

Electrical and Computer Engineering Department & School of Biomedical Engineering
McMaster University, Hamilton, Ontario CANADA. E-mail: jamal@mcmaster.ca

One of the grand challenges in engineering is in the healthcare field. In this challenge, the situation is compounded by the fact that over the past century, we have seen a continual increase in life expectancy primarily due to improvements in public health, nutrition, medicine and personal hygiene. However, this phenomenal success is now coupled with aging population demographics and falling birth rates. In fact, never before in human history have we been confronted with such a large aging population, nor have we developed solid, cost-effective solutions for the healthcare, social needs and well-being of the elderly. Here, we describe our work in which we use advances in information technology, wireless communication, web-based technologies and autonomies, to develop new, smart and cost-effective solutions for the health wellness of the elderly. Such solutions would enable elderly to lead independent lifestyles in their own homes while being non-invasively, non-intrusively and seamlessly monitored for the early detection of symptoms, so diseases can be treated earlier than in later stages as is currently done; to promote health wellness; as well as to treat chronic illnesses. Through a few examples that include walking, sleeping and vital signs sensing, we will describe our ongoing work as well as the challenges we have uncovered. In particular, we will focus on the critical role of information technology (IT) in developing innovative, low-cost and high impacting solutions to the pending elderly demographic crisis in a smart home. Finally, we will describe the role of the practical solutions being developed for this grand engineering challenge and their impact in the elderly ubiquitous healthcare.



is currently Distinguished University Professor and Senior Canada Research Chair in Information Technology, McMaster University. His current research interests are nanoelectronics, optoelectronics, nanotechnology and their emerging applications to health and environmental sciences. Dr. Deen's research record includes more than 540 peer-reviewed articles (about 20% are invited), two textbooks on "*Silicon Photonics- Fundamentals and Devices*" and "*Fiber Optic Communications: Fundamentals and Applications*", 6 awarded patents that have been used in industry, and 17 best paper/poster/presentation awards. Over his career, he has won more than fifty awards and honors.

As an undergraduate student at the University of Guyana, Dr. Deen was the top ranked mathematics and physics student and the second ranked student at the university, winning the Chancellor's gold medal and the Irving Adler prize. As a graduate student, he was a Fulbright-Laspau Scholar and an American Vacuum Society Scholar. He is a Distinguished Lecturer of the IEEE Electron Device Society for more than a decade. His awards and honors include the Callinan Award as well as the Electronics and Photonics Award from the Electrochemical Society; the Distinguished Researcher Award from the Province of Ontario; a Humboldt Research Award from the Alexander von Humboldt Foundation; the Eadie Medal from the Royal Society of Canada; McNaughton Gold Medal (), the Fessenden Medal and the Ham Education Medal, all from IEEE Canada. In addition, he was awarded the three honorary doctorate degrees in recognition of his exceptional research and scholarly accomplishments, professionalism and service. Dr. Deen has also been elected Fellow status in ten national academies and professional societies including The Royal Society of Canada - The Academies of Arts, Humanities and Sciences (), IEEE, APS (American Physical Society) and ECS (Electrochemical Society). Most recently, he was elected President of the Academy of Science, The Royal Society of Canada.