

Title:

Wireless System-on-Chip and System on Package Design for Radiotherapy and Space Applications

Abstract:

This presentation is focused on the development of a novel miniaturized wireless dosimeter for cancer patient radiotherapy. During radiotherapy treatment, cancerous region of the body are exposed to high energy radiation. The knowledge of the exact amount of radiation penetrating the body is essential for a successful treatment. Too little radiation will be ineffective and too much can seriously harm the patient. The device used to measure the radiation dose is called a dosimeter. Present dosimeters have numerous limitations. Most are either limited in sensitivity or are susceptible to temperature and environmental variations, thus leading to inaccurate measurements. The existing dosimeters are wired, large in size, non-wearable and require high operating voltages. The wires deflect and scatter the radiation away from the targeted region during the irradiation process. To alleviate the abovementioned problems, a miniaturized wireless dosimeter System on Chip (SoC) solution is proposed. For higher communication range the work has been extended to a System on Package (SoP) solution with efficient package antenna. The results of this research demonstrate the feasibility of low power wireless radiation sensors. This work is very suitable for radiation exposure monitoring of astronauts and other objects in space and provide a basis for the development of other wireless biomedical devices.

About the Presenter (Biography):

Dr. Muhammad Arsalan is a postdoc research associate at Wise-Net Lab, University of Maine. He recently completed his Ph.D. from Department of Electronics, Carleton University, Ottawa, Canada. His research interests includes bio-sensors, Micro Electro-Mechanical Systems (MEMS), low power CMOS, Radio Frequency Integrated Circuits (RFICs), and mixed signal IC design for biomedical and wireless applications. His research for the development of a first-of-its-kind wireless dosimeter won the **national award** at Canadian Microelectronics Corporation TEXPO 2007. He has designed state of the art wireless radiation sensors which are highly sensitive, very low power, immune to the environmental and process variations, and for the first time have integrated signal processing electronics. The technology developed for the wireless sensor platform to increase battery life won the European Microwave Week 2008 **Best Paper Award** and has sparked interest of media and companies from around the world. Arsalan was the session chair of IEEE INMIC 2004 conference. He was an invited researcher at Tokyo Institute of Technology, Japan in 2004. He has authored over 12 international publications and holds two international patents. Dr. Arsalan has won the Ottawa Centre of Research and Innovation (OCRI) 2008 **Researcher of the Year** award. His entrepreneurial and interpersonal skills are evident from the series of awards and championships he won, the latest in the series being the Enterprize Canada 2009 National Business Plan Competition. To recognize all these accomplishments, Dr. Arsalan has been honoured in the **Great Grads** list of the distinguished Carleton University Alumni. Only 22 scientists have made to the list since 1942.