

A Look Back at IEEE Vancouver Section History

Chris Scholefield, PhD BSc MIET MIEEE

It was my pleasure to join with the IEEE Vancouver Section in celebrating their centennial in 2011. During the year we participated in many events to celebrate this important milestone.

A number of working groups were formed to search through the Section historical records that have been stored over the years. This was an opportunity to clean house, but many important historical documents and facts were uncovered and important records have been scanned for archiving. These records include important historical correspondence on the formation of the Section and Chapters as well as newsletters and minutes of meetings.

We see one of these groups in action (Fig.1) after a day of going through a very old filing cabinet. I must say that following several days of work by many volunteers we have made a relatively small impact on the collection.

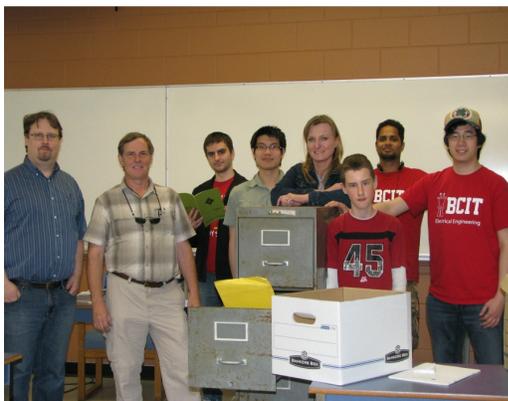


Figure 1 - Centennial Committee volunteers at work on the collection of Vancouver Section archives.

It is a very challenging task to describe 100 years of the section history within a few pages of this article. What I hope to do is illustrate a few of the nuggets of facts that have been found and will be of interest. Fortunately, there are a couple of articles describing some of the early history and copies have been reprinted in this publication [1, 2]. I will try not to repeat the earlier history, other than to put into context some of the facts we have found. Consequently, this article will focus on being an update on the recent history over the last 50 years.

The Vancouver Section was formed in 1911 from interest in power systems. In that same year, the Stave Lake power plant with two 10,500 kW units came into operation with its 60 kV transmission line to Vancouver. Only 8 years earlier, the very first hydroelectric plant in the lower mainland came online at Buntzen Lake, generating 1,500 kW for the newly formed British Columbia Electric Railway company, which amalgamated many lower mainland lighting and tram companies. The Buntzen plant was the primary power source to operate a Vancouver streetcar service starting in 1906 (Fig 2). The streetcars were originally designed to be horse drawn, but in a late design change they were modernized to incorporate electric motors. Much of the history of the BC Electric and the eventual formation of BC Hydro have been recorded by BC Hydro Power Pioneers [3].



Figure 2 - A BC Electric streetcar at 50th Avenue and Main Street in 1923. Courtesy of BC Hydro Power Pioneers.

It is with this background that a group of electrical engineers having a common interest in power generation and distribution partitioned the American Institute of Electrical Engineers (AIEE, pronounced AI double E) to form a new section in Vancouver and the AIEE authorized that formation in a letter dated August 22, 1911. The official date of formation according to the recorded meeting minutes (Fig. 3) was October 11, 1911 with the first meeting held two days later at the Dutch Grill. The meeting roster from the very first meeting shows 19 people in attendance representing several power companies (Fig 4).

DATES - A.I.E.E.
MEETINGS - FIRST YEAR OF OPERATION

August 22, 1911. Authorization by Headquarters, A.I.E.E., for the formation of the Vancouver Section.

October 11, 1911. Official date of organization of Vancouver Section.

October 13, 1911. First Meeting of Van. Section, "Dutch Grill", Vancouver.

November 10, 1911. Second Meeting of Van. Section, "Dutch Grill", Vancouver; Adoption of first By-Laws; Reading of first technical paper by L.G. Robinson "The Generating and Transmission System of the British Columbia Electric Railway Company".

December 1st, 1911. Third Meeting of Van. Section, "Trade's Hotel", Vancouver. First authorization of expenditures - The purchase of a Minute Book and a quantity of stamped envelopes for meeting notices. Reading of second technical paper by H.R. Keifer "Inductive Interference on Telephone Conductors Resulting from High Voltage Transmission Lines".

Figure 3 – Record of the first year of operation of the Vancouver Section of the AIEE

Vancouver.—Anderson, W., 413 Granville St.
Beebe, C. N., Box 175.
Boesch, J. E., B. C. Elec. Ry. Co., Ltd.
Breed, E. M., 814 Dominion Trust Bldg.
Chappell, W. C., Clifton Mansions.
Ehrenborg, G. B., 518 Winch Bldg.
Gain, L. A., 198 Hastings St.
Hayward, R. F., Western Can. Pr. Co. Ltd.
Hoffmeister, Frederic, 1121 Georgia St.
Lister, J. Geo., 1031 Harwood St.
McCrossan J. A., Box 1882.
Montgomery, J., Western Canada Pr. Co.
Nims, F. D., Western Can. Pr. Co., Ltd.
Philpot, L. B., 1656 Georgia St.
Read, John R., 439 Pender St.
Routh, Alex. C., Box 249.
Sperling, R. H., B. C. Elec. Ry. Co., Ltd.
Walkem, G. A.
Young, Russell, 1217 Robson St.

Figure 4 – Meeting roster from the first Vancouver Section meeting on October 13, 1911.

Communication across Canada in 1911 was very limited. This was still a decade prior to the formation of the BC Telephone Company, so there was no long distance voice communication. Holding a meeting with members of the AIEE in Toronto would necessitate taking a train with several days journey each way. Consequently, greater alignment was achieved with the Pacific North West Sections of the AIEE.

Membership in the Vancouver section grew quickly from the original 19, to 28 in the following year and 42 in 1913. It was a significant achievement that in 1913 this small group in the Vancouver Section hosted the AIEE Pacific Coast Regional Convention. This brought together electrical engineers from neighbouring Seattle and Portland (Fig. 5). These conventions would be held in Vancouver about every decade in 1913, 1922, 1932, 1942 and 1953.

(Illustrated).....	1781
MEETING AT VANCOUVER, SEPTEMBER 9-11, 1913.	
Effects of Ice Loading on Transmission Lines.—By V. H. Greisser. (Illustrated).....	1829
Mountain Railway Electrification.—By A. H. Babcock. (Illustrated).....	1845
The Gulf of Georgia Submarine Telephone Cable. By E. P. LaBille and L. P. Crim. (Illustrated).....	1877
A Modern Substation in the Coeur D'Alene Mining District.—By John B. Fisker. (Illustrated).....	1891
MEETING AT NEW YORK, OCTOBER 10, 1913.	

Figure 5 – Transactions of the AIEE Pacific Coast Regional Convention held in Vancouver.

An interesting side note from the meeting organizer's records demonstrates the culture of the time. At one of the meetings a novel concept was the introduction of a non-smoking table at the dinner. This was "well appreciated by the members who made use of the table", even though I am sure the room was never-the-less filled with smoke. It was also assumed that all attendees, about 400 electrical engineers, were male and activities were arranged for the entertainment of accompanying wives.

Following the second world war (1939-45), there were tremendous advances and interest in radio and electronics. This led to the formation of a Vancouver Section of the Institute of Radio Engineers (IRE) on September 19, 1950. Many of the members of this new IRE were also members of the AIEE and would also attend both meetings.

Mark Bradwell was Student President of AIEE in 1949, Section Chairman of the AIEE in 1958/9, an employee of BC Electric and the Section's longest serving member. I recently met with Mark to reminisce about old times.

"We had two meeting groups. These were not two technical groups. One was called the dinner meeting group and the other was the Section meeting group. We met and had dinner at the Devonshire Hotel with a half hour presentation with discussion after.

Then we would walk over to the medical/dental building in the next block to a meeting room where we had our formal Vancouver Section meeting. There we had a more formal presentation on a technical topic.

This was a means of increasing attendance. People would come to the dinner, whereas they wouldn't come to the other meeting."

The commonality between these Sections was experienced throughout other sections of the AIEE and IRE and eventually led to the two organizations amalgamating into the one Institute of Electrical and Electronic Engineers on January 1, 1963.

Mark Bradwell was involved in a working group from both organizations to create a temporary set of bylaws for the joint society. The two organizations had a very different view. IRE was much less formal than the AIEE. Following the merger there were two groups. The distinction used to be "large currents" representing the power field and "small currents" representing the electronic field.

Various interest groups became societies within the parent organization of the IEEE. There were three main interest groups in the Vancouver Sections at the time: Power, Electronics and Industrial. The power chapter was formed on December 17, 1964 followed by the Electronics and Industrial Chapters in February 1966.

Following the formation of the IEEE in 1963 the Vancouver Section began publication of the "Contact" as a newsletter to members. Current members of the Section will be familiar with Contact as a monthly publication delivered by mail and today frequently read online. Back when it was first introduced, Contact was a much larger annual publication. It is interesting to read articles from these early publications of Contact which coincided with the opening of BCIT (Fig. 6) and report of a field trip (Fig. 7)



Figure 6 – First publication of Contact containing an article on the opening of BCIT.

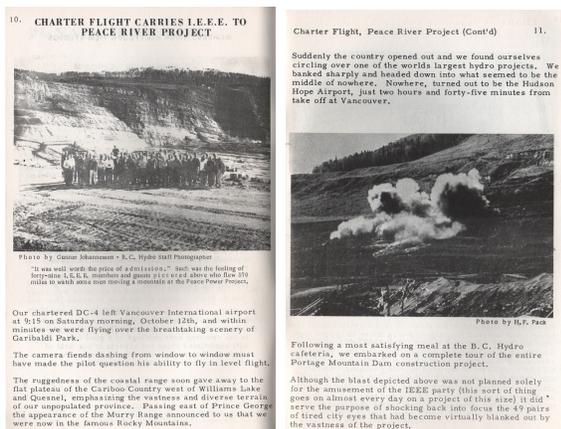


Figure 7 – Report of a field trip from the first Contact published in 1964.

Today's interest groups have expanded significantly from the original three to fifteen: Aerospace and Electromagnetics, Applied Physics, Circuits and Systems, Communications, Computing, Controls and Automation, Electron Devices, Engineering in Medicine and Biology, Industrial Applications and Electronics, Management, Oceans Geoscience and Remote Sensing, Power and Energy, Power Electronics, Signal Processing and finally Solid State Circuits and Technologies. Nearly all members' interests through membership of IEEE societies are now represented by chapters within the Vancouver Section.

There are also three affinity groups: Graduates of the Last Decade, Women in Engineering and Life Members. Student branches exist at UBC, SFU, BCIT, UBC-Okanagan and UNBC and the Vancouver Section awards scholarships to student members at these educational institutions (Appendix 1).



Figure 8 – Centennial plaque presented to UBC Student Branch in recognition of the first student branch Canada founded in 1930.

Recently, the Vancouver Section has sponsored the formation of two sub-sections: Northern BC in Prince George associated with University of Northern British Columbia and Okanagan associated with UBC Okanagan.

One major accomplishment was to host the very first Canadian Conference on Electrical and Computer Engineering (CCECE) in Vancouver in 1988, sponsored at that time by the Canadian Society of Electrical and Computer Engineering (CSECE). The CCECE was established by Dr Vijay Bhargava of the University of Victoria at the time and has been held annually since then. In 1995 CSECE merged with IEEE Region 7 to form IEEE Canada.

The IEEE recognizes individual contributions through a number of awards. The most significant award in Canada is the Mc Naughton Medal and the Vancouver Section has five

members who have received this award: Thomas Ingledow in 1971, Hector J. McLeod in 1973, Gordon F. MacFarlane in 1982, Harry M. Ellis in 1990 and Vijay Bhargava in 1995 (as a member of the Victoria Section at the time). There are many other awards which are detailed in Appendix 1.

The IEEE not only recognizes individual contributions, but also important milestones in history [4]. The Vancouver Section has been recognized in three milestones: television broadcasting, radio Astronomy and particle physics. The following plaque citations are displayed at each of these sites.

***First Television Broadcast in Western Canada, 1953
North Vancouver, British Columbia
Dedicated 6 November 2010***

On 16 December 1953, the first television broadcast in Western Canada was transmitted from this site by the Canadian Broadcasting Corporation's CBUT Channel 2. The engineering experience gained here was instrumental in the subsequent establishment of the more than one thousand public and private television broadcasting sites that serve Western Canada today.



Figure 9 – CBC Senior Staff at the time of the Mt. Seymour broadcasting site's opening in December 1953. From Left to Right: E. F. McGrath, Supervising Operator, CBU Transmitter. R. L. Whiteside, Technical Director, TV. A. Geluch, Chief Operator, Vancouver area. D. Horne, Supervisor Technical Operations, Vancouver Studios. F. B. C. Hilton, B.C. Regional Engineer. E. Rose, Assistant

Technical Director, TV. M. S. Bishop, Senior Transmitter Operator, CBUT. Photograph courtesy of CBC

First Radio Astronomical Observations Using VLBI, 1967

***Kaleden, British Columbia
Dedicated 25 September 2010***

On the morning of 17 April 1967, radio astronomers used this radiotelescope at DRAO and a second one at the Algonquin Radio Observatory located 3074 km away to make the first successful radio astronomical observations using Very Long Baseline Interferometry. Today, VLBI networks span the globe, extend into space and continue to make significant contributions to both radio astronomy and geodesy.



Figure 10 – Radio telescope at The Dominion Radio Astrophysical Observatory (DRAO), located near Penticton, BC.

First 500 MeV Proton Beam from the TRIUMF Cyclotron, 1974

***Vancouver, British Columbia
Dedicated 16 December 2010***

At 3:30 pm on 15 December 1974, the first 500 MeV proton beam was extracted from the TRIUMF cyclotron. Since then, TRIUMF has used proton beams from its cyclotron (and secondary beams of pions, muons, neutrons and radioactive ions produced in its experimental halls) to conduct pioneering studies that have advanced nuclear physics, particle physics, molecular and materials science, and nuclear medicine.

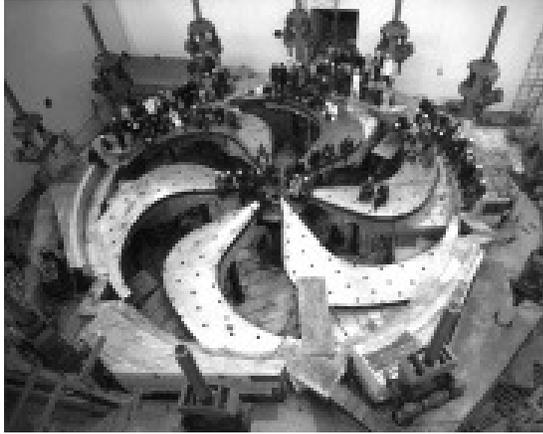


Figure 11 – January 1972: TRIUMF staff gathers on the lower six sectors of the cyclotron magnet. Photograph courtesy of Triumf.

The history of the Vancouver Section would not be complete without discussing some of the work of its members and the technology advances in the Vancouver community over this period. The BC Tech Map [5] provides a fascinating genealogy of hundreds of companies in Vancouver and other parts of BC. It identifies important relationships between the companies that most of our members worked at during their careers. When I talked to the author of the map, I found that it was the person stories of the people working in those industries that give life to the map.

Mark Bradwell joined BC Electric as an Engineer in Training, which was a four-year training program for graduate engineers. “Over this time I worked in eight departments, such as design of a substation or relay protection on a drawing board, supervising contractor building substations, line installation, underground cable analysis and system planning work using a network planning board.”

At the end of his training BC Electric decided to buy their own network calculator based on an analogue computer. “This was a 400 Hz generator with appropriately designed units

which would represent the system and a plug board to interconnect them.” Mark was put in charge of running this board.

Not long after this came the merger of the BC Electric (operating in the lower mainland) with Power Commission (operating on Vancouver Island and other parts of BC). “When this happened many lead engineers left to form the International Power Engineering Consultants and BC Hydro became a different type of organization. When the merger occurred, each organization had similar department heads. In large part the BC Electric managers prevailed and Power Commission managers became assistants.”

Dr Hermann Dommel was one of the recipients of this anniversary year’s Vancouver Section Centennial Award. He came to Vancouver from Bonneville Power Administration in Portland Oregon in 1973 to join UBC. He is regarded as a world expert on computer modeling of electromagnetic transients in power systems and has performed research and consulting for BC Hydro and other power companies. Until the mid 1960’s the transmission line would be modeled as a Pi circuit using analogue computers as a transient network analyzer.

Dr Dommel held a research chair until the year 2000 financed by BC Hydro and the Natural Sciences and Engineering Research Council of Canada. His work and the use of his Electromagnetic Transients Program (EMTP) by BC Hydro has led to an understanding of switching overvoltage due to transient overvoltages, which is applied to the design insulation, surge arrestors, matching surge resistors and controlled timing closing of switches.

A number of companies have created commercial modeling programs based on the same equations used by Dr Dommel and Canada has become a leader in commercial package development.

Dr Jose Marti continued Dr Dommel's work at UBC and expanded the capabilities and the areas of application of the EMTP software. He developed the reference model for multi-conductor transmission lines that is used in all major commercial EMTP packages. He also modified the EMTP algorithms to eliminate numerical oscillations and allow the efficient representation of power electronic components.

Dr Marti, also regarded as a world leader in real-time EMTP modeling, has built a platform to model the interdependencies that exist among the multiple systems affected during large disaster situations (e.g. power grid, water system, transportation network, hospitals network and first responders). This tool is the first of its kind and allows the real-time simulation of the dynamic behaviour of the disaster before critical decisions are taken.

Turning away from power systems and looking over the genealogy of technology in the BC Tech Map, we see that a few of these companies have played key roles by spinning off many other related companies. I have had the good fortune to work or be associated with several of these companies, particularly those associated with computers and communications.

One of these pioneers is Dr John Macdonald [6] who founded Macdonald Dettwiler and Associates in 1969, together with Vern Dettwiler. John Macdonald has been well recognized with many awards for his work,

including one of this year's Vancouver Section Centennial Awards.

In 1968 John Macdonald was working as a professor at UBC when he was approached by Lankard (later to become Micro-Pacific Research). They needed to develop a computerized supervisory control system to replace the discrete systems traditionally used for the new Northern Interprovincial Microwave Communication System. In order to build the solution Dr Macdonald joined with Vern Dettwiler, Ken Moran, Ron Spilsbury and others to form Macdonald Dettwiler and Associates.

The supervisor was designed using a real-time system running on DEC PDP-8i with 4k of memory and 32k disk storage. There were four computers connected over the microwave backhaul. They wrote a language called "system builder", which allowed the system to be reconfigured. The system ran flawlessly for 15 years until the system became overloaded due to scaling of the microwave system.

The move to space systems came from an idea of David Sloan who was very interested in space in 1971 when he became the 8th employee. As a result, MDA bid on contracts for the Earth Resource Technology Satellite (later called Landsat) and won a contract to build the demultiplexer, beating out Hughes Aircraft. David Sloan also came up with an idea to add a simple imaging device called the Quicklook system using a Polaroid camera as a maintenance tool.

MDA later made an unsolicited proposal to build a low cost ground station in a 40' trailer. The \$2M ground station was about 1/5th the cost of a tradition system and this prototype became the Shoe Cove station in Newfoundland. The low cost ground station

was extremely successful and became the core business through the 1970's

It is remarkable that MDA produced a number of highly successful spin-off companies, including Mobile Data International (later Motorola Mobile Data Division) and Creo (later Kodak Vancouver).

The formation of MDI originated when MDA was given a government communications contract to develop radio data communications for the RCMP. Conventional wisdom of the day believed that private mobile radio channels could carry no more than 30 bps of digital data. Dan Gelbart, who was seconded from MDA, designed a modem operating at 4800 bps with forward error correction and automatic repeat request. This revolutionized the technology to allow emergency services and taxis to use their regular low cost VHF radio to carry reliable high speed data.

MDA sold off the business to Ventures West and Mobile Data International was formed by Tom Purdy and Bill Thompson with Ventures West represented by Victor Jones [7]. The major success of MDI was supplying equipment to Fedex, allowing the mobile tracking of packages, and supplying mobile data systems to emergency services and for taxi dispatch. MDI was eventually acquired by Motorola for \$105M.

One successful spin off from MDI was Sierra Wireless. Dr Norman Toms joined MDI in 1987 and a few years later left to join MPR followed by six colleagues. In the early 1990's the Cellular Digital Packet Data (CDPD) announcement was made by the US cellular carriers. One of the ex-MDI engineers, Pete McConnell, had met with several of the US carriers and influenced the CDPD specification

to become more IP based. Norman Toms then met with executives of Sierra Semiconductors, the parent company of PMC Sierra in 1992, who provided funding for the formation of Sierra Wireless.

Dan Gelbart while at MDA had also developed an accurate image film recorder and the modem for MDI. He was leading the team working on developing an optical storage device when John Macdonald encouraged Dan to start his own company, Creo, building high precision imaging equipment. Creo was also very successful and was eventually acquired by Kodak for \$980M.

There may be some of you who think I have omitted a significant sector of BC Technology in this short account of the Vancouver Section history and some of the key technology developments. I would invite anyone who wants to record their place in history to go to the IEEE Global History Network [8], where a set of wiki pages have been created to allow further contributions to be made. Alternatively, if you have an interesting story to tell, please contact me and we will set up a recording session. Perhaps your own experiences will be found in the next update to the Vancouver Section history.

As we look back at the past we realize the very significant advances in technology achieved since the earlier history articles. In the space of 50 years, we have experienced the power of Moore's law in operation. The advances have not only given us commoditized technology that simplifies our work and helps us to communicate globally. The advent of computers and digital communication has created a global information revolution. This is changing society on a scale comparable with the invention of Gutenberg's printing press around

1439 which gave rise to the industrial revolution. I cannot imagine what technology advance and society change will occur in the next 50 years, but it will make interesting reading as we have history in the making.

References

- [1] Early Recollections of the Power Industry in BC, A. T. Goward, Electrical News and Engineering, June 1941.
- [2] A Narrative History of the Vancouver Section, Lorne R. Kersey, Power Engineering Review, PER-4, Issue 11, pp 6-9, 1984.
- [3] Historical collection of the BC Hydro Power Pioneers available at <http://www.powerpioneers.com> and published in "Gaslights to Gigawatts" and "Voices from Two Rivers", available from BC Hydro Power Pioneers.
- [4] List of Milestones recorded at the IEEE Global History Network
http://www.ieeeahn.org/wiki/index.php/Milestones_List_of_IEEE_Milestones
- [5] BC Tech Map, published by PricewaterhouseCoopers International Limited, See
<http://www.pwc.com/ca/en/technology-industry/bc-techmap.jhtml>
- [6] Audio recordings of BC technology pioneers, some of which are available at
<http://inceptionsoft.com/wiki/index.php/Podcasts>.
- [7] Personal account of MDI history recorded by Derek Spratt at
<http://www.derekspratt.com/html/business/other/motorola%20overview.html>
- [8] The history pages of the Vancouver Section on the IEEE Global History Network at
http://www.ieeeahn.org/wiki/index.php/IEEE_Vancouver_Section_History

Appendix 1 – Award Recipients

McNaughton Medal Winners

- Vijay Bhargava in 1995

- Harry M. Ellis in 1990
- Gordon F. MacFarlane in 1982
- Hector J. McLeod in 1973
- Thomas Ingledow in 1971

Service Awards

- Meliha Selak - 2010 Western Canada Merit Award
- Dave Michelson - 2009 Western Canada Merit Award
- Vijay Bhargava -1999 IEEE Haraden Pratt Meritorious Service Award
- Brian Lee - 1997 Western Canada Merit Award

Achievement Awards

- Vijay Bhargava - 2010 Outstanding Engineering Educator Award
- Clarence W. De Silva – 2000 Outstanding Engineering Educator Award
- KD Srivastava -1998 Outstanding Engineering Educator Award
- William Gruver – 2011 Computer Medal
- Vijay Bhargava - 2007 Fessenden (Telecommunications) Medal
- Herman W. Dommel - 2007 Power Medal
- Vijay Bhargava - 2002 IEEE Graduate Teaching Award
- Frank Plumtre - 2010 Vancouver PES Outstanding Engineer Award
- Wenyan Li - 2009 IEEE Canada Outstanding Engineer Award
- Briant Avent - 2008 Vancouver PES Outstanding Engineer Award
- Abdul M. Mousa - 2007 Vancouver PES Outstanding Engineer Award
- Charlie Henville - 2003 IEEE Canada Outstanding Engineer Award
- Hermann Dommel – 1989 IEEE Outstanding Educator Award

Vancouver Section Centennial Awards – 2011

- Rabab Ward
- Arkady (Ark) Tsisserev
- James McFarlane
- José Martí
- John MacDonald
- Victor Leung
- Harry Ellis (in memoriam)
- Hermann Dommel

- Thurb Cushing (in memoriam)

EIC Awards

- Andre Ivanov - 2011 EIC Fellow
- Jin Jiang – 2011 EIC Fellow
- Wenyan Li - 2010 EIC Fellow
- Victor C M Leung - 2009 EIC Fellow
- Ljiljana Trajkovic - 2007 Canadian Pacific Railway Engineering Medal
- Michael S. Davies - 2006 EIC Fellow
- Robert W. Donaldson - 2004 EIC Fellow

- Jan Conradi 2003
- Victor C Leung 2003
- James K Cavers 2002
- Wenyan Li 2002
- Andrew Ng 2002
- Brian H Marcus 2000
- Ebrahim Vaahedi 2000
- Rabab K Ward 1999
- Abdul M Mousa 1995
- John S Macdonald 1992
- Maria A Stuchly 1991

IEEE Canadian Foundation Scholarships

- Nina Selak, University of British Columbia - 2006
- P. Sin, University of British Columbia – 2001
- P. Leung, University of British Columbia - 2000
- V. Wong, University of British Columbia – 1999
- T. Le, University of British Columbia - 1992
- D. Wong, University of British Columbia - 1991
- T. Chia, University of British Columbia – 1990
- Verona Wong, IEEE Canada Women In Engineering Prize – 2007
- Yang Wen Liang, IEEE Canada Vehicular Technologies Award – 2006
- Emily Landry, UBC Okanagan – 2011

Past Fellows

- F.J. Bartholomew (AIEE)
- Thomas Ingledow (AIEE)
- Hector J. MacLeod (AIEE)
- John H. Steede (AIEE)
- Frank Noakes (AIEE)
- B.R. Tupper (IRE)
- Frank O. Wollaston (AIEE)
- Henry W. Smith (AIEE)
- Cyrus H. McLean (IRE)
- Keith H. Kidd (IEEE 1966)
- Harry M. Ellis (IEEE 1970)
- Yao-Nan Yu (IEEE 1978)

Fellows

- Ian G Cumming 2009
- Andre Ivanov 2006
- Resve A Saleh 2006
- Vikram Krishnamurthy 2005
- Charles F Henville 2004
- Jose R Marti 2002
- David L Pulfrey 2000
- Guy A Dumont 1999
- Clarence W. De Silva 1998
- William A Gruver 1996
- Vijay K Bhargava 1992
- Ian F Blake 1991
- W Kenneth Dawson 1991
- E V Jull 1989
- K D Srivastava 1985
- Hermann W Dommel 1979
- Lei Wang 2011
- Robert Schober 2010
- Rodney Vaughan 2007
- W Kenneth Dawson 2006
- Tim E Salcudean 2005
- Ljiljana Trajkovic 2005