**Application for CCECE 2019 Special Session**

1. Title: “ Radiation Effects in Microelectronics”

1. Rationale of the Session

Scaling in the sub-65 nanometer regime has brought a number of reliability issues that have previously been less of a concern. In particular, small device dimension and low operating voltages have caused nanoscale ICs to become highly sensitive to operational disturbances, such as signal coupling, supply and substrate noise, and single event effects (SEEs) that were caused by ionizing particles like cosmic neutrons and alpha particles. SEEs found in ICs can introduce transient pulses in circuit nodes or data upsets in storage cells. In well-designed ICs, SEEs appear to be the most troublesome in a space environment or in terrestrial and high altitude. For example, SEEs have been reported to be found in microprocessors, memories, network switches, routers, configuration bits in field programmable gate arrays (FPGA), and even in implantable medical devices (e.g. cardiac defibrillators) in terrestrial electronic systems.

Significant efforts have therefore been made during the recent years in order to develop solutions and tools to address these issues. However, in order to understand radiation effects in microelectronics, one needs to have broad knowledge about topics ranging from nuclear science, engineering physics (charge generation, transport and collection), microelectronic circuit design and fabrication (voltage perturbations with a circuit, response to SEEs), and system-level integration (ICs on a system-level board). The need for expertise in this area is increasing to address the problem. The proposed session is aimed to promote this multidisciplinary research. The scope of the topics will be from radiation effects in microelectronics, and radiation-tolerant designs, and radiation testing results.

The session will be co-chaired by Dr Chen (UofSaskatchewan), and Dave Hiemstra (MDA). The contributors are from industry and academic. Dave Himstra will contribute one paper about radiation effects study in programmable devices for space applications. Dr. Chen will have two papers about the radiation effects in voltage regulators and SRAM. Eric Gloutnay with Canadian Space Agency will submit a paper about radiation testing for space mission. We are inviting Claude Thibeault, Manoj Sachdev and others researchers and engineers to submit papers for this special session, and expect to have 6 or more papers for this session.

1. Contact Information of the Organizers
2. Li Chen, Professor

Department of Electrical and Computer Engineering,

University of Saskatchewan, Saskatoon

Li Chen: received the B.S degree from Tianjin University, Tianjin, China in 1991, and M.Eng and Ph.D. degree from University of Alberta, Edmonton, Canada in 2000 and 2004, respectively. Dr. Chen has been the faculty member of the Department of Electrical and Computer Engineering, University of Saskatchewan since 2006, where he is endowed with the Barbhold Chair Professor in Information Technology. He was promoted to Associate Professor and Professor in 2011 and 2016 respectively. His research interests are in radiation- and fault-tolerant microelectronics, ultra low-power microelectronics, analog and mixed-signal integrated circuits. He has more than 100 publications in referred journals and conferences proceedings.

1. Dave Hiemstra

Senior Staff Engineer

Macdonald, Dettwiler and Associates (MDA) Co., Brampton, ON, Canada

David M. Hiemstra received his B. Eng. & Mgt. (1984) and M. Eng. (1993) degrees in Electrical and Biomedical Engineering, respectively from McMaster University. He is a Senior Member of the IEEE. David joined MacDonald, Dettwiler & Associates (MDA), formally Spar Aerospace, in 1984, where he is a Senior Staff Engineer, and technical lead. He is involved in radiation effects and embedded avionics hardening for space, nuclear, and military applications, systems engineering, advanced infrared and visible focal plane array technology, analog circuit design, and electromagnetic compatibility. His current area of research is Single Event Effects in commercial off-the-shelf, system on a chip, microelectronics.

1. Organization of the Invited Session

An opening review will be provided at the beginning of the session by the organizers. Then the proposed papers will be presented. IDEALLY the session is to be scheduled on Monday morning (the first day) of the conference, due to scheduling constraints. Thanks for the consideration.