Special Issue

Molecular Robotics: Synthetic Biology Meets Robotics

Message from the Guest Editor

Molecular machinery has evolved from catenane-based machines that repeat tasks to molecular robots capable of sorting cargo or producing chemicals. The perception-action loop, the ability to sense, analyze, and respond to complex environments, is essential for building autonomous robotic systems. With recent advances in DNA nanotechnology, molecular robots have exploited the sequence-specific structural and functional features of DNA to create actuation, self-assembly, and perception-action behaviors. Apart from base-pairing properties, encoded genetic information in DNA can be used to create autonomous molecular robots. Synthetic biology has developed a variety of genetic circuits inspired by electronic circuits and embedded these in biological systems. Robots at the macroscale and microscale have embraced synthetic biology as their perception-action modules. Similar to this synergy, synthetic biology can provide control circuitry for molecular robots. This Special Issue will highlight recent advances in the field of molecular robots and present perspectives of further development. Molecular robots integrated with synthetic biology tools are of particular interest.

Guest Editor

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