Improving Healthcare through Power Electronics: Opportunities in Powering Medical Devices

Abstract: Smart and connected medical implants are the next frontier in the Internet of Things (IoT) and are set to revolutionize healthcare. Advancing our ability to interface technology with biological environments will enable patients to be monitored and receive treatment at home, and in the long term, have chronically implanted electronic devices seamlessly integrate with their everyday lives. The power source and the design of the power electronics in medical devices have significant impact in their form factor, function, usability and safety. This talk explores various powering modalities of medical devices, including emerging techniques for remote powering of millimeter- and micron-scale implantable devices utilizing electromagnetic power or ultrasound. Such devices will enable continuous monitoring of nervous system functions and will deliver bioelectronic medicine to treat neurological diseases, inflammatory diseases, respiratory diseases and more. Power designers have the opportunity to play a significant role in enabling these new devices by expanding their functionality, efficiency, safety and longevity.