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Report from the Chair

This year marked the start of a serious attempt to make our meetings dual mode, namely face to face and by video link. Thanks to an industrious member, Biplob Ray, a good video conferencing facility was made available in University of Central Queensland, not in Queensland but at 120 Spencer St. While there were some physical and online security issues, the venue worked well with up to 5 on line members at some meetings and about 20 physical members.

In March this year, following an offer from the Victorian IEEE section, the Region 10 conference was held in Melbourne to allow meetings of section chairs and IEEE executives from all over Region 10, anywhere from Afghanistan to Australia. This was held at the Pullman hotel on the Albert Park lake. A useful meeting was had and many friendships made. The author contributed a motion to the effect that two local students should be invited to attend the yearly R10 administration meeting. This was passed by the R10 Melbourne meeting.

During 2019, our membership increased by 3%, marking several successive years of modest growth. This may be put down largely to several active technical chapters leading the way with interesting activities. More needs to be done to take all chapters up to a higher activity level.

The section incorporation question drags on interminably. My view is that sections should have separate GST accounts which would be provided by an incorporated association for each state.

In keeping with previous years, WIE members introduced many high school students to e-textiles. Recently a group of WIE volunteers, Mehrnaz Shoustrian, EeHui Lim, Harmony Yu and Fatemeh Jalali showed a large group of high school students how they could introduce e textiles into their schools.

This August, two IEEE members Emerson Keenan and Harmony Yu attended a Conference Leadership Training program organised by Region 10 in Goa, India. It was attended by IEEE MCE executives who presented essentials of a Conference Leadership Training program. This was run on the 16 and 17th of August 2019. Delegates from across R10 were in attendance including participants from India, China, Japan, Indonesia, Malaysia and Singapore. I am confident that our members who attended the program will take up leadership positions in the IEEE and very probably in the wider community as well. Colourful reports of their varied activities were presented to the committee. Much useful information and ideas came out of the R10 leadership training program.

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Chair's Report cont.

FROM PAGE 1

Earlier this year, the state government passed a bill requiring practising engineers to become registered. This will cost engineers some thousands of dollars per annum. Two of our members Enn Vinnal and Les Davey are aiming to bring the IEEE into the accreditation and examination process.

Last month, IEEE Young professionals ran a wearable textiles fashion display complete with rap dancing. This was well attended by Latrobe members and large numbers of family members whose secondary school children displayed their work on the fashion runway set up by at Latrobe University. WIE have strongly promoted the wearable electronics to many secondary schools. This fashion show initiative was organised by Teodora Raducan and other IEEE members.

At our November meeting, the committee decided to delay our bid for our regions conference TENCON from 2021 to 2022, thus giving us 3 years to prepare. This will enable us to achieve certain funding from the Melbourne Convention bureau and an extra year to prepare.

I would like to put on record my thanks to the Victorian committee for assisting the section put in a successful year and keep all our myriad activities moving forward. In particular I would like to thank Mehrnaz Shoustarian and Elspeth Mackay for their sterling work in keeping the Victorian section finances and minutes on track.

Alan Harvey
Chair Vic/Tas Section

IEEE Latrobe Student Prize

IEEE Latrobe Student prize for Real-time embedded Machine Intelligence System for PPE Detection

In this project, Fernando J. Galetto has developed a working embedded system which can detect whether a person has wear the protective equipment (PPE) in real-time.

The development involves collecting a large number images as the dataset, training a deep neural network, and deploys it a low cost embedded system which consists of a Raspberry Pi as the host computer and an Intel Neural Processing unit as the main processor.

Fernando has successfully developed the system using software tools such as: Tensorflow from Google and OpenVino from Intel.

He has overcome many technical difficulties to implement the system. I
n addition, he has also implemented the system in an Intel FPGA which is capable of processing HD videos from 4 cameras in real-time (60 frames/second).

WIE Victoria at VCE Applied Computing Day 2019

SUBHASHI JAYASEKARA

WIE Victoria team successfully delivered a workshop at the VCE Applied Computing Day event held by Digital Learning and Teaching Victoria on 8th November 2019 at the Jasper Hotel in Melbourne CBD.

The program, catered for teachers of all levels, is a collaborative professional learning day targeting the teachers of VCE Computing and the new VCE Applied Computing Study Design 2020-2023.

The hands-on workshop delivered by WIE Victoria team, provided the participants with good experience in wearable technologies, helping them to create innovative projects with wearable tech that will be delivered to students in the future.

Morning breakout sessions were offered in Applied Computing Units 1&2, Software Development Units 3&4 and Data Analytics Units 3&4 (formerly Informatics), with a focus on planning, pedagogy and assessment.

Afternoon breakout sessions involved relevant hands-on workshops (eg. GUIs in Python, innovative projects with wearable tech) and discussion groups (eg. artificial intelligence, new VCE teachers Q&A).

WIE Victoria team delivering a wearable technology workshop at VCE Applied Computing Day 2019

For more event information regarding VCE Applied Computing Day 2019, visit: https://site.ieee.org/victorian-wie/2019/11/10/digital-learning-teaching-victoria/

Visit to M.Brodribb Pty Ltd

HARMONY YU

GNS Associates Pty Ltd

On 10th of July, I joined the side visit event for the IEEE Life Member group. We visited M.Brodribb Pty Ltd from 11am to 1:30pm. Mr. Brodribb introduced us to many of the companies projects, the history of the company and gave a tour of the work space.

Photo of Mr. Brodribb

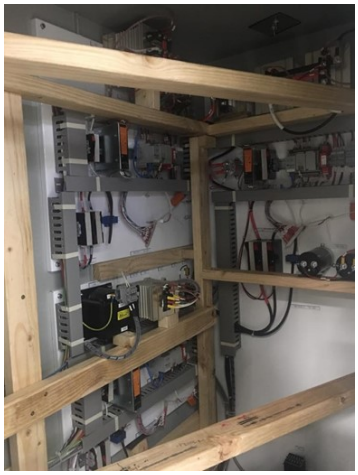
M. Brodribb Pty Ltd started as a small family company, founded in 1946 by his parents, until now, it already had a manufactory in Sir Lanka, cooperated with Chinese company (PCB manufactory). Their products have been used in power stations, oil refineries, mines and so on. Though a company with few employees it has a global clientele.

Mr. Brodribb gave a presentation about the companies past projects, then gave a tour of the manufactoring area.

Below is a work bench, with many, many panels, buttons and power points.

This was the first time I had seen a work bench with so many panels.

The two pictures below are a 5-channel cathodic protection rectifier, the overall size was similar to a wardrobe, my phone couldn't take the full-size equipment photo. The first picture is the label, and the second picture is the inside view of this equipment.



Visit to M.Brodribb Pty Ltd

Continued

We were shown a PCB board the company designed, which was made in China.

Brodribb told us PCB manufacturing in China is quite efficient. A PCB board can be made in 2 days after they send out the original design file.

When asked if it was secure to do so, Brodribb said they design their circuit board on Altium Designer, the original design file will be generated to a "Gerber File" which won't give any chance to other companies to copy their design.

In the manufacturing area, we watched a worker making transformer coils (see the picture above).

He was rolling copper wire on a rectangular prism, beside his working bench, there are some recently made transformer coils, see the photo below.

Brodribb introduced several employees, some of whom have been working with the company for 5-10 years.

Brodribb Pty Ltd offers internship opportunity for university students, they currently have an intern from RMIT and Mr Brodribb's son (also from RMIT) doing their internship there.

It was an immensely beneficial experience visiting M. Brodribb Pty Ltd.

I learned that although there are many large companies and competitions in the market, if a small company focuses on one point, the small company can develop well and grow.

We also appreciated Mr. Brodribb's hospitality and perhaps further IEEE visits could be organized to this company in future.

The Railway Signalling Debacle
Or … did anyone blow the whistle?

Editor's note: *This article first appeared in the October 1990 issue of Uplink. Although the Metrail organisation no longer exists and much has changed during the ensuing 30 years, the general Ethical principles discussed herein are still valid and give ample cause for thought in the present day.*

One of the troubles with being a professional engineer is that you are supposed to subscribe to an altruistic, community-minded Code of Ethics. The IEEE, of course, has such a code, as does EA and most of our colleague Learned Societies.

This can be a bit of a drag, because every now and then real ethical issues appear and require careful consideration, perhaps even action!

How nice it would be if the Code of Ethics were only loosely associative rather than binding on IEEE members. Or, like a share option, we could sell rather than take up the option after a given period, subject to established trading rules.

Unfortunately, that's not the way things are – nor could they ever reasonably become. Given the long -established tendency of professional engineers to claim credit (and even expect advantage) for their ethical behavior - from governments, employers, regulatory authorities and the general public - they (we) must surely be prepared to "carry the can" when an issue arises.

The current case in point is the state of the signalling infrastructure in Victoria's *Metrail* system, which according to recent reports (including one by a major consulting group), is in a rather precarious state of disrepair. There has obviously been a gradual deterioration over many decades rather than a sudden demise.

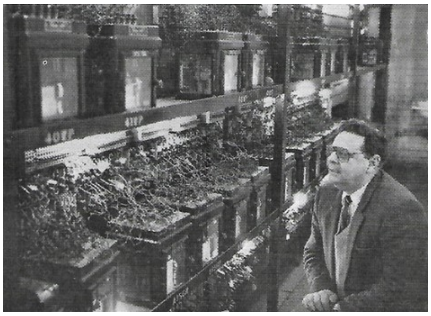
Accordingly, it is clear that over the years, a great many professional engineers (some in very senior positions) must have known about this problem.

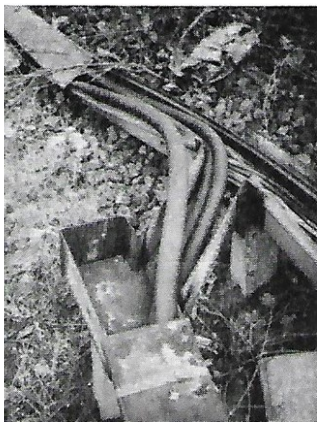
The awkward question for all of us is:
was anything said or done about the situation?

Did anyone blow the whistle?

Or was there instead a steady procession of those who came and looked, and passed by on the other side?

Now, I am not deliberately setting out to add to the discomfit of our EE colleagues in the railway signalling field. Nor am I necessarily implying that railway passenger safety is already seriously compromised (although anyone inspecting the South Kensington signal box installations shown below would have cause to wonder – it is an incredible sight!) With this said, there remains a number of important points to be made.





South Kensington signal box installations

The Railway Signalling Debacle Continued

First, the blame is not easily passed off on "The Government", past or present. Governments, by and large, deal with highly-technical matters just as their technical experts' advice. Certainly, in the present context, we can be confident that *nil action* would have followed any situation of *nil advice*. Also, the theory is that *Metrail* belongs to the people of Victoria, not to politicians and bureaucrats. If any message of concern had at any time been conveyed to the government and ignored, the public surely had the right (and the need) to know – by whatever means as may have been necessary.

Second, the safety aspects of the situation are not easily dispensed with by any generalisations of "fail-safe" system design. I fear that many of our railway colleagues fall headlong into this trap.

In fact, fail-safeness is an outmoded and largely irrelevant concept. Failure modes don't conveniently group themselves into "benign" and "catastrophic" categories, nor is there any justification for simplistic, binary, thinking about "degrees of safeness".

We need instead to apply up-to-date risk engineering techniques to determine the objective *exposure risk* and the ensuing *loss risk* in given situations. Further, this should involve the use, wherever practicable, of sound analytical models and hard quantitative data (as distinct from "safety folklore").

Third, any informed historical perspective would tend to favour pessimism rather than complacent optimism. Over the past 20-30 years, professional engineers have not always distinguished themselves in dealing with public and group safety in transportation, and the ongoing ethical issues arising from which.

For one reason or another, whether the threat of executive intimidation or "Groupthink" (a mis-placed reliance on collective thinking), or the assumed fail-safe attributes of a device or system, or some other reason – ethical behaviour in terms of the traditional code of ethics has come to mean almost too much to expect from professional engineers.

Perhaps it is too much to expect and we should stop kidding ourselves. Perhaps we should tear up our codes and get on with our work, unencumbered by such archaic nonsense!

Well, this is certainly a theoretical possibility and it has long been favoured by the ethical nihilists among us. But there surely must be a better and more enlightened way!

Some Possibilities

A few years ago, Professor Christopher Weeramantry of Monash University spoke of the need for a Technology Ombudsman to protect the public interest in matters of social concern, and thereby protect whistle-blowing engineers and scientists from employer reprisals.

This idea clearly has merit and requires further consideration. However, an ombudsman is by nature a passive authority waiting to hear complaints and other submissions brought to him/her.

A more proactive approach would be to require public utilities and corporations to undergo regular technology audits. These could embrace the full range of corporate activities, including key aspects such as public safety.

Employee engineers would then be provided with a particular opportunity to make confidential (and if need be, highly critical) submissions in their relevant areas of competence.

If the de-personalised results of such audits were made public as a matter of routine, it would provide professionals with conscientious concerns a direct channel to the outside world without fear of the organisational trauma that might otherwise be caused.

The logic of such a scheme is even more evident when the cost element is introduced. Public bodies have long been required to undergo annual financial audits, but these are usually conducted by personnel without technical skills outside the financial area.

The Railway Signalling Debacle
Continued

Yet mismanagement and inappropriate corporate strategies of any type are likely to needlessly waste money, and the present case is a classic example of this. Very large sums of money (perhaps hundreds of millions of dollars) are now urgently required to repair the *Metrail* signalling system. Arguably, the amount would have been very much less if it had been spent over a number of years in a well-planned maintenance program.

Technology Audits – suitably organised and regularly implemented – could ultimately have a significant and very beneficial impact on our public corporations and government departments.

At the same time, such a scheme could help promote *effective* Ethical conduct by professional engineers.

A way of repairing our professional infrastructure you might say!

IEEE RMIT Student Prize

IEEE RMIT Student prize for Sensor Data Compression for low data rate, low power networks

Luke Fowler was awarded the IEEE Student Prize for his work on Wireless Sensor Networks, sensor data compression for low data rate, low power networks.

Wireless Sensor Networks (WSNs) have become an industry standard, with many industries now relying on them to provide increased insight and efficiency. Their presence is ever-growing, and so are our expectations of them, with many technologies already pushed to their limits in terms of data throughput.

In order to allow their continued growth into the future, a more efficient way of handling sensor data must be adopted, regardless of the specific technology or protocol used.

This project thus presents a robust compression algorithm targeted specifically at low-power, low data rate sensor devices. It utilizes binary pattern recognition techniques to exploit temporal and spatial data redundancies in application-level payloads to reduce the overall transmission size by up to 94%, regardless of the application-level formatting. It does so without sacrificing data granularity (i.e. losslessly), and includes error checking functionality to help mitigate transmission errors.

Its scalable and modular design allows it to be easily adapted to many types of wireless sensor node, regardless of application. As proof of its feasibility, the algorithm was deployed on a pair of MultiTech xDot LoRa devices. It is shown to reliably achieve beneficial compression, even when faced with sub-optimal transmission reliability. It thus benefits both new and existing WSNs, making low data rate

Editorial

As editor, it seems that all has been said in the chair's address, however a few more IEEE events do come to mind.

First, we have a new world President-Elect, Kathy Land, a program manager at the American Department of Defense.

Her competitor Dejan Milojicic worked at Hewlett Packard and is by any measure a distinguished technologist.

It seems that a Business oriented candidate has won over a technological candidate. I believe this is a trend we should acknowledge and act on.

This year, a seminar in very early January organised by Enn Vinnal on Business essentials had an audience of over 40 a good number at any time but particularly at that time of year. We do have a technology chapter which is presently unfilled.

A talk organised by me on career development had an audience of 20 on one day's notice. It seems we should do our best to increase our business and management-oriented activities.

Regarding internal business management and leadership, every year we send aspiring candidates to leadership training with a view to future leadership of the Victorian section. This training was held in India this year.

Regarding our upcoming bid for the R10 conference TENCON, we need people who are prepared to be chair, secretary, vice chair, treasurer, technical chair and assistant technical chair.

Many of you volunteered for the TENCON 2021 bid. As most of you would know, the committee decided to delay our bid for our region conference TENCON from the 2021 conference to the 2022 conference, thus giving us 3 years to prepare.

I hope to see you all next year to bid for TENCON 2022.

We await to see what will happen to our proposals to even the score at Region 10, our region. This is because with around half the world's population and 35% of IEEE members, we have nominally the same resources as smaller regions.

Again, my sincere thanks to the Victorian committee for assisting the section put in a successful year and keep all our myriad activities moving forward.

My special thanks to our intrepid secretary Elspeth Mackay and our exacting and exact treasurer, Mehrnaz Shoustarian.

Alan L. Harvey, PhD
Uplink Editor and Chair

IEEE Vic/Tas Section

HAPPY AND SAFE HOLIDAYS TO ALL OUR MEMBERS AND THEIR FAMILIES