

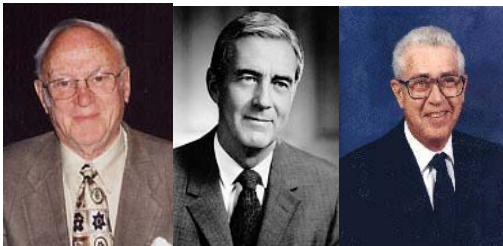
## History

**Title:** IEEE Honours Development of Pacemaker in Toronto

**Authors:** Patrick Finnigan SMIEEE, and Pelle Westlind LSMIEEE, Co-Chairs, IEEE Toronto Life Members

**Abstract:** The Institute of Electrical and Electronics Engineers (IEEE) History Center recently recognized with a Milestone in Electrical Engineering and Computing **The First External Cardiac Pacemaker 1950** “an external electronic pacemaker-defibrillator with electrodes inside the patient, developed by the National Research Council, for the successful continuous pacemaking of a heart. This achievement led to pacemakers which have enhanced the lives of thousands and also helped to firmly establish the importance of electronic devices in medicine.”

In 1949 Dr. John A. Hopps conducted experiments with medical colleagues Dr. W.G. Bigelow and Dr. J.C. Callaghan at the Banting and Best Institute in Toronto.



**Figure 1 Drs. Callaghan, Bigelow & Hopps**

While experimenting with radio frequency heating to restore body temperature, these doctors made an unexpected discovery: if a heart stopped beating due to cooling, it could be started again by artificial stimulation using mechanical or electric means. Their discovery of a method to restart a heart that had stopped beating led Hopps to develop the first pacemaker at the National Research Council of Canada in 1950.



**Figure 2 - First External Pacemaker (NRC)**

This work led to subsequent inventions of external and implantable pacemakers which are used worldwide by more than 2 million patients (1950-2005) extending their lives and greatly improving their quality of life.

It is interesting to realize that this work emerged during a time of historical ambiguity and concern.

.Edward Kendall wins Nobel Prize in Medicine for discovery of Cortisone
Senator Joseph McCarthy stirs up the “Red Scare” in the U.S.A.
Cold war at its peak – President Truman orders the construction of the Hydrogen bomb. Soviet Union detonates first atomic bomb.
Walt Disney releases Cinderella
IEEE awards its Medal of Honour to Frederick Terman – a “father” of Silicon Valley
First non-stop trans-Canada flight
The Winnipeg flood
First Canadian troops arrive in Korea
<b>First external Cardiac Pacemaker</b>

**Figure 3 – The context: Significant Events from 1950**

At the age of 21 Dr. Jack Hopps joined the National Research Council in 1941 after training at the University of Manitoba as an electrical engineer. The device that Hopps invented produced an electrical impulse to stop ventricular fibrillation. At this point in history, transvenous catheter electrodes were used. Surprisingly enough, they are still used today for implantable pacemakers. In early 1950, the catheter

electrodes relied on vacuum tubes. About a decade later, transistors were used to help decrease the size of the pacemakers

### The IEEE Milestone Plaque

The IEEE milestone proposal and research was carried out by a diverse team of IEEE members: Ron Potts, Bert deKat, and Inci McGreal, with additional support from members of the IEEE Toronto Section (especially Life Members and the Section Executive), and the IEEE History Center. The feedback from referees of the IEEE History Center, including Jerome Suran, former President of IEEE, and a world-leading expert on Pacemakers, significantly enhanced the technical proposal for this milestone



Figure 4 IEEE Pacemaker Milestone Plaque goes here

The plaque for the new IEEE Milestone in Toronto will be mounted eventually at the Best Institute, located beside the TTC Queen's Park Subway stop at the busy corner of College & University Ave., and where the invention occurred in Room 64 of the C.H. Best Institute.

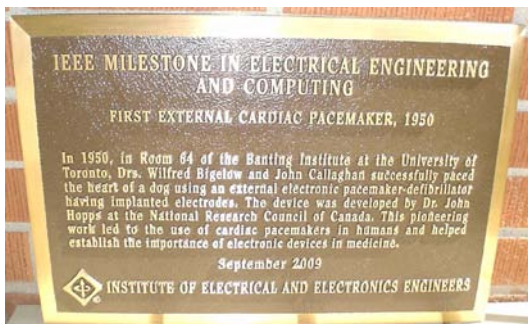


Figure 5 "First External Cardiac Pacemaker, 1950"

It is interesting to note that there is another IEEE Milestone [First Wearable Cardiac Pacemaker, 1957-1958](#) in Minneapolis, MN, USA. Dedicated October 1999 - IEEE Twin Cities Section.

### IEEE Toronto Section "Year of the Pacemaker" 2009 Events

Since electronics is now so integral to medicine, especially in the Toronto area, the IEEE Toronto Section Engineering in Medicine and Biology chapter is very vibrant and active. They have recently sponsored an event as part of our section's "Year of the Pacemaker", to help celebrate the IEEE Milestone. **On May 27, Professor Shelley McKellar**, of the University of Western Ontario, presented at a very well attended wine-and-cheese reception at the Toronto Marriott Hotel, a fascinating and well-illustrated talk on **"Repairing the Diseased Heart"**.

Also, **Sep 27-29, 2009** — [Toronto International Conference – Science and Technology for Humanity – TIC-STH 2009](#) will be held in Toronto, Ontario. During this conference, the official installation of the Milestone Plaque will take place, during the "Symposium on the History and Advances in the Pacemaker".

### About the Authors

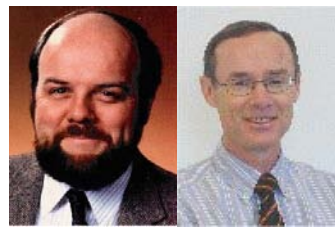


Figure 6 Patrick Finnigan & Pelle Westlind

**Patrick Finnigan** is an Information Technology Architect specializing in Customer Relationship Management strategy and implementation. He has 30 years of broad experience in large-scale software application development and especially deployment of a number of significant business applications including outbound customer campaign management and government applications aimed at full citizen access to government services. He holds a M.Math degree from the University of Waterloo, and is a member of PEO. He is a Senior member of the IEEE, and is co-chair of the IEEE Toronto Section Life members. He has been an IEEE member for 27 years.

**Pelle Westlind** obtained his degree in Electrical Engineering from the Higher Technical College of Vasteras, Sweden in 1963 and started his working career with the Ericsson Telephone Company in Stockholm, Sweden. He Left for Canada in 1967 and a new job in a HVDC Project in Vancouver, BC. Pelle spent some 32 years in the electrical power industry in Canada. Since 1999 Pelle has been accepting freelance work in project management within telecommunication and the electrical power industry. Pelle has been active in IEEE since he joined 33 years ago starting with the Power Engineering Society in Vancouver and most recently with the Toronto Section where he has served since 1999. Pelle is a Life Senior Member of the IEEE, and is co-chair of the IEEE Toronto Section Life members. As well, Pelle serves as treasurer of the Toronto Section as well as doing work on organizing committees or where ever work is needed.