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Biologically Inspired Robots

Biologically Inspired Miniature Robots

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Abstract:

This presentation will focus on current biologically inspired miniature robot research activities at the NanoRobotics Laboratory. At first, miniature surface climbing robots inspired by geckos are presented. Geckos have unique dry adhesive fibers in their feet to climb any surface with a very high maneuverability. Discovering the principles of gecko adhesion recently, synthetic polymer micro/nanofibers are analyzed and fabricated using micro/nanomolding and optical lithography techniques. Using these synthetic adhesives, tank, whegged, and legged type climbing robot prototypes are designed, built, and tested. Next robot is the Water Walker which is inspired by water strider insects. It can stay on water using surface tension effect and can move on water by rowing two side legs. Current analysis, design, test results, and issues are presented. Our team is also building a Water Runner robot which is a large scale bipedal robot running on water surface inspired by basilisk lizards. Finally, miniature robots are very promising for health-care applications inside or outside the human body. Biomedical swimming and wireless endoscopic crawling micro-robots are designed and built for diagnosis and treatment of diseases in the urinary and digestive systems, respectively. All of these miniature robots with many open research challenges could revolutionize health-care, environmental monitoring, desktop manufacturing systems, and space exploration applications in the future.