Prof. Robin Augustine | Key Speaker @ RTEOp 2023 https://www.rteop2023.com/robin-augustine

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Recent Trends in Electromagnetics and Optics

Organized by the Electronics and Telecommunication Engineering Department | IIEST, Shibpur

RTEOp

Prof. Robin Augustine

Uppsala University, Sweden

Topic of Lecture:

FAT-INTRA BODY COMMUNICATION: A NEW PARADIGM FOR INTRA-BODY COMMUNICATION TECHNOLOGY ENABLING REINSTATEMENT OF LOST FUNCTIONALITIES IN HUMAN

Abstract of Lecture:

Intra Body Communication has been researched Quite Extensively for Past Couple of Decades to serve the Needs in Real-time Monitoring, Drug Delivery, Sensing for Pre-emptive Measures and to provide Better Quality of Living to the Population. The Applications are not just limited to Healthcare, but also span the Areas of Recreation, Sports & Information Technology. A Handful of Intra Body, more specifically Human Body Centric (HBC) Communication Modalities have been developed so far namely Galvanic, Capacitive & Inductive Methods. Human Body or Part is used as a Communication Channel in these Technologies. Though they offer the Possibility to connect Devices & transfer Data Wirelessly from One Part of the Body to the other, they suffer from One Common Drawback which is the Low Bandwidth; hence Lower Data Rates. Radio Frequency Communication has been regarded until recently as an Improbable Candidate for Extensive HBC Applications.

In 2016, the Asan et. al from the Microwaves in Medical Engineering Group, Uppsala University, Sweden published her First Paper on the Feasibility using the Adipose Tissue to transmit Microwave Signals inside the Body with Significantly Low Loss (2dB/cm). Since then a Number of Articles have been published on different Aspects of Fat-intra-body Communication (Fat-IBC). Considering the Human Anatomy the Fat Tissue is found to be sandwiched between Denser Tissues such as Skin & Muscle. As it is known that the Fat due to its very Low Water Content has Low Permittivity & Losses while Muscle & Skin do have almost an Order of Magnitude High Permittivity & Losses, which is Three to Four Times that of Fat. This creates a Natural Wave Guiding Structure which we can utilize to transmit Microwave Signals at ISM Frequencies. Fat-IBC pushes further the Current Limits in Intra-body Data Transfer by providing a Higher Bandwidth & enabling better Power Management to ensure Longer Implanted Battery Life. Fat Channel Communication will also help Substantially the Development of Artificial Limbs which require Transfer of High Volume Electrophysiological Data, Wirelessly.

A Bit About Prof. Augustine

Prof. Robin Augustine graduated in Electronics Science from Mahatma Gandhi University, India in 2003. He received Master's Degree in Electronics with Robotics Specialization from Cochin University of Science and Technology India in 2005. Received Doctoral Degree in Electronics and Optic Systems from Univerisité Paris Est Marne La Vallée, France in July 2009. His Thesis Topic was "Electromagnetic Modeling of Human Tissues and its Application on the Interaction between Antenna and Human Body in the BAN context". He was the Recipient of UGCRFSMS Fellowship from Indian Government and EGIDE Eiffel Grant for Excellence from French Research Ministry in 2006 and 2008 Respectively. He served as Post Doctoral Researcher at University of Rennes, 1, Brittany, France from 2009-2011. He joined Uppsala University as Senior Researcher in 2011. He is Author or Co-author of more than 180 Publications including Journals & Conferences and has 3 Patents. He is the Editorial Board Member of IET Electronics Letters and Frontiers in Communication. He became Associate Professor at Uppsala University on 2016. He is now Senior University Lecturer in Medical Engineering and Docent in Microwave Technology. He is the Head of The Microwaves in Medical Engineering Group comprising of 6 Senior Researchers, 4 Ph.D. Students & 2 Research Engineers. 2 Ph.D. Students graduated in 2019 under his Supervision. His Current Research Field includes Designing of Wearable Antennas, BMD Sensors, Microwave Phantoms, Dielectric Characterization, Bionics, Mechatronics, Non-invasive Diagnostics, Point of Care Sensors for Physiological Monitoring, Clinical Trials, Animal Trials, in and on Body Microwave Communication. He has pioneered the Fat–Intra Body Communication Technique. He is a Regular Sessions Chair and convened Session Organizer in EuCAP. He has received Carl Trygger & Olle Engqvist Fundings for his Post-Docs. He has been invited at the Swedish Royal Academy of Sciences (Host of Nobel committee) to present his Work on Non-invasive Physiological Sensing. He is Project Coordinator for Indo-Swedish Vinnova Project BDAS and for Swedish Part of the Bilateral (The Netherlands and Sweden) Horizon 2020 Eurostars Project COMFORT. In February 2016, he became Associate Professor (Associate Professor) at UU. Recipient of Swedish Research Agency, Vetenskapsrådet's (VR) Project Grant 2017 for his Project on A Novel Modality for Osteodiagnosis. He was Part of Vinnova Project on Skin Cancer Diagnostic Tool based on Micromachined Interface for High-resolution THz Spectroscopy (MTSSC). He is Co-PI of the EU Project SINTEC , SSF Framework Grant LifeSec and Vinnova Grant & connect My Body, 2018. He is the Research Lead on the Eurostars Porject SenseBurn 2018. He is appointed as the Board Member of Department of Electrical Engineering from January 2020. He is the Project Leader for Eurostars Project MAS 2020 and Co-PI for the SSF Framework Grant Zero-IoT 2020. He is parterning in the SSF 2022 Grant Body Centric Operating System - BOS. He is the Recipient of Two Attractive Innovation Project 2020 Awards from Uppsala University Innovation. He is the Founder, Chairman and CTO of the Swedish Medtech Company Probingon AB. He is currently coordinating EU HORIZON 2020 FET-OPEN Science Excellence Project B-CRATOS, a Visionary Project in Man Machine Interface.

Attend the Lecture

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