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Report from the Chair

A Busy Time for the Victorian Section

We have passed the half-year mark in 2016 and as we look back at the last six months, we can be proud of our achievements. I must firstly congratulate all of the volunteers who have responded to our call to action. We have had record attendances at our section monthly meetings. It is fantastic to see so many new, enthusiastic volunteers. Together we are stronger and more influential!

2016 marks a new era for the IEEE Victorian Section, new faces, and new ideas. We have begun the year with some deep thought and strategic planning. Consequently, we have put into motion some exciting new initiatives that will increase our visibility, appeal, grow our brand, while providing unique and valuable products and services to our entire membership. We have recognised and acknowledged the importance that our industry members play and we have taken action, organising an IEEE – Industry Leadership forum. Over 30 CEOs, General Managers and Senior Executives joined us to discuss how the section can best serve their needs but also how we can work together to leverage the industry membership to create new initiatives for our membership and the greater Victorian community. We identified a major need to serve IEEE members who form part of the large SME cluster. Furthermore, as part of this event we also hosted the Sri Chandra from the IEEE Standards Association, the first engagement of this time in our section's history.

We have taken a leadership position and brought together Engineers Australia and the IET under one umbrella to organise the first joint Engineering & IT Career Expo to be held on the 21st of September this year in the State Library of Victoria. We are expecting over a 1000 attendees and over 20 nationally recognised organisations to exhibit. Furthermore, we are developing the first of a kind for IEEE in Asia-Pacific, a student internship and job training program that will ensure IEEE

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Chair's Report cont.

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members receive training and mentoring from experienced members in industry, making them job ready.

Conferences are an integral part in IEEE's portfolios through which great thinkers of our time, meet to discuss ideas, disseminate and critique work and build global networks and collaborate to push the boundaries of technology. I am very pleased and excited about the collaboration with the Melbourne Convention Bureau with a strategy to secure some of the world's biggest conferences.

I would like to congratulate Prof. Iouri Belski, the founding chair of the IEEE Victorian Section Education Society. Prof. Belski was awarded a Fellowship with the Federal Government's Office of Teaching & Learning. This marks a significant achievement for our Section as well as for Prof. Belski.

Lastly, I would to thank all of our volunteers and supporters. Without you, we cannot achieve what we have set out to achieve in 2016. I look forward to serving you in the second half of 2016 and driving new success for the IEEE Victorian Section.

Eddie Custovic
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Minnesota University Student Group Visit to RMIT

RMIT's Advanced Manufacturing Precinct hosts Professor Gerald E. Sobelman and his students from the Department of Electrical and Computer Engineering at the University of Minnesota.

VLSI Architectures for Communications

Minnesota University Student Group Visit RMIT's Advanced Manufacturing Precinct

ALAN HARVEY

On Friday 3 June, Professor Gerald E. Sobelman from the Department of Electrical and Computer Engineering at the University of Minnesota in Minneapolis USA, visited Melbourne with a party of 19 students from his University.

Professor Sobelman is a returning, IEEE distinguished lecturer.

His previous group visited in 2014.

The 2016 group was shown through RMIT and in particular the advanced manufacturing precinct.

After lunch at RMIT, Prof Sobelman gave a seminar in RMIT building 80 on VLSI design.

His presentation covered several different VLSI design techniques for modern communications systems, including both algorithmic aspects and digital baseband hardware implementation issues.

In particular, designs for multiple antenna (MIMO), Orthogonal Frequency Division Multiplexing (OFDM) and Software Defined Radio (SDR) systems were presented.

Efficient VLSI structures for related Network-on-Chip designs were discussed.

Industry visitors also attended.

Following his talk, the group were shown places of interest nearby.

These included the Melbourne Central shot tower, the State library, the old Melbourne jail and the Exhibition building and gardens.

Having spent 3 weeks in Australia, visiting endless Universities in Brisbane, Sydney and Melbourne, the group expressed great relief that their University visits were over and that they could enjoy a history tour of Melbourne.

Students enjoyed their visit and flew back to the United States on the Sunday.

Students were from all years of their university course and were equally divided between men and women.

Students did have rest days during the study tour and visited the Gold coast beaches and the Great Ocean road in Victoria.

Final year students I spoke to had interesting jobs in robotics and vehicle testing.

The RMIT Advanced Manufacturing Precinct website is:

https://www.rmit.edu.au/about/our-locations-and-facilities/facilities/research-facilities/advanced-manufacturing-precinct

Victorian Section News

GITANSH KHIRBAT, ALAN HARVEY

University of Melbourne IEEE Student Branch Wins Two Awards

Gitansh Khirbat, Chair of the IEEE Student branch at the University of Melbourne, writes: I am extremely delighted to report that Unimelb SB has been recognised with the best student branch award by the IEEE Australian Council.

Unimelb SB has also been recognised as the exemplary student branch of the Region 10 at the R10 SYWL Congress. On this occasion, I would like to express my gratitude to the past chairs Dinuka and Deepak who along with their superb teams executed everything as planned and laid forth a great example for me as the current chair to lead through.

Gitansh Khirbat, Chair of the University of Melbourne Student Branch, Barry L. Shoop, IEEE President and Rebecca Thorburn, LaTrobe University at the Region 10 Student/ Young Professional/Women in Engineering/Life Member Congress

I would also like to thank our superb Victorian section which never fails to encourage and motivate us to achieve better heights. I am grateful to Victorian Section for providing me partial funding to attend this SYWL Congress wherein we received this award.

The University of Melbourne Student branch received $700 and Certificates acknowledging their award.

Victorian Section News

The President of the Victorian IEEE, Eddie Custovic says: A huge congratulations on behalf of the entire section. 2016 continues to be a year of awards and recognition of the time everyone has put in. Vision, hard work and dedicated volunteers are a recipe for success.

Award Winners at the R10 SYWL Congress

2016 IEEE Student Research Paper Prize Results

Thirteen research papers were entered in the 2016 paper competition. The judges awarded the following researchers:

First prize of $1,300 to **Saman A. Gorji** from Swinburne University for his outstanding paper entitled "**Galvanically Isolated Quasi Switched-Boost-Based DC/DC Converter**".
The **runner up** was **Safiollah Heidari** from the University of Melbourne who received a prize of $700 for his research paper entitled "**A Responsive Knapsack-based Algorithm for Resource Provisioning and Scheduling of Scientific Workflows in Clouds**".
Certificates of merit were awarded to **Loau Tawfak Al Bahrani** from Swinburne University and **Sahar Sabbaghi** from the University of Melbourne for their papers.

The judges encourage all research students to enter their papers for 2017.

Development of an Automation Culture

ANTHONY E. GASCOIGNE

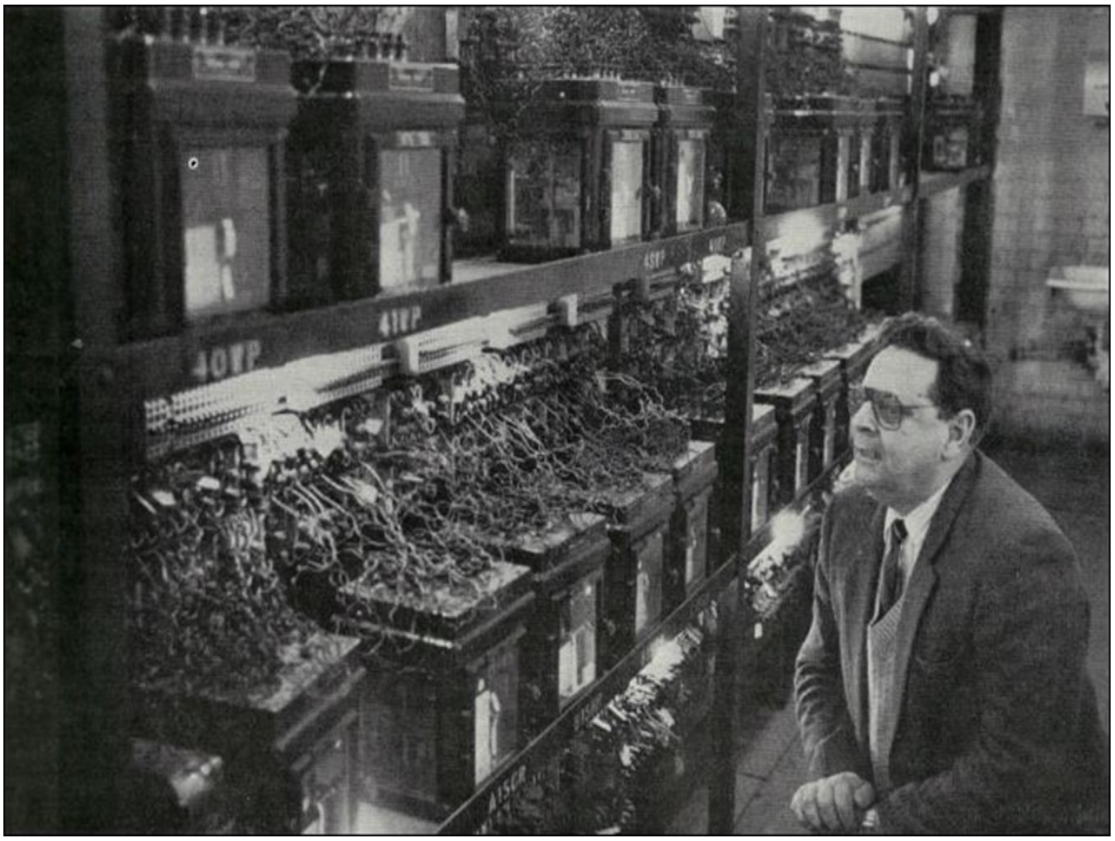
In this extract from an earlier publication[1], the author argues for the development of a coherent Automation Policy for Australia and then examines some of the Ethical issues associated with such a policy.

Automation and Human Need

Automation has the potential for radically improving the quality of life, as can be demonstrated both from an historical perspective and numerous present-day examples.

The progressive elimination of many of the boring, repetitive, unsafe and demeaning work practices on the farm and in the factory fall into the first category; modern developments in surgery, road building, health care and fruit harvesting in the second.

It is frequently contended that automation causes unemployment, but this is a very myopic view. It is also an age-old argument, which by now should have lost all credibility. Long before the Space Age, *every* advance in technology was likely to attract objections of this sort; no doubt the man who invented the wheel was accused of destroying jobs!



Engineering Ethics in Practice: safety-critical railway signalling equipment and wiring in a dubious state of serviceability. Did anyone blow the whistle? (Photo: courtesy *The Age*)

Development of an Automation Culture (Continued)

While we do not wish to denigrate persons who sincerely hold such beliefs, we suspect that more often than not they have simply found a convenient scapegoat. In the words of Professor Helen Hughes of The University of Melbourne, " It is not surprising that Ned Ludd and the original Luddites did not understand the beneficial effects of Mechanisation. But some 200 years later there is little excuse for using essentially the same arguments to claim that advances in technology are the principal causes of unemployment" [Hughes 1994, p42].

With respect to an Economy as a whole, precisely the reverse relationship is seen to hold: nations that make the greatest use of automation tend to have *low* levels of unemployment. For example, Japan, with some 350,000 robots (almost 200 times the number installed in Australia) has an unemployment rate of rate of less than 3%. Whatever interpretation is put on these figures, they can hardly be dismissed as statistical anomalies. Nor can they give any comfort to those who see a direct and inevitable nexus between automation and unemployment.

Of course, major changes in industry, including technological changes, have at times been associated with significant dislocations of parts of the workforce. But this is related as much to the methods used in implementing change as to its technological basis. That such changes have had an adverse social impact does not eliminate the need for change per se. For example, very few people acquainted with, say, a 1930s-style production line, or a garment-manufacturing "sweat shop", would be attracted to such ways of earning a living. Any informed observer would conclude that "there must be a better way" – on both humane and technological grounds. And yet, manufacturing operations in both of these categories are said to still exist in Australia. Apprehensions about the undesirable consequences of automation do nothing to address the known human needs in such situations.

In our view, it is much more reasonable to identify particular opportunities provided by technology, and to plan pro-actively to overcome all attendant disadvantages. Far from neglecting social issues, such an approach provides the dynamic for orderly (and equitable) change in all levels of society [Jones 1982].

Thus, a key factor in the development of a mature Automation Culture for Australia is discernment of the immense benefits in prospect from well-conceived and well-planned automation. Any disadvantages found in past practices are largely the result of faulty perceptions and poor planning. The policy outlined herein is dedicated to meeting the real human and social needs of the Australian workforce, and of the population at large, in addition

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Development of an Automation Culture (Continued)

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to the economic and material benefits arising from automation.

Ethical Considerations

Despite our confident statements in the preceding section, we recognise that that there will be some with genuine ethical concerns – either relating to technology in general or automation technology in particular. Certainly, there will be many who reject Buckminster Fuller's philosophical proposition that humankind is *inexorably destined* to embrace automation technologies [Fuller 1969]. This "argument-by-design" is taken up by Michael Kassler [Kassler 1992;1994].

It is not practicable to deal here with ethical and philosophical issues in any comprehensive fashion, since this would take us far from the main objectives of this discussion paper. Accordingly, the following outline is restricted to only a few pertinent issues. For our present purposes, it is useful to distinguish between two connotations: Ethics as a set of moral principles on the one hand; and Professional Ethics, being the expected codes or norms of behaviour of a particular profession or group, on the other.

Some Ethical Principles.

There is no unanimity as to what ethical principles should apply in the present context. However, we expect that the following five propositions will have broad acceptance.

First, we might expect that technology will convey more advantages than disadvantages. Certainly, outright harm is to be avoided.

"No robot shall harm a human being, or through inaction allow a human to come to harm", states Asimov's First Law of Robotics.

Second, the particular manner in which the advantages are manifested is important; that is, we should have a *social conscience*.

As far as practicable, the benefits should be widely spread throughout the community. At the very least, we should avoid situations where the benefits available to one group or segment of society are at the expense of another group, and outright exploitation is to be deprecated.

Third, we should expect that technology will involve the wise use of resources. This must necessarily include *economic resources* since the wastage or reckless use of money cannot benefit anyone. But it must also extend to natural resources.

We should not extract or consume resources simply because they are there, or because it is technologically possible to do so, nor should we wilfully despoil our natural environment.

In all these respects we must have a proper regard for the *future consequences* of our actions.

Development of an Automation Culture (Continued)

Fourth, we will doubtless require that technology will not detract to any significant extent from individual freedoms. Before adopting a new technology we must be amply satisfied on this point. A mindless commitment to a "machine culture" is an affront to humanity and an unnecessary evil: we have no right to turn humans into automatons!

Fifth, we might expect that technology will not detract markedly from the quality of life enjoyed by a particular community or group of citizens. This necessarily extends to the difficult (but valid) concept of Aesthetics, along with other more quantifiable measures of community impact (air and water pollution, noise levels, traffic density, etc.)

Unfortunately, the real-life application of general *principia* along the foregoing lines is never easy and can be very nebulous. A single example will serve to illustrate this point. The *potential for harm* of a given technological application is often extremely difficult to establish. Rather than a simple good/bad classification, we are typically confronted with various levels of Risk, and it remains to determine whether such risk(s) are acceptable or not. Sometimes a considerable time must elapse before the ultimate consequences of use are known. Also, the consequences of *rejection* must also be considered, for existing technologies and practices always carry some risks, as well as the proposed innovations.

Even if the objective risks are well known (by no means a common situation), we are left ultimately with the subjective perceptions- of-risk of the persons and parties involved. For it is a truism that if a person perceives that a risk is "too high", then for that person it is an *unacceptable risk*.

In recent years we have seen a multitude of public debates and disputes on technology-related issues. The Very Fast Train proposal of the late1980s, and the alleged ill effects of very low frequency fields from electric power lines, are two salient examples. In both cases, and in numerous other instances not cited here, the protagonists seemed completely unable to agree on the "ground rules " for risk identification and assessment!

Professional Ethics

Professional groups in Australia (as in many other countries) commonly have a code of ethics to which members are required to comply as a condition of membership. As an example, As an example, Article 1 of the Code of Ethics of the Institution of Engineers Australia states:

The responsibility of Engineers for the welfare, health and safety of the community shall at all times come before their responsibility to the Profession, to sectional and private interests, or to other Engineers.

In like manner, members of the worldwide Institute of Electrical and Elec-

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Development of an Automation Culture (Continued)

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tronics Engineers, Inc., bind themselves:

...to accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment.

Other sections of these codes deal with matters such as specialist knowledge and areas of competence, personal probity, and refraining from malicious criticism of other engineers. (We make particular reference here to professional engineers because this group usually has a key role in respect of new technological applications.)

We do not wish to appear unduly critical of these excellent codes. In fact the conservative view (which we fully support) is that engineering profession would be greatly diminished in stature in the absence of noble statements of this type. However, there are a number of difficulties which are pertinent in the present context and which have been very much in evidence during recent controversies. We briefly draw attention to two such issues.

First, there is the obvious problem of determining *the public good*. Which of the general criteria outlined above is to prevail? Alternatively, in what order of precedence are they to be ranked? And who is ultimately to decide? The matter of Public Safety is of special concern since it depends so much on the perceptions of those involved, as emphasised earlier. The perceptions of the general public are in turn affected by the stated views of politicians, industrialists, public officials, technical experts, lobby groups, media commentators, and all other parties in the public arena at the particular time.

Some lobby groups (and the experts they engage) seem to delight in making alarmist statements which elicit a "fear response" in the public mind. This may not always be intentional, but it is an inevitable consequence of unqualified statements and immoderate language in referring to complex technical issues. In terms of formal codes of ethics, it is hard to see how the public good is ever well served by widespread public fear; for this is the worst possible climate for rational decision-making and the orderly exercise of democratic rights!

Second, we refer to the problems of *Expertise* per se. It is well known that experts are sometimes wrong. A person may be eminently qualified and widely experienced (and so comply with all the customary requirements of professional ethics), and still hold erroneous views. Also, an expert is probably no more immune to partisan influences or other forms of bias than is an unqualified individual.

Similarly, a professional is enjoined by Ethics not to unfairly denigrate a fellow professional, but in practice this may be very difficult to avoid.

Development of an Automation Culture (Continued)

If a debate on a complex technical issue has reached the public arena, then a certain amount of name-calling between adversaries is almost inevitable (some would say that the news media will accept nothing less!) Certainly, it is not a time when objective arguments and an informal exchange of technical opinions can readily take place. The spectacle is particularly demeaning if subsequent events show that the experts on both sides of the argument were substantially in error!

Such difficulties have caused a certain degree of reaction against Expertise of all forms. To some, the very notion of "an expert" connotes undeserved status and privilege. We occasionally hear calls for key technical decisions to be made by lay people so that the decision-making process will thereby become "more democratic".(We emphasise that we consider all such proposals to be impractical and absurd: the thought of a Citizens Panel deciding, for example, whether to run the computer at 100 or 150 megahertz is mind-numbing!)

Nevertheless, the general point is taken: ways need to be found for experts to contribute more effectively to public debates on technology.

Overview

In summary, we recognise that the use of Automation technologies raises matters of possible contention on ethical grounds.

These relate both to the general issues of Technology in Society and to the behaviour of professional engineers and other practitioners in particular contexts.

Although broad ethical principles can be elucidated, the application of such Principles to Practice can be extremely difficult.

Since there are no prescriptive ways of determining "degrees of goodness" (or of "rightness", ethical assessments are of necessity value-based and subjective.

We welcome all constructive debate on ethical and moral issues. Nevertheless, we might reasonably expect that the protagonists involved in any discussion of the Ethics of Automation Technology will:-

a) Be well-informed on all technical aspects (both theoretical and practical);

b) Be generally aware of the many vagaries and subtleties of socio-technological issues, as briefly outlined herein.

c) Unequivocally reject "blind fear" arguments, of all types and manifestations.

[1] Gascoigne A.E. 1995, "An Automation Policy for Australia: Advanced Technology at Work for the Nation" (discussion paper). Australian Robot Association, Inc. Melbourne. ISBN 0 646 23509 5. (24 Refs.).

IEEE Women in Engineering & the Design and Technology Teachers' Association (DATTA) 2016 Conference

MEHRNAZ SHOUSHTARIAN

In May this year, IEEE Victorian Women in Engineering (WIE) held a Wearable Technology workshop at the Design and Technology Teachers' Association (DATTA) Conference.

STEAMpunk! was DATTA Victoria's annual conference for Design and Technology educators, which took place on the 13th & 14th of May at Harvester Technical College in Sunshine.

Teachers attending the Wearable Technology workshop at DATTA

WIE was excited to run their workshop on the use of the LilyPad Arduino and its associated components for high school teachers.

Many of the attendees believed that this would be a great addition to their technology Design and Technology lessons and would certainly be 'something the girls would love'!

The workshop consisted of an introduction to the LilyPad microcontroller hardware and the Arduino software.

Participants were then given an opportunity to 'sew' together simple circuits and try out a few Arduino sketches. As always once the needle was threaded, the rest was straight forward! Design and Technology is an area of the high

IEEE WIE & DATTA 2016 Conference (Cont)

Fatemeh Jalali of WIE demonstrating the software to the teachers at the Wearable Technology Workshop at DATTA 2016.

school curriculum that applies the design process, and uses tools and materials (with new technological knowledge) to create functional products.

DATTA has a membership of over 450 and holds annual conferences and facilitates various professional learning workshops throughout the year.

This was the second time WIE was invited to this conference and again WIE was proud to be part of this exciting event. The DATTA conference website is:

http://www.datta.vic.edu.au/content/steampunk-2016-conference

Editorial

IEEE activity in the second quarter of 2016 continues at a high level, with many technical meetings, workshops and section meetings!
Reports for Uplink are most welcome on any activity of interest to the Victorian section.
This year it is hoped we can break the record number of technical meetings held during the year.
Keep the details of your meeting for Uplink and make sure you take photographs as well.

The editor personally led a group of American students and their professor for a tour of RMIT and to nearby places of historic interest.

A workshop on Rapid Prototype Development was run at RMIT by the editor in June and was attended by 16 people. Several industry people attended also.

Many thanks to our Uplink Compiler Marie der Klooster. Her ability to unscramble complicated technical articles is admirable.

We await your articles for the remaining months of 2016.

Keep on keeping on with your endeavors!

Alan L. Harvey
Editor, Uplink
CASS Chair

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