Microbial Life for Robotics towards artificial life

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Abstract

This talk will present results from the practical implementation of MFCs in a range of applications. The presentation will show the chronological evolution of the technology, starting from the earlier implementation in robotics to the more recent development in sanitation and as a robotic chemostat for maintaining steady state conditions in microbial communities. The talk will have a focus on EvoBot, a robotic chemostat that has been developed as part of the EU FP-7 EVOBLISS project (611640), which was funded under the Evolving Living Technologies Programme. The work combined scientific approaches from robotics, artificial intelligence, chemistry, and microbiology and the talk will demonstrate how the integration of these otherwise disparate disciplines was used to produce i) a generally useful, expandable and customizable technical platform for the artificial evolution of new materials and applications based on a real-time feedback robotic workstation and ii) a specific improved technology, namely a microbial fuel cell, that incorporates natural as well as artificial macro-, micro-, and nanoscale elements for improved function. EvoBot was used with the scientific objective to investigate the possibility of optimizing artificial chemical life, microbial ecosystems, and nanoparticles and their physiochemical, dynamic environments using robot facilitated, artificial evolution. The main conceptual synergy of EVOBLISS was to embody the principles of living technology at various scales in order to probe a system?s ability to evolve within and between scales. The talk continues with a description of the multiple by-products that can be produced by the core MFC technology and concludes with the case for microbial fuel cells as a platform technology for multiple a range of environments including sanitation, renewable energy generation, production of value-added products via elemental recycling and wastewater treatment.