Recent Advances in Chipless RFID Sensors

Abstract:

Radio frequency (RF) and wireless sensor technologies have been impacting the new millennium with the greatest force than ever before. The motto is to wirelessly collect and process data at every point of transactions of our everyday life for the betterment of national economy, health and wellbeing of mass population. Wi-fi, near field communications (NFC), 5th generation (5G) wireless communications, radio frequency identification (RFID), wireless energy harvesting, smart cities, internet of everything (IoE) and industrial internet of things (IoT) are the buzz words of recent time. These technologies should be low cost and low power for mass deployment and long life. University research can affordably develop these technologies in collaboration with industry sectors.

The seminar talk will focus on the recent advancements of fully printable chipless RFID and RF sensors for low cost item level and ubiquitous tagging and sensing to fulfill the mottos of IoE, wireless energy harvesting, RF sensors, wireless sleep monitoring and healthcare of old age people, etc. For the last fifteen years Monash Microwave, Antenna, RFID and Sensor Laboratory (MMARS) at Monash University, Melbourne, Australia, has been developing these technologies in collaborations with half a dozen Australian local and multinational industry partners. So far eleven patent applications are lodged only in the field of chipless RFID and RF sensors for Australian polymer banknotes, library access cards and books, and pathology samples. However, there are challenges in university and industry collaboration as the philosophies of university and industry are disjoint. While university focuses on pedagogy, gathering and sharing of new knowledge and recognition, industry focuses on return of investment. Innovations through collaborative industrial research projects can reduce the gap. The seminar will also throw light on the new RF and sensor technologies to be encouraged in the direction of international research collaborations.
Prof. Nemai Chandra Karmakar graduated with BSc (EEE) and MSc (EEE) from Bangladesh University of Engineering and Technology in 1987 and 1989, respectively, MSc in EEE from the University of Saskatchewan, Canada in 1992, PhD in EEE from the University of Queensland in 1999, PGDipTHE from Nanyang Technological University in 2001 and MHEd from Griffith University in 2007. He worked as a microwave design engineer at Mitec Ltd., Brisbane from 1992-1995 and contributed significantly to the development of Optus Mobilesat smart antennas. He taught senior level courses in electronics, radar, microwave active and passive design and antennas at QUT, NTU, and Monash University. He has been working with many industry partners on various collaborative research projects on fully printable chipless RFID sensors for ubiquitous tagging and sensing, wireless power transmission, microwave biomedical imaging and devices, smart antennas for mobile satellite communications and diagnostics of faulty power equipment. He has eleven patent applications in chipless RFID and sensors, edited and authored twelve books and about four hundred book chapters, refereed journal, and conference publications. He has more than twenty successful PhD supervision. Since 2012-2019, Prof. Karmakar executed numerous contract research projects of worth $270,000. He is the Director, Monash Microwave, Antenna, RFID and Sensor Laboratory (MMARS), Director, ECSE Industry Engagement, Department of Electrical and Computer Systems Engineering, Monash University, Clayton, Australia.