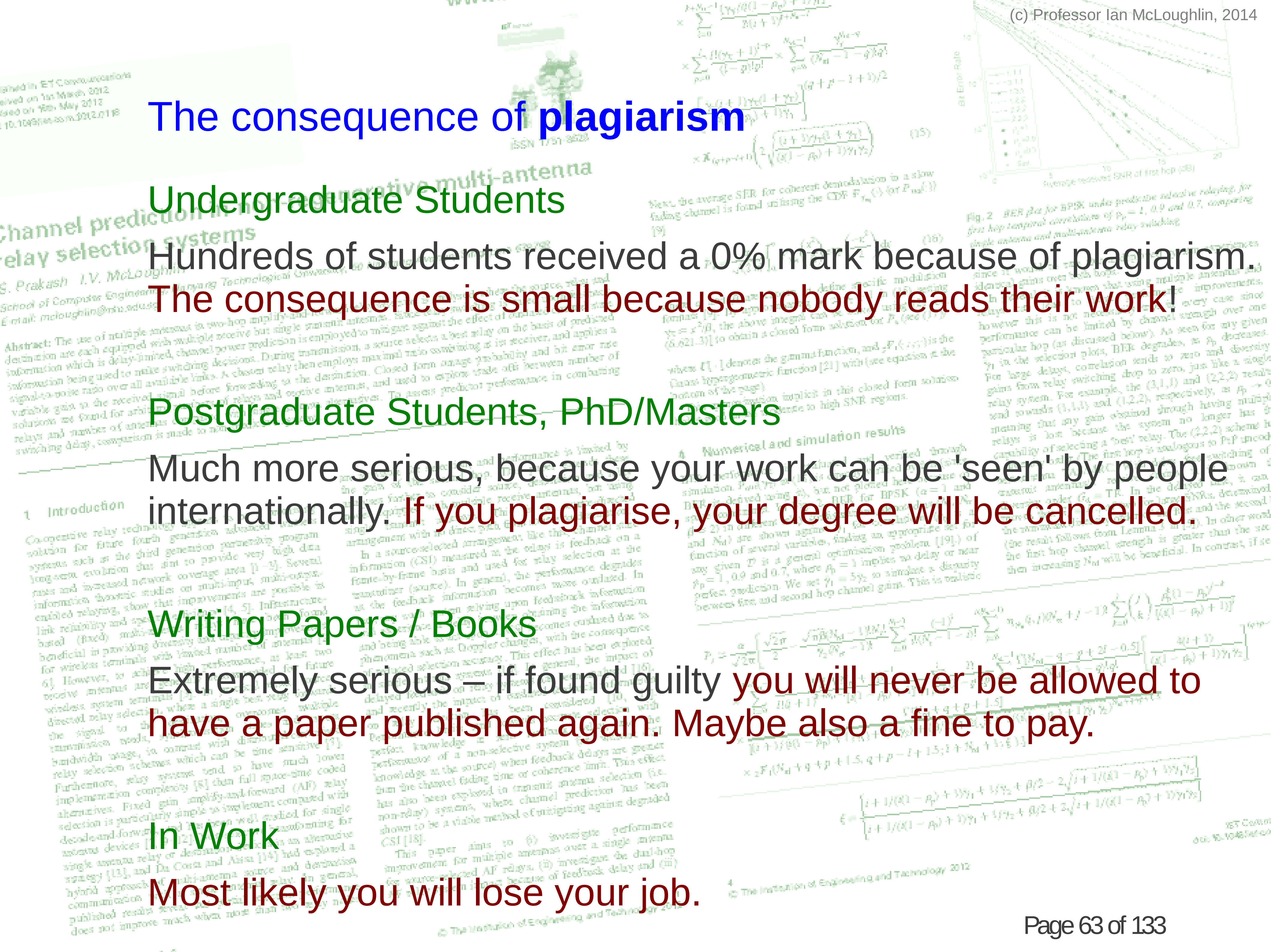
1. The moral consequence.

Just like any other moral failure, you might think that nothing is happening, but do this too much and eventually you will become a bad person.

2. The practical consequence.

Someone will find out. Maybe not this week, this month this year. Maybe they will only find it out when you are rich and famous.

Then... disaster will hit you. You made the disaster, you will suffer the consequences.



The consequence of **plagiarism**

Undergraduate Students

Hundreds of students received a 0% mark because of plagiarism. The consequence is small because nobody reads their work!

Postgraduate Students, PhD/Masters

Much more serious, because your work can be 'seen' by people internationally. If you plagiarise, your degree will be cancelled.

Writing Papers / Books

Extremely serious – if found guilty you will never be allowed to have a paper published again. Maybe also a fine to pay.

In Work

Most likely you will lose your job.

The consequence of **plagiarism**

The German Defence Minister resigned in 2011 because he was found to have copied text in his PhD thesis written in 2006 (without giving a citation).

German Defence Minister Guttenberg resigns over thesis

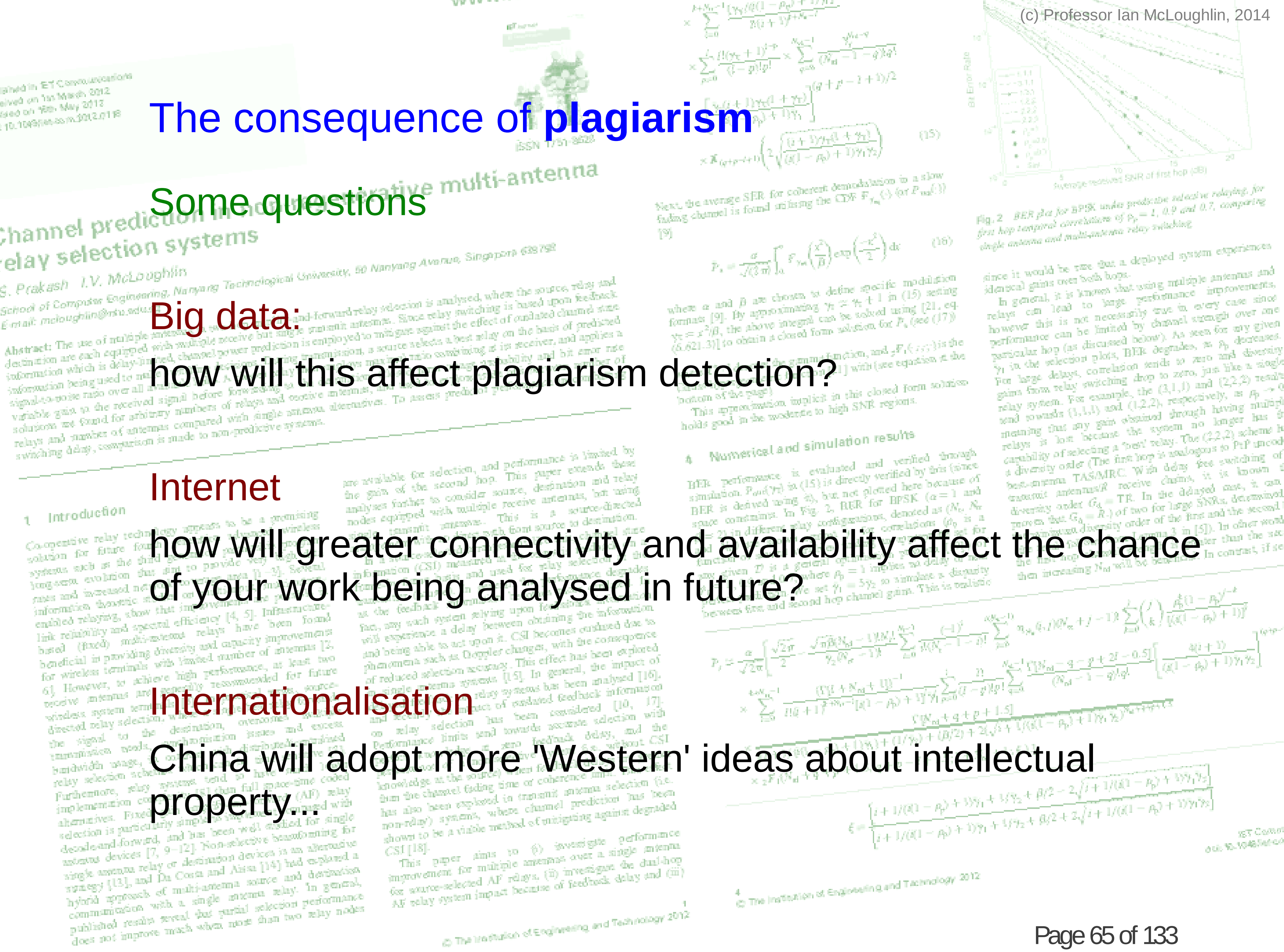
The German army was being restructured under Mr zu Guttenberg, so his departure leaves a gap in government

German Defence Minister Karl-Theodor zu Guttenberg has stepped down after he was found to have copied large parts of his 2006 university doctorate thesis.

Mr Guttenberg, considered until recently a possible candidate for chancellor, has already been stripped of his PhD.

He told a news conference that it was "the most painful step of my life".

Source: The BBC



The consequence of **plagiarism**

Some questions

Big data:

how will this affect plagiarism detection?

Internet

how will greater connectivity and availability affect the chance of your work being analysed in future?

Internationalisation

China will adopt more 'Western' ideas about intellectual property...

The consequence of **plagiarism**

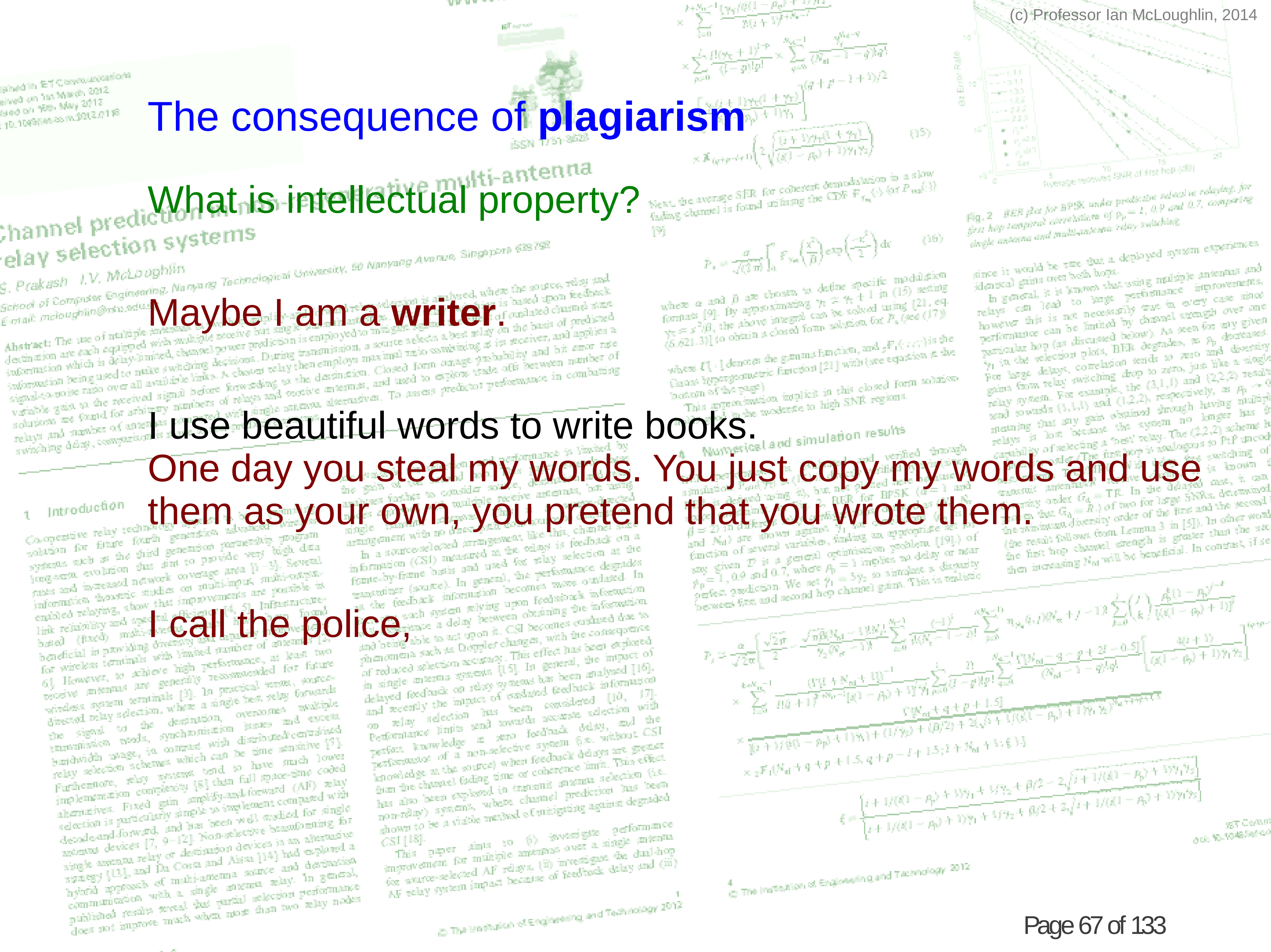
What is intellectual property?

Maybe I am a **painter**.

I paint beautiful paintings and sell them to make money.
One day you walk into my shop and steal a painting: you just take it from the wall and then walk out without paying...

I call the police, they track you down, arrest you and you go to prison.

Is this fair? Why?



The consequence of **plagiarism**

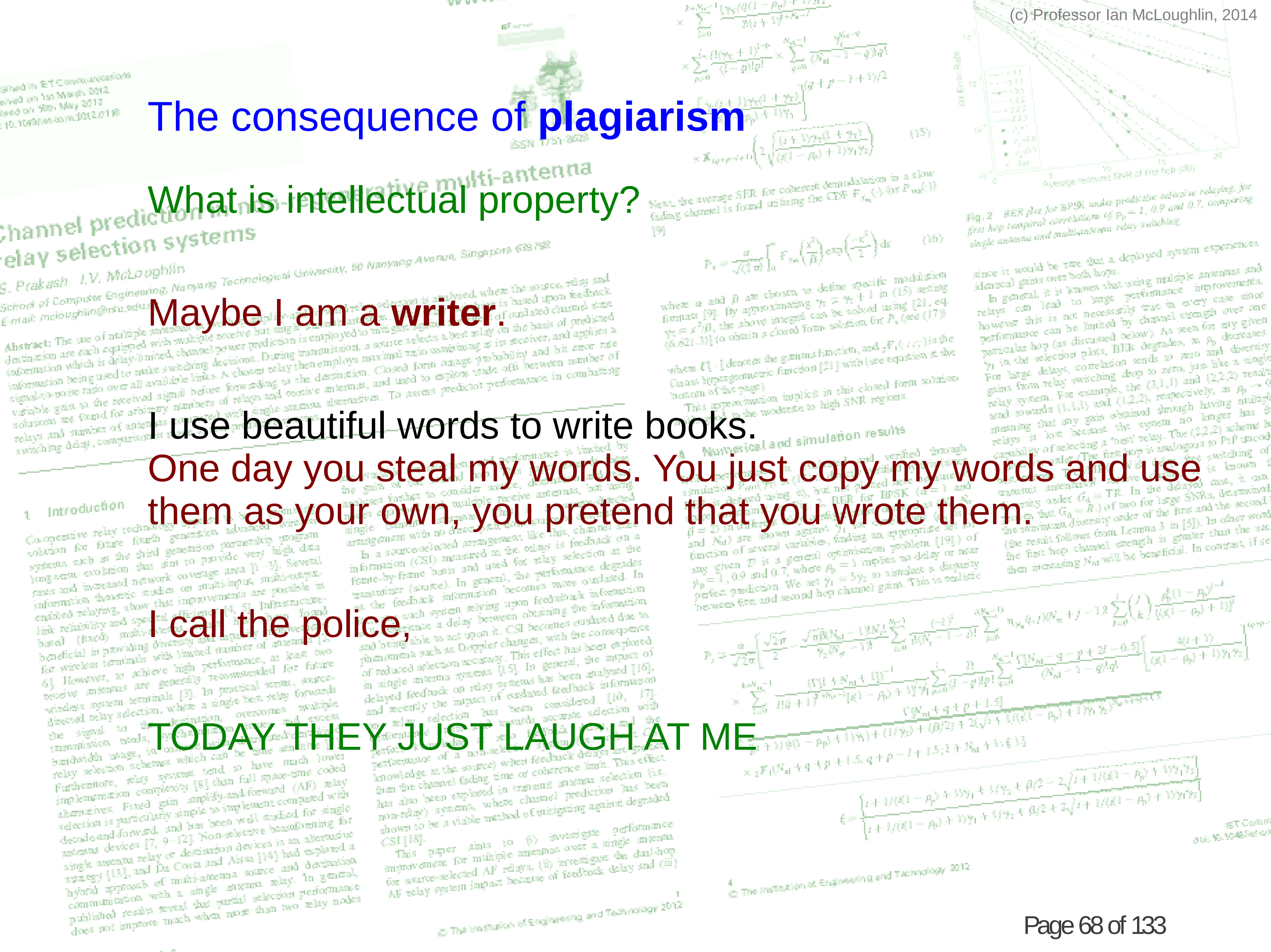
What is intellectual property?

Maybe I am a **writer**.

I use beautiful words to write books.

One day you steal my words. You just copy my words and use them as your own, you pretend that you wrote them.

I call the police,



The consequence of **plagiarism**

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Maybe I am a **writer**.

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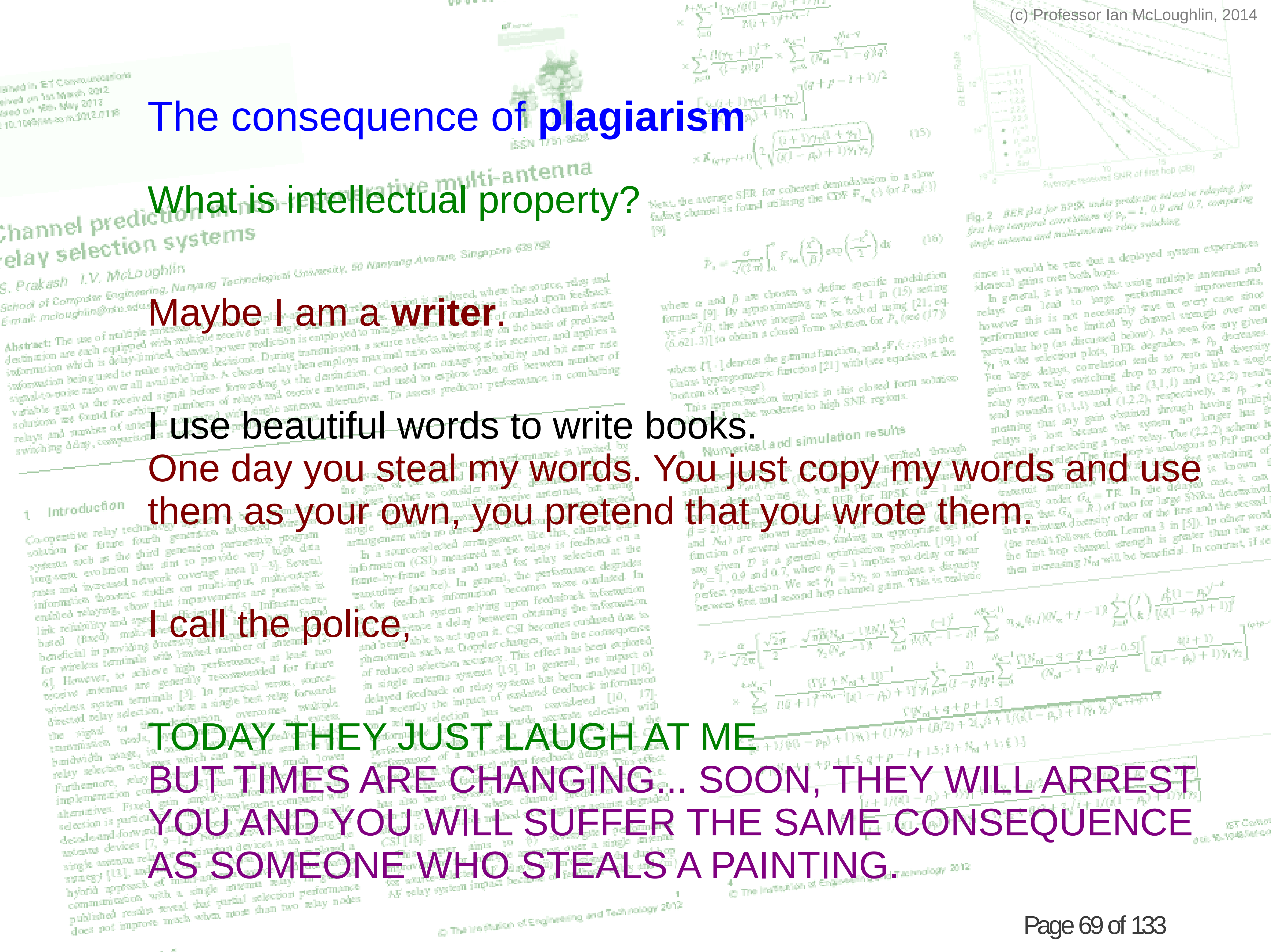
I call the police,

TODAY THEY JUST LAUGH AT ME



The consequence of **plagiarism**

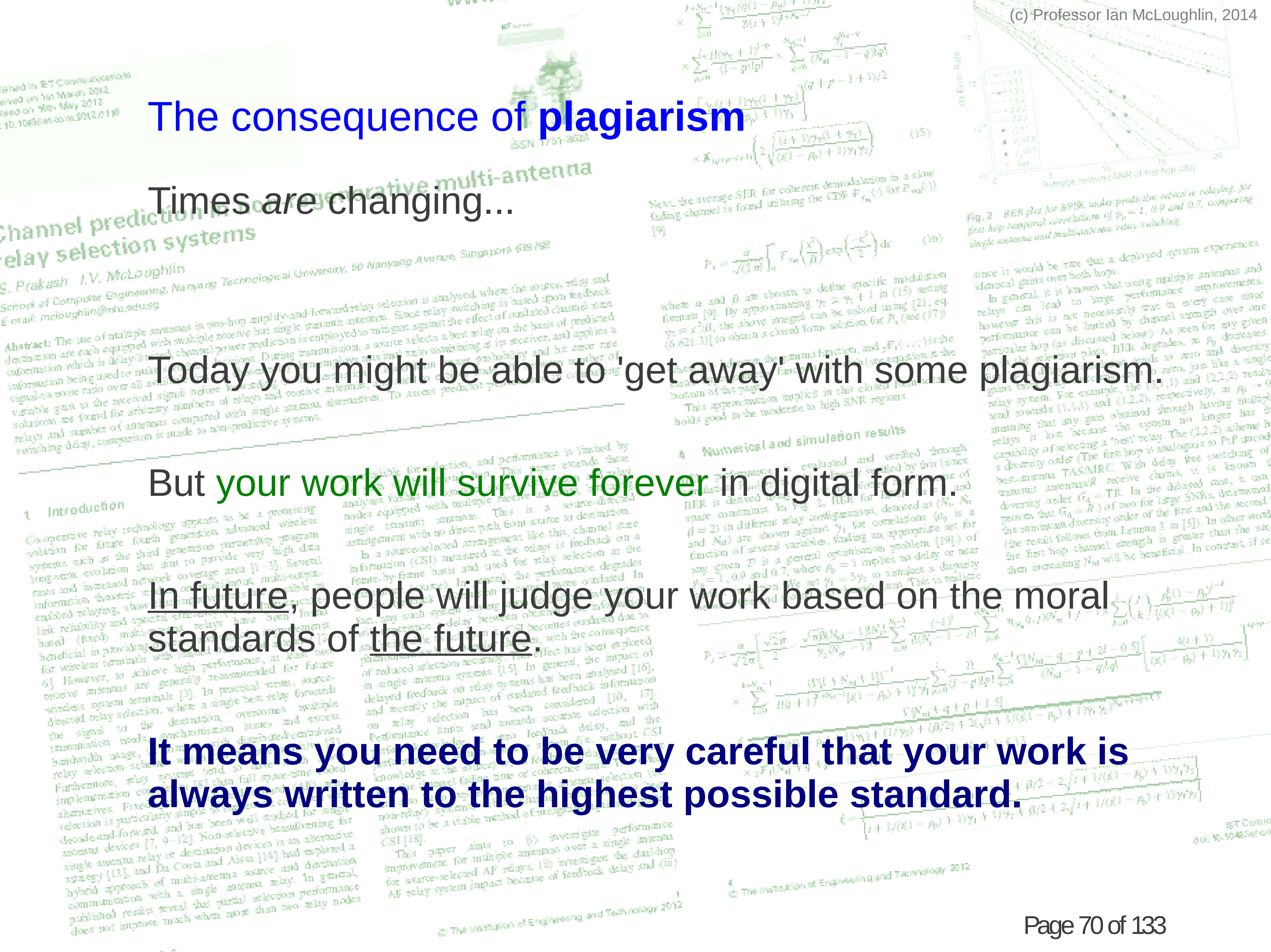
What is intellectual property?

Maybe I am a **writer**.

I use beautiful words to write books.
One day you steal my words. You just copy my words and use them as your own, you pretend that you wrote them.

I call the police,

TODAY THEY JUST LAUGH AT ME
BUT TIMES ARE CHANGING... SOON, THEY WILL ARREST YOU AND YOU WILL SUFFER THE SAME CONSEQUENCE AS SOMEONE WHO STEALS A PAINTING.



The consequence of **plagiarism**

Times *are* changing...

Today you might be able to 'get away' with some plagiarism.

But your work will survive forever in digital form.

In future, people will judge your work based on the moral standards of the future.

It means you need to be very careful that your work is always written to the highest possible standard.

Tables in LaTeX

Back to LaTeX... Tables are important – we use them a lot when we want to structure text.

Not only when we want to put a TABLE into the paper.

```
\begin{table}
    \centering
    \begin{tabular}{              }

    \end{tabular}
\end{table}
```

This defines the number of columns

The content of the table goes in here

Tables in LaTeX

5 columns, all are LEFT justified 'l' (could be 'r' or 'c' instead, or use '|' to give border lines)

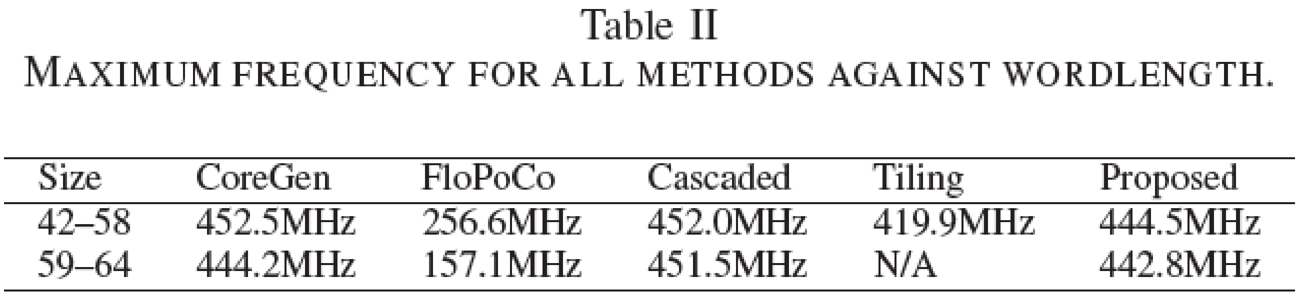


Table II

MAXIMUM FREQUENCY FOR ALL METHODS AGAINST WORDLENGTH.

Size	CoreGen	FloPoCo	Cascaded	Tiling	Proposed
42–58	452.5MHz	256.6MHz	452.0MHz	419.9MHz	444.5MHz
59–64	444.2MHz	157.1MHz	451.5MHz	N/A	442.8MHz

```
\begin{table}
\centering
{ \caption{Maximum frequency for all methods against wordlength.}
\begin{tabular}{llllll}
  \hline
  Size & CoreGen & FloPoCo & Cascaded & Tiling & Proposed\\
  \hline
  42--58 & 452.5MHz & 256.6MHz & 452.0MHz & 419.9MHz & 444.5MHz\\
  59--64 & 444.2MHz & 157.1MHz & 451.5MHz & N/A & 442.8MHz\\
  \hline
\end{tabular}
}
\label{fig_freq}
\end{table}
```

Tables in LaTeX

Horizontal line

Divides the columns

End of line

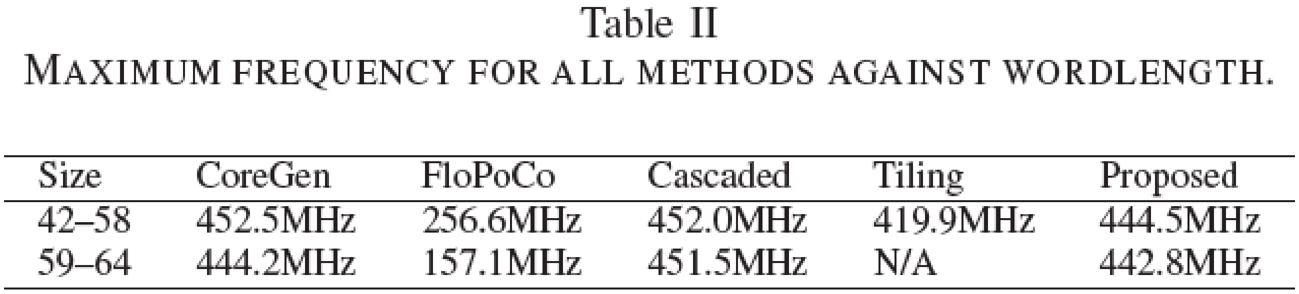


Table II
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Size	CoreGen	FloPoCo	Cascaded	Tiling	Proposed
42–58	452.5MHz	256.6MHz	452.0MHz	419.9MHz	444.5MHz
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```
\begin{table}
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\begin{tabular}{llllll}
  \hline
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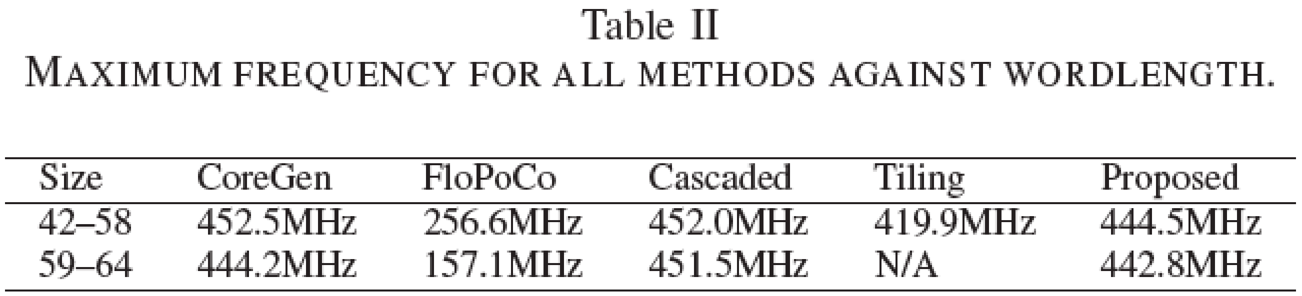
  \hline
  42--58 & 452.5MHz & 256.6MHz & 452.0MHz & 419.9MHz & 444.5MHz\\
  59--64 & 444.2MHz & 157.1MHz & 451.5MHz & N/A & 442.8MHz\\
  \hline
\end{tabular}
}
\label{fig_freq}
\end{table}
```

Tables in LaTeX

Define the caption text... (if we want the caption under the table, move this line to after \end{tabular}



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42–58	452.5MHz	256.6MHz	452.0MHz	419.9MHz	444.5MHz
59–64	444.2MHz	157.1MHz	451.5MHz	N/A	442.8MHz

```
\begin{table}
\centering
{ \caption{Maximum frequency for all methods against wordlength.}
\begin{tabular}{llllll}
  \hline
  Size & CoreGen & FloPoCo & Cascaded & Tiling & Proposed\\
  \hline
  42--58 & 452.5MHz & 256.6MHz & 452.0MHz & 419.9MHz & 444.5MHz\\
  59--64 & 444.2MHz & 157.1MHz & 451.5MHz & N/A & 442.8MHz\\
  \hline
\end{tabular}
}
\label{fig_freq}
\end{table}
```

Define a label for us to \ref inside the paper...

Tables in LaTeX

Let's try another example. Assume we want a table like this:

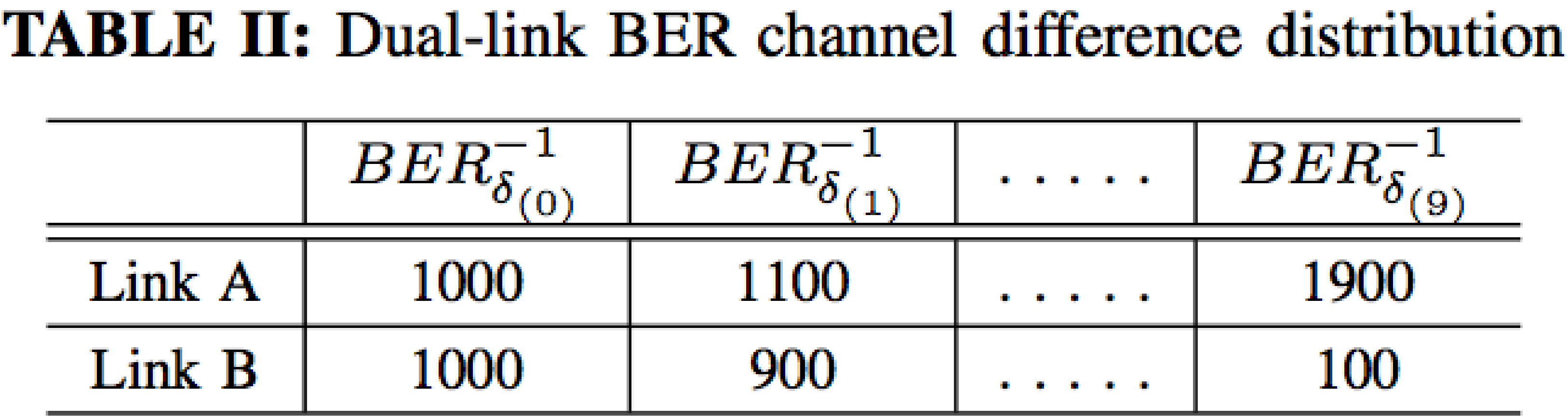


TABLE II: Dual-link BER channel difference distribution

	$BER^{-1}_{\delta_{(0)}}$	$BER^{-1}_{\delta_{(1)}}$	. . . . .	$BER^{-1}_{\delta_{(9)}}$
Link A	1000	1100	. . . . .	1900
Link B	1000	900	. . . . .	100

How would we put this together??

Note: for now we will ignore the maths symbols...

Tables in LaTeX

We start with the basic template for a figure in an IEEE paper.

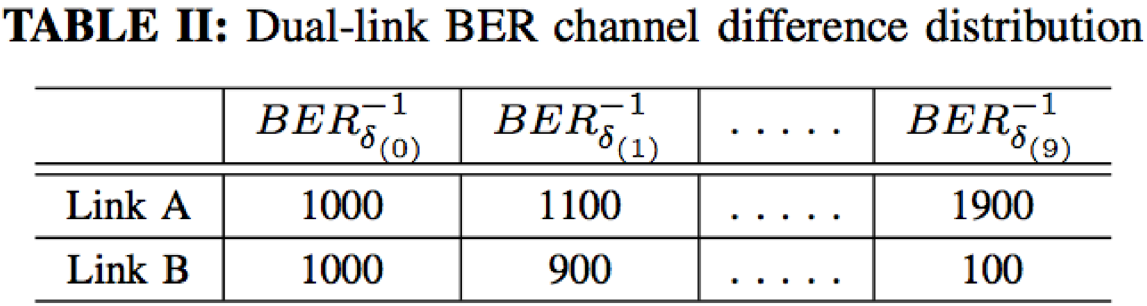


TABLE II: Dual-link BER channel difference distribution

	$BER^{-1}_{\delta_{(0)}}$	$BER^{-1}_{\delta_{(1)}}$	.....	$BER^{-1}_{\delta_{(9)}}$
Link A	1000	1100	.....	1900
Link B	1000	900	.....	100

```
\begin{table}
\centering
{ \caption{      }
\begin{tabular}{      }


\end{tabular}
}
\label{      }
\end{table}
```

Now we just need to fill in the missing parts,

Start with the number of columns...

Tables in LaTeX

We want:

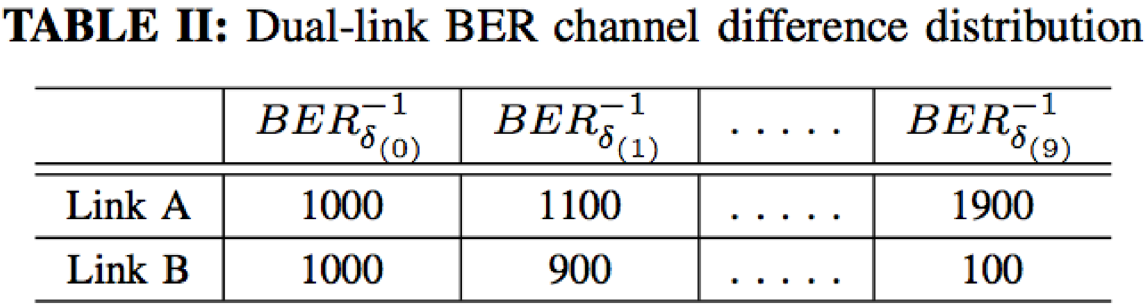


TABLE II: Dual-link BER channel difference distribution

	$BER^{-1}_{\delta_{(0)}}$	$BER^{-1}_{\delta_{(1)}}$	.....	$BER^{-1}_{\delta_{(9)}}$
Link A	1000	1100	.....	1900
Link B	1000	900	.....	100

5 columns

All are CENTRE justified

There are border lines ('|') between all columns except the outside ones...

So the column specification is:

c|c|c|c|c

```
\begin{table}
\centering
{ \caption{      }
\begin{tabular}{c|c|c|c|c}


\end{tabular}
}
\label{      }
\end{table}
```

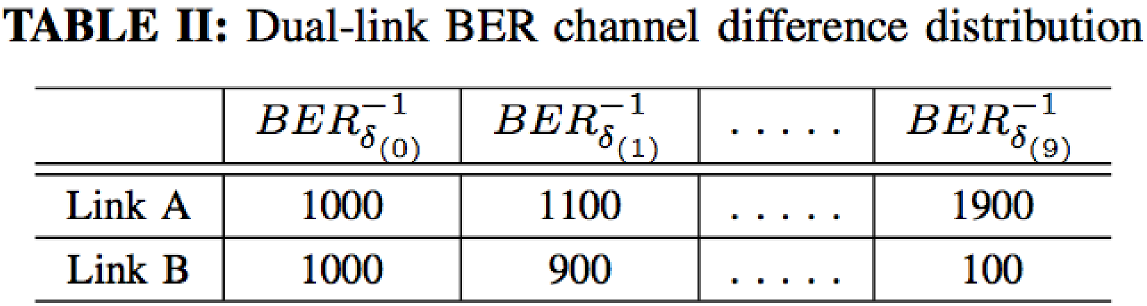
Tables in LaTeX

Working from the top down, fill in the rows.

Start with a horizontal line...

Then, fill in the first row...

Note the space before the first '&' (i.e. the first cell is an empty one)



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	$BER^{-1}_{\delta_{(0)}}$	$BER^{-1}_{\delta_{(1)}}$	. . . . .	$BER^{-1}_{\delta_{(9)}}$
Link A	1000	1100	. . . . .	1900
Link B	1000	900	. . . . .	100

```
\begin{table}
\centering
{ \caption{      }
\begin{tabular}{c|c|c|c|c}
\hline
 & BER & BER & ..... & BER\\

\end{tabular}
}
\label{      }
\end{table}
```

Tables in LaTeX

Next, we put two horizontal lines...

Then continue...

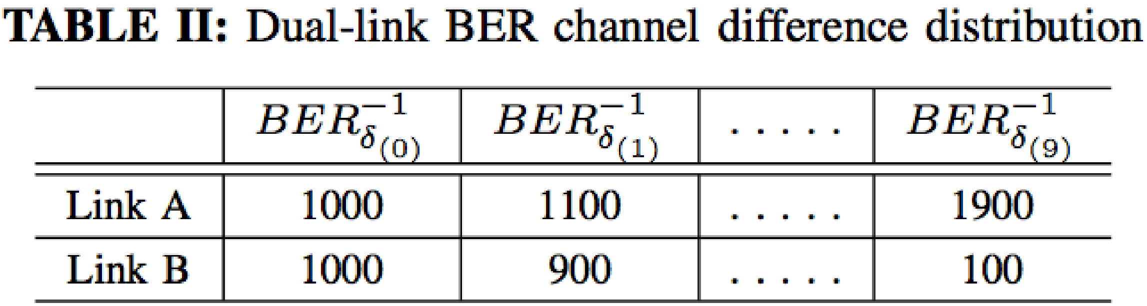


TABLE II: Dual-link BER channel difference distribution

	$BER_{\delta_{(0)}}^{-1}$	$BER_{\delta_{(1)}}^{-1}$	.....	$BER_{\delta_{(9)}}^{-1}$
Link A	1000	1100	.....	1900
Link B	1000	900	.....	100

```
\begin{table}
\centering
{ \caption{      }
\begin{tabular}{c|c|c|c|c}
\hline
 & BER & BER & ..... & BER\\
\hline
\hline
Link A & 1000 & 1100 & ..... & 1900\\
\hline
Link B & 1000 & 900 & ..... & 100\\
\hline
\end{tabular}
}
\label{      }
\end{table}
```

Tables in LaTeX

Finally, complete the figure caption and give it a meaningful label...

In this way, we can build up some really complicated tables.

This is especially good when we want a program-generated table!

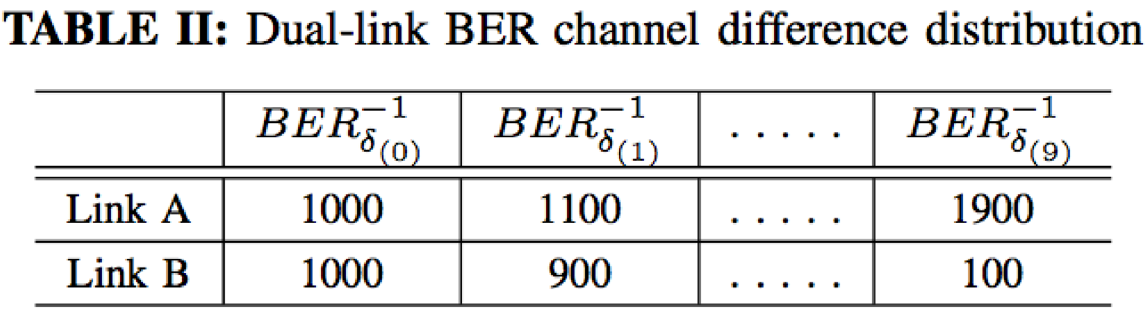


TABLE II: Dual-link BER channel difference distribution

	$BER^{-1}_{\delta_{(0)}}$	$BER^{-1}_{\delta_{(1)}}$	.....	$BER^{-1}_{\delta_{(9)}}$
Link A	1000	1100	.....	1900
Link B	1000	900	.....	100

```
\begin{table}
\centering
{ \caption{Dual-link BER channel
different distribution}
\begin{tabular}{c|c|c|c|c}
\hline
 & BER & BER & ..... & BER\\
\hline
\hline
Link A & 1000 & 1100 & ..... & 1900\\
\hline
Link B & 1000 & 900 & ..... & 100\\
\hline
\end{tabular}
}
\label{tab:ber_diffs}
\end{table}
```

Tables in LaTeX – **advanced** topics

Here is a very complicated example...

```
\begin{tabular}{|c|c|c|c|c||c|}
\hline
      & \multicolumn{4}{|l||}
{\textbf{Double ended measures}} &
{\textbf{Single end}}\\
Test & LLR & \small{SSNR} & IS
& P.862 & {P.563~~~~}\\[0.4ex]
\hline
&&&&&\\[-2ex]  % one very small row to
make space for the fraction below.  ex
extends the row height
$S \rightarrow W$ & 0.827 & 26.92 & 12.70
 &  $\frac{1.234}{0.559}$ &  $S=3.620$ \\
[0.4ex]
$W \rightarrow S'$ & 0.696 & 22.74 & 3.09
&  $\frac{0.958}{0.589}$ & $W=2.864$ \\
[0.6ex]
$S \rightarrow S'$ & 0.789 & 25.55 &
10.44 & $\frac{0.680}{0.648}$ &
$S'=3.394$ \\[0.4ex]
\hline
\end{tabular}
\end{table}
```

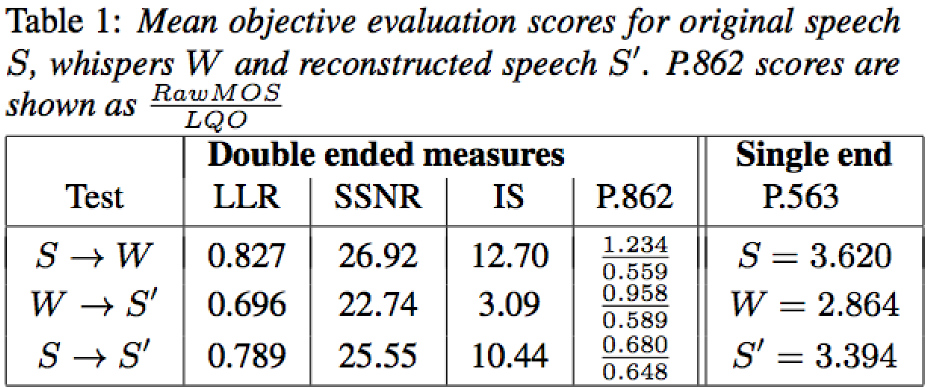


Table 1: *Mean objective evaluation scores for original speech S, whispers W and reconstructed speech S'. P.862 scores are shown as* $\frac{RawMOS}{LQO}$

	Double ended measures				**Single end**
Test	LLR	SSNR	IS	P.862	P.563
$S \rightarrow W$	0.827	26.92	12.70	$\frac{1.234}{0.559}$	$S = 3.620$
$W \rightarrow S'$	0.696	22.74	3.09	$\frac{0.958}{0.589}$	$W = 2.864$
$S \rightarrow S'$	0.789	25.55	10.44	$\frac{0.680}{0.648}$	$S' = 3.394$

\multicolumn allows some text to span a few columns.

You must specify borders and justification.

[1ex] adds extra row height.

Anything between \$ and \$ is maths – ignore it for now.

Tables in LaTeX – more information

You can do a lot with tables. Here are some examples that I've used in the past:

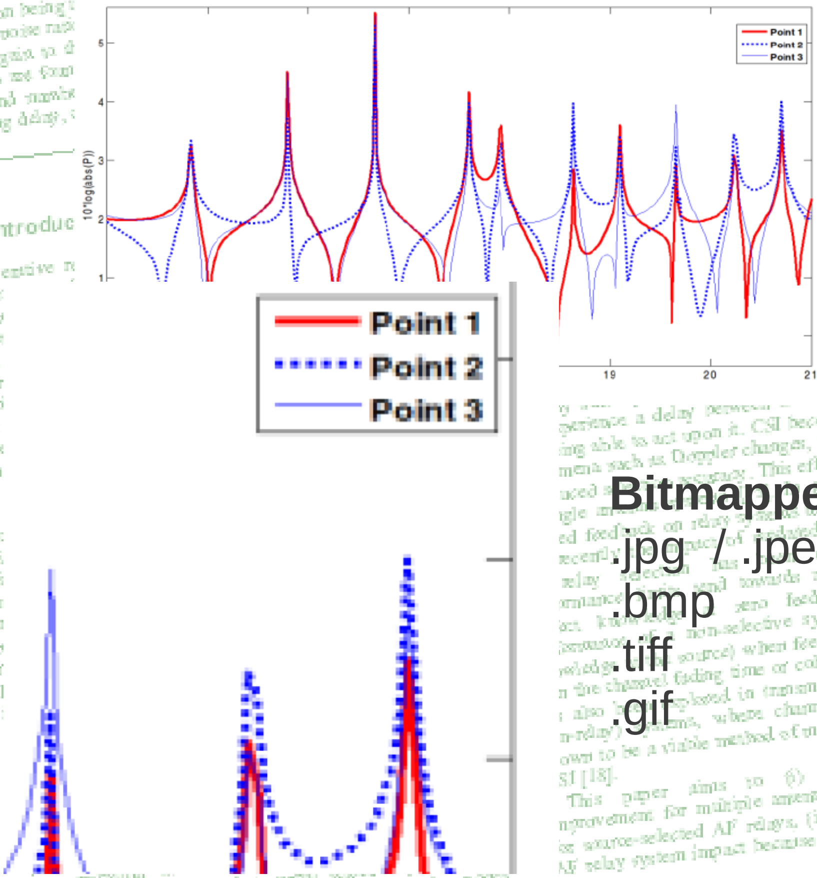
1. Have a table containing other tables.
2. Have a table containing figures.
3. Rotate the table 90 degrees.
4. Span the table across multiple pages (by default it will always fit to one page).
5. Have text spanning several cells vertically (the example we showed was to span horizontally).

You can find a lot of material online about LaTeX tables!

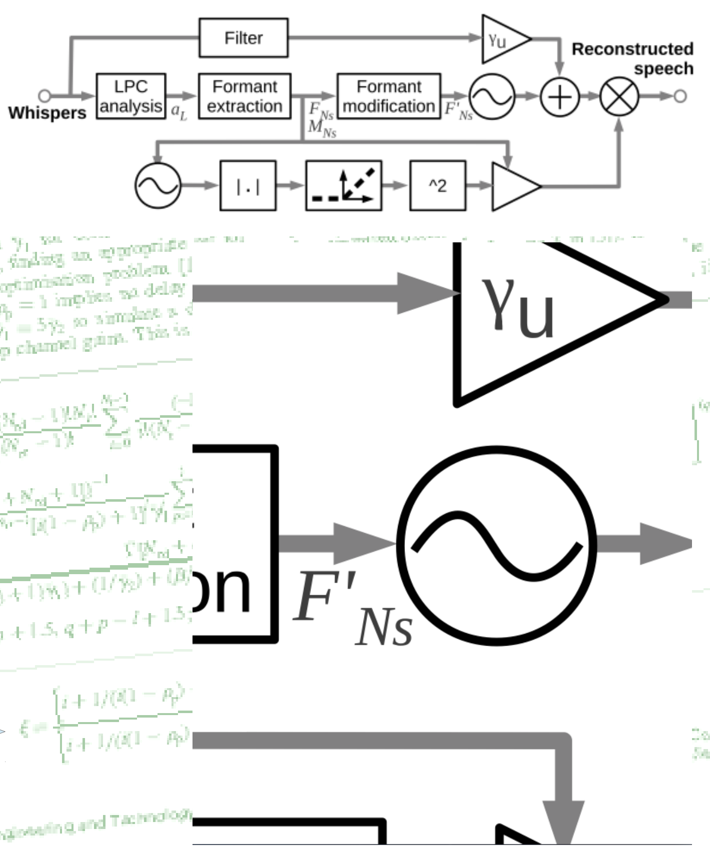
Figures in LaTeX

Figures are important. They contribute a lot to the “look and feel” of any paper.

You should **ALWAYS** make sure your figures are in **vector format** (unless your figure is a photograph or similar)...



Bitmapped
.jpg / .jpeg
.bmp
.tiff
.gif



Vector
.eps

.pdf
.ps
can be both

Figures in LaTeX

How do I create my figures?

From MATLAB/Octave – I just 'print' them as .eps files directly.

From OpenOffice/LibreOffice spreadsheet plot (calc), I just create the plot, select it and export as .eps format.

For other figures, I draw the figure in OpenOffice/LibreOffice, then select it and export as .eps format. Very quick, very easy and 100% reliable.

Easy to convert between eps, pdf, ps on Linux and OS-X

Figures in LaTeX

Several ways to include figures, we will use the current IEEE paper method.

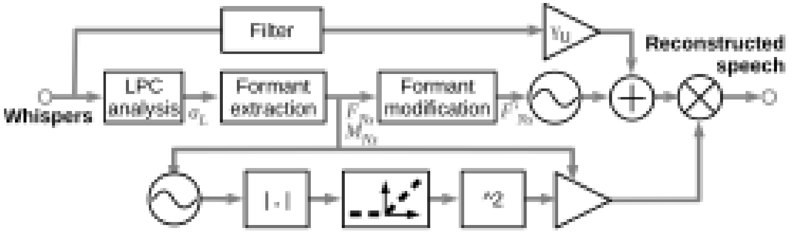


Figure 1: *Block diagram of reconstruction mechanism.*

```
\begin{figure}[t]
\centerline{\epsfig{figure=block_diag,width=80mm}}
\caption{{\it Block diagram of reconstruction mechanism.}}
\label{fig:blockdiag}
\end{figure}
```

This includes the file “block_diag.eps”, scaling it to be 8cm wide and giving it the specified caption & label.

[t] means the figure will be located at the 'top' of a page if possible (we could have [b] for 'bottom' or [h] for 'here', but none are guaranteed to be in those locations...)

Figures in LaTeX

That was the 'new' method. Many journals and conferences still use the 'old' method:

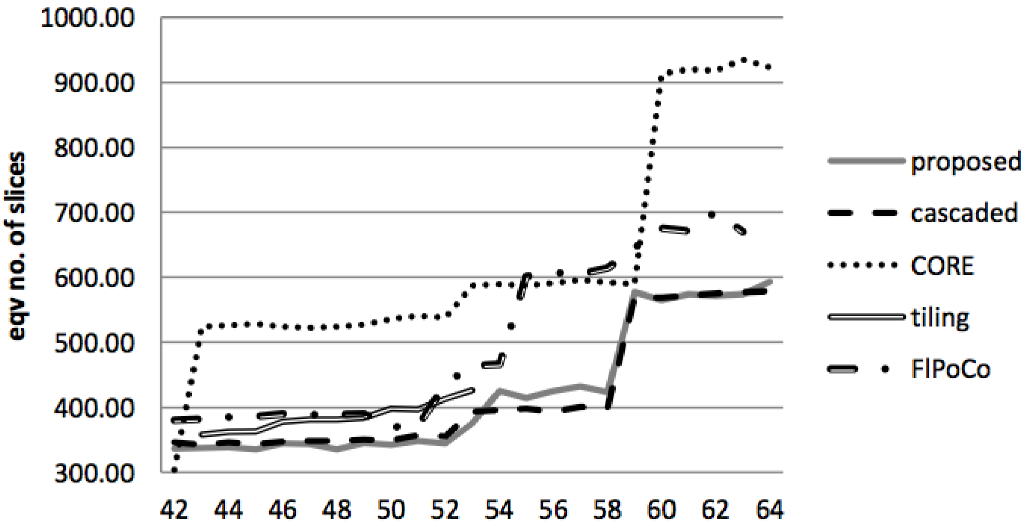


Figure 6. Equivalent Slice usage for All Methods

```
\begin{figure}
\centering
\includegraphics[width=10cm,height=6cm]{area.pdf}
\caption{Equivalent Slice usage for All Methods}
\label{fig_slice}
\end{figure}
```

Figures in LaTeX

By default, in a 2-column paper, figures fit into 1 column. But if you have a very 'wide' figure you can force it to fit across an entire page with:

```
\begin{figure*}

\end{figure*}
```

```
\begin{figure}

\end{figure}
```

The same thing is true of `table` and `table*`

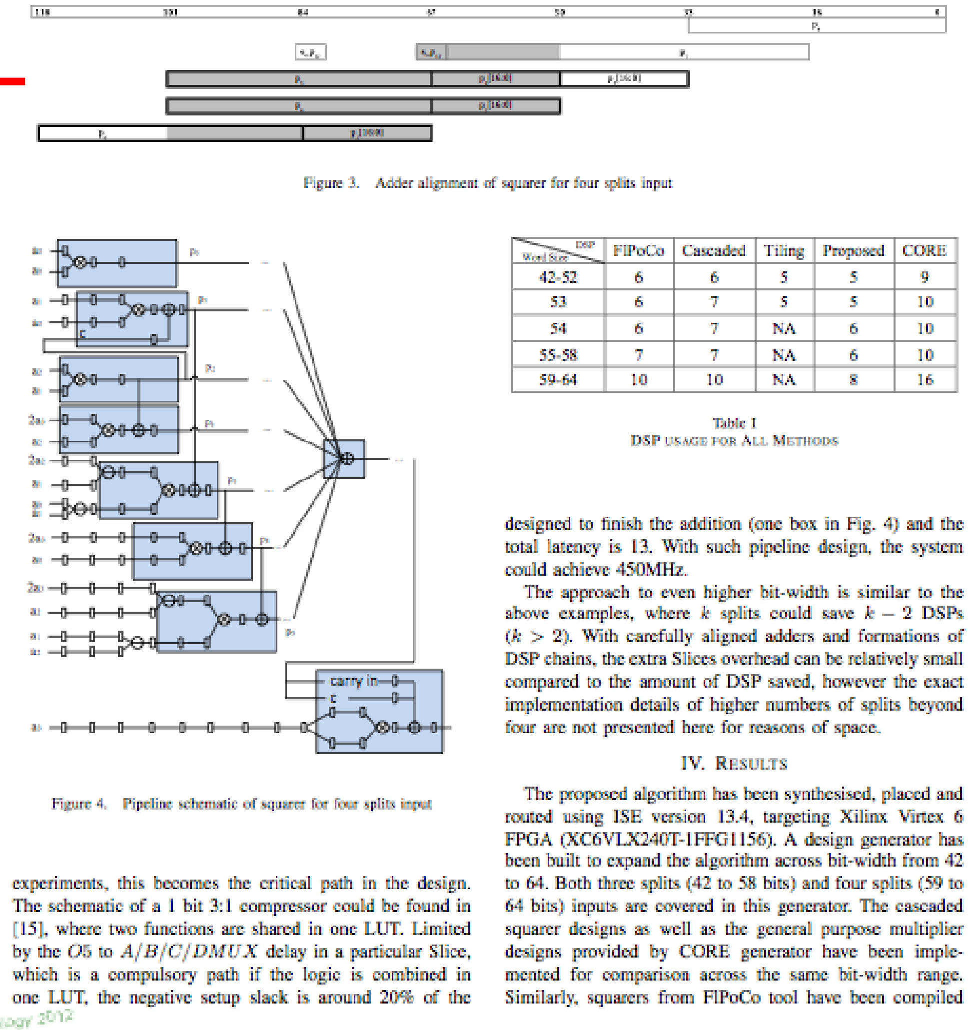


Figure 3. Adder alignment of squarer for four splits input

Figure 4. Pipeline schematic of squarer for four splits input

DSP / Word Size	FlPoCo	Cascaded	Tiling	Proposed	CORE
42-52	6	6	5	5	9
53	6	7	5	5	10
54	6	7	NA	6	10
55-58	7	7	NA	6	10
59-64	10	10	NA	8	16

Table I
DSP USAGE FOR ALL METHODS

experiments, this becomes the critical path in the design. The schematic of a 1 bit 3:1 compressor could be found in [15], where two functions are shared in one LUT. Limited by the $O5$ to $A/B/C/DMUX$ delay in a particular Slice, which is a compulsory path if the logic is combined in one LUT, the negative setup slack is around 20% of the

designed to finish the addition (one box in Fig. 4) and the total latency is 13. With such pipeline design, the system could achieve 450MHz.

The approach to even higher bit-width is similar to the above examples, where k splits could save $k-2$ DSPs ($k > 2$). With carefully aligned adders and formations of DSP chains, the extra Slices overhead can be relatively small compared to the amount of DSP saved, however the exact implementation details of higher numbers of splits beyond four are not presented here for reasons of space.

IV. RESULTS

The proposed algorithm has been synthesised, placed and routed using ISE version 13.4, targeting Xilinx Virtex 6 FPGA (XC6VLX240T-1FFG1156). A design generator has been built to expand the algorithm across bit-width from 42 to 64. Both three splits (42 to 58 bits) and four splits (59 to 64 bits) inputs are covered in this generator. The cascaded squarer designs as well as the general purpose multiplier designs provided by CORE generator have been implemented for comparison across the same bit-width range. Similarly, squarers from FlPoCo tool have been compiled

Figures in LaTeX

The subfig package allows you to include two graphs or diagrams as subfigures:

```
begin{figure*}
\label{fig:fig3}
\centering
\subfigure{
    \includegraphics[trim=6mm 0mm 0mm
    8mm,clip,width=9cm,height=5.8cm]
    {figures/out_8new.eps}
    }
\subfigure{
    \includegraphics[trim=6mm 1mm 0mm
    10mm,clip,width=9cm,height=5.8cm]
    {figures/out_15new.eps}
    }
\end{figure*}
```

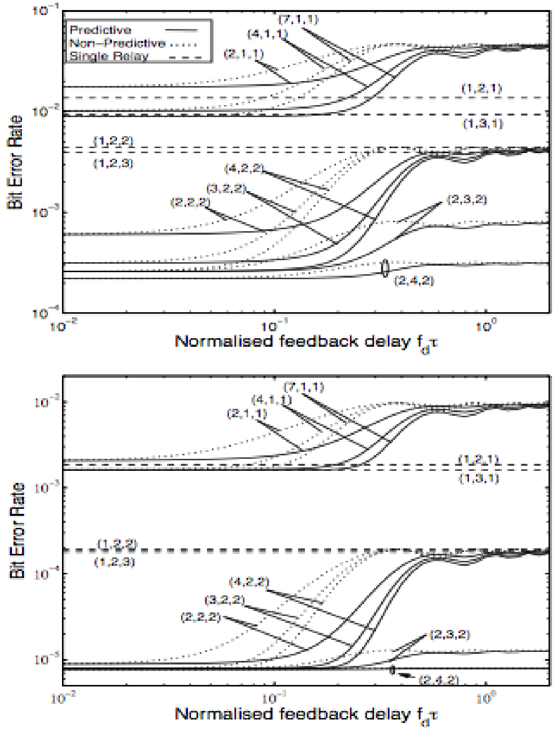


Figure 3: BER degradation due to feedback delay with and without prediction at $\bar{\gamma}_1 = 8dB$ (top) and $\bar{\gamma}_1 = 15dB$ (bottom) for different relay schemes with $\bar{\gamma}_2 = 5\bar{\gamma}_1$.

Note: to make this work, you will need to “include” the package by adding this line after \documentclass at the top of your file:

```
\usepackage[tight,footnotesize]{subfigure}
```

Figures in LaTeX

Finally, one more useful thing:

`\vspace{}`

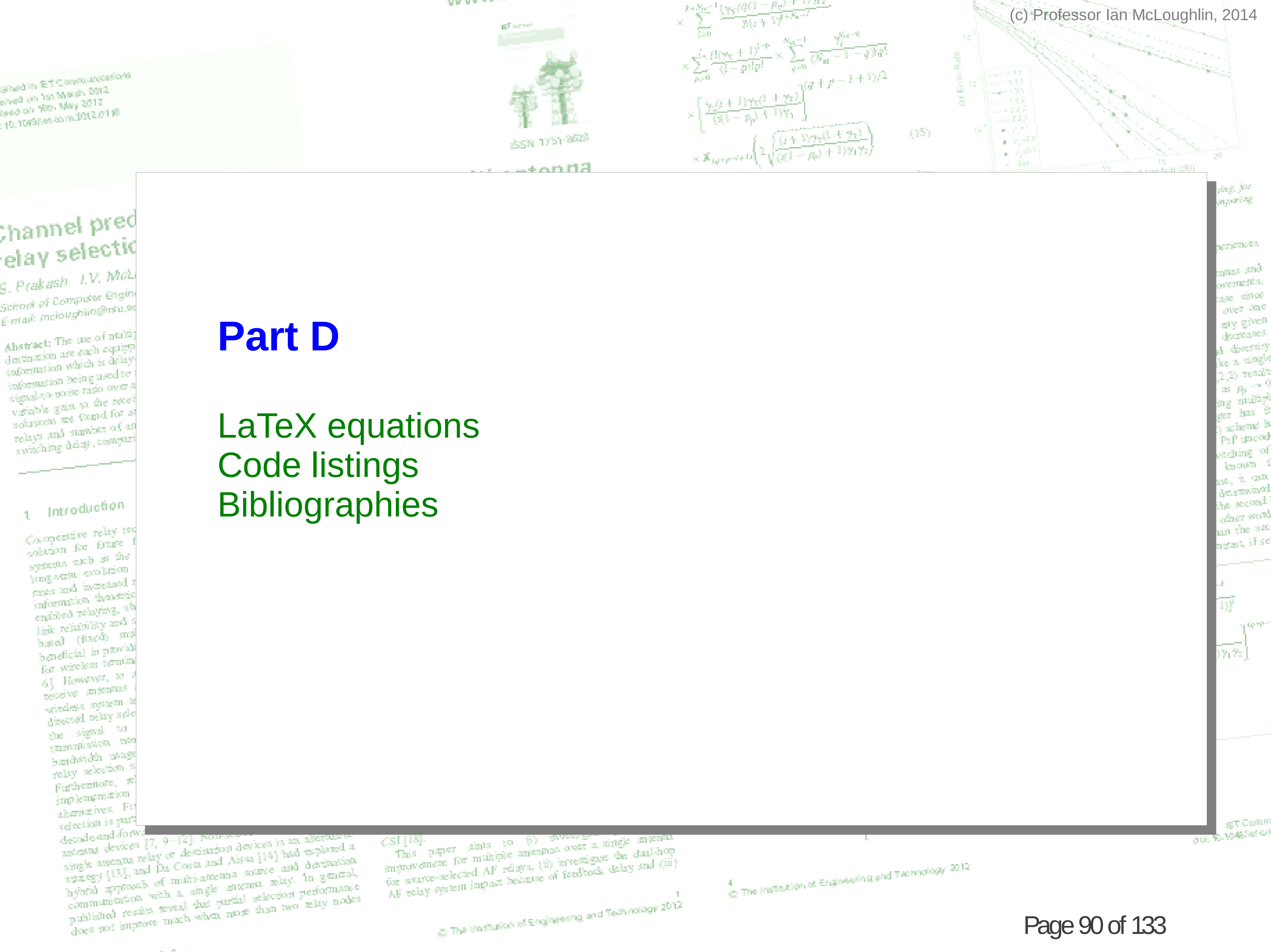
can be used to add some vertical space (for example, put it after a table to increase the space between the table and the following text).

But you can also do this:

`\vspace{-4mm}`

to reduce the space. This is very useful when LaTeX leaves a gap that's too big!

There are thousands of other things you can do with figures



Part D

LaTeX equations
Code listings
Bibliographies

Equations in LaTeX - overview

This is the strong point of LaTeX. It is why many people decide to use LaTeX. The equations formatting is really, really good.

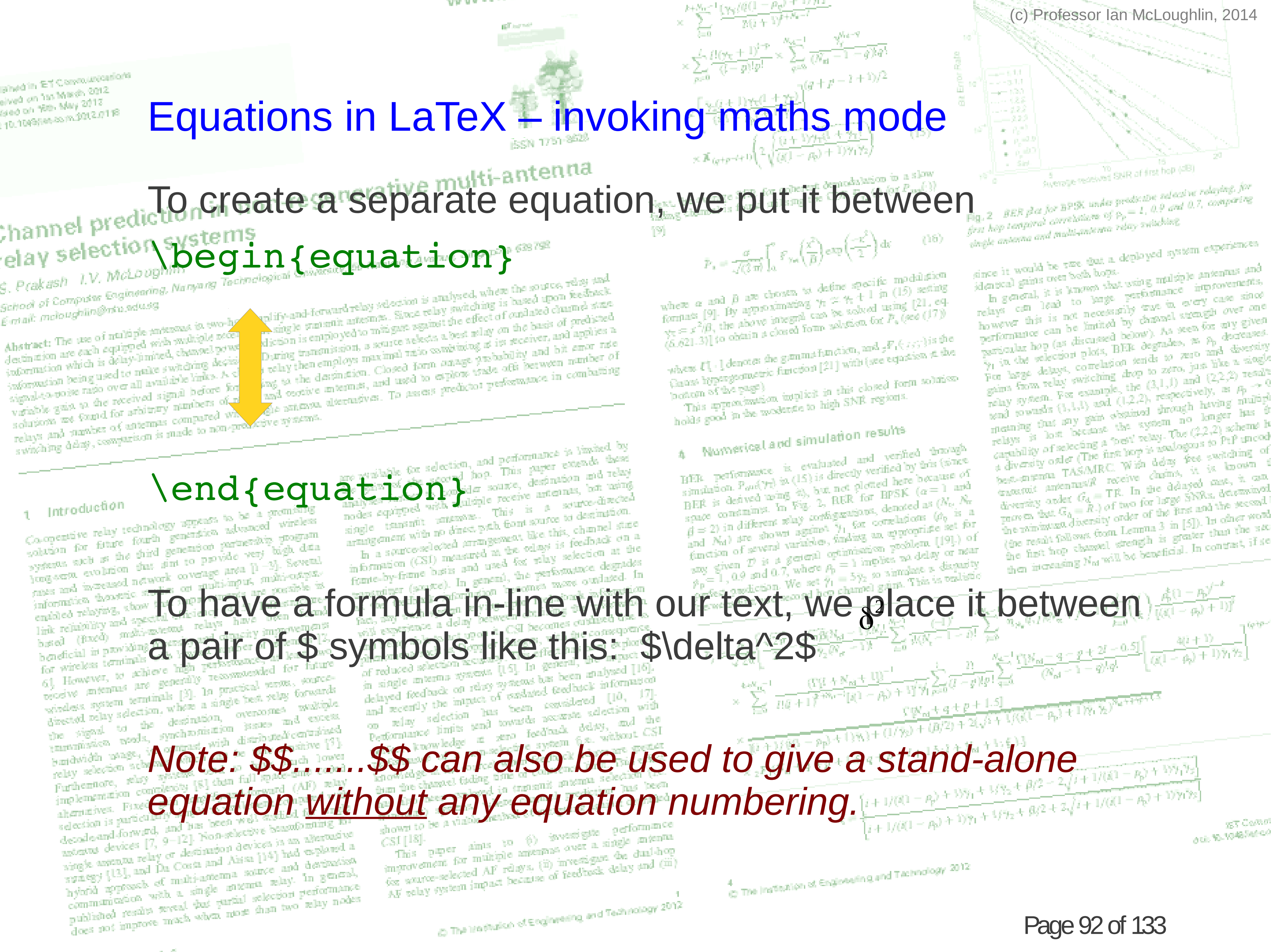
$$\hat{\gamma}_i(k+\mathcal{D}) = \frac{\mathcal{E}_1}{N_0}\sum_{j=1}^{N_{rr}} \left|\hat{h}_{ij}(k+\mathcal{D})\right|^2 \qquad (1)$$

Automatic

where $\mathcal{E}_1$ is the power of the transmitted signal at M_S and $\hat{h}_{ij}\left(k+\mathcal{D}\right) = \mathbf{w}_{opt}^H \widetilde{\mathbf{h}}_{ij}$ is the

```
\begin{equation}
{\hat{\gamma}_i}(k+\mathbf{\mathcal{D}})=
\frac{\mathcal{E}_{1}}{N_0}\sum^{N_{rr}}_{j=1\
}{{\left|{\hat{h}}_{ij}(k+\mathcal{D})\right|}^2}
\end{equation}

Where $\mathcal{E}_1$ is the power of the transmitted
signal at $M_{S}$ and ${\hat{h}}_{ij}\left(k+
{\mathcal{D}}\right) \! =\mathbf{w}_{opt}^H
{\widetilde{{\mathbf h}}}^{\ \ }_{ij}$ is the
```



Equations in LaTeX – invoking maths mode

To create a separate equation, we put it between

```
\begin{equation}
```

```
\end{equation}
```

To have a formula in-line with our text, we δ^2 place it between a pair of $ symbols like this: `$\delta^2$`

Note: $$……$$ can also be used to give a stand-alone equation <u>without</u> any equation numbering.

Equations in LaTeX – further information on equations

This document can't teach you everything you need to know about equations in LaTeX, but will give you enough to get started.

Later, when you need something more, you can find almost everything you will ever need here:

`http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/latex_maths+pix/latex_maths+pix.html`

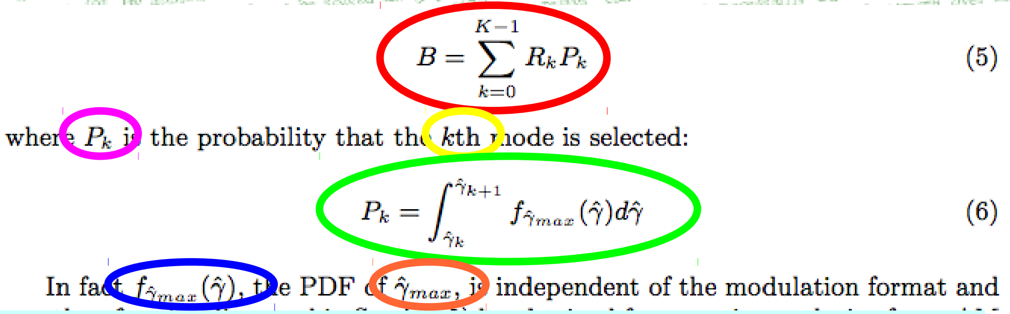
You can also find many other resources on the web for LaTeX equation writing.

Equations in LaTeX – how to write

Build it up gradually... Use { } to set the precedence in displaying equations (they are not displayed unless you do \{}).

Always close your brackets!!

Here are some examples:



$$B = \sum_{k=0}^{K-1} R_k P_k \quad (5)$$

where P_k is the probability that the kth mode is selected:

$$P_k = \int_{\hat{\gamma}_k}^{\hat{\gamma}_{k+1}} f_{\hat{\gamma}_{max}}(\hat{\gamma}) d\hat{\gamma} \quad (6)$$

In fact $f_{\hat{\gamma}_{max}}(\hat{\gamma})$, the PDF of $\hat{\gamma}_{max}$, is independent of the modulation format and

```
\begin{equation}
  \label{eqn:mspa}
  B=\sum_{k=0}^{K-1}R_k  P_k
\end{equation}

where $P_k$ is the probability that the $k$th mode is selected:

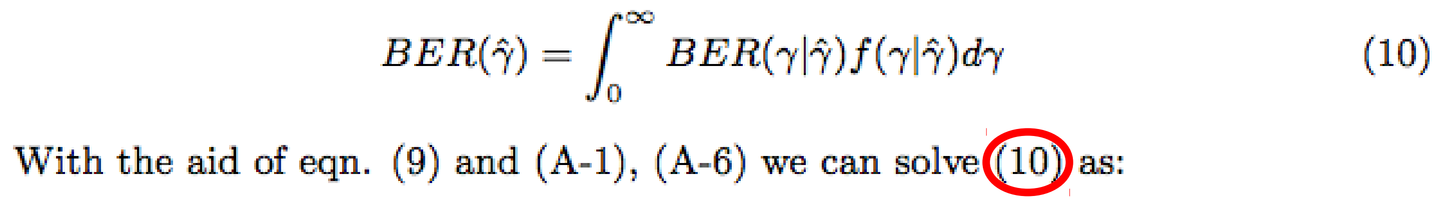
\begin{equation} \label{eqn:msp}
  {P_k}=\int_{\hat\gamma_{k}}^{\hat
  \gamma_{k+1}}  f_{\hat{\gamma}_{max}
  (\hat{\gamma})d{\hat\gamma}
\end{equation}

In fact $f_{\hat{\gamma}_{max}}(\hat{\gamma})$, the PDF of
$\hat{\gamma}_{max}$, is independent of the modulation format
```

Equations in LaTeX – how to write

Equations are numbered automatically. Use `\nonumber` to stop a number being displayed (see next page).

Labels and references work the same as with other labels:



$$BER(\hat{\gamma}) = \int_0^{\infty} BER(\gamma|\hat{\gamma})f(\gamma|\hat{\gamma})d\gamma \tag{10}$$

With the aid of eqn. (9) and (A-1), (A-6) we can solve (10) as:

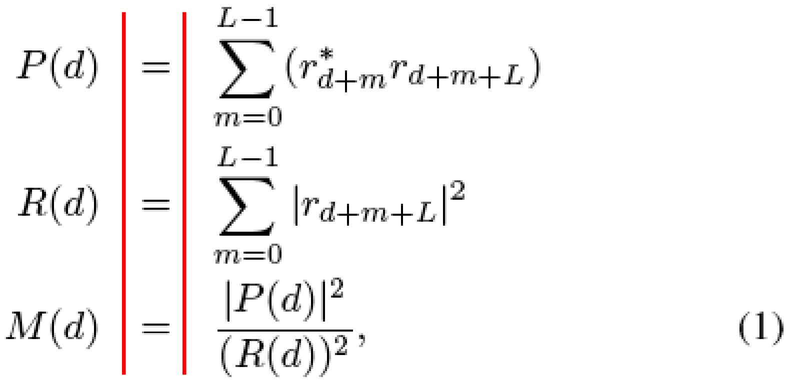
```
\begin{equation} \label{eqn:instber}
{BER(\hat\gamma)}=\int_{0}^{\infty} BER(\gamma|\hat{\gamma})
f(\gamma|\hat{\gamma })d{\gamma}
\end{equation}

With the aid of eqn. (\ref{eqn:instber1}) and
(\ref{eq:pdfint}), (A-6) we can solve (\ref{eqn:instber}) as:
```

Note: in this example, the equation with label {eq:pdfint} is are located in the appendix to the paper.

Equations in LaTeX – how to write

If you have a few equations and you want to line them up neatly, you can use `\eqnarray` to help you:



$$
\begin{eqnarray}
P(d) &=& \sum_{m=0}^{L-1}(r^{*}_{d+m}r_{d+m+L}) \nonumber \\
R(d) &=& \sum_{m=0}^{L-1} |r_{d+m+L}|^2 \nonumber \\
M(d) &=& \frac{|P(d)|^2}{(R(d))^2}, \qquad (1)
\end{eqnarray}
$$

Whatever is between the & & on each line will be aligned – it doesn't have to be an = sign.
\\ means the end of a line.

```
begin{center}
\begin{eqnarray}
P(d) &=&\sum_{m =0}^{L-1}(r^{*}_{d+m}r_{d+m+L} ) \nonumber \\
R(d) &=&\sum_{m =0}^{L-1} |r_{d+m+L}|^2 \nonumber \\
M(d) &=& \frac{|P(d)|^2} {(R(d))^2},
\end{eqnarray}
\end{center}
```

Equations in LaTeX – how to write

Matrices are handled differently – using the array command:

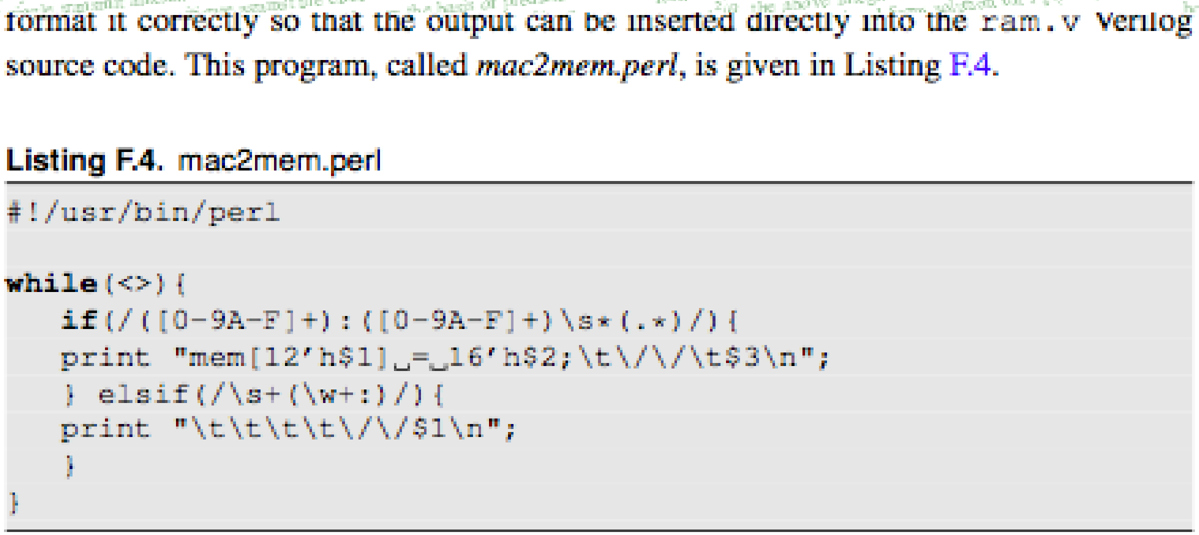
$$\mathbf{C} = \left[\begin{array}{ccc} |s_{HH}|^2 & 0 & s_{HH}s_{VV}^* \\ 0 & 2|s_{HV}|^2 & 0 \\ s_{VV}s_{HH}^* & 0 & |s_{VV}|^2 \end{array}\right]$$

```latex
\begin{eqnarray}
    \textbf{C}=
       \left[
          \begin{array}{ c c c }
   |s_{HH}|^{2}     &      0          & s_{HH}s_{VV}^{*}  \\
          0         & 2|s_{HV}|^{2}  &          0        \\
s_{VV}s_{HH}^{*}    &      0          & |s_{VV}|^{2}
          \end{array}
     \right]
\end{eqnarray}
```

Notice how the array command syntax is similar to the way tables are handled in LaTeX.

Code listings in LaTeX

You can include your code, without changing it, formatting or editing it. This is a *very* good way to NOT introduce errors! It requires the *listings* package: `\usepackage{listings}`



format it correctly so that the output can be inserted directly into the `ram.v` Verilog source code. This program, called *mac2mem.perl*, is given in Listing F.4.

Listing F.4. mac2mem.perl

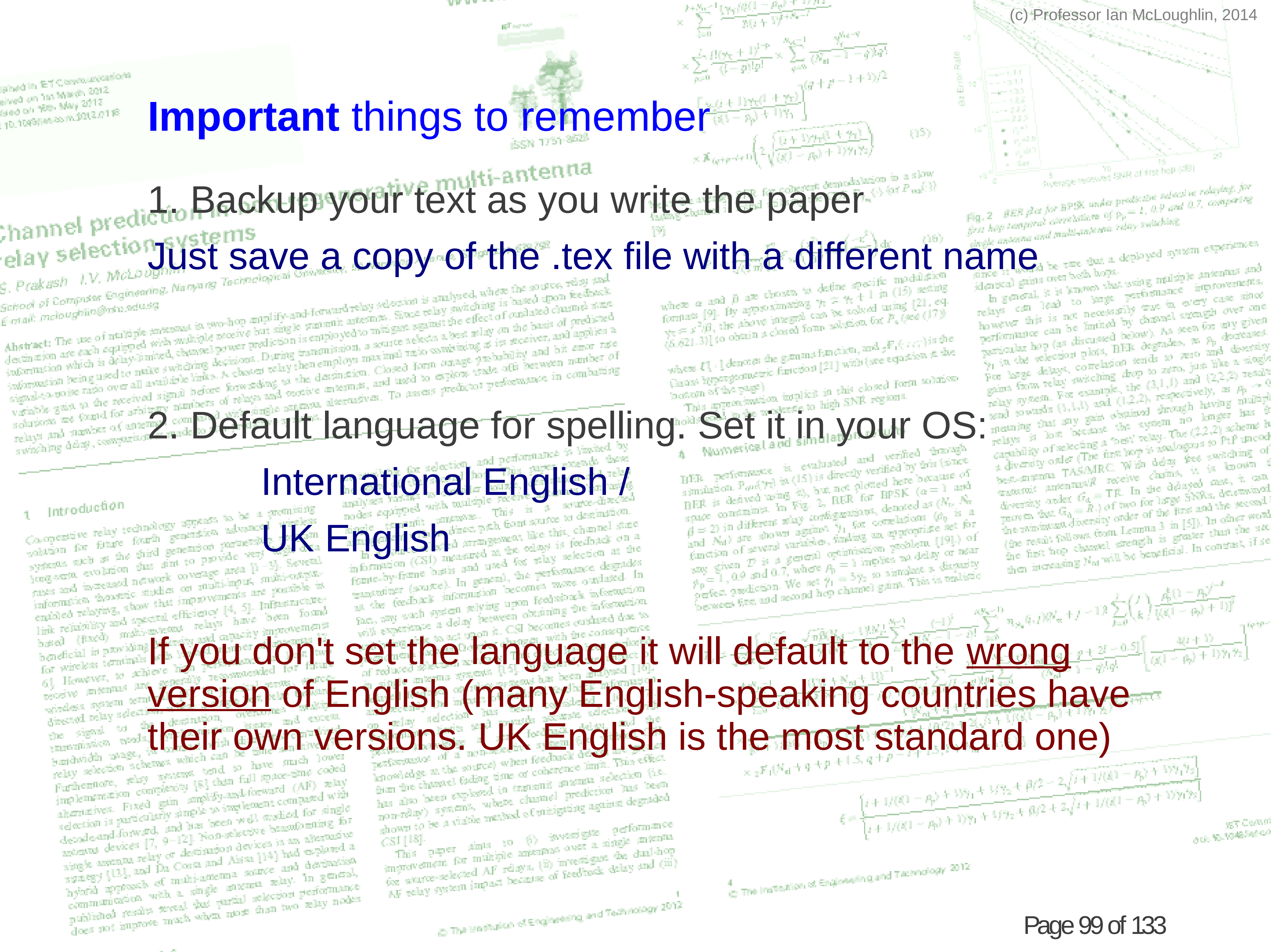
```
#!/usr/bin/perl

while(<>){
   if(/([0-9A-F]+):([0-9A-F]+)\s*(.*)/){
   print "mem[12'h$1]␣=␣16'h$2;\t\/\/\t$3\n";
   } elsif(/\s+(\w+:)/){
   print "\t\t\t\t\/\/$1\n";
   }
}
```

```
This program, called \textit{mac2mem.perl}, is given in
Listing \ref{lst:mac2mem}.

\lstinputlisting[caption=mac2mem.perl, label=lst:mac2mem]
{mac2mem.perl}
```

The listings package has __lots__ of options to change the way the code looks when printed.



Important things to remember

1. Backup your text as you write the paper

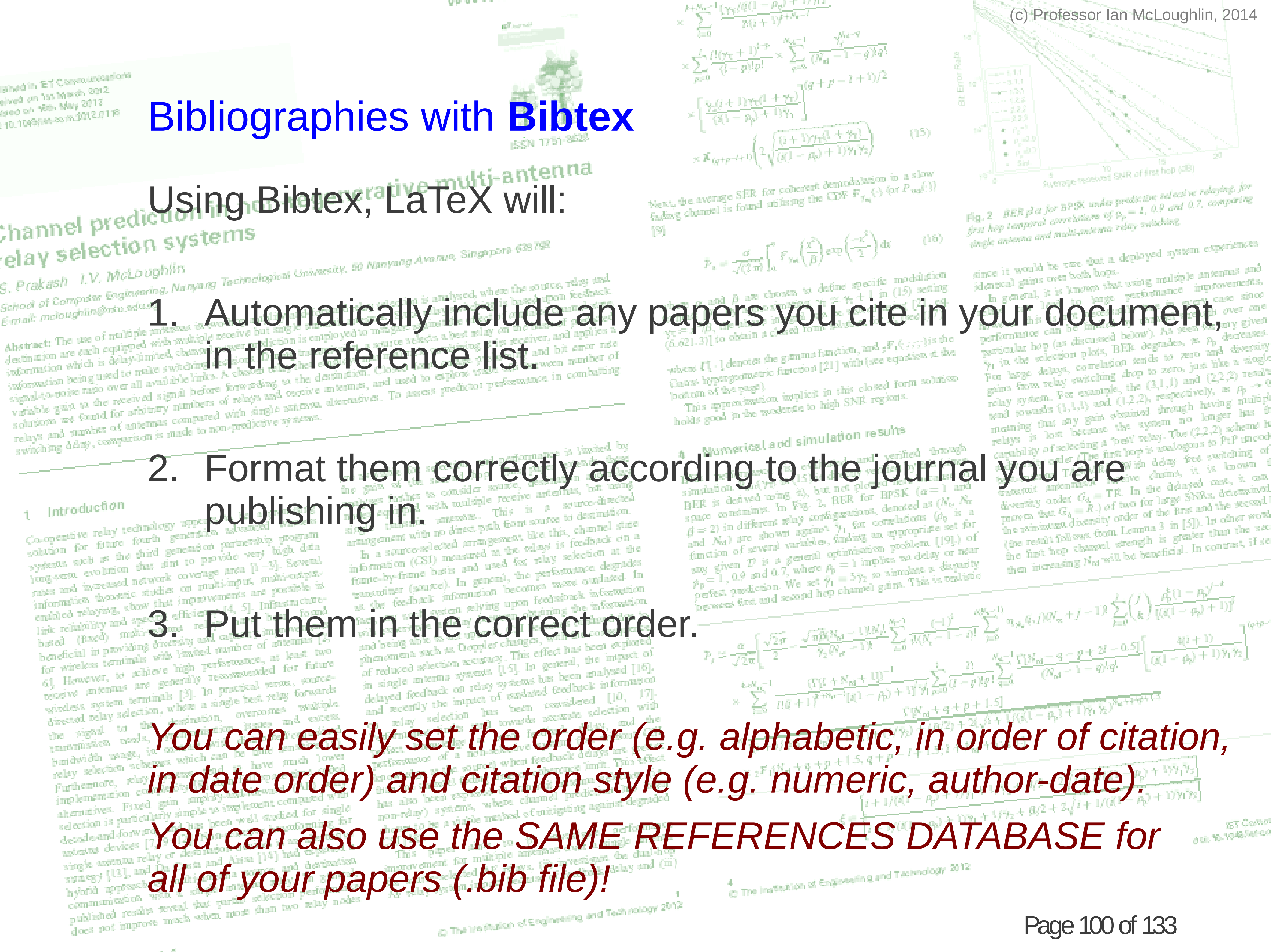
Just save a copy of the .tex file with a different name

2. Default language for spelling. Set it in your OS:

International English /

UK English

If you don't set the language it will default to the wrong version of English (many English-speaking countries have their own versions. UK English is the most standard one)



Bibliographies with **Bibtex**

Using Bibtex, LaTeX will:

1. Automatically include any papers you cite in your document, in the reference list.
2. Format them correctly according to the journal you are publishing in.
3. Put them in the correct order.

You can easily set the order (e.g. alphabetic, in order of citation, in date order) and citation style (e.g. numeric, author-date).

You can also use the SAME REFERENCES DATABASE for all of your papers (.bib file)!

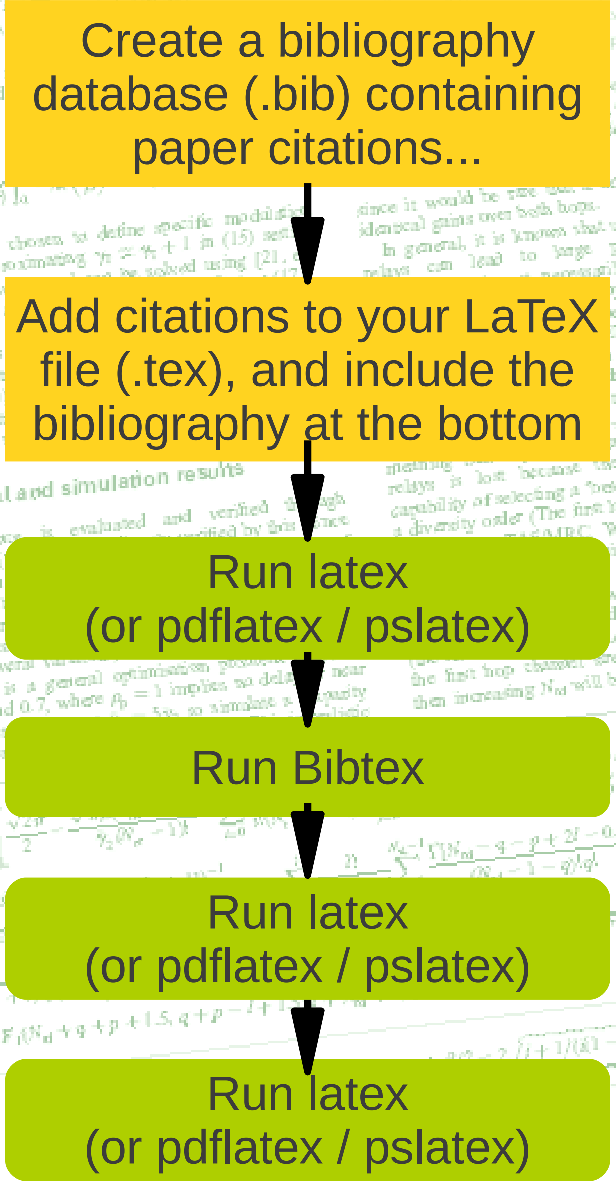
Bibliographies with **Bibtex**

Put all your citations into a .bib file and give them unique labels.

Inside your LaTeX paper, cite the references using the labels from the .bib file.

Include a bibliography at the end of your paper, and tell LaTeX how to format it.

Run Bibtex ONLY when you have added a new reference.



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Run Bibtex

Run latex (or pdflatex / pslatex)

Run latex (or pdflatex / pslatex)

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It's easy to get a Bibtex file. Download the citations from the web. i.e. **Google Scholar:**

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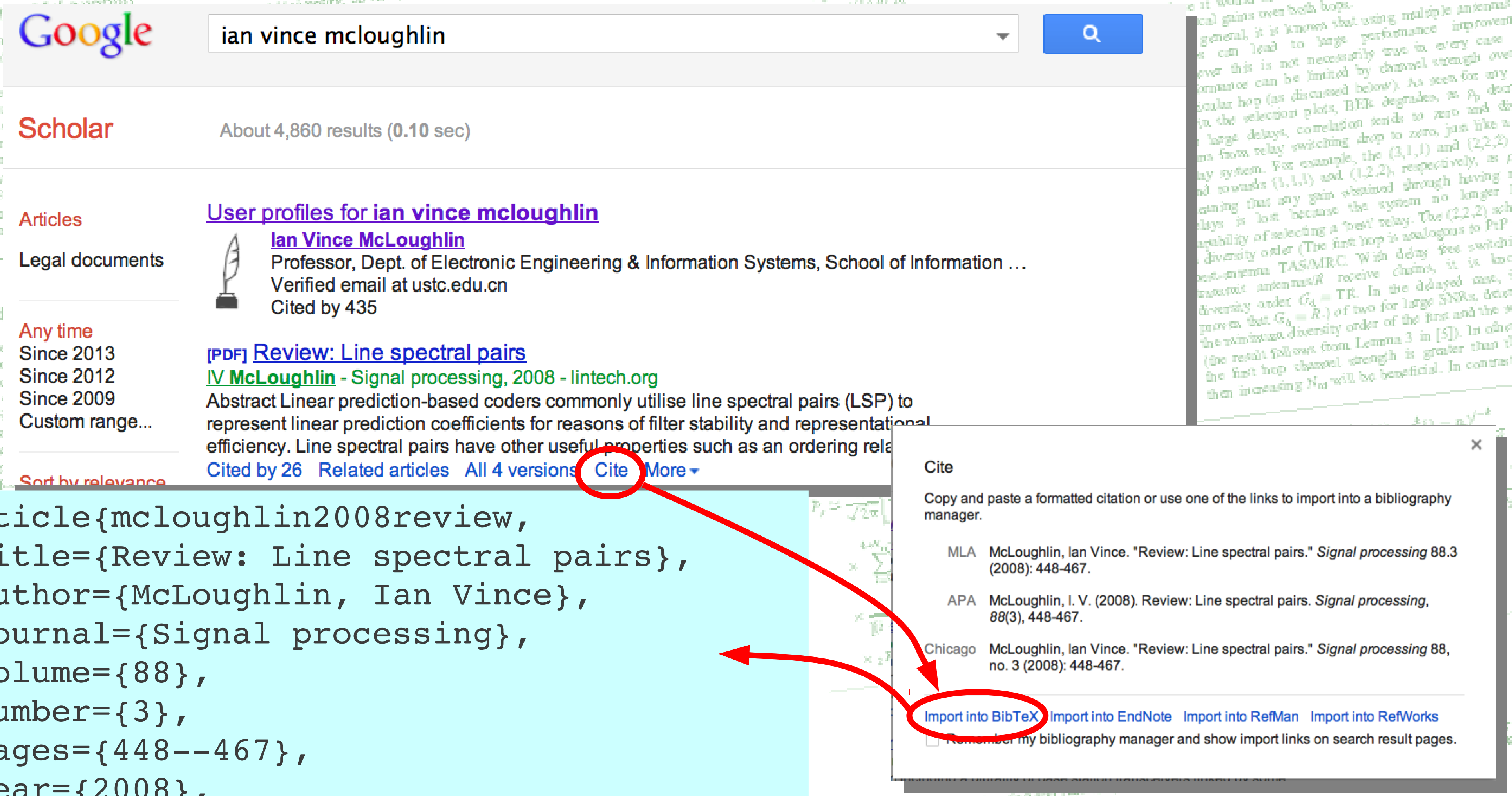

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Verified email at ustc.edu.cn
Cited by 435

[PDF] Review: Line spectral pairs
IV **McLoughlin** - Signal processing, 2008 - lintech.org
Abstract Linear prediction-based coders commonly utilise line spectral pairs (LSP) to represent linear prediction coefficients for reasons of filter stability and representational efficiency. Line spectral pairs have other useful properties such as an ordering rela
Cited by 26 Related articles All 4 versions Cite More

Cite

Copy and paste a formatted citation or use one of the links to import into a bibliography manager.

MLA	McLoughlin, Ian Vince. "Review: Line spectral pairs." *Signal processing* 88.3 (2008): 448-467.
APA	McLoughlin, I. V. (2008). Review: Line spectral pairs. *Signal processing*, *88*(3), 448-467.
Chicago	McLoughlin, Ian Vince. "Review: Line spectral pairs." *Signal processing* 88, no. 3 (2008): 448-467.

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```
@article{mcloughlin2008review,
  title={Review: Line spectral pairs},
  author={McLoughlin, Ian Vince},
  journal={Signal processing},
  volume={88},
  number={3},
  pages={448--467},
  year={2008},
  publisher={Elsevier North-Holland, Inc.}
}
```

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Hardware architecture for data concealment using sub-band coding, LSB coding and pseudo-random bit stream generators

3 Author(s)

Adi, R.W. ; Sch. of Comput. Eng., Nanyang Technol. Inst., Singapore ; Tio, C.M.M. ; McLoughlin, I.

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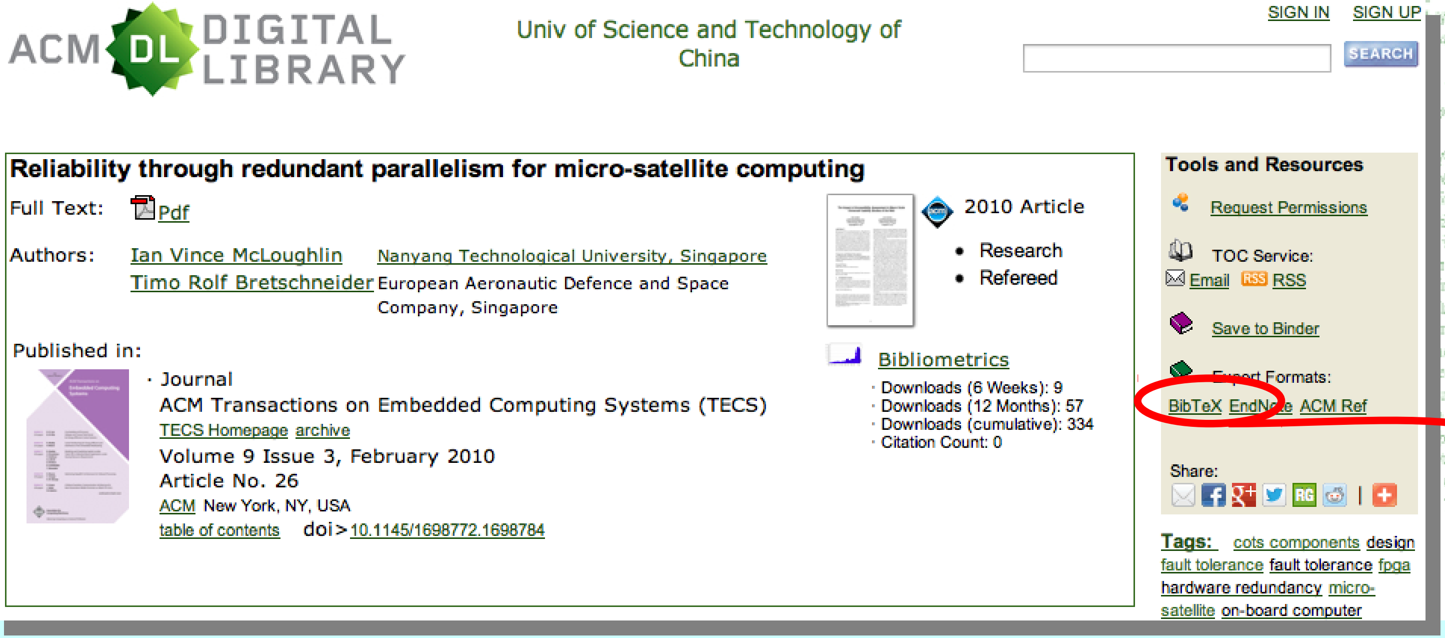
coding, LSB coding is an algorithm exhibiting good
o. This paper reports on the VLSI implementation
implementation has both analogue input/output and
audio equipment, such as DAT, amplifier, audio
hitecture has been designed to give real time
h efficiency, whilst maintaining audio fidelity through
r effects. We also present the design study on
ted implementation approach and estimate major system

```
@INPROCEEDINGS{892261,
author={Adi, R.W. and Tio, C. M M
and McLoughlin, I.},
booktitle={TENCON 2000.
Proceedings},
title={Hardware architecture for
data concealment using sub-band
coding, LSB coding and pseudo-
random bit stream generators},
year={2000},
volume={3},
pages={221-225 vol.3},
doi={10.1109/TENCON.2000.892261},}
```

Bibtex – creating a .bib file

i.e. for **ACM Digital Library**



Reliability through redundant parallelism for micro-satellite computing

Full Text: Pdf

Authors: Ian Vince McLoughlin, Nanyang Technological University, Singapore
Timo Rolf Bretschneider, European Aeronautic Defence and Space Company, Singapore

2010 Article
- Research
- Refereed

Published in:
- Journal
ACM Transactions on Embedded Computing Systems (TECS)
TECS Homepage archive
Volume 9 Issue 3, February 2010
Article No. 26
ACM New York, NY, USA
table of contents doi>10.1145/1698772.1698784

Bibliometrics
- Downloads (6 Weeks): 9
- Downloads (12 Months): 57
- Downloads (cumulative): 334
- Citation Count: 0

Tools and Resources

Tags: cots components design fault tolerance fault tolerance fpga hardware redundancy micro-satellite on-board computer

```
@article{McLoughlin:2010:RTR:1698772.1698784,
 author = {Ian Vince McLoughlin and Timo Rolf Bretschneider},
 title={Reliability through redundant parallelism for micro-satellite computing},
 journal = {ACM Trans. Embed. Comput. Syst.},
 issue_date = {February 2010},
 volume = {9},
 number = {3},
 month = mar,
 year = {2010},
 pages = {26:1--26:25},
 publisher = {ACM},
}
```

Bibtex – creating a .bib file

Sometimes we just add the entry manually, and we might need to edit the automatically-generated entries.

There are different types of entries, the order of items does not matter, but certain elements *must* be present.

`@article` is for **journal articles**:

```
@article{SharifJV2012,
title = "A Comprehensive Vowel Space for Whispered Speech",
journal = "Journal of Voice",
volume = "26",
number = "2",
pages = "e49 - e56",
year = "2012",
author = "Hamid Reza Sharifzadeh and Ian V. McLoughlin and Martin J. Russell"
}
```

SharifJV2012 is the label we use for citing this inside our LaTeX paper.

Bibtex – creating a .bib file

`@inproceedings` is for **conference papers**:

```
@InProceedings{speech:IVMICCPOL,
  Author  = {Ian Vince McLoughlin and Zhong Qiang Ding and Eng Chong Tan},
  Title  = {Intelligibility evaluation of {GSM} coder for {M}andarin speech
using {CDRT}},
  booktitle = "19th International Conference on the
Computer Processing of Oriental Languages",
  vol=1,
  pages= {421-424},
  month=may,
  year = "2001"
}
```

Notes:

1. With Bibtex, don't worry about formatting – but you need to tell the system when to force the use of capital letters.

2. Give the authors names in full, surname last, separated by 'and'... Don't use any punctuation in the author list.

Bibtex – creating a .bib file

`@book` is for **complete books**, `@inbook` is for book **chapters**:

```
@book{CUPbook,
  Author          = {Ian Vince McLoughlin},
  Title           = {Applied Speech and Audio Processing},
  isbn = {9-780-5215-1954-0},
  publisher = "Cambridge University Press",
  year = 2009
};



@inbook{AhmadiBook2009,
   author         = "Farzaneh Ahmadi and Ian Vince McLoughlin",
   title          = "The use of low frequency ultrasonics in speech
processing",
   booktitle    = "Recent Advances in Signal Processing",
   publisher      = "Itech Book Publishers",
   address        = "Vienna, Austria",
   year           = "2009",
   chapter        = "25",
   pages    = {503-528}
}
```

Bibtex – creating a .bib file

`@phdthesis` and, `@electronic` are also common:

```
@phdthesis{Hamidthesis,
  author        = "Hamid Reza Sharifzadeh",
  title         = "Reconstruction of natural sounding speech from whispers",
  school        = "Nanyang Technological University",
  address       = "Singapore",
  month         = jan,
  year          = "2011",
  url           = "http://hdl.handle.net/10356/46426"
}



@electronic{FPGA:opencores_webpage,
  title         = "Opencores webpages",
  url           = "http://www.opencores.org",
  month = may,
  year          = "2003"
};
```

You can find a more complete explanation of these entry types, and others, here:
`http://nwalsh.com/tex/texhelp/bibtx-7.html`

Bibtex – adding citations to the LaTeX document

If I have an entry in my .bib file, I can now cite that as a reference in my paper using the `\cite{ }` command to give a numeric reference like [24] and an entry in the list of references.

Create a bibliography database (.bib) containing paper citations...

Add citations to your LaTeX file (.tex), and include the bibliography at the bottom

In fact there are a few variants of this basic command to change how the citation gets displayed in the text:

```
\citet{lotfi09} for  Lotfi et al. (2009)
\citep{lotfi09} for  (Lotfi et al., 2009)
\citet*{lotfi09} for Lotfi & Langensiepen (2009)
```

From “Writing a Scientific Paper in LaTeX”
Ahmad Lotfi, Nottingham Trent University, UK

Bibtex – adding the bibliography

Adding the Bibliography in an IEEE paper is simple, just include these lines after the conclusion of the paper:

```
\bibliography{IEEEabrv,myreflist}
\bibliographystyle{IEEEtran}
```

Create a bibliography database (.bib) containing paper citations...

Add citations to your LaTeX file (.tex), and include the bibliography at the bottom

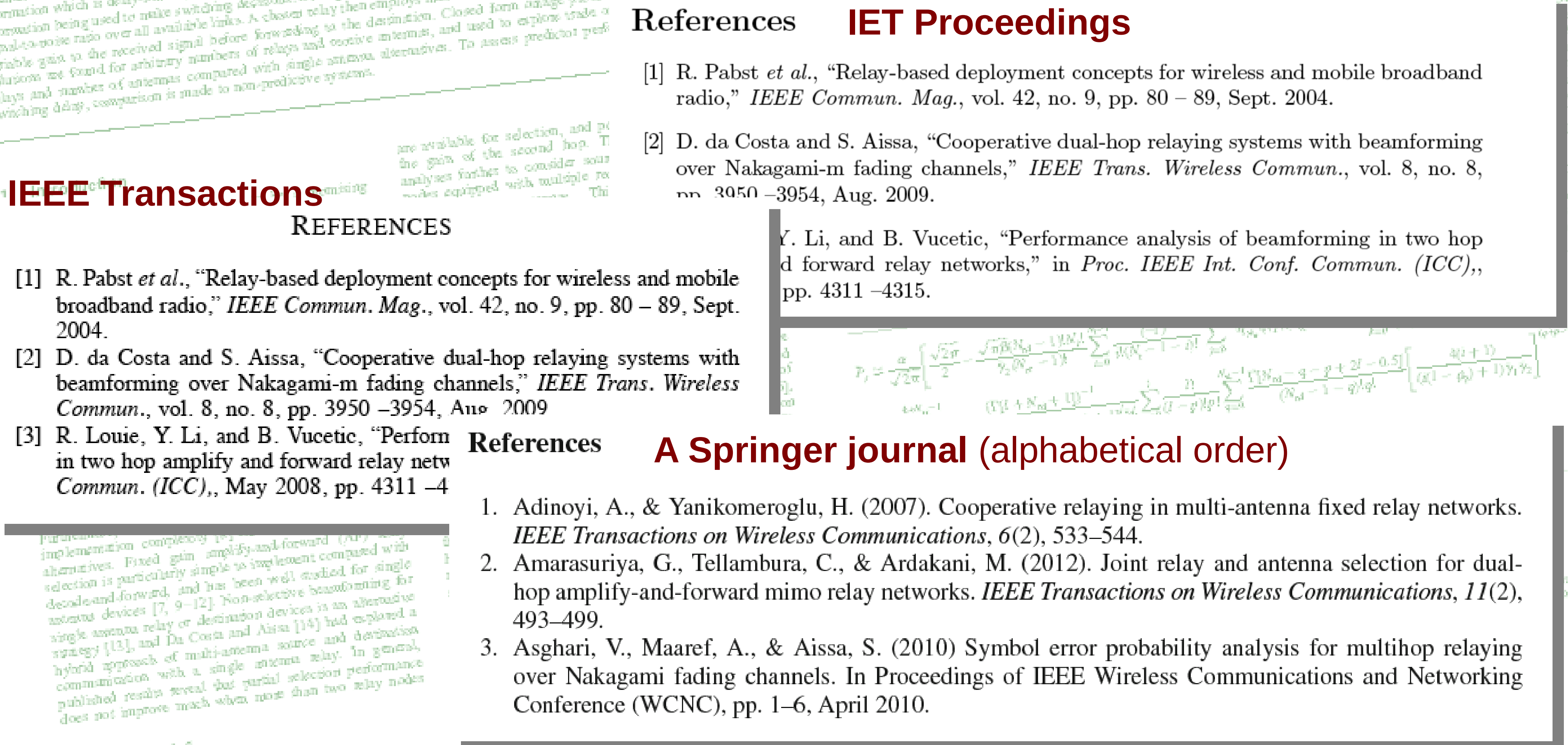
LaTeX will look for the following files in the current directory (if they are located elsewhere, just add the path to them in the command above):

myreflist.bib - my bibliography file
IEEEabrv.bib - holds standard IEEE abbreviations
IEEEtran.bst - IEEE bibliography style

IEEEabrv.bib and IEEEtran.bst are provided as part of the paper template for any IEEE journal or conference.

Bibtex – adding the bibliography

Bibtex handles the appearance for you. For example, here are the first 3 references for <u>the same paper</u> which has been compiled for three different journals. There is <u>no change</u> to my .bib file and almost <u>no change</u> to the .tex file to do this:



IET Proceedings

References

[1] R. Pabst *et al.*, “Relay-based deployment concepts for wireless and mobile broadband radio,” *IEEE Commun. Mag.*, vol. 42, no. 9, pp. 80 – 89, Sept. 2004.

[2] D. da Costa and S. Aissa, “Cooperative dual-hop relaying systems with beamforming over Nakagami-m fading channels,” *IEEE Trans. Wireless Commun.*, vol. 8, no. 8, pp. 3950 –3954, Aug. 2009.

Y. Li, and B. Vucetic, “Performance analysis of beamforming in two hop
d forward relay networks,” in *Proc. IEEE Int. Conf. Commun. (ICC)*,,
pp. 4311 –4315.

IEEE Transactions

REFERENCES

[1] R. Pabst *et al.*, “Relay-based deployment concepts for wireless and mobile broadband radio,” *IEEE Commun. Mag.*, vol. 42, no. 9, pp. 80 – 89, Sept. 2004.

[2] D. da Costa and S. Aissa, “Cooperative dual-hop relaying systems with beamforming over Nakagami-m fading channels,” *IEEE Trans. Wireless Commun.*, vol. 8, no. 8, pp. 3950 –3954, Aug. 2009

[3] R. Louie, Y. Li, and B. Vucetic, “Perform
in two hop amplify and forward relay netw
Commun. (ICC),, May 2008, pp. 4311 –4

A Springer journal (alphabetical order)

References

1. Adinoyi, A., & Yanikomeroglu, H. (2007). Cooperative relaying in multi-antenna fixed relay networks. *IEEE Transactions on Wireless Communications*, *6*(2), 533–544.
2. Amarasuriya, G., Tellambura, C., & Ardakani, M. (2012). Joint relay and antenna selection for dual-hop amplify-and-forward mimo relay networks. *IEEE Transactions on Wireless Communications*, *11*(2), 493–499.
3. Asghari, V., Maaref, A., & Aissa, S. (2010) Symbol error probability analysis for multihop relaying over Nakagami fading channels. In Proceedings of IEEE Wireless Communications and Networking Conference (WCNC), pp. 1–6, April 2010.

Part E

Useful packages
Debugging
The review process
Getting cited

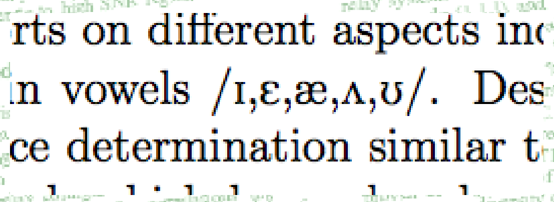
Some more useful **packages**

Euro symbol `\usepackage{eurosym}`

Then use `\euro` to generate the symbol.

International Phonetic Alphabet `\usepackage{tipa}`

`vowels /\textipa{I},\textipa{E},\textipa{\ae},\textipa{2},\textipa{U}/.`


rts on different aspects inc
n vowels /ɪ,ɛ,æ,ʌ,ʊ/. Des
ce determination similar t

Get the full information here:

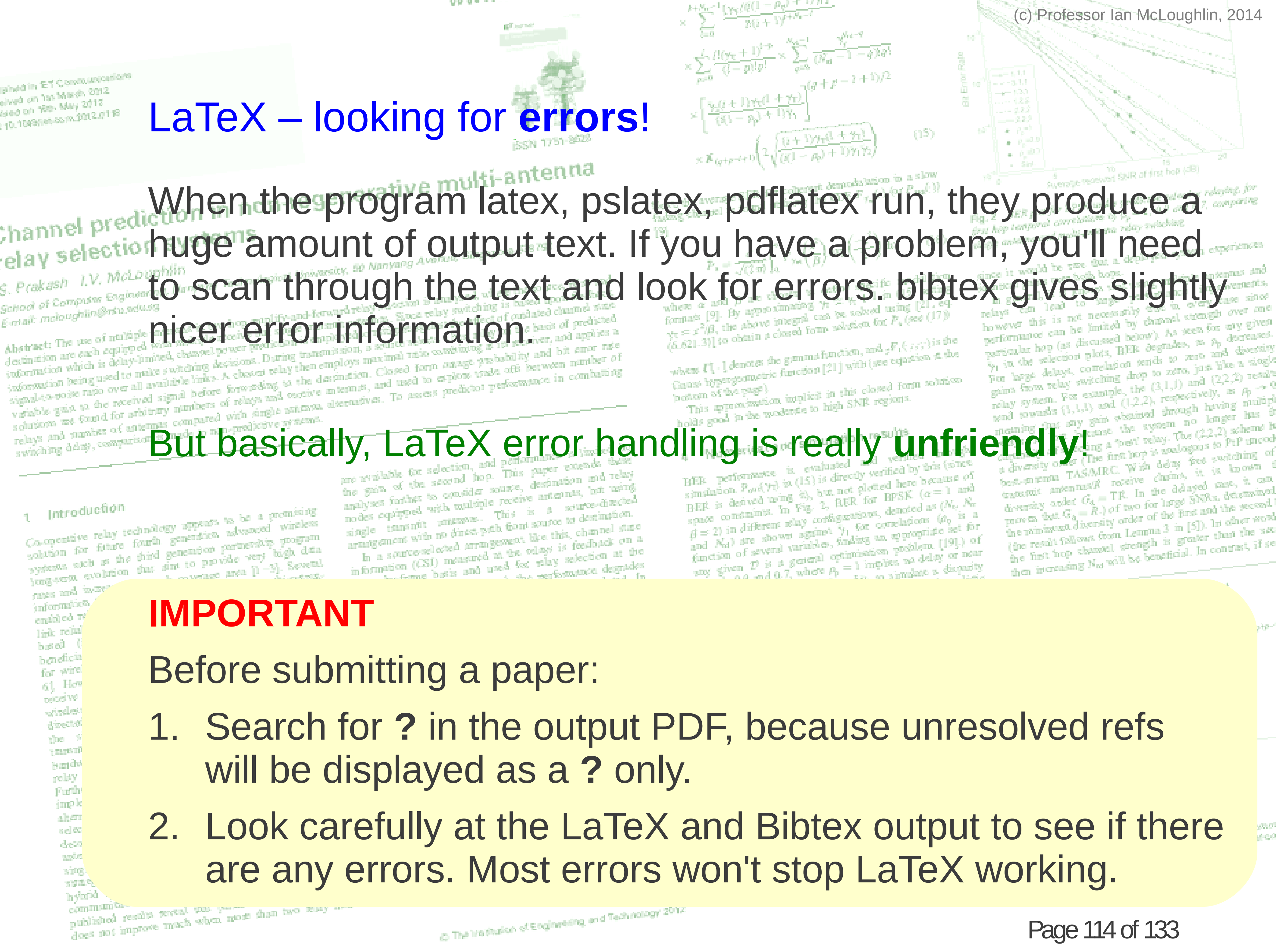
`http://www.tug.org/tugboat/tb17-2/tb51rei.pdf`

Chinese

Not as simple as you would think, because .tex files are ASCII:

`http://blogs.fsfe.org/ciaran/?p=150`

`http://www.goodmami.org/2009/04/traditional-and-simplified-chinese-in-latex/`



LaTeX – looking for **errors**!

When the program latex, pslatex, pdflatex run, they produce a huge amount of output text. If you have a problem, you'll need to scan through the text and look for errors. bibtex gives slightly nicer error information.

But basically, LaTeX error handling is really **unfriendly**!

IMPORTANT

Before submitting a paper:

1. Search for **?** in the output PDF, because unresolved refs will be displayed as a **?** only.
2. Look carefully at the LaTeX and Bibtex output to see if there are any errors. Most errors won't stop LaTeX working.

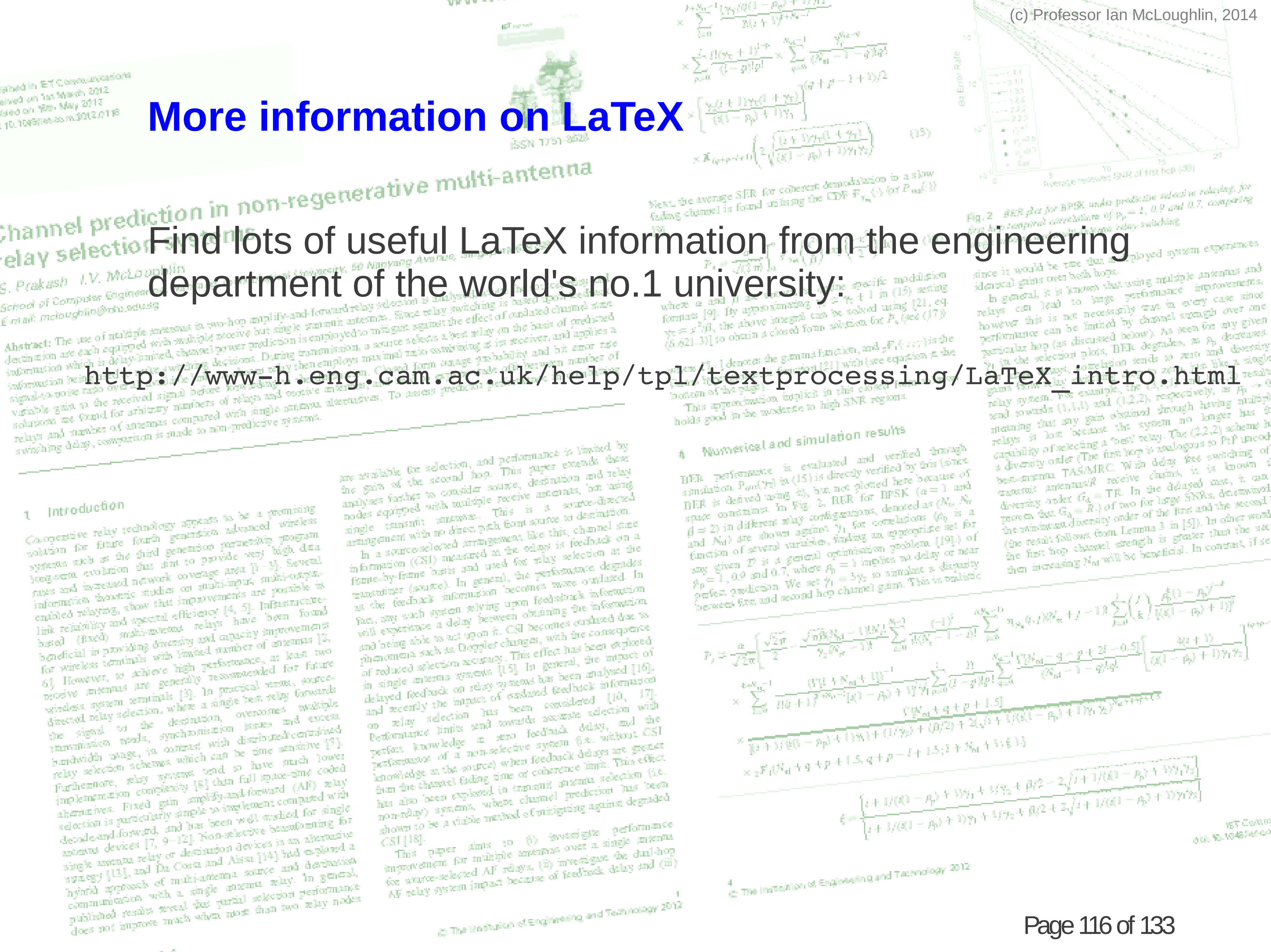
LaTeX – looking for **errors**!

Often LaTeX tells you what line number is the error, but many times it's wrong – especially if the error is a missing **}**, **]** or **)**

It will take some time, but eventually you will start to know what the errors mean.

For now, if you can't find the source of an error, do a binary search – cut your paper in half, compile just that half. Was the error in there? If YES, cut in half again, if NO, try the half that you didn't process...

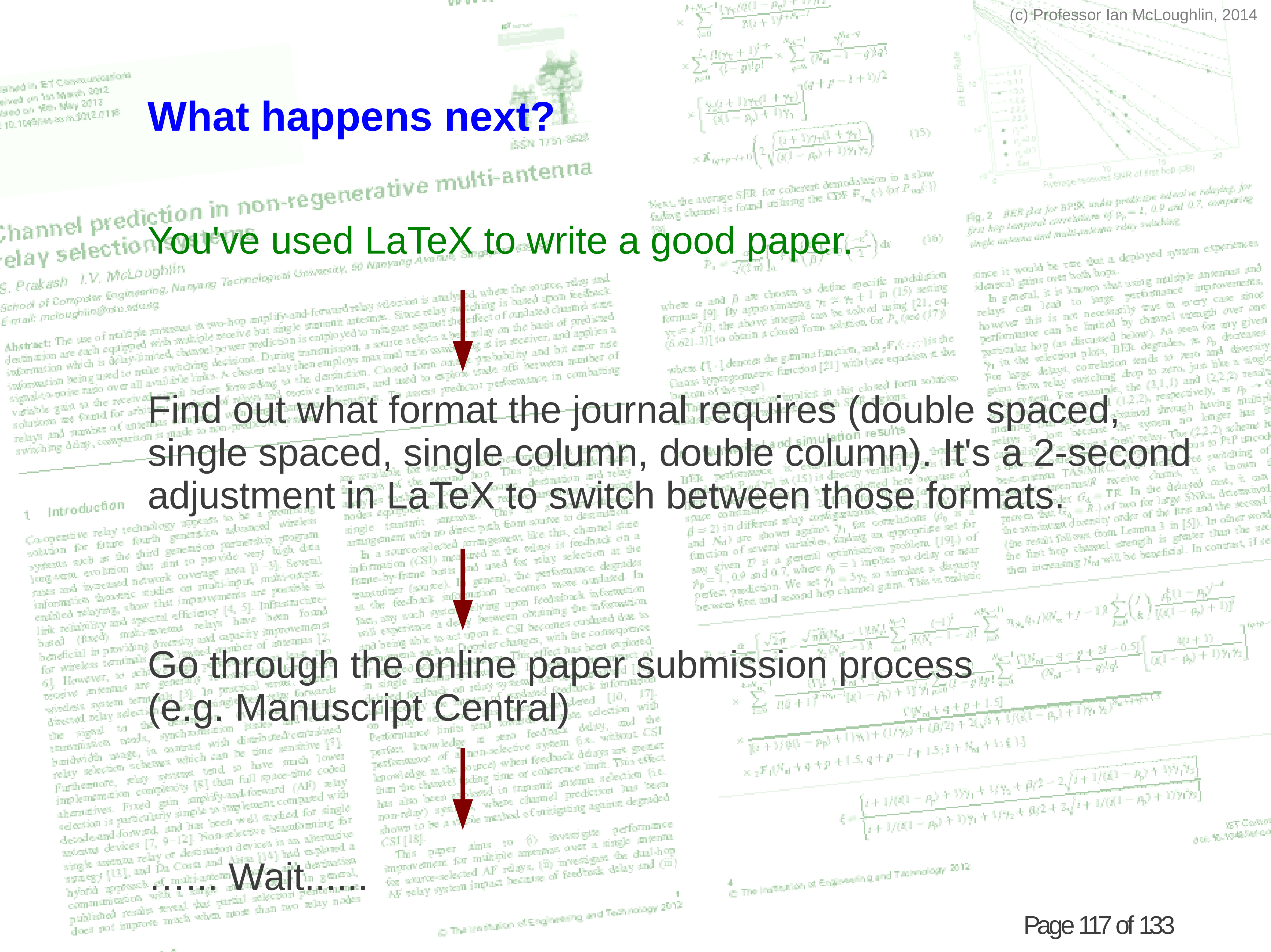
It sounds tedious, but even with a 200 page book, you can narrow the error down within 1 or 1 minutes. With a paper, you can get an answer in seconds.



More information on LaTeX

Find lots of useful LaTeX information from the engineering department of the world's no.1 university:

`http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/LaTeX_intro.html`



What happens next?

You've used LaTeX to write a good paper.

↓

Find out what format the journal requires (double spaced, single spaced, single column, double column). It's a 2-second adjustment in LaTeX to switch between those formats.

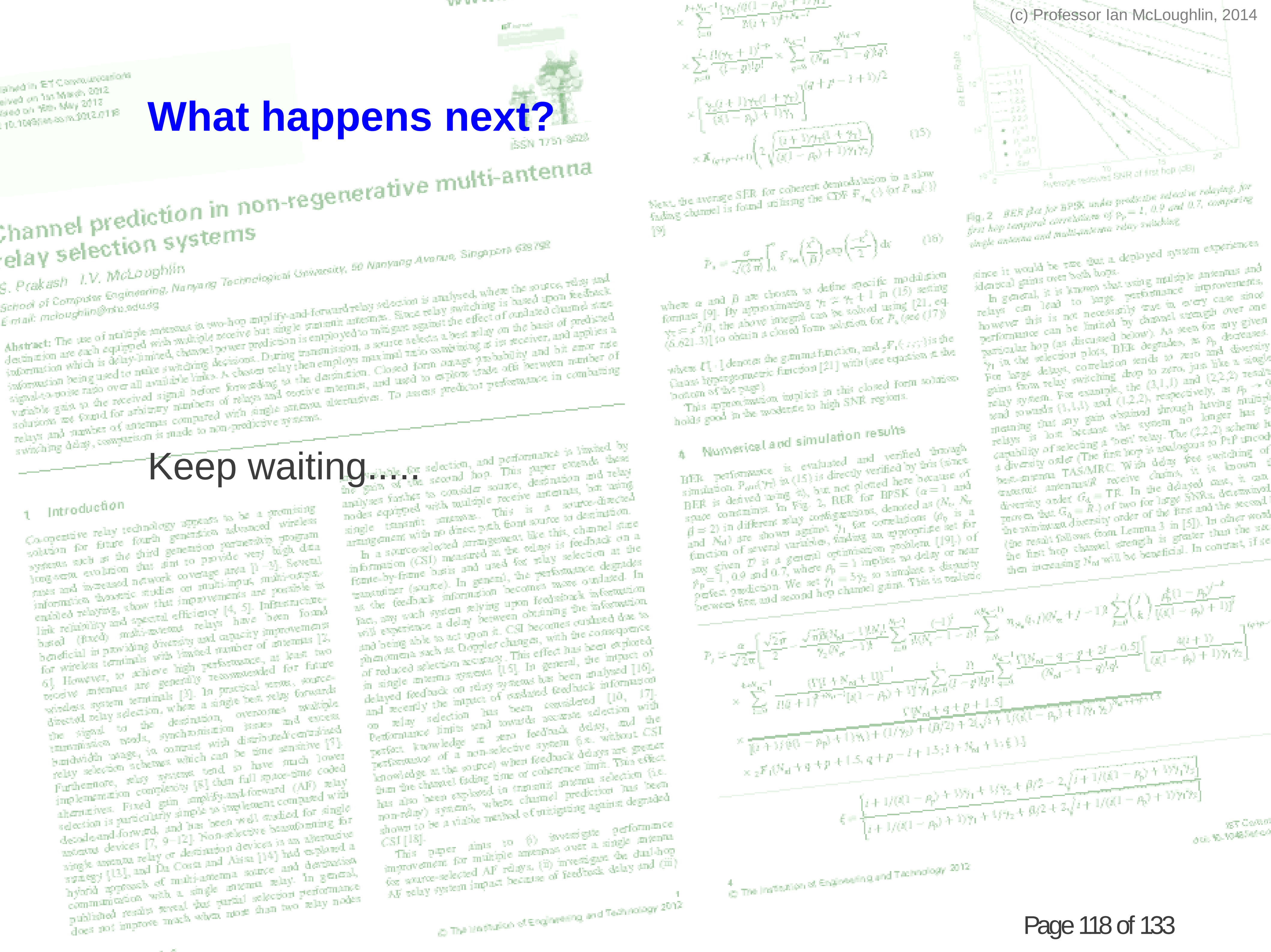
↓

Go through the online paper submission process (e.g. Manuscript Central)

↓

…... Wait…...

What happens next?

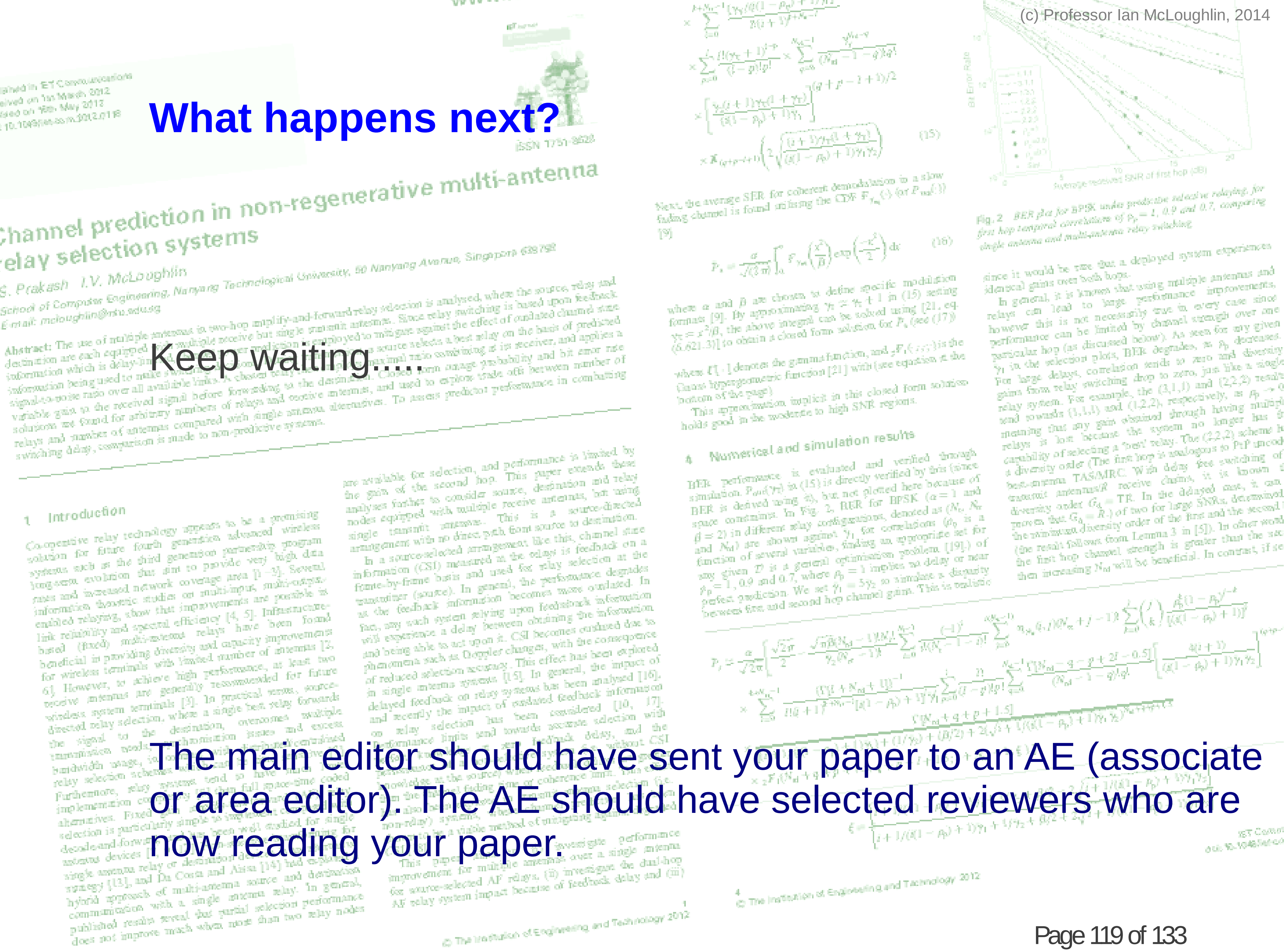

Channel prediction in non-regenerative multi-antenna relay selection systems

S. Prakash I.V. McLoughlin

School of Computer Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798

E-mail: mcloughlin@ntu.edu.sg

Keep waiting.....



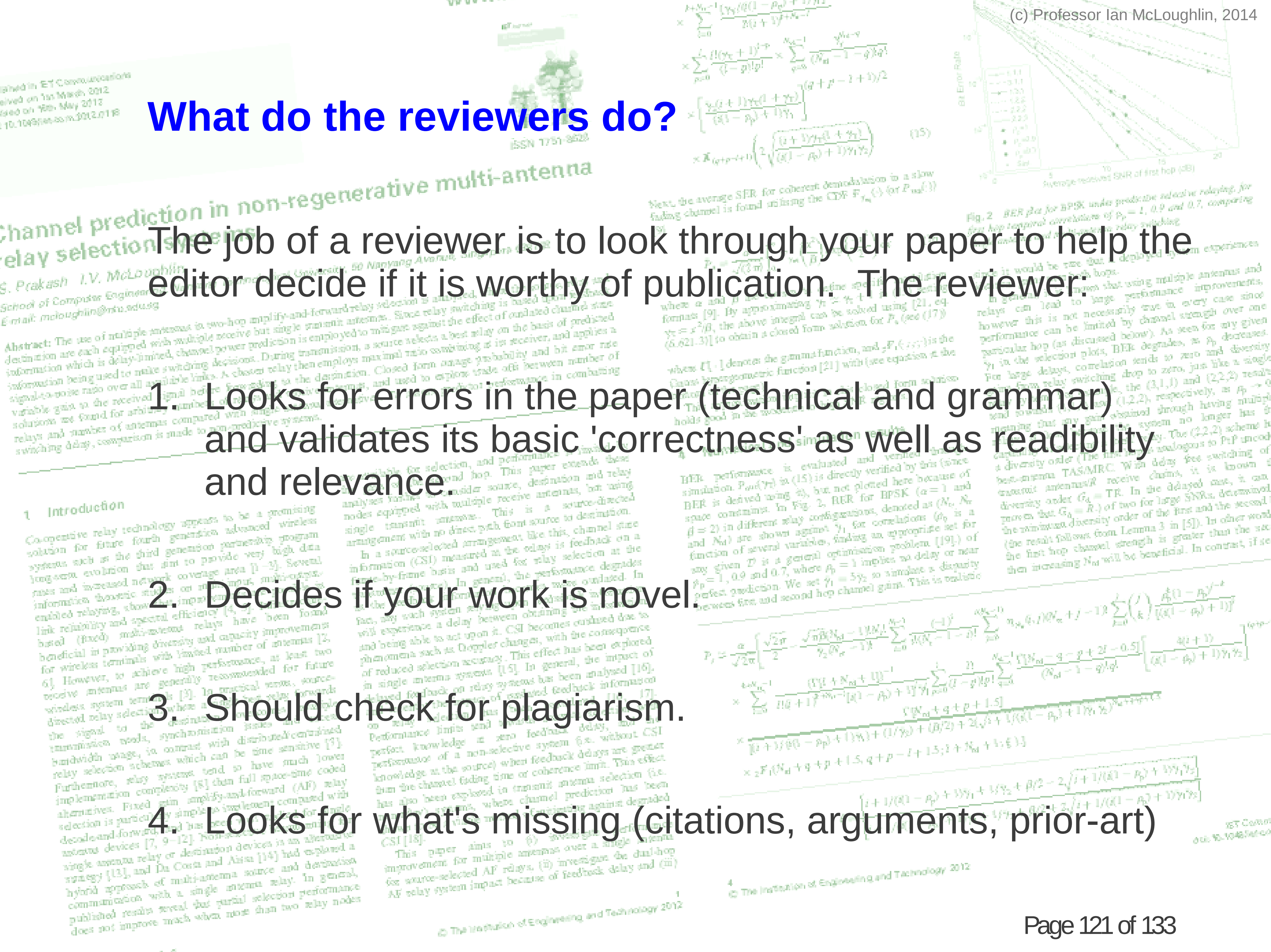
What happens next?

Keep waiting.....

The main editor should have sent your paper to an AE (associate or area editor). The AE should have selected reviewers who are now reading your paper.

What happens next?

Sometimes the review process takes a very long time, and you wonder what are the reviewers doing with your paper?



What do the reviewers do?

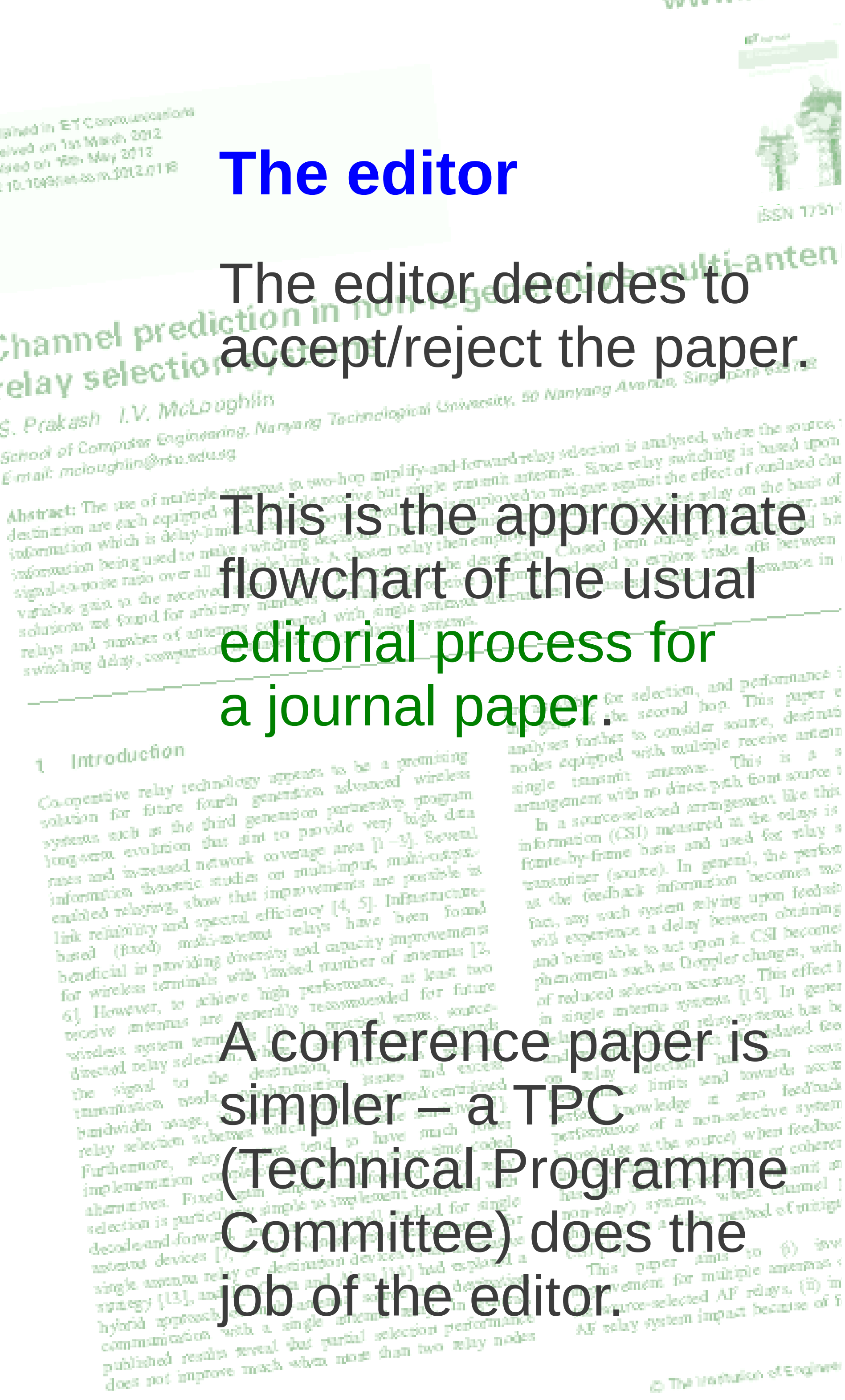
The job of a reviewer is to look through your paper to help the editor decide if it is worthy of publication. The reviewer:

1. Looks for errors in the paper (technical and grammar) and validates its basic 'correctness' as well as readibility and relevance.

2. Decides if your work is novel.

3. Should check for plagiarism.

4. Looks for what's missing (citations, arguments, prior-art)

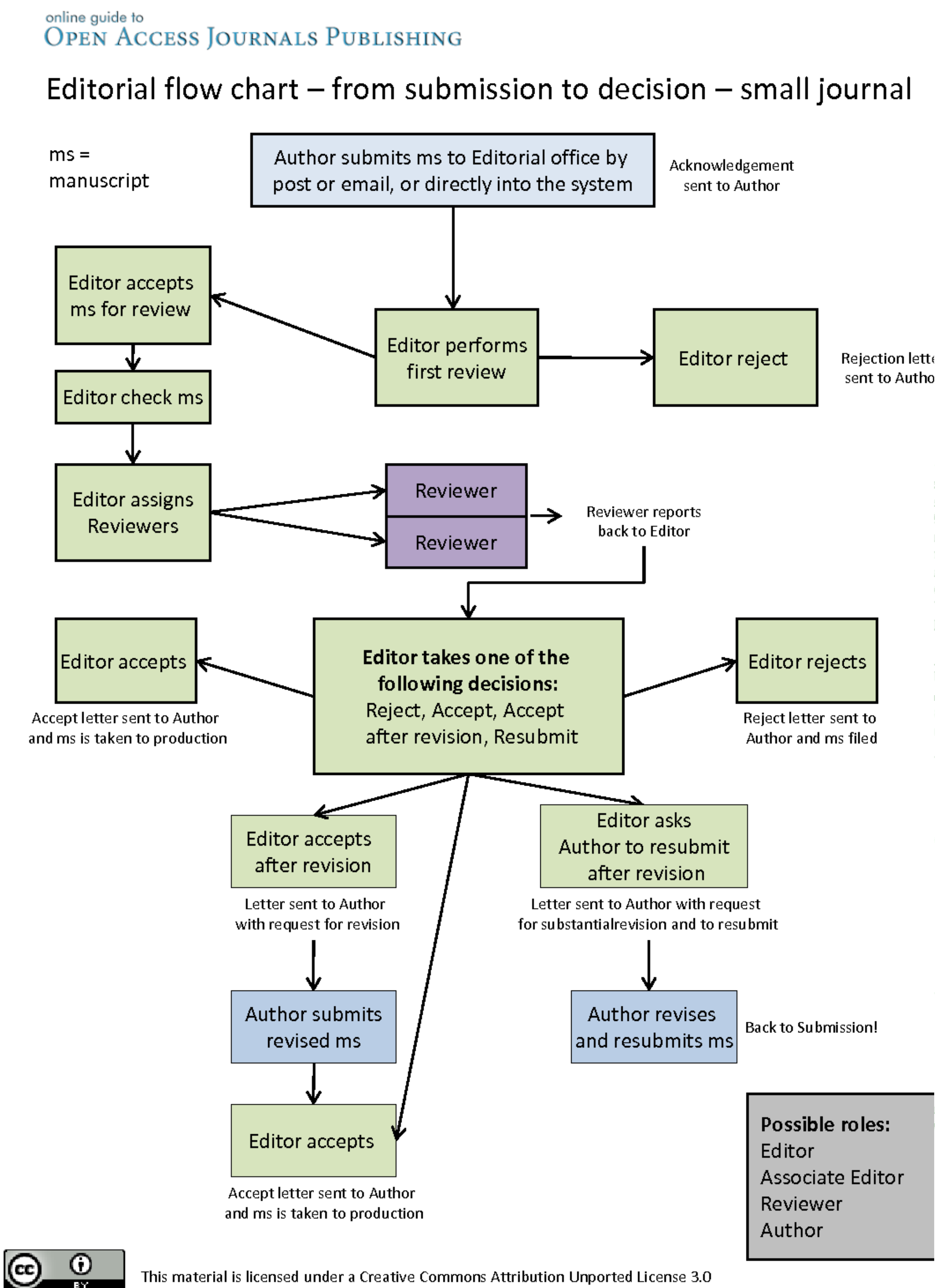


The editor

The editor decides to accept/reject the paper.

This is the approximate flowchart of the usual editorial process for a journal paper.

A conference paper is simpler – a TPC (Technical Programme Committee) does the job of the editor.



online guide to
OPEN ACCESS JOURNALS PUBLISHING

Editorial flow chart – from submission to decision – small journal

ms = manuscript

Author submits ms to Editorial office by post or email, or directly into the system

Acknowledgement sent to Author

Editor performs first review

Editor accepts ms for review

Editor reject

Rejection lett
sent to Autho

Editor check ms

Editor assigns Reviewers

Reviewer

Reviewer

Reviewer reports back to Editor

Editor takes one of the following decisions:
Reject, Accept, Accept after revision, Resubmit

Editor accepts

Accept letter sent to Author and ms is taken to production

Editor rejects

Reject letter sent to Author and ms filed

Editor accepts after revision

Letter sent to Author with request for revision

Editor asks Author to resubmit after revision

Letter sent to Author with request for substantialrevision and to resubmit

Author submits revised ms

Author revises and resubmits ms

Back to Submission!

Editor accepts

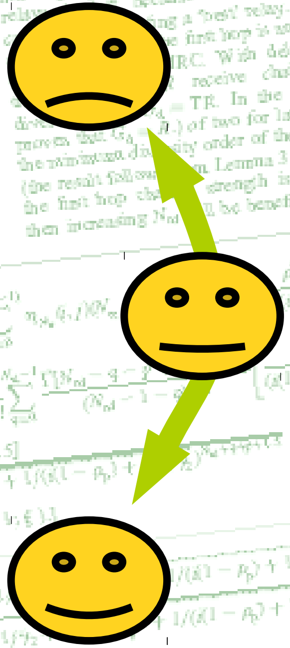
Accept letter sent to Author and ms is taken to production

Possible roles:
Editor
Associate Editor
Reviewer
Author

Notification about review result

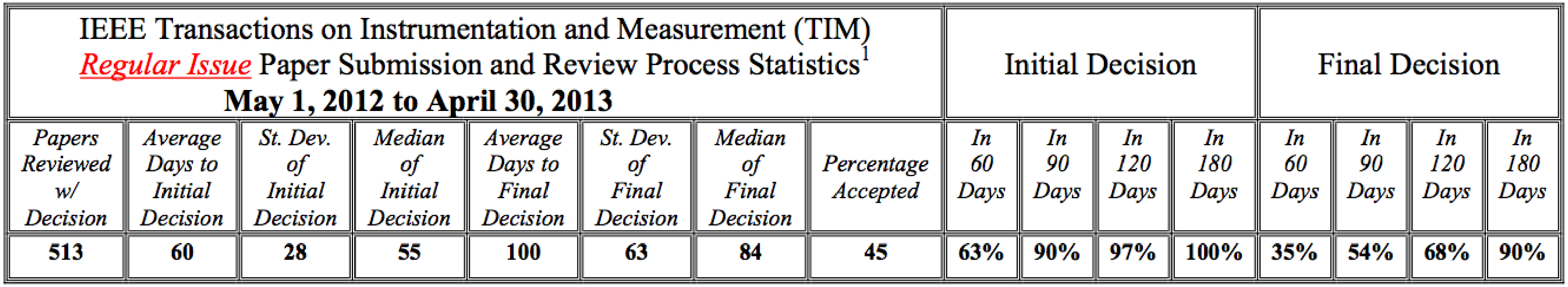
There are several possible outcomes from the paper review process. Although the wording might be slightly different, here is the spectrum of responses:

1. Unconditional rejection
2. Reject, but encouraged to resubmit after making major changes
3. Accept with mandatory changes
4. Unconditional acceptance (very rare)



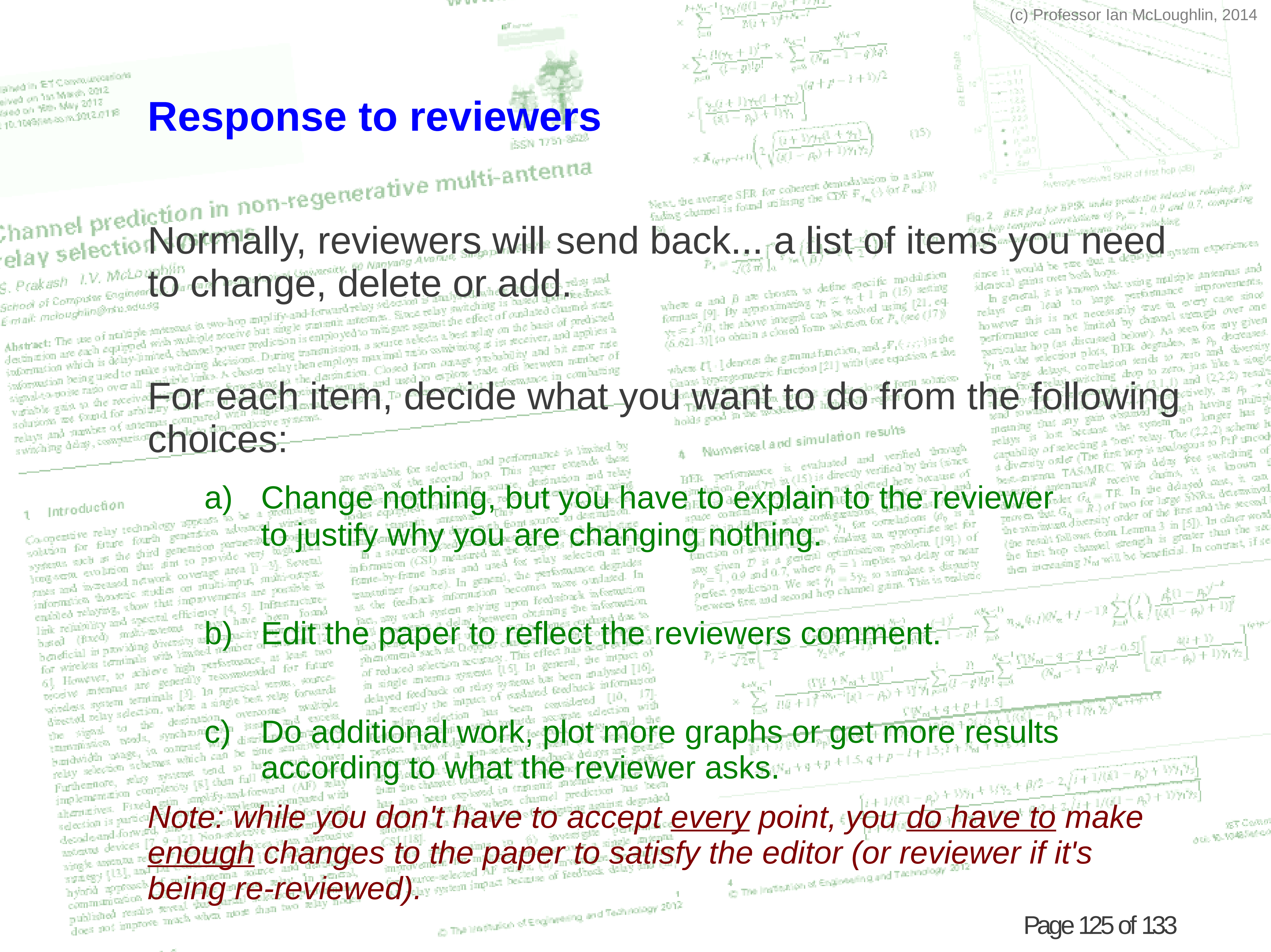
Response to reviewers

Some typical IEEE statistics on the length of time taken to respond to authors:



IEEE Transactions on Instrumentation and Measurement (TIM) *Regular Issue* Paper Submission and Review Process Statistics[1] **May 1, 2012 to April 30, 2013**								Initial Decision				Final Decision			
Papers Reviewed w/ Decision	*Average Days to Initial Decision*	*St. Dev. of Initial Decision*	*Median of Initial Decision*	*Average Days to Final Decision*	*St. Dev. of Final Decision*	*Median of Final Decision*	*Percentage Accepted*	*In 60 Days*	*In 90 Days*	*In 120 Days*	*In 180 Days*	*In 60 Days*	*In 90 Days*	*In 120 Days*	*In 180 Days*
513	**60**	**28**	**55**	**100**	**63**	**84**	**45**	**63%**	**90%**	**97%**	**100%**	**35%**	**54%**	**68%**	**90%**

An acceptance rate of 45% is quite high. Usually we will be nearer the 25% to 30% range for journals, and 50% for a typical conference.



Response to reviewers

Normally, reviewers will send back... a list of items you need to change, delete or add.

For each item, decide what you want to do from the following choices:

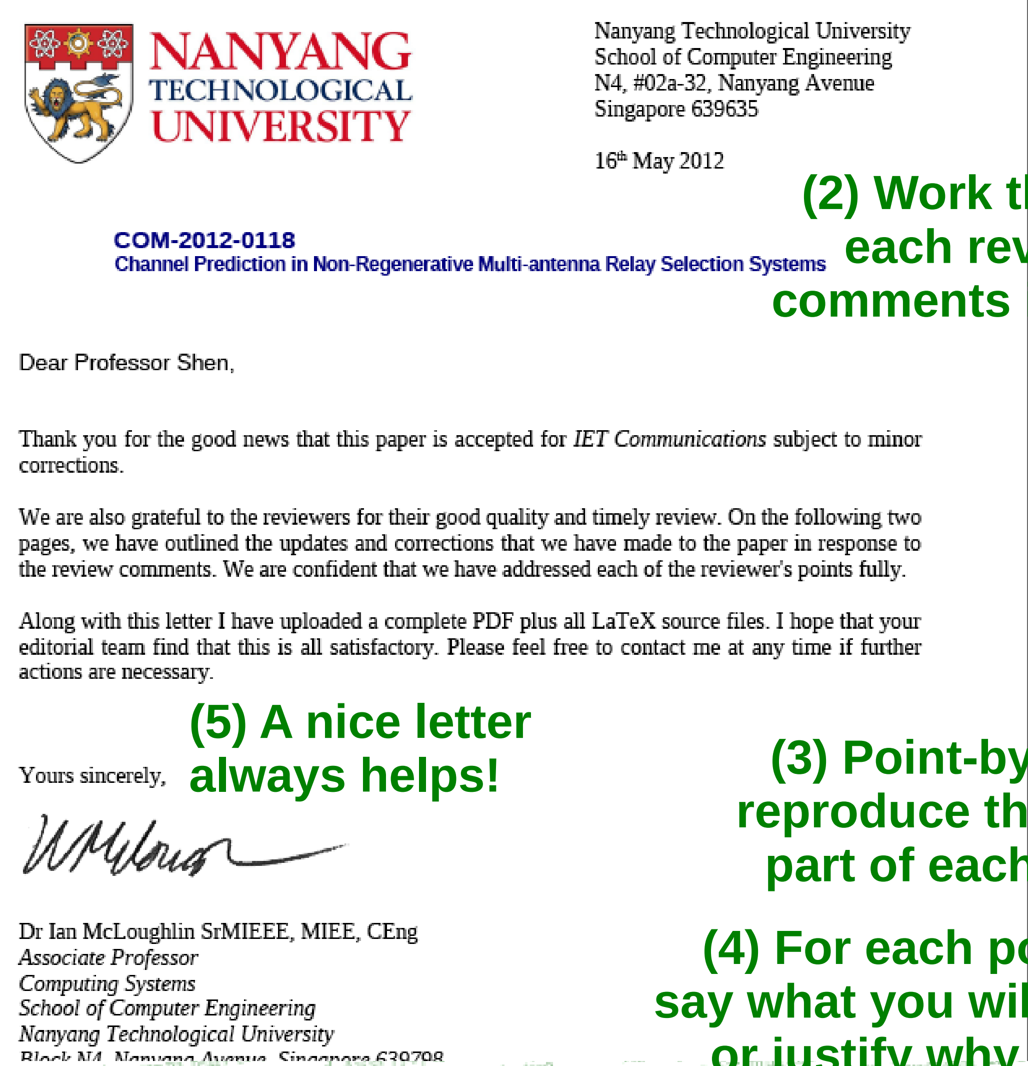
a) Change nothing, but you have to explain to the reviewer to justify why you are changing nothing.

b) Edit the paper to reflect the reviewers comment.

c) Do additional work, plot more graphs or get more results according to what the reviewer asks.

Note: while you don't have to accept <u>every</u> point, you <u>do have to</u> make <u>enough</u> changes to the paper to satisfy the editor (or reviewer if it's being re-reviewed).

Response to reviewers



NANYANG TECHNOLOGICAL UNIVERSITY

Nanyang Technological University
School of Computer Engineering
N4, #02a-32, Nanyang Avenue
Singapore 639635

16th May 2012

COM-2012-0118
Channel Prediction in Non-Regenerative Multi-antenna Relay Selection Systems

Dear Professor Shen,

Thank you for the good news that this paper is accepted for *IET Communications* subject to minor corrections.

We are also grateful to the reviewers for their good quality and timely review. On the following two pages, we have outlined the updates and corrections that we have made to the paper in response to the review comments. We are confident that we have addressed each of the reviewer's points fully.

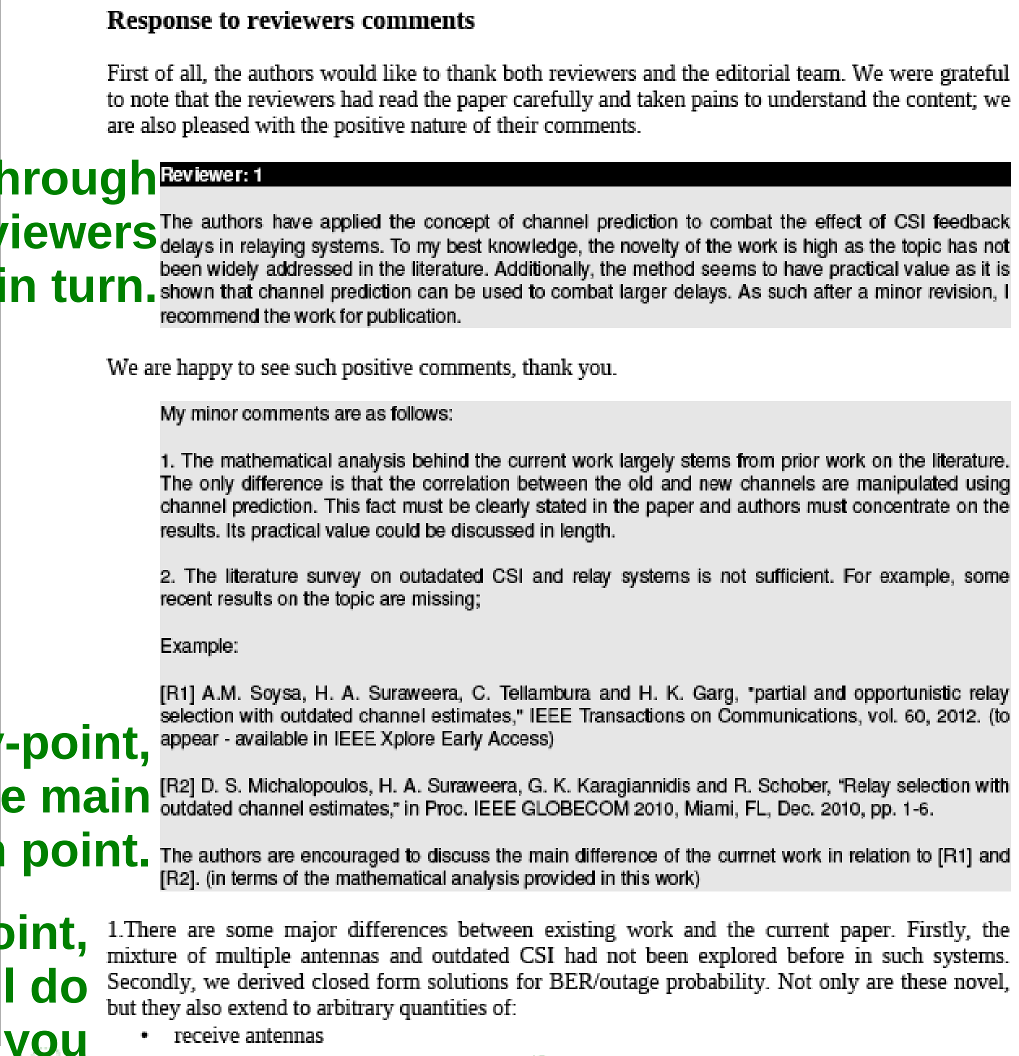
Along with this letter I have uploaded a complete PDF plus all LaTeX source files. I hope that your editorial team find that this is all satisfactory. Please feel free to contact me at any time if further actions are necessary.

Yours sincerely,

Dr Ian McLoughlin SrMIEEE, MIEE, CEng
Associate Professor
Computing Systems
School of Computer Engineering
Nanyang Technological University
Block N4, Nanyang Avenue, Singapore 639798

(5) A nice letter always helps!

(1) Always thank the reviewers!



Response to reviewers comments

First of all, the authors would like to thank both reviewers and the editorial team. We were grateful to note that the reviewers had read the paper carefully and taken pains to understand the content; we are also pleased with the positive nature of their comments.

Reviewer: 1

> The authors have applied the concept of channel prediction to combat the effect of CSI feedback delays in relaying systems. To my best knowledge, the novelty of the work is high as the topic has not been widely addressed in the literature. Additionally, the method seems to have practical value as it is shown that channel prediction can be used to combat larger delays. As such after a minor revision, I recommend the work for publication.

We are happy to see such positive comments, thank you.

> My minor comments are as follows:
>
> 1. The mathematical analysis behind the current work largely stems from prior work on the literature. The only difference is that the correlation between the old and new channels are manipulated using channel prediction. This fact must be clearly stated in the paper and authors must concentrate on the results. Its practical value could be discussed in length.
>
> 2. The literature survey on outadated CSI and relay systems is not sufficient. For example, some recent results on the topic are missing;
>
> Example:
>
> [R1] A.M. Soysa, H. A. Suraweera, C. Tellambura and H. K. Garg, "partial and opportunistic relay selection with outdated channel estimates," IEEE Transactions on Communications, vol. 60, 2012. (to appear - available in IEEE Xplore Early Access)
>
> [R2] D. S. Michalopoulos, H. A. Suraweera, G. K. Karagiannidis and R. Schober, "Relay selection with outdated channel estimates," in Proc. IEEE GLOBECOM 2010, Miami, FL, Dec. 2010, pp. 1-6.
>
> The authors are encouraged to discuss the main difference of the curmet work in relation to [R1] and [R2]. (in terms of the mathematical analysis provided in this work)

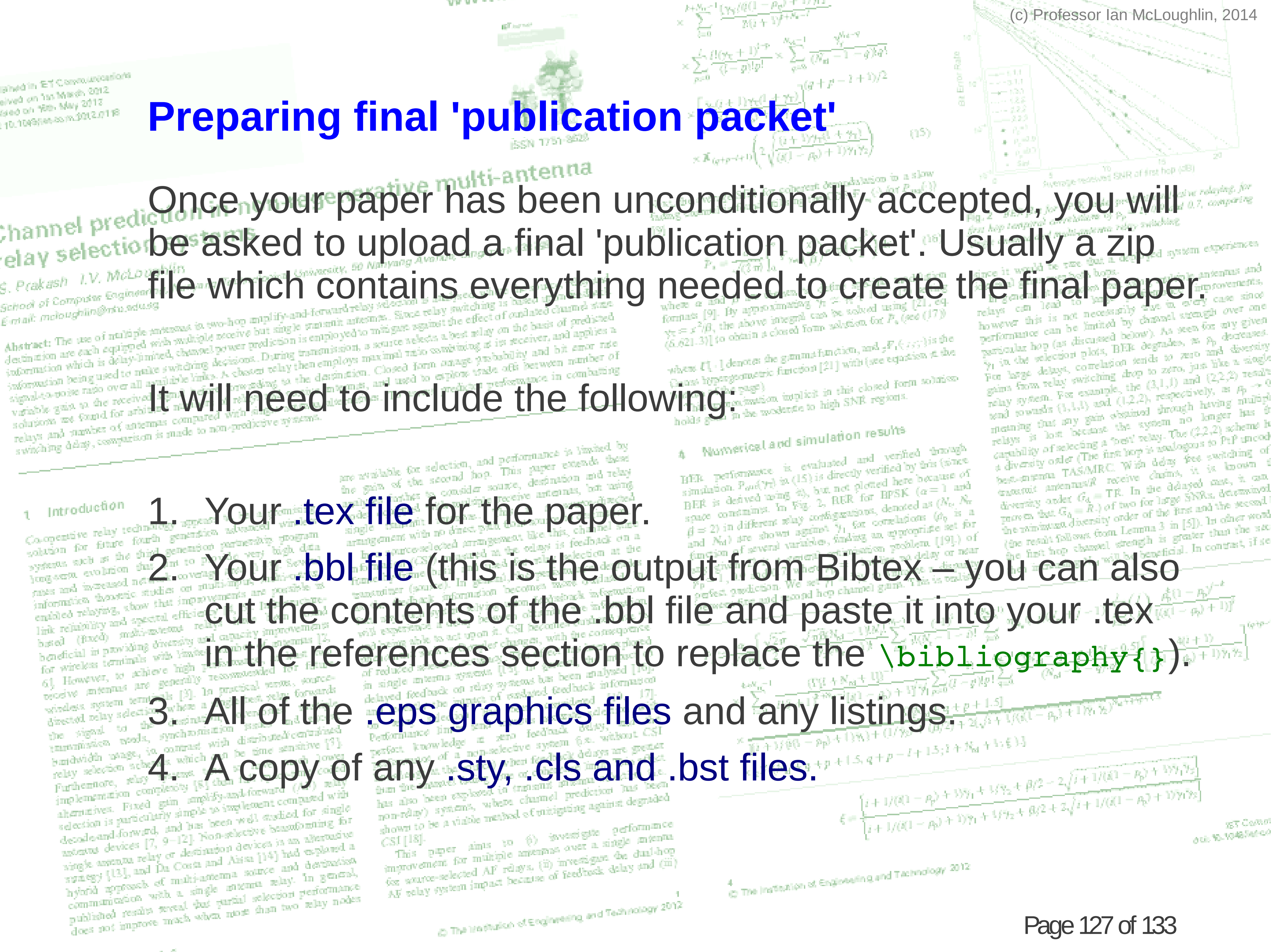
1.There are some major differences between existing work and the current paper. Firstly, the mixture of multiple antennas and outdated CSI had not been explored before in such systems. Secondly, we derived closed form solutions for BER/outage probability. Not only are these novel, but they also extend to arbitrary quantities of:

- receive antennas

(2) Work through each reviewers comments in turn.

(3) Point-by-point, reproduce the main part of each point.

(4) For each point, say what you will do or justify why you won't be making any changes.



Preparing final 'publication packet'

Once your paper has been unconditionally accepted, you will be asked to upload a final 'publication packet'. Usually a zip file which contains everything needed to create the final paper.

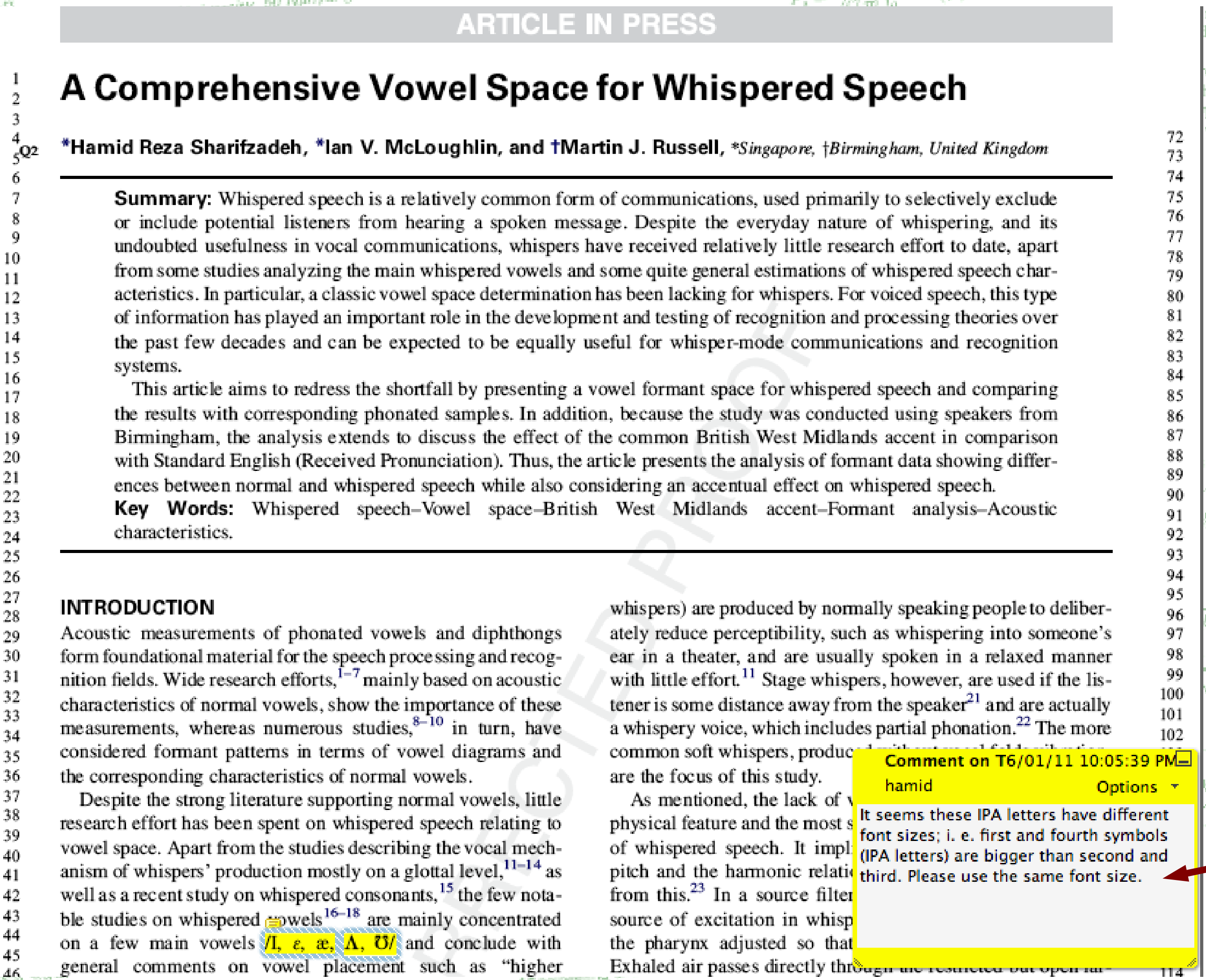
It will need to include the following:

1. Your .tex file for the paper.
2. Your .bbl file (this is the output from Bibtex – you can also cut the contents of the .bbl file and paste it into your .tex in the references section to replace the `\bibliography{}`).
3. All of the .eps graphics files and any listings.
4. A copy of any .sty, .cls and .bst files.

Proof checking

The editorial team will probably contact you to look at the proofs: to answer any questions they have and search for errors.

This is a question I needed to answer.



ARTICLE IN PRESS

A Comprehensive Vowel Space for Whispered Speech

Q2 ***Hamid Reza Sharifzadeh, *Ian V. McLoughlin, and †Martin J. Russell,** **Singapore, †Birmingham, United Kingdom*

Summary: Whispered speech is a relatively common form of communications, used primarily to selectively exclude or include potential listeners from hearing a spoken message. Despite the everyday nature of whispering, and its undoubted usefulness in vocal communications, whispers have received relatively little research effort to date, apart from some studies analyzing the main whispered vowels and some quite general estimations of whispered speech characteristics. In particular, a classic vowel space determination has been lacking for whispers. For voiced speech, this type of information has played an important role in the development and testing of recognition and processing theories over the past few decades and can be expected to be equally useful for whisper-mode communications and recognition systems.

This article aims to redress the shortfall by presenting a vowel formant space for whispered speech and comparing the results with corresponding phonated samples. In addition, because the study was conducted using speakers from Birmingham, the analysis extends to discuss the effect of the common British West Midlands accent in comparison with Standard English (Received Pronunciation). Thus, the article presents the analysis of formant data showing differences between normal and whispered speech while also considering an accentual effect on whispered speech.

Key Words: Whispered speech–Vowel space–British West Midlands accent–Formant analysis–Acoustic characteristics.

INTRODUCTION

Acoustic measurements of phonated vowels and diphthongs form foundational material for the speech processing and recognition fields. Wide research efforts,[1–7] mainly based on acoustic characteristics of normal vowels, show the importance of these measurements, whereas numerous studies,[8–10] in turn, have considered formant patterns in terms of vowel diagrams and the corresponding characteristics of normal vowels.

Despite the strong literature supporting normal vowels, little research effort has been spent on whispered speech relating to vowel space. Apart from the studies describing the vocal mechanism of whispers' production mostly on a glottal level,[11–14] as well as a recent study on whispered consonants,[15] the few notable studies on whispered vowels[16–18] are mainly concentrated on a few main vowels /I, ε, æ, Λ, Ʊ/ and conclude with general comments on vowel placement such as "higher

whispers) are produced by normally speaking people to deliberately reduce perceptibility, such as whispering into someone's ear in a theater, and are usually spoken in a relaxed manner with little effort.[11] Stage whispers, however, are used if the listener is some distance away from the speaker[21] and are actually a whispery voice, which includes partial phonation.[22] The more common soft whispers, produc
are the focus of this study.

As mentioned, the lack of
physical feature and the most
of whispered speech. It impl
pitch and the harmonic relati
from this.[23] In a source filter
source of excitation in whisp
the pharynx adjusted so that
Exhaled air passes directly thr

Comment on T6/01/11 10:05:39 PM
hamid
Options

It seems these IPA letters have different font sizes; i. e. first and fourth symbols (IPA letters) are bigger than second and third. Please use the same font size.

I added this comment to the editors.

hannel prediction in non-regenerative multi-antenna
elay selection systems

S. Prakash I.V. McLoughlin
School of Computer Engineering, Nanyang Technological Universi
E-mail: mcloughlin@ntu.edu.sg

Abstract: The use of multiple antennas in two-hop amplify-and-forw
destination are each equipped with multiple receive but single transmi
information which is delay-limited, channel power prediction is emplo
information being used to make switching decisions. During transmis
signal-to-noise ratio over all available links. A chosen relay then emp
variable gain to the received signal before forwarding to the desti
solutions are found for arbitrary numbers of relays and receive an
relays and number of antennas compared with single antenna, als
switching delay, comparison is made to non-predictive systems.

Congratulations!!!

Your paper is finally published

Getting your papers cited - **HOWTO**

Place a draft copy of your paper online for students to download (Google Scholar will find it very quickly). Try `http://arxiv.org`

Some people put the PROOF online, but I'm not sure that it is legally allowed. It is DEFINITELY not allowed to put the final paper online, so don't do that!

You can send a copy to other people in the field (but that's quite annoying behaviour...). Maybe better to give printed copies to people at a conference.

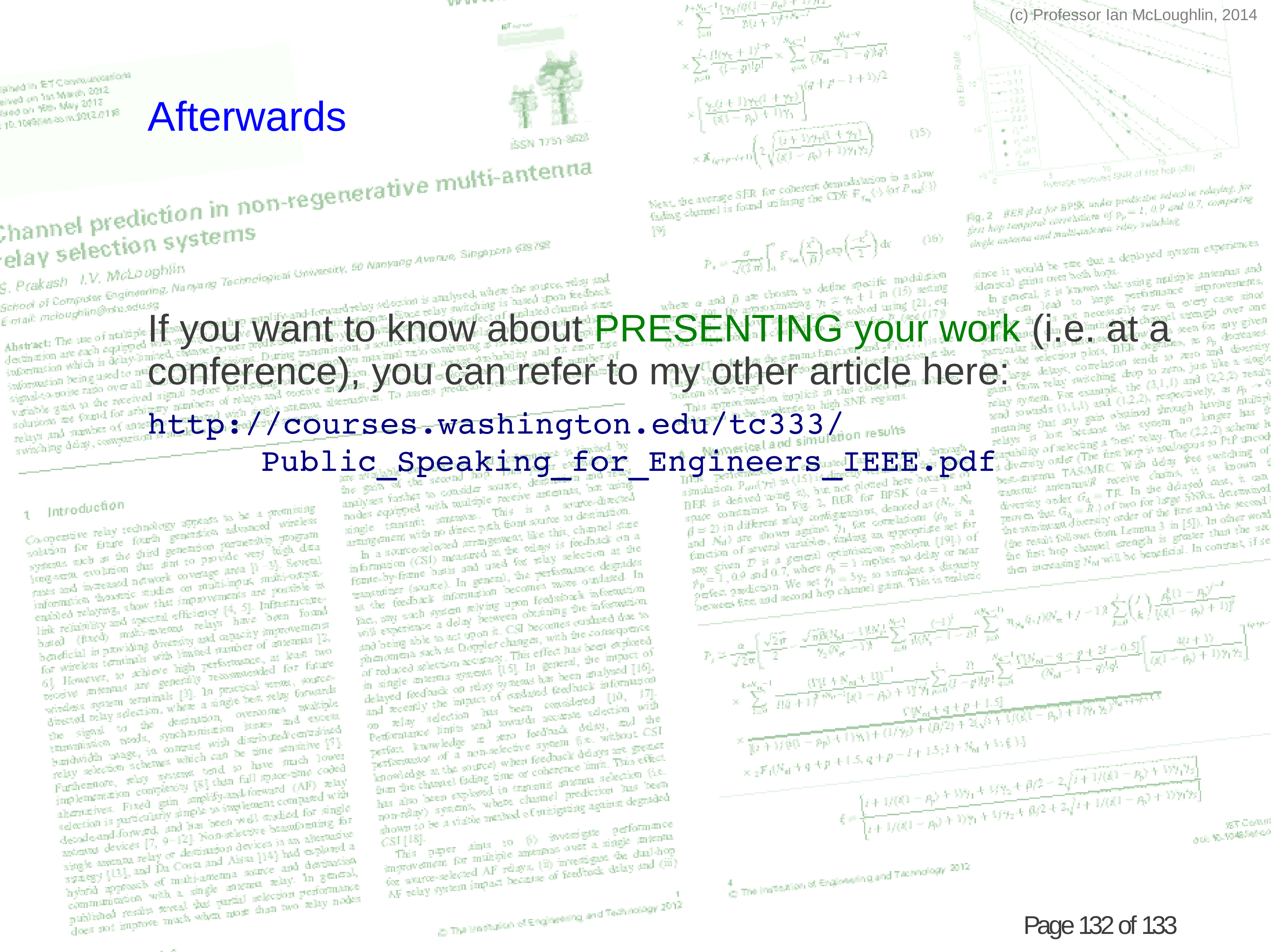
Mainly, the best way to get citations is to write a GOOD paper!! Give it a GOOD title, a RELEVANT abstract, and publish it in a GOOD journal!

What is **a GOOD journal**?

For speech/audio signal processing, we normally consider the following to be good journals (the list is not in any order):

- ★ IEEE Journals *e.g. IEEE Trans. Audio Speech and Language Processing*
- IET Journals *e.g. IET Signal Processing*
- Most ACM Transactions.
- Electronics Letters
- Speech Communications Journal (Elsevier)
- Journal of Voice
- ★ Journal of the Acoustical Society of America (JASA)
- Signal Processing Journal (Elsevier)
- The Audio Engineering Society (AES) journal

For an objective measure, we can use the Thomson-Reuters Journal Citation Report (JCR) "Impact Factor". As a rough guide, IF > 1 is good.



Afterwards

If you want to know about PRESENTING your work (i.e. at a conference), you can refer to my other article here:

`http://courses.washington.edu/tc333/Public_Speaking_for_Engineers_IEEE.pdf`

The End

Thank you!!