Michel Maharbiz

Title: "Recent Advances in Neural Dust, a platform for peripheral and central nervous system recording"

Abstract:
The emerging field of bioelectronic medicine seeks methods for deciphering and modulating electrophysiological activity in the body to attain therapeutic effects at target organs. Current approaches to interfacing with peripheral nerves and muscles rely heavily on wires, creating problems for chronic use, while emerging wireless approaches lack the size scalability necessary to interrogate small-diameter nerves. Furthermore, conventional electrode-based technologies lack the capability to record from nerves with high spatial resolution or to record independently from many discrete sites within a nerve bundle. Recently, we demonstrated *neural dust*, a wireless and scalable ultrasonic backscatter system for powering and communicating with implanted bioelectronics. We show that ultrasound is effective at delivering power to mm-scale devices in tissue; likewise, passive, battery-less communication using backscatter enables high-fidelity transmission of electromyogram (EMG) and electroneurogram (ENG) signals from anesthetized rats. These results highlight the potential for an ultrasound-based neural interface system for advancing future bioelectronics-based therapies.

Bio:
Michel M. Maharbiz is a Full Professor with the Department of Electrical Engineering and Computer Science at the University of California, Berkeley. Prof. Maharbiz is a Bakar Fellow and was the recipient of a 2009 NSF Career Award for research into developing microfabricated interfaces for synthetic biology. He is known as one of the co-inventors of "neural dust", an ultrasonic interface to the nervous system. His group is also known for developing the world’s first remotely radio-controlled cyborg beetles. This was named one of the top ten emerging technologies of 2009 by MIT’s Technology Review (TR10) and was in Time Magazine’s Top 50 Inventions of 2009. Dr. Maharbiz has been a GE Scholar and an Intel IMAP Fellow. Professor Maharbiz’s current research interests include building micro/nano interfaces to cells and organisms and exploring bio-derived fabrication methods.